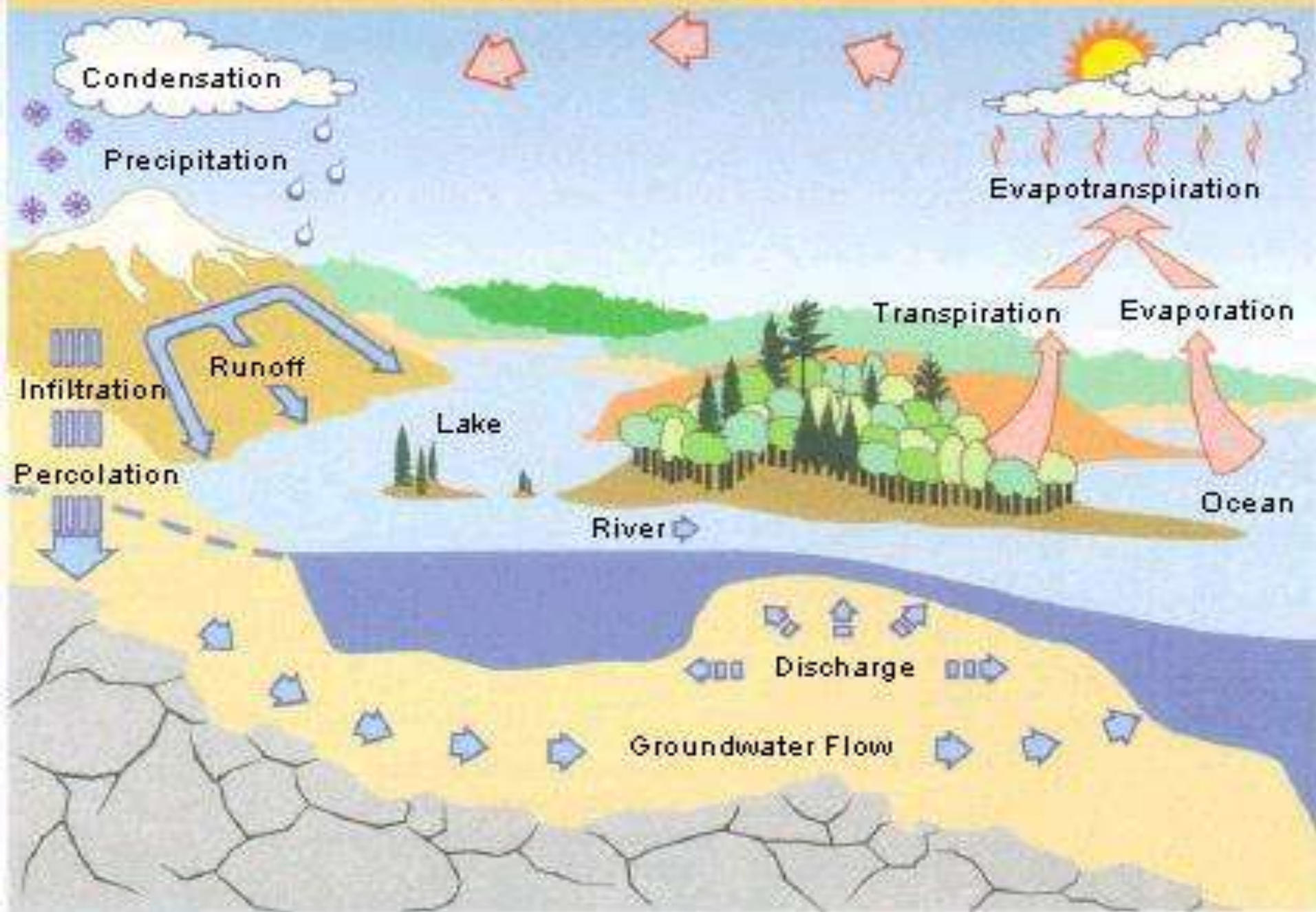
