

Groundwater Under Direct Influence of Surface Water (GUDI) – an Evaluation for Public Water Supplies in Newfoundland and Labrador









Environment



Government of Newfoundland and Labrador, Department of Environment and Conservation, Water Resources Management Division

## Groundwater Under Direct Influence of Surface Water (GUDI) – an Evaluation for Public Water Supplies in Newfoundland and Labrador

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Project Number: 60236351

Date: June, 2013

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June 13, 2013

Ms. Dorothea Hanchar, M.Sc. Groundwater Resources Manager Department of Environment and Conservation Government of Newfoundland and Labrador PO Box 8700 Confederation Building, West Block 4<sup>th</sup> Floor St. John's, NL A1B 4J6

Dear Ms. Hanchar

#### Project No: 60236351

#### Regarding: Final Report on Groundwater Under Direct Influence of Surface Water (GUDI) – an Evaluation for Public Water Supplies in Newfoundland and Labrador

AECOM is pleased to provide the Government of Newfoundland and Labrador, Department of Environment and Conservation, Water Resources Division with the final report on groundwater under direct influence of surface water – an evaluation for public water supplies in Newfoundland and Labrador.

AECOM would like thank you for the opportunity to work for the Water Resources Management Division. If you have any questions or comments regarding the findings herein please contact the undersigned.

Sincerely, AECOM Canada Ltd.

Nora Doran, P.Geo. Hydrogeologist nora.doran@aecom.com

ND :kv Encl. Report

Groundwater Under Direct Influence of Surface Water – an Evaluation for Public Water Supplies in Newfoundland and Labrador

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# **Revision Log**

Revision #	Revised By	Date	Issue / Revision Description
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# **AECOM Signatures**

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# 1. Introduction

### 1.1 General

AECOM Canada Ltd. (AECOM) was retained by the Government of Newfoundland and Labrador, Department of Environment and Conservation (DEC), Water Resources Management Division (WRMD) to conduct an evaluation of 36 public water supplies in Newfoundland and Labrador, which are groundwater supplies suspected to be under the influence of surface water (GUDI). In addition, a review of GUDI guidelines in other jurisdictions and recommendations for guidelines and approaches for GUDI evaluation in Newfoundland and Labrador was conducted. The work was completed between September, 2011 and March, 2012.

The purpose of a GUDI study is to identify communal wells that require treatment beyond a minimum level of primary disinfection to ensure that appropriate treatment is provided to inactivate or remove human pathogens such as viruses, bacteria and protozoa, before water is supplied to the first customer.

### 1.2 Objective

The objective of the study is two-fold:

- 1) To assess selected public supply wells in Newfoundland and Labrador and determine if they are in fact GUDI; and,
- 2) To provide recommendations to WRMD regarding development of GUDI guidelines to address groundwater quality, well head protection, and treatment issues with GUDI wells.

### 1.3 Scope of Work

The scope of work conducted by AECOM for the project included the following key elements:

- Review and summarize the GUDI requirements in other jurisdictions. Identify whether these requirements are legislation, regulations or guidelines.
- Confirm whether the 36 public supply wells identified by NL WRMD are indeed under direct influence of surface water.
- Define a methodology for designating a Wellhead Protection area for GUDI wells, and apply this methodology to the confirmed GUDI wells. The methodology should be risk-based and take into account additional factors beyond simply the distance from the wellhead.
- Provide recommendations for drafting guidelines regarding:
  - o Designation criteria for GUDI wells, including Wellhead Protection strategies;
  - Treatment standards for GUDI wells; and
  - Treatment, monitoring and management options for GUDI systems.

#### 1.4 Background

Source protection of the 500+ municipal surface and groundwater supplies within the Province is an important issue for the WRMD. Of particular concern are those wells which are suspected of being under the direct influence of surface water (GUDI). GUDI wells pose a risk to human health through exposure to microbial pathogens found in nearby surface water. GUDI issues for water supplies moved to the forefront of water quality issues for municipalities and other jurisdictions after the Walkerton well contamination in Ontario in 2000. Since that time, most Provinces in Canada have developed specific guidelines and protocols for evaluating and designating GUDI wells.

