

ROCKY VIEW COUNTY

GUIDELINES FOR CONNECTIONS

TO

BRAGG CREEK WATER AND SANITARY SYSTEMS



DATE: OCTOBER 3, 2013

REVISION: 0



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1.0 INTRODUCTION

1.1 General

1. The following recommended potable water service guidelines are provided for property owners in Bragg Creek who are switching from private water supply to the municipal water distribution system and also for property owners making new connections to the municipal water distribution system.
2. The following recommended on-site wastewater system guidelines are provided for property owners in Bragg Creek who are switching from private sewage treatment systems to a connection to the municipal sewage collection and treatment system and also for property owners making new connections to the municipal sewage collection and treatment system. These guidelines outline project specifications and system requirements for construction and operation of the on-site component of the municipal wastewater system connection.
3. Any work completed on private property by the owners or their agents is the sole responsibility of the property owner. It is also the owner's responsibility to ensure that any work in confined spaces such as trenches is done safely.

1.2 Permits and Inspections

1. All applicable regulations such as Alberta Environment and Sustainable Resource Development's Standards and Guidelines, the Alberta Building Code, Fire Code, Safety Codes Act and Rocky View County Land Use Bylaw are to be adhered to.

1.2.1 Water Permits and Inspections

1. Rocky View County and/or their representative must inspect and approve the connection to the municipal water distribution system before the connection is backfilled.

1.2.2 Sanitary Permits and Inspections

1. Rocky View County and/or their representative must inspect and approve the connection to the sanitary low pressure main before the connection is backfilled.
2. Inspection of all buried and submerged equipment, tanks and piping by Rocky View County or its representatives is required. Tank shall be empty for inspection. Approval and signoff of the system by Rocky View County or its representatives is required prior to backfill.
3. Final inspection of the system by Rocky View County or its representatives including infiltration testing of system and pressure testing of pump discharge line is required.

4. A property owner who wishes to modify an existing septic tank or use a tank that is not part of an authorized pre-assembled package system must get the tank inspected by Rocky View County or its representative before retrofitting is authorized.

1.2.3 Site Plan

1. Owner is required to submit a site plan with the Water Connection Approval application and the Sewer Connection Permit identifying locations and dimensions of:
 - Proposed sanitary and water connections.
 - Proposed sanitary pump station location.
 - Existing buildings and driveways.
 - Existing water wells.
 - Existing waste disposal system/tanks.
2. Sample site plan is included in Appendix B.

2.0 MATERIALS

2.1 Water System Materials

1. The following materials are required in all systems which will connect to the municipal potable water distribution system.

2.1.1 Water Service Piping

1. PEX pipe (cross-linked polyethylene pipe): Size 20-50mm PEX pipe shall be manufactured in accordance with CSA B137.5 and ASTM F876 and shall comply with NSF 14. The degree of cross-linking for PEX pipe shall be not less than 80% when tested according to ASTM D2765, Method B. PEX pipe shall have CSA / NSF approved pressure rating of:
 - 160 psi @ 23°C / 73.4°F
 - 100 psi @ 82°C / 180°F
 - 80 psi @ 93°C / 200°F

The outside diameter of the pipe shall be copper tube size (CTS) and shall have a standard dimension ratio (SDR) 9. The pipe shall be manufactured in natural color or in sky blue (RAL 5015) and shall carry the following marks every 1.5 meters (minimum): manufacturer's name, normal size, pressure / temperature rating, portable tubing, manufacturing date & machine number and footage mark. The pipe shall have consecutive footage marks every 1.5 meters (minimum) starting with zero (0) at the beginning of each coil. The pipe shall be shipped in protective cardboard boxes marked with the product name and size.

Approved Products 25mm diameter:

- Rehau (Municipex)
- Wirsbo (Aquapex)
- Or approved equal

2. Installation and handling including joining of pipe and fittings shall be according to the manufacturer's recommendations and applicable AWWA Specification for the type of pipe and fitting selected.

2.1.2 Water Meter

1. Rocky View County and/or its representatives to supply and install the required water meter. The meter(s) shall be sized based on the water demands stated in the application for Water Connection Approval.
2. Once the application for water service has been approved by the Utility Operations Department, the applicant will be contacted to schedule a time to install the meter and remote sending unit. Failure to do so will result in delays in meter installation. Fees for residential meter assemblies are specified in the Master Rates Bylaw as amended. Where commercial assemblies are required additional fees may apply.

2.2 Sanitary System Materials

1. The following materials are required for all onsite wastewater systems which will connect to the municipal low pressure sanitary collection system.
2. Onsite wastewater systems generally consisting of:
 - a. Pump stations including grinder pump, tank, piping, and controls.
 - b. Service piping connections.