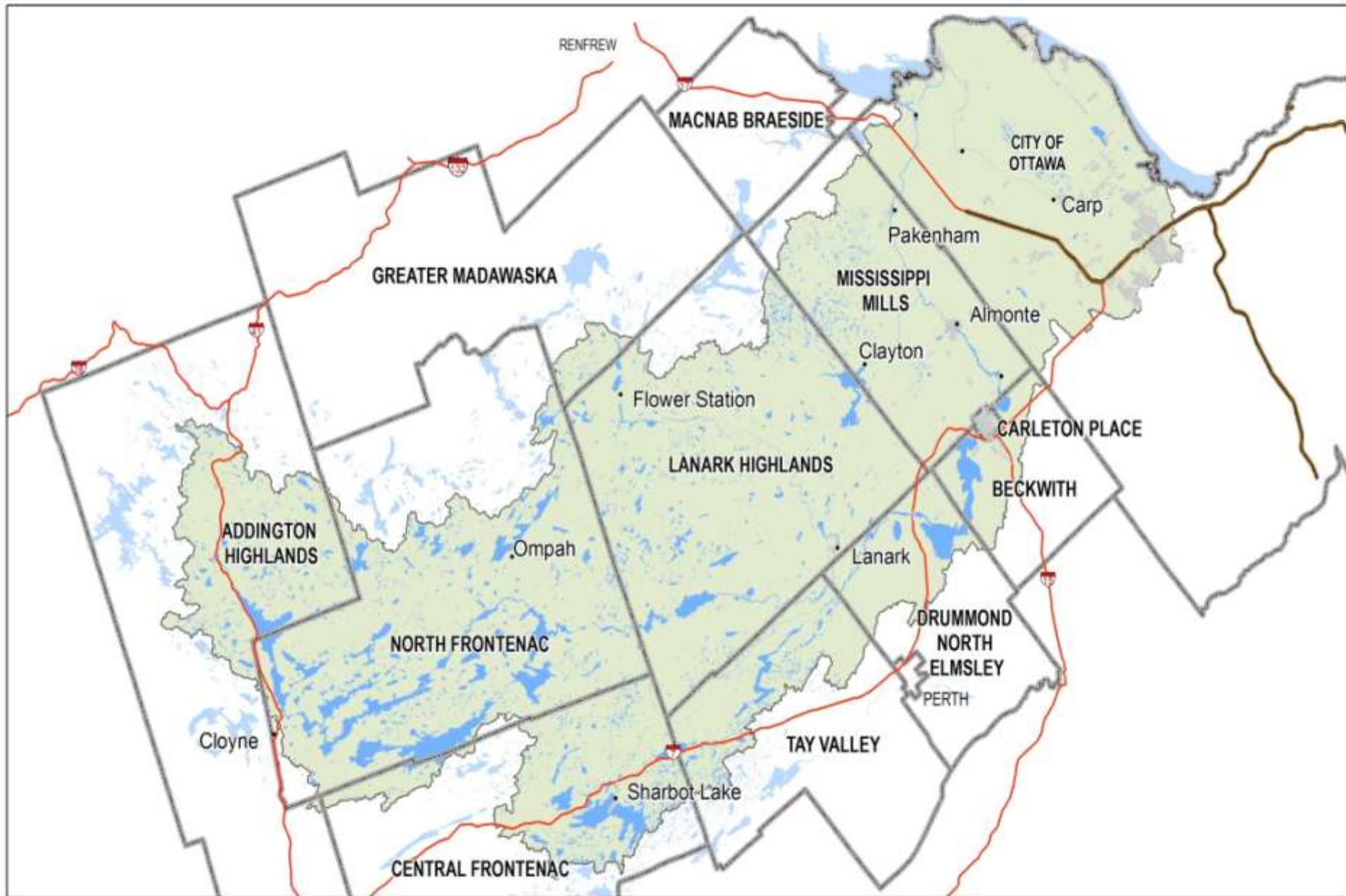


