

Technical Bulletin

Wells Regulation – Test Hole & Dewatering Well Maintenance

This technical bulletin is one in a series of seventeen ¹ on well issues created for a person who:

- may have a new test hole ² or dewatering well ³ constructed in the future,
- currently owns a test hole or dewatering well, or
- may take possession of a property with a test hole or dewatering well.

The purpose of this technical bulletin is to:

- summarize the information found in the *Test Holes and Dewatering Wells – Requirements and Best Management Practices* manual published by the Ministry of the Environment, April 2014 (**hereon in referred to as the “Manual”**) regarding maintenance of test holes and dewatering wells , and
- present the maintenance requirements in Regulation 903 (Wells Regulation), as amended, made under the Ontario Water Resources Act for a test hole or dewatering well.

¹ A list of the seventeen technical bulletins is shown in the Additional Information Sources section near the end of this technical bulletin.

² A “test hole” means a well that, (a) is made to test or to obtain information in respect of ground water or an aquifer, and (b) is not used or intended for use as a source of water for agriculture or human consumption, subsection 1(1) of the Wells Regulation, e-laws: http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_900903_e.htm

³ A “dewatering well” means a well that is not used or intended for use as a source of water for agriculture or human consumption and that is made, (a) to lower or control the level of ground water in the area of the well, or (b) to remove materials that may be in the ground water, subsection 1(1) of the Wells Regulation, e-laws: http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_900903_e.htm

Well Owner's Obligations

The Wells Regulation requires that the well owner ⁴ maintain the well at all times after the completion of the well's structural stage (i.e. once it is capable of being used for the purpose for which it was constructed)⁵, in a way that prevents the entry of surface water and other foreign materials into the well.

Considerations for Maintaining a Well

Proper maintenance by the well owner requires ongoing observation of the state of the test hole or dewatering well, the pump and other equipment associated with the well and the surrounding area. The owner of the land is responsible for the maintenance of every well located on owner's property.

A well maintenance checklist and some solutions are found in Table 1.

Table 1: Well Maintenance Checklist

Well Maintenance Checklist Items	<input checked="" type="checkbox"/>
Confirmation of where each test hole or each dewatering well is located and its accessibility. This can be done by comparing the Universal Transverse Mercator (UTM) co-ordinates and well tag (or other unique identifier) to the well log or well record.	
Annual or more frequent visual inspection in and around the well. Appropriate times to inspect test holes and dewatering wells are during sampling, measuring and other testing events. If a well record or log is available, compare the construction details, water levels and water quality information (e.g. odour, and colour) on the record when inspecting the well.	

⁴ "Well owner" means the owner of land upon which a well is situated and includes a tenant or lessee of the land and a well purchaser, subsection 1(1) of the Wells Regulation, e-laws: http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_900903_e.htm

⁵ A well's structural stage is complete on the day on which the well is capable of being used for the purpose for which it was constructed but for, (a) compliance with section 15; (b) the installation of a pump; or (c) any alterations necessary to accommodate pumping, monitoring, sampling, testing or water treatment equipment, subsection 1(3) of the Wells Regulation, e-laws: http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_900903_e.htm

Well Maintenance Checklist Items	<input checked="" type="checkbox"/>
Verification that the test hole or dewatering well is not allowing the entry of contaminants or surface water by:	
Ensuring the well cap or cover is securely in place. The well cap should be removed and the person inspecting the well should look for signs of moisture, spiders, spider webs, insects and other foreign materials attached to the inside of the well cap. If the well cap or cover is damaged or cracked, or allows foreign materials including insects to enter the well, it must be replaced with a vermin-proof cap or watertight well cover immediately.	
Ensuring the well cap or cover can withstand the weight of persons, animals and vehicles.	
Looking at the air vent for cracks or holes. The person inspecting the well should ensure that the screen is shielded to prevent the entry of insects and other foreign materials into the well.	
Looking for signs of corrosion or deterioration, cracks, holes or gaps on the casing. This could include moisture or water seepage, rust (iron) stains or black (manganese) stains at or below joints, waterline inlets, holes or cracks on the inside of the well casing. All holes, cracks and joints must be sealed or the deteriorated casing must be replaced.	
Looking and listening for signs of surface water seeping or cascading down into the well along the well casing or just below the well casing.	
Looking for pooling of water around the well. The ground surface needs to be appropriately sloped to prevent surface water from pooling around the wellhead.	
Measuring water levels before and after a significant rainfall event with the pump shut off, if present. Rapid or large changes in the well water level could suggest surface water runoff is entering directly through the well's structure.	
Looking for any ground settling around the outside of the well casing. This could mean the annular seal is compromised allowing surface water to seep into the well.	
Ensuring any spaces outside the casing and around waterlines and other equipment are properly sealed with a suitable sealant, such as a	