2.2.1 Pump and Mechanical

1. Grinder pump, able to handle sewage effluent within the following parameters without exceeding manufacturer's pump performance curve:
 - a. Pump operating pressure between 428-552 kPa (62-80 psi)
 - b. Pump flow between 26.5-53 Liters/minute (7-14 US Gallons per minute {USGPM})
 - c. Grinder constructed so as to eliminate clogging and jamming under all normal operating conditions.
2. Mechanical seal, to provide a mechanical shaft seal to prevent leakage between motor and pump.

3. Lift out system, able to provide access to the pump, motor, and grinder from the surface.
4. Corrosion resistant isolation ball valve or gate valve, located within the wet well after the check valve, to accommodate easy removal of pump and equipment.
5. Corrosion resistant double check valve.
6. Minimum requirement is simplex pumping system (single pump operation). Duplex systems (two pumps alternating operation) may be required for high flows and/or commercial applications.

2.2.2 Power and Controls

1. Pump electric motor, 746 – 1,492 watts (1- 2 HP) single phase 120 VAC is recommended for residential installations or 240 VAC if available. Contractor to confirm the power supply voltage of the site.
2. The following features are recommended to control and monitor sewage levels in tanks to minimize damage due to possible sewage backup, excessive levels in tanks or pump failure:
 - a. Level sensing using three pilot duty float switches for pump on, pump off, high level alarm. Float switches to be non-corrosive, suitable for 5 amps at 120 VAC, cable length suitable to reach junction box.
 - b. Control System:
 - Enclosure NEMA4X for outdoor installation, NEMA1 for indoor installation.
 - Magnetic motor contactor.
 - Motor overload protection for motors greater than 1 HP and motors that do not have internal thermal protection.
 - Hand-Off-Auto switch (accessibility from panel exterior is not necessary).
 - Pump hour meter.
 - Indicating lights for pump run and power available. Lights are not required to be visible from panel exterior.
 - Terminals for input power, pump connection, float switches.
 - Alternate power supply connection may be installed at the owner's discretion.
 - c. Alarm System:
 - Visual (red beacon) and audible (greater than 80 dB).
 - Test-Normal-Silence switch accessible from panel exterior.

- Enclosure NEMA4X for outdoor installation, NEMA1 for indoor installation.
- 120 VAC.
- Can be combined with control system provided alarm circuit can be powered separately.
- Dry auxiliary contacts recommended to allow connection to building monitoring/security system.
- Battery backup recommended.

2.2.3 Tank

1. Water proof storage tank with minimum operating storage capacity below inlet of:
 - a. **Residential Service**, capable of storing minimum of 265 Liters (70 U.S. gallons) of sewage.
 - b. **Commercial Service**, capable of storing minimum of 568 Liters (150 U.S. gallons) of sewage.

2.2.4 Pre-Assembled Package System

1. Pre-assembled packages including pump, power, controls, and tank which satisfy the requirements of Sections 2.2.1, 2.2.2, and 2.2.3 are available from various manufacturers. See Section 4.0 for selected examples of the above package systems which would be acceptable.
2. Approved equivalents from other manufacturers may also be used if approved by the Utility Operations Department.

2.2.5 Existing Septic Tank Retrofit

1. Some existing septic tanks may be suitable for retrofitting to house a grinder pump and the other necessary equipment. The septic tank must be in good condition and not allow groundwater infiltration or sewage exfiltration. If tank is concrete it must be free of spalling.
2. The property owner may purchase a grinder pump and controls separately or it may be possible to place a pre-assembled package system directly into the primary compartment of the septic tank depending on individual site conditions.
3. Secondary compartment of the existing septic tank to be sealed and abandoned.
4. Primary compartment of the existing septic tank should be sized to meet storage volume requirements comparable to those listed in Section 2.2.3.
5. Property owners should confirm the suitability of all equipment with Rocky View County or its representative in a retrofit structure.

2.2.6 Sanitary Service Piping

1. Pressure service pipe from the pump station to the municipal service at the property line shall be 32 mm to 50 mm piping with a pressure rating of not less than 690 kPa (100 psi). Recommended service pipe is high density polyethylene (HDPE) DR11 and recommended joining method is through thermal Socket fusion to the standard of ASTM D F2620-06 by a factory-trained or certified installer.
2. Service pipe may be joined with compression fittings meeting CAN/CSA B137.1 by a factory-trained or certified installer. Compression fittings to be used in conjunction with stainless steel inserts only at valve or fittings locations.
3. Gravity service pipe from the building to the grinder pump station inlet should match the inlet grommet diameter of the tank. Recommended gravity service pipe is polyvinyl chloride (PVC) in SDR35 meeting CSA B182.2.
4. All connections to be water tight.