# 2. Background Data Collection and Information Review

### 2.1 Pre-screening by NL WRMD

The NL WRMD completed a study in October, 2009 entitled "Public Groundwater Supplies under Direct Influence of Surface Water in Newfoundland and Labrador". Results of this internal study revealed a total of nine groundwater supplies in Newfoundland and Labrador that were confirmed to be influenced by surface water. They included wells located in the communities of Change Islands (6 wells); Happy Valley-Goose Bay; McCallum and Port au Choix.

Furthermore, a total of 35 groundwater supplies were identified as being potentially under the influence of surface water and 38 groundwater supplies were identified as potentially being under the influence of surface water during periods of wet conditions. The WRMD described wet conditions as conditions occurring during and shortly after heavy rainfall events. The magnitude of the rainfall events selected was not quantified in the report. Possible surface water influences were determined by evaluating existing water quality data collected through the drinking water quality monitoring program. The criteria used to select potential groundwater supplies influenced by surface water was:

- Color greater than 10 TCU
- Turbidity greater than 1 NTU

Other water quality parameters evaluated in the October, 2009 report by NL WRMD included turbidity, dissolved organic carbon, hardness, colour and conductivity. According to the report, if the above listed parameters were different than would be expected for groundwater supplies, as determined by NL WRMD, then surface water was suspected to be influencing the groundwater quality.

There are a total of 36 public water supply wells suspected of being GUDI, and these public supply wells are the focus of this report (Table 1 and Figure 1).

Community	Water Supply, Water Supply #
Badger	Well Field, 2 wells on standby WS-G-0010
Baine Harbour	Dug WS-G-0013
Bay St. George	#3 Well Jeffery's WS-G-0859
Bay St. George South	#2B Lions Club Well WS-G-0844
Bear Cove	Lower Bear Cove WS-G-0040
Black Duck (Siding)	#1 Well WS-G-0059
Bunyan's Cove	#1 Well WS-G-0094
Bunyan's Cove	#2 Well WS-G-0095
Deep Bight	Deep Bight Well Field WS-G-0213
Flat Bay West	#1 Well WS-G-0244
Fox Roost-Margaree	Drilled 8 inch WS-G-0852
Frenchman's Cove	Dug Well WS-G-0261
Glenwood	Handpump Well WS-G-0800
Grates Cove	#1 Cyril Meadus Well WS-G-0293
Holyrood	Main Line WS-G-0356
Hopeall	Gilberts Hill Well WS-G-0826
Makinsons	Taylor's Wells WS-G-0442

#### Table 1 – Summary of Public Water Supply Wells in NL Suspected as being GUDI

Groundwater Under Direct Influence of Surface Water – an Evaluation for Public Water Supplies in Newfoundland and Labrador

Community	Water Supply, Water Supply #
Marysvale	Drilled WS-G-0449
Piccadilly Slant-Abraham's Cove	#2 Well – Abraham's Cove WS-G-0540
Port Rexton	#5 Well – Mabel Clarke's Well WS-G-0586
Port Rexton	Champney's Arm Well WS-G-0588
Port au Port West-Aguathuna-Felix Cove	#1 & #3 Drilled WS-G-0574
Sheaves Cove	Drilled WS-G-0643
Sheshatsheits	Wells 1,2 & 3 WS-G-0645
Ship Cove-Lower Cove-Jerry's Nose	#4 Well – Nancy Rowe Well WS-G-0839
St. Andrew's	#2 Well WS-G-0680
St. Lunaire-Griquet	Drilled WS-G-0702
Swift Current	Drilled WS-G-0725
Tompkins	Greg Wall Well WS-G-0738
Wabana	St. Edward's Memorial St. WS-G-0774
Wabana	Fancy Hill Main Street WS-G-0766
Wabana	Main Street WS-G-0769
West St. Modeste	Well Field





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# Legend

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Community Name

NL Public Water Supply Registration Number

Public Supply Wells not

included in AECOM's Survey

Figure 1 -Location of Public Water Supply Wells in NL Suspected as being GUDI

Figure 1



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### 2.2 Relevance of AECOM Report Authors' Experience

This study is based on published and unpublished reports and guidelines. The report authors' opinion is also provided based on professional experience. To provide context for report review, a brief profile of the report authors, Tim Lotimer and Nora Doran, is provided.