Well Maintenance Checklist Items	<input checked="" type="checkbox"/>
bentonite slurry or other material as needed. All damage to the sealant from settlement or erosion must be repaired if surface water or foreign materials can enter the well.	
Looking for and removing any debris floating in the well. Debris floating on the surface of the well water (e.g. plant matter, insects, rodents) indicates that foreign material is entering the well through the casing, or the well cap or cover. This may mean that replacing the well cap or cover is required. In certain circumstances it may also be advisable to disinfect the well.	
Identification and correction of any of the following situations that might result in contamination:	
Newly constructed ditches, swales or other construction activities that may direct surface water toward the test hole or dewatering well.	
Downspout and underground storm water pipe discharge directed toward, near or into the test hole or dewatering well.	
Refuse, manure, pesticides, fertilizers, petroleum products, salt, paint, animal waste or any other potential contaminants stored, used or disposed of near the well after the test hole or dewatering well has been constructed.	
Industrial or farm equipment located near the test hole or dewatering well.	
Vehicles such as cars, trucks, trailers, boats, snowplows, snowmobiles parked or stored near the well or in some cases driving near or over the test hole or dewatering well.	
Trees around the wellhead as the roots can compromise the annular seal protecting the well.	
Verification that the top of the well is accessible for future repair.	
Identification of changes in the appearance (aesthetic) or physical quality of the water, such as colour, odour, turbidity, amount of sand/silt content or particle counts, or chemical indicators, especially after a rainstorm or snow melt.	
Identification of signs of wear on equipment installed in the test hole or	

Well Maintenance Checklist Items	<input checked="" type="checkbox"/>
dewatering well, including any pumps, lines, electrical cables and associated equipment.	
Verification of the pump and the well efficiency. If the pump is continually running or losing pressure, it may be a sign of a crack or hole in the waterlines. In other cases, iron bacteria and mineral encrustation can clog pump intakes, well screens and water intake zones and reduce water yields. Changes in water quality combined with a decrease in efficiency may indicate that maintenance is required.	

Where existing flush-mounted well pits (vaults) or other well pits are in use, they should be regularly inspected and must be properly maintained just like a well. Well pits are prone to collect contaminants, surface water or other foreign materials. Any contaminants, surface water or other foreign materials that collect in a well pit can potentially access the test hole or dewatering well through the top of the casing. This can be especially problematic on a contaminated site. If surface water or contaminants are entering a well pit, the well including the well pit must either be properly plugged and sealed or upgraded to prevent the surface water and contaminants from entering the well pit.

Well owners or their consultant(s) should review the safety considerations in the “Safety Considerations when Maintaining or Rehabilitating a Test Hole or Dewatering Well” section of this technical bulletin and any safety plan associated with the site when conducting assessments or inspections of their test holes or dewatering wells.

Cradle to Grave Approach to Test Holes and Dewatering Wells

Test holes or dewatering wells are commonly found on sites where there are problematic and sometimes hazardous environmental conditions. In many scenarios, the Ministry of the Environment has come across sites where the person constructing the well, project manager and owner of the land have walked away from the site with wells being degraded to a point where they have become pathways for contaminants. Therefore, as a best management practice, it is important for a person involved in well design or construction to take a “cradle to grave” approach with every well installed for an environmental investigation, groundwater research project, remediation project or dewatering project. The cradle to grave approach means that the entire life cycle of a well is considered and properly managed from initial design and construction to maintenance and ultimately abandonment.

See Chapter 14 of the Manual: *Test Hole and Dewatering Well Maintenance & Repair* for further information on the “Cradle to Grave” best management practice.

Rehabilitation of an Existing Test Hole or Dewatering Well

There are several indicators that a test hole or dewatering well may require rehabilitation. For example:

- observed reduction in the yield of a dewatering well used to lower the water table or as part of a pump and treat system to collect contaminated groundwater,
- unexpected or unanticipated changes observed in groundwater characteristics (e.g., water quality field parameters and laboratory analyses results, colour, odour) during or after purging the test hole, and
- observed structural damage (e.g., missing casing and cap above the ground surface).

These and other indicators or triggers for rehabilitation should be captured as part of the maintenance program for the site. A properly administered maintenance program will ensure that problems are identified and addressed in a timely fashion.

As each well and each environment is different, as a best management practice, a *Professional Engineer* or a *Professional Geoscientist* should assess any problem test hole or dewatering well and the groundwater to identify the source of the issue and provide recommendations on a case by case basis. In some cases, a licensed well technician with the correct class of licence working for a licensed well contractor can conduct the assessment of the well. If the assessment concludes that rehabilitation of the well is required, it is important to determine which prescribed well technician licence class applies to the types of work being performed on an existing well. For further information, see Chapter 3 of the Manual: *Exemptions: Wells, Activities & Experienced Professionals* and Chapter 4 of the Manual: *Well Contractors & Well Technicians – Licences, Responsibilities & Exemptions*).