3.0 INSTALLATION

3.1 Water Service Connection

1. The following are the installation requirements for connection to the municipal potable water distribution system.

3.1.1 Existing Well Disconnections and Service Tie-ins

1. The sequence of activities required to disconnect existing wells and install service tie-ins required on private property to connect to the municipal potable water distribution system are as follows:
 - Disconnect the power to water well pump, and ensure that waterline between the well and the building is drained.
 - Isolation of the underground waterline between the water well and the building.
 - Installation of the water service from the underground waterline leaving the building to the municipal water service stub installed near the property line.
 - Connections of the new water service to the underground waterline leaving the building and to the municipal water service stub. Prior to backfilling an inspection and approval of the buried piping and connection to the municipal water stub at property line is required by Rocky View County and/or its representatives. Provide Rocky View County or its representatives 48 hour notice of inspection.
 - Contact Rocky View County to arrange for the installation of a water meter and to turn on the municipal water service.

- Flush, leak test at operating pressure and commission the newly installed water service. Bacteriological test results to confirm potability to be sent to Provincial Health Authority. Pressure test results can be sent to the Utility Operations Department.

3.1.2 Water Service Piping

1. The water service line from the building to the service connection shall be buried with a minimum of 2.7 m of cover or equivalent insulation and be horizontally separated by 300 mm from the sanitary pipe.
2. Lay pipes on a prepared bed and hand place sand bedding material around and up to 300 mm above the pipe. Ensure backfill material is sufficiently dry and not frozen. Do not drop backfill material directly on top of the pipe. Take care not to kink or distort the pipe.
3. The property owner should flush the municipal water service by flushing toilets and opening the cold water tap on faucets, for a minimum of 15 minutes, before any water is consumed.

3.1.3 Existing Water Wells and Potable Water Cisterns

1. Utility Operations Department does not support the re-use of existing water cisterns. This is due to the potential for customer demands exceeding the plant capacity to produce water. It is recommended to install direct connections to building and decommission (bypass) existing cistern entirely.
2. It is the property owner's responsibility to ensure that the existing water well is decommissioned according to Alberta Environment and Sustainable Resource Development's standards and regulations. See appendix C for the procedures required to decommission an active well, and the required *Record of Well Plugging* to be submitted to Alberta Environment and Sustainable Resource Development after the well has been decommissioned.
3. Ensure that the ground is graded such that water will drain positively away from the well casing.

3.1.4 Water Service Maintenance

1. Property owner is responsible for maintenance of water service connection including but not limited to repair or replacement of parts.

3.2 Sanitary System Installation

1. The following are the installation requirements for all onsite wastewater systems which will connect to the municipal low pressure sanitary collection system.

3.2.1 Installation Sequence of Grinder Pump Stations and Sanitary Service Connections

1. The sequence of activities required to install the grinder pump station equipment and service tie-ins on private property and to connect to the low pressure force main are as follows:
 - Submit an application for Sewer Connection Permit to Rocky View County Utility Operations Department. Additional information may be required if application is not complete. Failure to complete the application in full will result in delays to the permit process.
 - If retro-fitting an existing septic tank, inspection of existing tank must be completed by a qualified tank inspection company to determine suitability for retrofit at the Owner's expense
 - Installation of the pump station complete with controls and pressure service piping.
 - Connection of the pump station to the buildings' existing gravity service including extension of gravity service to pump station if required.
 - Installation of the pump discharge line to the low pressure sewer system service stub located near the property line and connection of the pump discharge line to the low pressure sewer system service stub.
 - Inspection of all buried and submerged equipment, tanks and piping by Rocky View County or its representatives. Tank shall be empty for inspection. Approval and signoff of the system by Rocky View County or its representatives is required prior to backfill.
 - Installation of the control cable and pump station control panel.
 - Power supply connection to the pump station control panel.
 - Final inspection of the system by Rocky View County or its representatives including infiltration testing of system and pressure testing of pump discharge line.
 - Final Backfill.

3.2.2 Pump and Mechanical

1. Pump and all mechanical work to be installed meeting manufacturer's specifications.

3.2.3 Power and Controls

1. All electrical work shall be completed, or supervised and approved, by a qualified electrician.
2. All electrical work shall meet all applicable Canadian electrical codes.
3. Provide separate appropriately sized dedicated circuit breaker feeders for pump and alarm systems.
4. Provide adequately sized conduit between tank and junction box to allow easy replacement of pump or switches.
5. Ensure no moisture or gases can enter control/alarm panel from tank.

3.2.4 Tank

1. Ground shall be graded to ensure positive drainage away from the tank.
2. Tank shall be anchored with ballast weights to prevent buoyancy uplift according to manufacturer's recommendations.
3. Excavations for the tank must have proper trench slopes as per Alberta Occupational Health and Safety regulations.
4. The tank shall be buried to provide a minimum cover of 2.8 m cover or equivalent insulation over the sewage operating level in the tank.
5. Alberta Occupational Health and Safety confined space entry requirements must be followed when working within confined spaces such as sanitary tanks.