In 2000, Tim Lotimer helped investigate the causes of the Walkerton Water Tragedy, where 7 people died and thousands became sick from drinking water from a municipal well that was GUDI without appropriate treatment (Hrudey et al, 2003). He informally helped the Ontario Ministry of the Environment develop the 2001 Terms of Reference for GUDI evaluations. In 2002, Tim was among the 30 selected consultants from more than 200 expressions of interest, chosen to work with an Ontario Ministry of the Environment review team on the Groundwater Studies GUDI project. Since that time, he has conducted GUDI studies of public water supplies while maintaining a keen interest in public health protection and the pathogen threats from groundwater supplies. More recently, he served on an expert panel for Nova Scotia Environment reviewing their GUDI protocol and assisting as a technical reviewer on the role of turbidity in well water as a public health threat. He is also a member of the team that is currently updating the Ontario GUDI protocol.

Nora Doran has completed over 40 GUDI evaluations and conducted over 30 hydrogeological evaluations and over 10 groundwater supply exploration projects in Atlantic Canada. Ms. Doran is a Professional Geoscientist, registered with PEGNL, and has over 12 years of consulting experience in Atlantic Canada. Ms. Doran's technical expertise relates to water supply development in fractured rock environments including well exploration and design, pumping test design and interpretation, sustainable yield estimation and groundwater development potential.

# 3. GUDI Requirements in Other Jurisdictions

The following section describes GUDI evaluation criteria in selected jurisdictions of the United States and Canada. The purpose of this section is not to provide an exhaustive listing and summary of the GUDI requirements in other areas, but rather to highlight the requirements in other jurisdictions with the goal of identifying and bringing forth the key elements for inclusion in a GUDI protocol for Newfoundland and Labrador.

### 3.1 United States

Under the US Safe Drinking Water Act, the United States Environmental Protection Agency (US EPA) National Primary Drinking Water Regulation characterizes drinking water sources as either:

- Surface water, including groundwater sources that are under the direct influence of surface water; or,
- Groundwater.

GUDI is defined by the US EPA as any groundwater with significant occurrence of:

- Insects;
- macro organisms;
- algae; or,
- large-diameter pathogens such as Giardia lamblia or Cryptosporidium.

#### And/or

- Any groundwater with significant and relatively rapid shifts in water characteristics such as those listed below, which correlate closely to climatological or surface water conditions:
  - Turbidity;
  - Temperature;
  - Conductivity; or,
  - pH.

The US EPA leaves it up to each State to set out a method to establish the criteria to designate municipal wells as GUDI and suggests that such method(s) may be based on:

- site-specific measurements of water quality; and/or,
- documentation of well construction characteristics and geology with field evaluation.

In 2009, a "Review of the State of the Art: Ground Water Under the Direct Influence of Surface Water Programs" was completed by the Bureau of Economic Geology at the University of Texas (Chaudhary *et al.*, 2009). Their review indicated that GUDI studies in the United States typically involved three phases:

- 1. Hydrogeologic screening and assessment (focuses on the hydraulic connectivity between the supply aquifer and surface water);
- 2. Water quality monitoring (historical bacteriological data (total and fecal coliforms), turbidity, conductivity, temperature and precipitation); and,
- 3. Microscopic particulate analysis (MPA).