# Implications for Groundwater and Wells from Drought of 2012

Peter Stanton

# THE WATER CYCLE





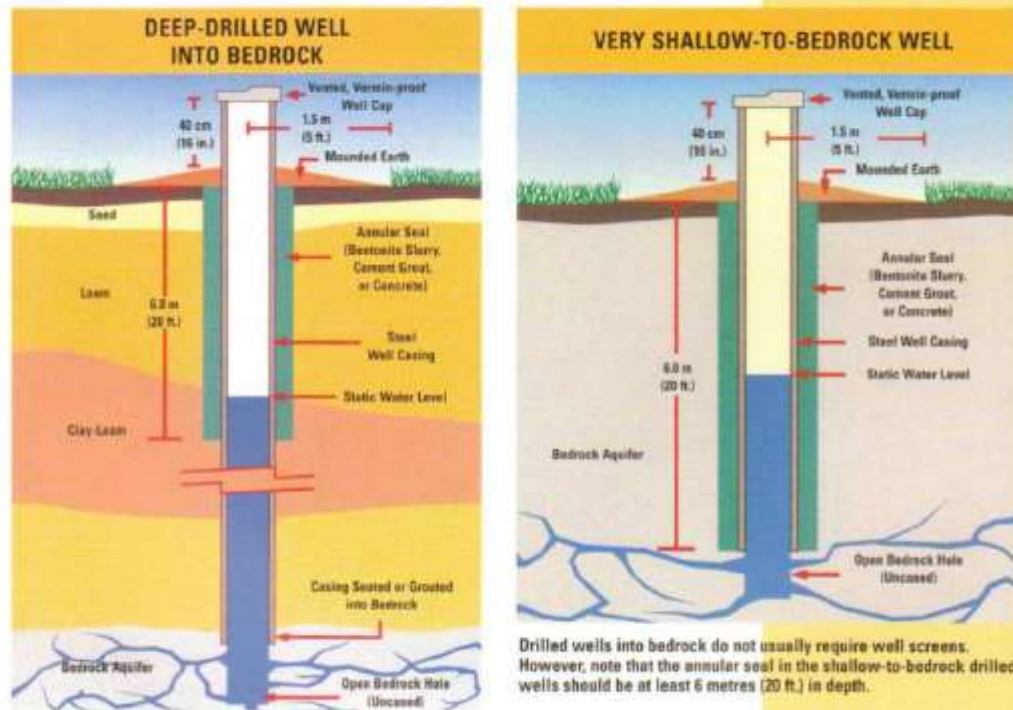


## BEST MANAGEMENT PRACTICES

### WELLS DRILLED IN BEDROCK

Bedrock wells are encased to at least 6 metres (20 ft.) below the ground surface. The casing is driven into solid bedrock or cemented at the bottom to keep sediment and foreign material out of the uncased open hole.

Where the bedrock in the aquifer is sound enough, no well screen is needed. Sometimes a slotted or louvered screen may be used to stabilize the hole where the bedrock is highly fractured or unstable.



As with overburden wells, the bedrock well is developed to remove fine sediment from the fractures in the open hole. This improves the clarity of the water and the efficiency of the well. Following development, the well is disinfected with chlorine. (See page 75.)

## BEST MANAGEMENT PRACTICES

### LARGE-DIAMETER WELLS — CONSTRUCTION, UPGRADING, PLUGGING AND SEALING

#### CONSTRUCTION

Large-diameter wells are usually dug with a backhoe or bored with a well boring rig. Casings for constructing these wells may be:

- ▶ concrete tile, at least 60 centimetres (24 in.) in diameter and 5 centimetres (2 in.) thick, or made of 18-gauge corrugated, galvanized steel, or approved fiberglass
- ▶ made of new material with the concrete tile fully cured (up to 28 days).

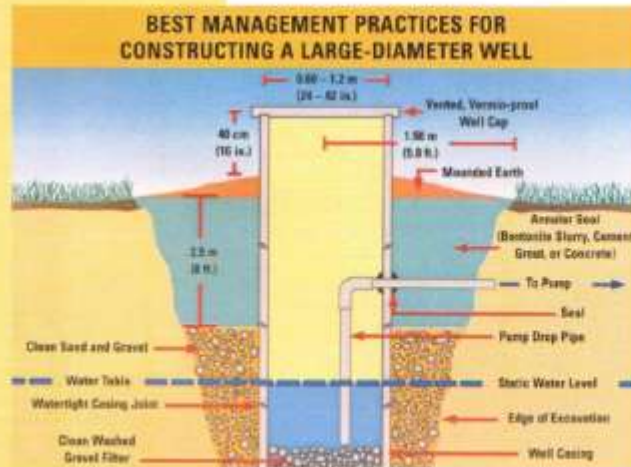
The upcoming diagrams show recommended well construction methods.

#### DUG WELLS

In the past, these wells were often dug by hand. Today, backhoes and power shovels are more common. The wells are shallow, seldom more than 9 metres (30 ft.) deep. They don't penetrate very far into the water table and can dry up if the water table drops during dry weather.