3.2.5 Pre-Assembled Package Systems

1. Pre-assembled package systems to be installed meeting manufacturer's specification.

3.2.6 Existing Septic Tank Retrofit

1. A property owner who wishes to modify an existing septic tank or use a tank that is not part of an authorized pre-assembled package system must get the tank inspected by Rocky View County or its representative before retrofitting is authorized.
2. The property owner must make the following modifications to the septic tank:
 - All sludge must be removed from the tank before connection to the municipal system.
 - The septic tank must be water proofed so that no ground water can enter the tank. This includes the access cover, penetrations and the tank itself.

- The baffle wall between the primary and secondary compartment must be sealed so that sewage is permitted only in the primary compartment. Connection of the existing septic tank to the septic field must be severed.

3.2.7 Sanitary Service Piping

1. The pressure service line from the pump station to the service connection shall be buried with a minimum of 2.7 m of cover or equivalent insulation.
2. Lay pipes on a prepared bed and hand place sand bedding material around and up to 300 mm above the pipe. Ensure backfill material is sufficiently dry and not frozen. Do not drop backfill material directly on top of the pipe. Take care to not kink or distort the pipe.
3. Install tracer wire on pipe and marker tape along pipe alignment approximately 0.3 meters below ground level.
4. Support exterior valves by placing a concrete block or pressure treated lumber between the valve and firm soil.
5. Any exterior isolation valve must have a cover clearly identifying that it is for sanitary purposes.

3.2.8 Sanitary System Maintenance

1. Property owner is responsible for maintenance of system within the property boundary including but not limited to cleaning, repair or replacement of parts.

4.0 SUPPLIERS AND CONTRACTORS

1. Rocky View County is in the process of pre-qualifying contractors to undertake the work. Property owners may choose other suppliers or contractors at their discretion. Water meter packages, including remote sensing units will be provided exclusively by the Utility Operations Department and/or its representatives.

4.1 Plumbing Parts Suppliers – Sanitary and Water

1. The following lists suppliers who may be able to supply pipes and various required fittings for sanitary and potable water systems.
 - EMCO WATERWORKS CORPORATION , (403) 723-2710
2. Other suppliers may be used.

4.2 Sanitary Pre-Packaged Systems Suppliers

1. The following sections list suppliers who may be able to supply the Pre-packaged systems equipment described in Section 2.2.4.
2. Other manufacturers and types of pre-packaged systems must be approved by Rocky View County. Approval of alternative systems should be requested when the Sewer Connection Permit is applied for.

4.2.1 Liberty Pump Pre-Packaged Systems and Parts

1. Liberty Pumps pre-packaged systems model which meet the criteria of Section 2.2.4 include:
 - Model 2484LSGX202, with 2 stage pump (residential).
 - Model D3684LSGX202, with 2 stage pump (commercial).
2. Suppliers of Liberty Pump pre-packaged systems are listed in alphabetical order:
 - BARTLE & GIBSON CO. LTD., (403) 291-1099
 - CHINOOK PUMPS LTD., (403) 243-3310
 - EMCO WATERWORKS CORPORATION, (403) 723-2710
 - WOLSELEY CANADA, (403) 243-8790

4.2.2 E/One Sewer Systems Pre-Packaged Systems and Parts

1. E/One Sewer Systems pre-packaged systems model which meet the criteria of Section 2.2.4 include:
 - Model DH071 (residential).
 - Model DH152 (commercial).
2. Suppliers of E/One pre-packaged systems are:
 - JOHN BROOKS SYSTEMS, (780) 468-4499