The following literature provides information on the rehabilitation of wells including biofilm and mineralization problems and should be reviewed:

- *Water Well Rehabilitation, A Practical Guide to Understanding Well Problems and Solutions* ⁶,
- *Chemical Cleaning, Disinfection and Decontamination of Water Wells* ⁷,
- ASTM D5978-96 (2005) – “*Standard Guide for Maintenance and Rehabilitation of Ground-Water Monitoring Wells*” ⁸,

⁶ Mansuy, Neil. 1999. *Water Well Rehabilitation, A Practical Guide to Understanding Well Problems and Solutions*. CRC Press LLC. Boca Raton, FL.

⁷ Schnieders, John H. 2003. *Chemical Cleaning, Disinfection & Decontamination of Water Wells*. Johnson Screens Inc. St. Paul, MN.

- *Groundwater and Wells: Third Edition*⁹, Chapter 13: pg 597 – 628,
- *Practical Handbook for Environmental Site Characterization and Groundwater Monitoring*¹⁰ - In particular Chapter 12: Monitoring Well Post-Installation Considerations, pg 868 – 872, and
- *Construction, Dewatering and Groundwater Control*¹¹ – pages 195 - 221.

Unless exempt, there are requirements for affixing well tags and completing and submitting well records for persons who rehabilitate wells.

For further information please see the *Wells Regulation – Test Hole & Dewatering Well Repairs & Alterations* technical bulletin.

Safety Considerations when Maintaining or Rehabilitating a Test Hole or Dewatering Well

When maintaining wells, well owners should be aware that there are many serious risks associated with wells including the possibility of explosive gases and electrocution. Since most well owners are not familiar with these potential hazards, licensed well technicians, knowledgeable with respect to these hazards, and working for licensed well contractors should always be hired to work on the well. Some registered professionals (e.g., Professional Engineers, Professional Geoscientists, Certified Engineering Technicians) working for licensed well contractors are exempt from the well technician licensing requirements for certain specified well construction activities. See Chapter 3 of the Manual: *Exemptions: Wells, Activities & Experienced Professionals* and Chapter 4 of the Manual: *Well Contractors & Well Technicians – Licenses, Responsibilities & Exemptions* for further information. Any professionals working on test holes or dewatering wells should be knowledgeable about health and safety hazards.

⁸ ASTM D5978-96 (2005) – “Standard Guide for Maintenance and Rehabilitation of Ground-Water Monitoring Wells,” 10.1520/D5978-96R05. ASTM International, West Conshohocken, PA. www.astm.org.

⁹ Sterrett, Robert J. 2007. *Groundwater & Wells: Third Edition*. Johnson Screens/A Weatherford Company. New Brighton, MN.

¹⁰ Nielsen, David M. 2006. *Environmental Site Characterization and Ground-Water Monitoring: Second Edition*. CRC/Taylor & Francis Group. Boca Raton, FL.

¹¹ Powers, J. Patrick. Et al. 2007. *Construction Dewatering and Groundwater Control: New Methods and Applications: Third Edition*. John Wiley & Sons, Inc. Hoboken, NJ.

Important precautionary actions to take include:

- making sure that the power supply to the pump has been shut off to minimize the risk of shock or electrocution when inspecting a well,
- safeguarding the well site any time the well cap or cover is removed to minimize hazards, and
- following all applicable safety plans for the site.

A person must not enter any confined space (e.g., non-ventilated areas including well pits, pump houses, and others defined in the O. Reg 632/05 under the *Occupational Health and Safety Act*), unless properly trained and equipped. Confined spaces present asphyxiation hazards and some wells produce naturally occurring gases that may be poisonous and/or explosive.

For further information on safety plans see the “Safety Considerations When Working on Contaminated Sites,” section in Chapter 6 of the Manual: *Constructing the Hole, Casing & Covering the Test Hole or Dewatering Well*.

It is important that anyone working on a test hole or dewatering well using chemical products:

- obtain and follow the guidelines set out in the Material Safety Data Sheet (MSDS) for any chemical product used in the rehabilitation. The MSDS will include the following:
 - properties of the material,
 - hazards associated with the material,
 - personal protective equipment (PPE) required when using the material,
 - contact information, and
 - first aid and medical attention information.
- make sure that all rehabilitation products are approved for the intended use and will not impair the quality of the groundwater.
- check product labels to verify product contents, proper use and storage

Safety practices and requirements (e.g., Workplace Hazardous Materials Information System training), as regulated and advocated by the Ministry of Labour, must be followed.