In dug wells, the annular space between the outside of the well casing and the edge of the hole is not always properly sealed because of the large hole dug to install the tiles. Shallow depths and poor seals make these wells susceptible to surface and subsurface

contamination. Rubber rings are now frequently put in the joints between concrete tiles used as casings. It's extremely difficult to grout a large-diameter dug well properly. Make sure you watch the contractor grout between the tiles and annular space. Submit a Water Well Record on completion of a dug well.



- ▶ **Upgrading**  
– see page 55
- ▶ **Plugging and Sealing**  
– see page 60

## BEST MANAGEMENT PRACTICES

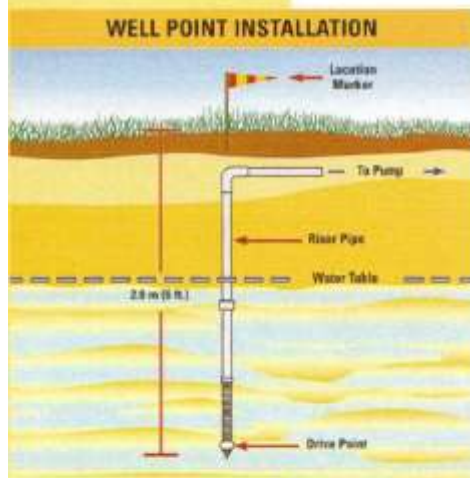
### WELL POINTS AND SPRINGS

#### WELL POINTS

These wells are used in shallow, uniform, sand aquifers and for this reason are often called sand points.

They are used where:

- ▶ the water table is very shallow
- ▶ the aquifer is within about 5 metres (16 ft.) of surface
- ▶ the aquifer is loose sand and gravel, and free of stones.



This illustration shows a typical installation. It is better, and in some cases required, that a riser pipe be extended to the surface.

Water yields from springs are unreliable. They are subject to seasonal fluctuations according to changes in water table depth, which in turn is affected by precipitation patterns.

Since well points are located in materials with high infiltration rates and a shallow depth to the aquifer, they are **high-risk water supplies**.

Well points are usually 2.5 to 5 centimetres (1 to 2 in.) in diameter and made of stainless steel, forged steel, or brass. They may be driven or jetted into the ground. Jetting requires a high-capacity pump and a jetting tool (or a jetting shoe attached to the end of the well point). A stream of water is pumped through the tool into the ground. The erosive action of the water creates a hole for the well point.

Connecting several well points to one pump increases the water yield. The points should be spaced apart to avoid interference between them. The proper spacing depends on the thickness and permeability of the aquifer and on the expected pumping rate.

Removal of well points can be accomplished by pulling (e.g., with a winch) or jetting. However, this leaves a cavity, which, because it tends to collapse easily, is difficult to properly plug and seal. An alternative is to plug the well point with cement slurry or cement slurry with bentonite (5%).

#### IMPROVED SPRINGS

Groundwater springs often occur on hillsides where the ground surface crosses the water table. They are easily accessible as a water supply but must be collected or captured in a sanitary fashion to prevent surface contaminants from entering the water supply.

The groundwater discharging at a spring may have been in the ground for only a short time. Contaminants from human activities uphill from the spring can reach it in a very short time.



Measurements recorded in:  Metric  Imperial

**Well Owner's Information**

First Name: [Redacted] Last Name / Organization: [Redacted] E-mail Address: [Redacted]  Well Constructed by Well Owner

Mailing Address (Street Number/Name): 3311 EGLINTON RD#B Municipality: RICHMOND Precinct: CN Postal Code: [Redacted] Telephone No. (inc. area code): [Redacted]

**Well Location**

Address of Well Location (Street Number/Name): 3311 EGLINTON RD#B Township: NEPTUN (RP) Lot: 2 Commission: 6

Country/District/Municipality: OTTAWA/CARLETON City/Town/Village: RICHMOND Province: Ontario Postal Code: [Redacted]

UTM Coordinates: Zone: 18N Easting: 614365711 Northing: 3761 Municipal Plan and Sublot Number: [Redacted] Other: [Redacted]