4.3 Contractors

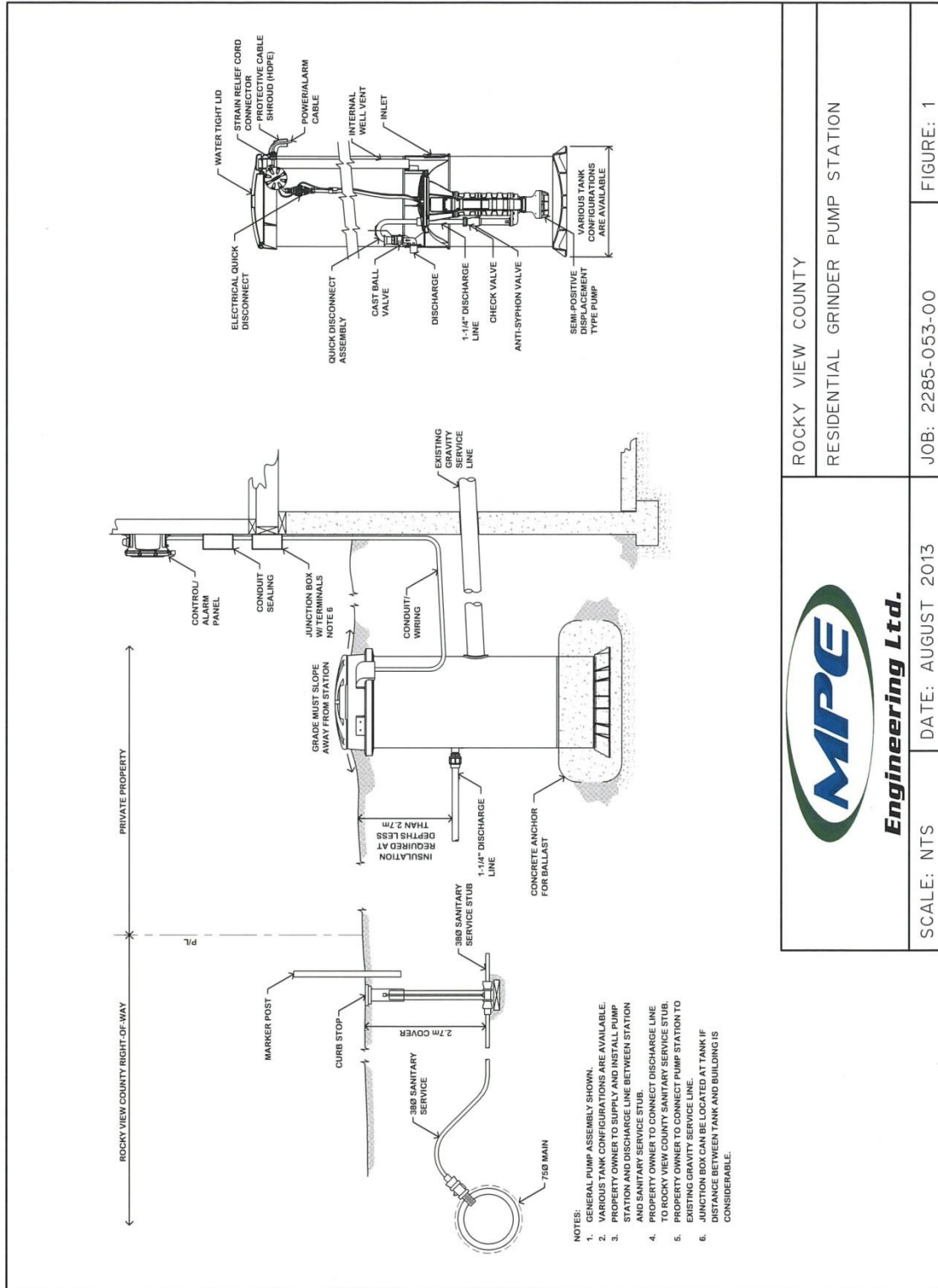
1. Rocky View County is in the process of prequalifying contractors to undertake the work. Rocky View County will provide this information when it becomes available.

5.0 OFF SITE PUMPING

1. If off site pumping of water is required during construction activities, application must be made to Rocky View County as per the Off Site Pumping Bylaw C-7141-2012 as amended. Application forms can be found on the Rocky View County web site at <http://www.rockyview.ca/Government/Bylaws.aspx>

APPENDIX A

Figure 1 – Residential Grinder Pump Station



ROCKY VIEW COUNTY

RESIDENTIAL GRINDER PUMP STATION



DATE: AUGUST 2013

SCALE: NTS

JOB: 2285-053-00

FIGURE: 1

APPENDIX B

Figure 2 – Example of Typical Site Plan

INFORMATION REQUIRED FOR LOT CARD

SKETCH ON THE DRAWING PROVIDED THE LOCATION OF THE FOLLOWING LANDSCAPING, WATER AND SEWER, AND EXISTING UTILITIES FEATURES. INDICATE THE DISTANCE (IN METERS OR FEET) FROM A CORNER OF THE EXISTING BUILDING TO THE APPLICABLE ITEM.

LANDSCAPING¹

- ANY SIGNIFICANT TREES.
- ANY FLOWER BEDS.
- ASPHALT OR CONCRETE PATHS.
- DECKING.
- ANY OTHER LANDSCAPE ITEM YOU FEEL IS IMPORTANT SUCH AS STATUES, FOUNTAINS, ETC.
- DRIVEWAYS.

WATER AND SEWER²

- WATER WELL.
- WATER CISTERNS.
- BURIED WATER PIPE INCLUDING SIZE AND PIPE COMPOSITION IF KNOWN.
- SEPTIC FIELD.
- SEPTIC TANK³
- BURIED SEPTIC PIPE.
- PREFERRED LOCATION IF ANY, FOR THE PROPOSED PUMP STATION.
- PREFERRED LOCATION OF THE NEW WATER AND SANITARY SERVICE PIPE.