#### 3.1.1 Microscopic Particulate Analysis

Microscopic Particulate Analysis (MPA) was developed by the US EPA in 1992 as a consensus methodology for identifying those drinking water supplies that are under the direct influence of surface water. The method describes in detail sample collection, equipment and supplies needed, sample processing, analyst qualifications and interpretive analysis. In this method, a relative risk score is determined, based on whether there is a significant occurrence of indicator organisms. The key indicators include Giardia, coccidia, diatoms, other algae, insects/larvae, rotifers and plant debris. It is pointed out that while the presence of Giardia, coccidia and helminths are considered conclusive evidence of GUDI, their absence does not rule out a GUDI condition.

#### 3.1.2 US EPA Groundwater Rule

The US EPA published the Ground Water Rule (GWR) in the US Federal Register on November 08, 2006. The purpose of the rule was to provide for increased protection against microbial pathogens in public water systems that use groundwater sources (US EPA, 2006). US EPA is particularly concerned about groundwater systems that are susceptible to fecal contamination since disease-causing pathogens may be found in fecal contamination. The GWR applies to public water systems that exploit groundwater. The rule also applies to any system that mixes surface and groundwater if the groundwater is added directly to the distribution system and provided to consumers without treatment.

The GWR requires sampling for one of three fecal indicators for non-GUDI wells. In this rule, EPA authorizes the use of *E. coli* and enterococci as bacterial indicators of fecal contamination because "both of these indicators are closely associated with fresh fecal contamination and are found in high concentrations in sewage and septage". EPA also authorizes the use of coliphage (viruses that infect the bacterium *E. coli*) because "they are closely associated with fecal contamination and they do not tend to infect other non-fecal bacteria".

#### 3.1.3 Washington State Department of Health

The Washington State Department of Health document entitled Potential GWI Sources – Determining Hydraulic Connection Through Water Quality Monitoring (2003) states that of the non-microbial indicators, water temperature is "the most useful indicator of potential surface water influence" and that conductivity, pH and turbidity are also good indicators.

#### 3.1.4 Colorado Department of Public Health & Environment

The Colorado Department of Public Health & Environment document entitled "Determination of Groundwater Under the Direct Influence of Surface Water" (2012) was prepared partially in response to local drinking water regulations that requires delineation of GUDI sources to ensure that they are filtered. The Colorado Primary Drinking Water Regulations state that under these circumstances the operator "must install filtration equipment" (Colorado Department of Public Health & Environment, 2012).

Key relevant Colorado definitions include:

- Confining Layer: a laterally extensive geologic zone having a hydraulic conductivity of less than 10<sup>-6</sup> cm/s;
- Groundwater flow path length: the measured horizontal distance from a well to the edge of the nearest surface water body;
- GUDI: Any water beneath the surface of the ground with the US EPA definitions outlined in the section above plus "any well that was unable to pass a visual well inspection";
- Surface water: Any water source that is open to the atmosphere and subject to surface runoff;
- Type 1 aquifer: Aquifers below a confining layer. All wells completed in Type 1 aquifers are considered to be non-GUDI;

- Type 2 aquifer: Aquifers in unconfined bedrock;
- Type 3 aquifer: Aquifers in unconsolidated rock, including severely weathered crystalline rocks; and,
- Time of travel (TOT): An estimate of the time it takes for water to move from a surface water feature to a well. The approved method of determining TOT is by use of a derivative of Darcy's law and this method can only be used for Type 3 aquifers. Other methods may be approved on a case-by-case basis.

Initial screening criteria for delineating a potential GUDI source include:

- 1. A source depth less than 15 m;
- 2. A groundwater flow path less than 150 m; and,
- 3. A TOT less than 50 days.

For those wells where any of the initial screening criteria are met then groundwater quality performance testing must be completed to show that:

- Using MPA or total coliform data, there is no significant occurrence of insects or other macro organisms, algae, or large-diameter pathogens such as *Giardia lamblia* or *Cryptosporidium;* and,
- There are no significant or rapid shifts in water quality parameters such as aerobic spores, turbidity, temperature or conductivity, which correlate closely with adjacent surface water or climatological conditions.