Exempted Wells & Shallow Works

The Wells Regulation exempts certain types of wells, such as a pond or trench, from the Wells Regulation and from the sections on licensing of the Ontario Water Resources Act that pertain to wells ¹².

A person who constructs, maintains or abandons a shallow works that meets the conditions set out in section 1.1 of the Wells Regulation:

- is exempt from the sections on licencing of the Ontario Water Resources Act that pertain to wells, ¹³ and
- need only meet the requirements found in section 1.1 of the Wells Regulation.

The shallow works exemption contained in section 1.1 of the Wells Regulation does not apply to a monitoring well that is constructed as part of a phase one or two environmental site assessment for a record of site condition ¹⁴.

See the *Wells Regulation – Understanding a Well, Test Hole and Dewatering Well* and *Wells Regulation – Shallows Works* technical bulletins for further information.

Water Supply Wells

Certain licensing and construction requirements for water supply wells are different from the requirements for test holes and dewatering wells as defined by the Wells Regulation. For further information on the requirements for water supply wells see the *Water Supply Wells – Requirements and Best Management Practices* manual, published by the Ministry of the Environment, December 2009 and the Wells Regulation.

¹² Sections 36 to 50 of the Ontario Water Resources Act, R.S.O. 1990, c. O. 40, e-laws: http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90o40_e.htm

¹³ Sections 36 to 50 of the Ontario Water Resources Act, R.S.O. 1990, c. O. 40, e-laws: http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90o40_e.htm

¹⁴ Ontario Regulation 153/04 as amended made under the Environmental Protection Act, R.S.O. 1990, c. E. 19, e-laws: http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90e19_e.htm

Additional Information Sources

The seventeen technical bulletins on test holes and dewatering wells are:

- Wells Regulation – Understanding the Meaning of Well, Test Hole and Dewatering Well
- Wells Regulation – Shallow Works Test Holes & Dewatering Wells
- Wells Regulation – Exempted Activities Performed on Wells, Including Test Holes & Dewatering Wells
- Wells Regulation – Test Hole and Dewatering Well Licensing
- Wells Regulation – Licensing (Class 5) for Individuals who Perform Tests on Wells
- Wells Regulation – Site Considerations & Initial Planning for Test Holes & Dewatering Wells
- Wells Regulation – Constructing New Uncased Test Holes & Dewatering Wells in Operation for No Longer than 30 Days
- Wells Regulation – Constructing New Test Holes & Dewatering Wells in Operation for No Longer than 180 Days
- Wells Regulation – Constructing New Test Holes & Dewatering Wells
- Wells Regulation – Constructing New Multi-level Monitoring Test Holes
- Wells Regulation – Completing the Structure of the New Test Hole or Dewatering Well
- Wells Regulation – Flowing Test Holes & Dewatering Wells
- Wells Regulation – Test Hole & Dewatering Well Maintenance
- Wells Regulation – Well Record, Reporting & Tagging for a Test Hole & Dewatering Well
- Wells Regulation – Test Hole & Dewatering Well Repairs & Alterations
- Wells Regulation – Well Abandonment - When to Plug & Seal a Test Hole or Dewatering Well
- Well Regulation – Well Abandonment - How to Plug & Seal a Test Hole or Dewatering Well

These technical bulletins are available on Ontario.ca.

Further information on the maintenance of a test hole or dewatering well can be found in Chapter 14 of the Manual: *Test Hole and Dewatering Well Maintenance & Repair*.

A copy of the *Test Holes and Dewatering Wells – Requirements and Best Management Practices* manual can be obtained on Ontario.ca.

A copy of the Ontario Water Resources Act, Regulation 903 as amended made under the Ontario Water Resources Act (Wells Regulation) and other regulations can be obtained from the e-Laws website at www.e-laws.gov.on.ca.

The publications are also available by calling the Publications Information Centre at 1-800-565-4923 or (416) 325-4000.

For further information about wells, contact the Wells Help Desk at 1-888-396-9355 (Well) or the nearest Ministry of the Environment office listed in the blue pages of the telephone directory.

Notice: This bulletin is being provided for information purposes only and is not intended, nor should it be construed as providing legal advice in any circumstances. The applicable environmental legislation, including the following, should be consulted.

- ***Ontario Water Resources Act, R.S.O. 1990, c. O. 40***
- ***R.R.O. 1990, Regulation 903 (Wells) as amended made under the Ontario Water Resources Act, R.S.O. 1990, c. O. 40***
- ***Ontario Regulation 153/04 as amended made under the Environmental Protection Act, R.S.O. 1990, c. E. 19***

Legislation and regulations change from time to time so it is essential that the most current versions be used.

PIBS 9637e

Disponible en Français