EXISTING UTILITIES: ELECTRICITY, GAS, AND TELEPHONE LOCATION

- BURIED OR ABOVE GROUND ELECTRICITY LINES, INCLUDING ELECTRICAL SERVICE CAPACITY (220V OR 110V) IF KNOWN.
- BURIED NATURAL GAS PIPE.
- BURIED OR ABOVE GROUND TELEPHONE LINES.

NOTES:

1. ROCKY VIEW COUNTY ON-SITE SERVICES RECLAMATION AFTER CONSTRUCTION INCLUDES TOPSOIL AND SEEDING ONLY. SKETCH ON THE DRAWING THE LOCATION AND SIZE ANY OF THE LANDSCAPING FEATURES TO BE PRESERVED, AND THE ALIGNMENT OF SERVICE PIPING WILL BE ADJUSTED AS MUCH AS POSSIBLE TO MINIMIZE DAMAGE.
2. NOTE IF THE WATER / SEWER ITEM IS STILL FUNCTIONAL AND IN USE.
3. DETERMINE IF THE EXISTING SEPTIC TANK SUITABLE FOR USE AS AN EXTRA DOUBLE CONTAINMENT FOR THE PUMP STATIONS.

NAME _____ SIGNATURE _____

REMARKS:

HOUSE NO. _____ STREET NAME _____

PLAN _____ BLOCK _____ LOT _____

TOWN OF BRAGG CREEK

TYPICAL LOT CARD

SCALE: 1:500 DATE: OCTOBER 4 2013 JOB: 2285-043-05 REVISION: 0



APPENDIX C

Plugging Abandoned Wells



For more information refer to the Water Wells That Last video (Part II — Managing and Maintaining).

Plugging Abandoned Wells

When a well is no longer being used or maintained for future use, it is considered abandoned. Abandoned wells pose a serious threat to the preservation of groundwater quality. They are also a serious safety hazard for children and animals.

There are approximately 59,000 farmsteads in Alberta and most of these have at least one well. In addition there are a great number of non-farming rural residents that rely on water wells. The exact number of abandoned wells in Alberta is unknown but is estimated to be in the tens of thousands. Plugging an abandoned well prevents:

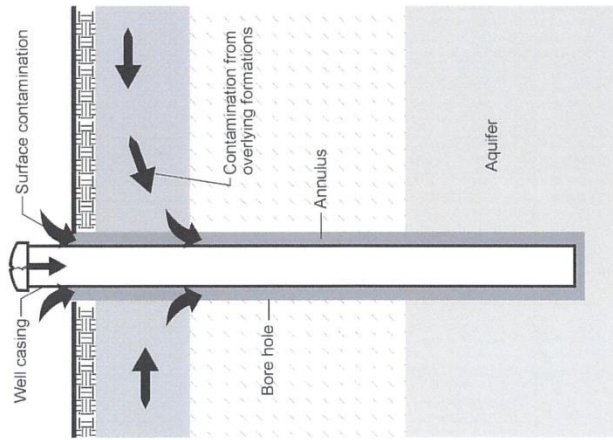
- Downward movement of water in the well or well annulus
- Surface contamination from reaching aquifers
- Intermixing of water between aquifers of different water quality
- Serious accidents from happening.

Unfortunately, groundwater contamination and its effects are usually not recognized until groundwater quality is seriously affected and nearby wells have been contaminated. Surface contaminants can enter a well several ways:

- Directly through the surface opening if the cap is loose, cracked or missing
- Through unsealed spaces along the outside of the casing (see Figure 1, Well Contamination).

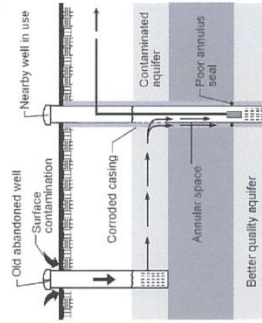
When the steel casing of an abandoned well starts to corrode, holes will develop. When this takes place, surface contaminants or poor quality water from shallow aquifers may migrate into the deeper aquifers of nearby operating wells (see Figure 2, Contamination From an Abandoned Well).

Figure 1 Well Contamination



Wells that are no longer being used should be plugged. They are a serious public safety and environmental hazard.

Figure 2 Contamination From an Abandoned Well



Who is Responsible?

In Alberta, responsibility for plugging a water well is defined by legislation. The well owner is responsible for plugging the well when:

- The well is no longer being used as a water supply
- The well is in a poor state of repair and the pumping equipment has been removed or cannot be repaired or replaced
- The well produces water that is unsuitable for drinking.

The licensed water well contractor is legally responsible for immediately plugging a well when it is not completed due to construction problems or inadequate yield. Before you sign a contract with a driller, ask questions about what materials are going to be used to plug the well and associated costs.