**Drift and Bedrock Material/Construction Logging Record (see instructions on the back of all logs)**

General Colour	Most Common Material	Other Materials	General Description	Depth (m)	Depth (ft)
BROWN	SAND	CLAY BOULDERS		0.00	1.83
GRAY	SAND	GRAVEL BOULDERS		1.83	6.30
GRAY	LIMESTONE	SHALE		6.30	15.75
					(18')

**Annular Space**

Depth Set at (m/ft)	Type of Sealed Unit (Material and Type)	Volume Placed (m³/ft³)
1.00 / 3.31	Expandable grout	0.21

**Results of Well Yield Testing**

After test of well yield, water was:  Clear and sand free  Other, specify: [Redacted]

Draw Down (m/ft)	Recovery Time (min)	Water Level (m/ft)
5.60		6.89
6.57	1	13.23
7.21	2	13.23
7.70	3	13.23
8.10	4	13.23
9.75	5	12.03
11.41	10	8.90
12.30	15	7.24
14.12	20	6.33
15.01	25	5.86
15.70	30	5.68
16.09	40	5.66
16.66	50	5.64
17.02	60	5.62

Pump stops set at (m/ft): 3.0m (10')

Duration of pumping: 7 hrs + 0 min

Final water level and if pumping (m/ft): 17.02

If flowing give flow (m³/d or GPD): NA

Recommended pump depth (m/ft): 31.1m (100')

Recommended pump rate (m³/d or GPD): 32 lpm (7 gpm)

Observation and/or Monitoring Hole: 32 lpm (7 gpm)

Abandonment:  Yes  No

**Method of Construction**

Case Test  Diamond  Public  Well Use:  Well used  Monitoring  Other, specify: [Redacted]

Rotary (Conventional)  Jetting  Domestic  Commercial  De-watering  Mining  Drilling  Livestock  Test Hole  Industrial  Other, specify: [Redacted]

Air circulation  Impaction  Cooling & Air Conditioning

**Construction Record - Casing**

Inside Diameter (mm)	Open Hole Off Material (Salvaged, Flanges, Concrete, Plastic, Steel)	Well Thickness (mm)	Depth (m/ft)	Status of Well
6.88	Steel/Alu	0.40	10.46 / 33.1	<input checked="" type="checkbox"/> Replacement Well <input type="checkbox"/> Test Hole <input type="checkbox"/> Exchange Well <input type="checkbox"/> De-watering Well <input type="checkbox"/> Observation and/or Monitoring Hole <input type="checkbox"/> Abandonment (Estimated) <input type="checkbox"/> Abandonment, Insufficient Supply <input type="checkbox"/> Abandonment, Poor Water Quality <input type="checkbox"/> Abandonment, other, specify: [Redacted] <input type="checkbox"/> Other, specify: [Redacted]

**Construction Record - Screen**

Outside Diameter (mm)	Material (Plastic, Galvanized, Steel)	Set No.	Depth (m/ft)
			NA

**Water Details**

Well Yield at Depth: Kind of Water:  Fresh  Unfiltered  Gas  Other, specify: [Redacted]

Water found at Depth: Kind of Water:  Fresh  Unfiltered  Gas  Other, specify: [Redacted]

Water found at Depth: Kind of Water:  Fresh  Unfiltered  Gas  Other, specify: [Redacted]

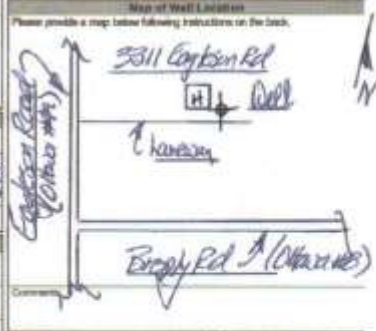
**Well Contractor and Well Technician Information**

Business Name of Well Contractor: STANIS DRILLING INC. Well Technician Name: PETE J. PARDONHAM

Business Address (Street Number/Name): 607-191 1ST FIVE AVENUE Precinct: CN Postal Code: K2A 2A0

Province: ON City/Town/Village: STANIS DRILLING INC. TEL: (613) 271-0000 FAX: (613) 271-0000

Well Technician License No. (Registered Professional Geoscientist): 010-836 License No.: 2012-12-15



Well owner's information (submit to Ministry):

Date Package Delivered: 2012-12-06

Ministry Use Only: Well No.: 2163777

State Work Completed:  Yes  No Date: 2012-12-06

*A guide to caring for your well and  
protecting your family's health.*



**Well  
Aware.ca**

**Green  
Communities  
CANADA**



by the Green Communities  
Canada in partnership with  
The Ontario Ground Water  
Association. Financial  
support provided by the  
Ontario Ministry of  
The Environment.