This testing must be completed in accordance with Table 2. MPA analysis can undertaken be as described in the US EPA MPA Consensus Method (1992) or the Water Research Foundation (2011). Contrary to what is included in the guidance document by the Colorado Department of Public Health & Environment, it is the report author's opinion that total coliform analysis applied alone is not sufficient to assess the presence of significant occurrence of insects or other macro organisms.

#### Table 2 – Schedule of Water Quality Analyses (after Colorado Department of Public Health & Environment)

Parameter	Location	Frequency	Sampling Dates	
Temperature, turbidity and conductivity	Well and surface water (if available)	2 times per 7-day period	March 1 <sup>st</sup> – Oct. 31 <sup>st</sup>	
Total Coliform (with E.Coli)	Well	Once per month	March 1 <sup>st</sup> – Oct. 31 <sup>st</sup>	
Total aerobic bacterial spores	Well and surface water	3 times as specified (concurrently with MPAs)	March 1 <sup>st</sup> – April 30 <sup>th</sup> July 1 <sup>st</sup> – August 31 st Sept. 1 <sup>st</sup> – Oct. 31 <sup>st</sup>	
Microscopic Particulate Analysis (MPA)*	Well (surface water may also be required on a case by case basis)	3 times as specified	March 1 <sup>st</sup> – April 30 <sup>th</sup> July 1 <sup>st</sup> – August 31 <sup>st</sup> Sept. 1 <sup>st</sup> – Oct. 31 <sup>st</sup>	
EPA Method 1622/1623 (Giardia and cryptosporidium)	Case by case	Case by case	Case by case	
*When taking the MPA sample, the system must take a paired total aerobic bacterial spore sample.				

#### 3.1.5 Water Research Foundation

The Water Research Foundation (WRF) completed a study to assess the limitations of the US EPA MPA Consensus Method (1992) and to revaluate microbial methods to assess GUDI. It was found that no single microorganism was able to fulfill all criteria established for an "ideal" indicator of:

- 1. Surface water influence; and,
- 2. Surrogate of pathogen transport.

As a result the WRF recommended use of diatoms, green algae, *Giardia, Cryptosporidium*, fecal coliforms and aerobic spores for an updated MPA. They noted that there is still no ideal indicator or surrogate for the key pathogens of concern, such as *Giardia* or *Cryptosporidium*.

They advocate increased monitoring when systems are most vulnerable to pathogen intrusion, and suggest that aerobic spores and fecal coliforms are the most suitable indicators to serve as preliminary microbial screening parameters.

#### 3.2 Canada

#### 3.2.1 Health Canada

Health Canada (based on 2003 Guidelines for Canadian Drinking Water Quality: Supporting Documentation: Turbidity), suggests that determining whether a supply is GUDI is a complex process. The assessment process includes evaluation of the geology, hydrogeology, hydrochemistry, microbiology, land use and soils.

Municipal drinking water treatment providing filtration and disinfection with chlorine can reduce the risk of contracting giardiasis and cryptosporidiosis. Chlorine by itself is not effective against *Cryptosporidium* but can inactivate *Giardia*. Recent research by Health Canada indicates that ultraviolet light will inactivate both organisms.

The Health Canada Draft Guideline Turbidity in Drinking Water (2012) discusses in detail how turbidity compromises the disinfection process and therefore proposes that, in the case of non GUDI wells a turbidity < 1.0 NTU would be a reasonable guideline. If turbidity is >1.0 NTU, the cause should be investigated.

For GUDI supplies, Health Canada recommends that the source be filtered prior to disinfection. They also provide considerations for exemption of filtration, including:

- 1. Completion of a vulnerability assessment;
- 2. Implementation of source water protection;
- 3. A sanitary survey;
- 4. Provision of a treatment process that still achieves a minimum 3-log reduction of *Giardia* and *Cryptosporidium* cysts and 4-log reduction of viruses using a multi-disinfectant strategy (such as use of UV or ozone to inactivate cysts plus chlorine to inactivate viruses;
- 5. Maintaining an appropriate disinfectant residual in the distribution system; and,
- 6. Contingency or emergency response planning.