It is generally best to hire a licensed water well contractor to complete the plugging of your well. This person has the expertise and equipment to do a proper job. Unless you use the right plugging materials and have them properly placed in the well, you will end up with a poorly sealed well that will continue to allow contaminants to enter into the groundwater. When a replacement well is drilled, your old well should be immediately plugged.

Process of Plugging a Well

There are several steps to take before actually plugging the well. Some steps you will be able to do yourself and others you may want to consult with, or hire, a licensed water well contractor to complete.

Preparation

To know exactly how much plugging material is needed, measure the total depth and diameter of the well, plus the non-pumping water level (the depth to the standing water in the well). If possible, compare these measurements to the information on the drilling report from when the well was originally constructed. The only time you should even consider plugging a well yourself is when the well is open to its original depth.

Ideally the casing should be removed from the well before the plugging process begins. Often only the liner casing is removed and the surface casing is left intact because it is more difficult to remove and it could separate down hole. The older the well, the more difficult it will be to successfully remove the casing. If the casing is left in place, it should be perforated, particularly if there is evidence of water movement in the annulus of the well. Any casing left in place must be cut off 0.5 m (20 in.) below ground surface after the well is plugged.

For information on how to take a non-pumping water level measurement, see Module 5 "Monitoring Your Water Well".

Module 9 — Plugging Abandoned Wells

Materials

Materials that are used to plug a well must be uncontaminated and impervious. They must prevent any movement of water. See the chart below for acceptable and unacceptable materials.

Acceptable Materials	Unacceptable Materials
<ul style="list-style-type: none"> • grout - neat cement (cement mixed with water) - sand cement (cement, sand and water) • concrete (cement, sand and aggregate mixed with water) • manufactured high yield bentonite products • clean, uncontaminated clay (for large diameter wells) 	<ul style="list-style-type: none"> sand gravel drilling mud or fluid

Cement grout and concrete may shrink after setting so may not create as good a seal as bentonite.

Sand and gravel are not acceptable materials. They are not impervious materials because water can easily move through them.

High yield bentonite is a special type of clay that swells when wet to provide a very effective impervious seal. It comes in a powder that when mixed with water produces a slurry that can be pumped into the well. It is also manufactured in pellet or granular form that is designed to pour into the well. This type of bentonite when mixed with water will actually swell to about eight times its original size and will form a water-tight plug.

It is important to understand that bentonite cannot be used as a plugging material in some situations. When the chloride level in the well water is greater than 4000 mg/L, or the calcium level is greater than 700 mg/L, bentonite will not swell properly, so then it is best to use a cement grout.

Large diameter or bored wells pose special problems because of their size and the volume of material required to fill them. A lower cost alternative for the plugging material is clean, uncontaminated clay that can be shovelled into the well until it is filled. This must be done carefully, however, to ensure the clay reaches the bottom of the well and seals off all empty space. The cribbing must be cut off below ground surface and the well should be topped up with high yield bentonite to make a water-tight seal.

Method

Aside from choosing the appropriate plugging material, the method of placing material into the well is most critical. Regulation requires that the plugging material must be introduced from the bottom of the well and placed progressively upward to ground surface.

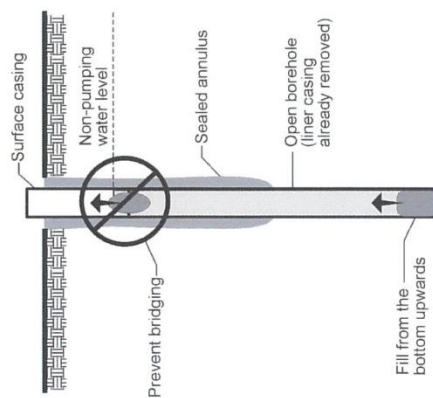
If the plugging material is cement grout, concrete or bentonite slurry, special equipment is needed. The material must be placed into the well through a tremie pipe that is usually about 3 in. in diameter. At all times this pipe must be kept below the surface of the plugging material to prevent it from diluting or separating. It is recommended that you hire a licensed water well contractor when a slurry is chosen as the plugging material because they will have the proper equipment and experience to do the job correctly.

When bentonite pellets are chosen for the plugging material, they can be poured into the well from the ground surface. These pellets have a weight material added to help them sink to the bottom of the hole. They are also coated to prevent immediate swelling on contact with water. When poured slowly, they should reach the bottom of the well before swelling.

If you are not careful, however, these pellets will bridge off down hole and the well will be only partially plugged (see Figure 3, Bridging).

Before you pour in the pellets, you can determine how many feet of well casing can be filled with the size of pellets you have chosen. As the well is being filled, measure the depth to the top of the plugging material quite frequently. Then you will know if the plug is rising faster than expected indicating a bridge has formed. If this happens, be sure to break it up before adding more material to the well.