# Resources

## GENERAL RESOURCES

**Well Aware.** For further information and to contact your local Well Aware delivery agent. Phone: (705) 745-7479, [www.wellaware.ca](http://www.wellaware.ca)

**Ontario Ground Water Association.** Membership includes licensed well drillers and pump installers, manufacturers and suppliers, and groundwater scientists and engineers. Phone: (519) 245-7194 Fax: (519) 245-7196, [www.ogwa.ca](http://www.ogwa.ca)

**Ontario Ministry of the Environment (MOE)** Well-related publications available to rural homeowner. Phone: (800) 565-4923, [www.ene.gov.on.ca/environment](http://www.ene.gov.on.ca/environment) or any ServiceOntario location.

**Canadian Water Quality Association** provides information about water quality improvements for homes, businesses, industry and institutions. Phone: (866) 383-7617, [www.cwqa.com](http://www.cwqa.com) (see *Ask an Expert*)

**Canadian Mortgage and Housing Corporation** has many detailed publications about rural water and wastewater. Phone: (613)748-2000, [www.cmhc-schl.gc.ca](http://www.cmhc-schl.gc.ca)

**Conservation Ontario** is the network of local watershed management agencies in partnership with government, landowners and other organizations. Phone: (905) 895-0716, [www.conservationontario.ca](http://www.conservationontario.ca)

**Complete Walkerton Inquiry report.** [www.attorneygeneral.jus.gov.on.ca](http://www.attorneygeneral.jus.gov.on.ca)

## WATER TESTING

**Public health units** test for bacteria. For the health unit nearest you, look under "Health" in the blue pages of your telephone directory. Phone: (866) 532-3161, [www.health.gov.on.ca](http://www.health.gov.on.ca)

**Licensed private labs** can provide packages that include pesticides, minerals, metals, solvents, and fuels for a fee. Phone: (800) 565-4923 [www.ene.gov.on.ca/environment](http://www.ene.gov.on.ca/environment), search: laboratories licensed to perform drinking water testing in Ontario

## WELL RECORDS

**Ontario Ministry of the Environment** has the records available for free. Tag number, lot and concession number, and last name of the original well owner are extremely helpful to track your record. Phone: (888) 396-9355, [www.ene.gov.on.ca/environment](http://www.ene.gov.on.ca/environment) or visit any ServiceOntario location.

## WATER TREATMENT DEVICES

**Health Canada** provides information regarding treatment devices. Phone: (866) 225-0709, [www.hc-sc.gc.ca](http://www.hc-sc.gc.ca), search: removal of taste, odours, and chemicals, and disinfection of water

**Canadian Water Quality Association** provides information about water quality improvement for homes, businesses, industry and institutions. Phone: (866) 383-7617, [www.cwqa.com](http://www.cwqa.com)

## SEPTIC SYSTEMS

**Ontario Onsite Wastewater Association** represents septic contractors for installers, engineers, contractors, regulators, septic pumpers, manufacturers, designers, and researchers. [www.oowa.org](http://www.oowa.org)

**Ontario Association of Sewage Industry Services** represents Septage Pumpers and Haulers, Sewage System Installers, Portable Toilet Renters Manufacturers and Professionals. Phone: 1-877-202-0082, [www.oasisontario.on.ca](http://www.oasisontario.on.ca)

**A Guide to Operating and Maintaining Your Septic System.** Available from Ministry of Municipal Affairs and Housing. Phone: 1-416-585-6666

**Canadian Mortgage and Housing Corporation** fact sheet *Your Septic System*. Phone: (613)748-2000, [www.cmhc-schl.gc.ca](http://www.cmhc-schl.gc.ca)

## ENVIRONMENTAL FARM PLAN

**Ontario Soil and Crop Improvement Association** has information on the Environmental Farm Plan in your area. Phone: 1-800-265-9751, [www.ontariosoilcrop.org](http://www.ontariosoilcrop.org)