Figure 3 Bridging



— Module 9 — Plugging Abandoned Wells

Steps to Plugging a Well

- Step 1** Remove all pumping equipment from the well. Thoroughly flush out the well using a bailer or air compressor.
- Step 2** Measure the total depth of the well, the diameter and the non-pumping water level. If possible, compare these figures with the information on the original drilling report. Confirm whether the well is open to its original depth.
- Step 3** Use these figures to decide which plugging material is appropriate and how much you will need. A licensed water well contractor can help you decide. Whether or not the casing can be successfully pulled out will also determine which material to use and what method is appropriate for placing it into the well. If the casing cannot be removed, choose a slurry that can be pumped under pressure into the well so that any space around the outside of the casing will also get filled in.

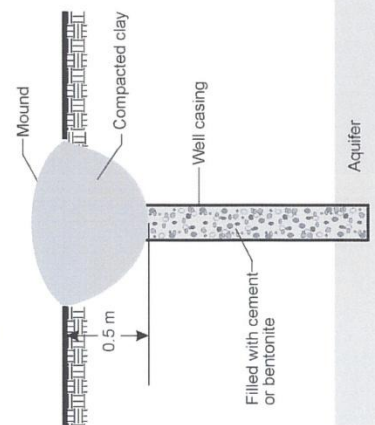
By regulation, a well must be filled full length with impervious material. That material must be introduced into the well at the bottom and be placed progressively upward to ground surface.

- Step 4** Disinfect the well. Add enough chlorine to bring the water standing in the well to a chlorine concentration of 200 mg/L. For every 450 L (100 gal.) of water in the well, add 2 L (0.4 gal.) of household bleach (5.25% chlorine). See Module 6 "Shock Chlorination—Well Maintenance" to calculate how much water is in your well. Leave this chlorine in your well.
- Step 5** If possible, remove the well casing.
- Step 6** Place the plugging material into the well. It must be introduced at the bottom of the well and placed progressively upwards to ground surface. The only exception to this rule is when the plugging material being used is a bentonite pellet that has been designed and manufactured for pouring into the well from the ground surface.
- Step 7** If the casing was not already removed, dig around it and cut it off a minimum of 0.5 m (20 in.) below the ground surface (see Figure 4, Cutting Off the Casing and Mounding the Clay).
- Step 8** Backfill and mound this portion of the hole with material appropriate for intended use of the land (i.e., clay) (see Figure 4, Cutting Off the Casing and Mounding the Clay).

- Step 9** Use the worksheet at the end of this module to record the details of your well plugging. Include the well owner name, legal land description, GPS location, total depth, casing diameter, type and amount of plugging material used, date and method of placing material into the well. Send a copy of this record to:

Alberta Environment
Groundwater Information Centre
11th Floor, Oxbridge Place, 9820-106 Street
Edmonton, Alberta T5K 2J6

Figure 4 Cutting Off the Casing and Mounding the Clay



Special Problems

Flowing wells present special problems for plugging. It is highly recommended that you use the services of a licensed water well contractor. Before a flowing well can be plugged, the flow must be controlled. Several methods can be used:

- Reduce the flow by pumping high specific gravity fluids such as drilling mud or cement into the well.
- If there is a nearby well that is tapped into the same aquifer as the flowing well being plugged, pump it to create a drawdown in the well being plugged.
- Where practical, extend the well casing high enough above the ground surface to stop the flow.

Worksheet

For future reference, use the "Record of Well Plugging" worksheet to record the date of plugging, materials and procedures used. Also map the location of this plugged well for future reference. A sample copy is included at the back of this module. Working copies are included in the pocket on the back cover. Keep the worksheet in the back pocket.

Module 9 — Plugging Abandoned Wells

AWWID Well ID Number: _____
(call 780-427-2770 to obtain)

Worksheet



Record of Well Plugging

Original landowner's name: _____ Date of plugging: _____

Legal land description of well: Qtr _____ Sec _____ Twp _____ Rge _____ W of _____ Meridian
Lot _____ Blk _____ Plan _____

GPS Location: _____ Latitude: _____ Longitude: _____

Location reference points on the farm (i.e., distance from buildings): _____

Current well depth: _____ Original well depth: _____ Well diameter: _____

Was well casing removed before plugging? _____

Water characteristics: (attach any analysis done) _____

Reason for plugging the well: _____

Type and quantity of plugging material used: _____

How was material placed into the well? _____

Who completed the procedure? _____

Mail a copy of this worksheet to the Groundwater Information Centre. Include a photocopy of the original drilling report if possible.

Alberta Environment and Sustainable Resource Development
Groundwater Information Centre
11th Floor, Oxbridge Place
9820 - 106 Street
Edmonton, Alberta T5K 2J6

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