Health Canada notes that low turbidity does not necessarily indicate the absence of pathogens.

#### 3.2.2 Ontario

The Ontario Ministry of the Environment (MOE) developed the Terms of Reference for Hydrogeological Study to Examine Groundwater Sources Potentially Under Direct Influence of Surface Water (2001). The objective of the study is to ensure that appropriate treatment is provided to reduce the risk to human health attributable to disease-causing microorganisms.

A number of ways/indicators are suggested to evaluate whether the well supply was GUDI. These included characterization of land use, review of the geology/local hydrogeology, assessment of the physical condition of the wells, evaluation of surface water/groundwater interaction, estimation of the travel time from surface water to the well, and evaluation of source water quality. With respect to the assessment of the physical condition of wells, corrective action must be taken immediately to rectify any construction or maintenance deficiency.

An overarching assumption in the study was that non-GUDI supplies are less at risk than GUDI wells because:

- 1. The time of travel from the surface was long enough for pathogen die-off to occur;
- 2. There was little or no hydraulic potential between a surface water source and the aquifer in which the well was completed; and,
- 3. There was an aquitard present that provided a physical barrier to pathogen movement.

Similar to other jurisdictions, the outcome of the GUDI study is to demonstrate that the well is either under the direct influence of surface water or not under the direct influence of surface water. Investigators are advised to err on the side of public health protection if there is significant uncertainty in the findings. Where the Ontario GUDI TOR differed from other jurisdictions, there is a requirement to determine, for well supplies designated as GUDI, whether there is *effective in situ filtration*. This requirement recognizes that the raw water "must not contain significant numbers of particles which could shield embedded microbes from effective UV or chlorine disinfection".

The Ontario GUDI TOR requires that the following conditions are met to conclude that effective in situ filtration is occurring.

- Task 1: Using particle counters, demonstrate that the water consistently contains significantly less than 100 particles per ml in the size range 10 microns and greater;
- Task 2: Confirm that the particle count is not likely to change during "storm, season or other regular environmental changes"; and,
- Task 3: The raw water is characterized by good microbiological quality.

In practice, Task 2 proved to be difficult as monitoring during significant storm events (25 year and greater storms) was often not feasible within the relatively short time frame afforded to conduct the GUDI study.

In the Ontario Procedure for the Disinfection of Drinking Water (2006) the definition of GUDI was further refined to: *"groundwater having incomplete or undependable subsurface filtration of surface water and infiltrating precipitation"* 

This definition was in recognition that, in most instances, appropriate disinfection processes could deal with the microbial risk, as long as particles in the water did not interfere with the disinfection process. Thus, municipal groundwater supplies designated as GUDI were provided relief from providing chemically assisted filtration if:

1) It could be shown that the aquifer was providing effective in situ filtration; and;

2) Wellhead protection measures were implemented that would reduce pathogen loadings and prevent land use modifications that would change the ability of the aquifer to provide effective in situ filtration (such as removal of material due to aggregate extraction).

In 2011, Ontario commenced a review of the GUDI delineation protocol and by early 2012 had put in place a Committee consisting of regulators, water operating authorities and consultants. The Committee's role was to conduct a comprehensive review and develop a new terms of reference to identify wells that require additional treatment for Ontario. Dr. Monica Emelko of the University of Waterloo is the principal investigator for this work. As a starting point, as of March 2012, the Committee had generally agreed that all wells require disinfection and therefore:

"the principal objective of the study is to determine whether a well requires treatment, other than disinfection, to reduce the risk to human health attributable to pathogens"

Recognition of emerging evidence that significant threats to groundwater quality are associated with variability of recharge, often associated with extreme weather events, has significant implications regarding pathogen transport and risk associated with GUDI supplies. Incorporation of this concept into the new Ontario procedure has proven to be challenging.

This Committee is expected to provide its recommendations to the Province of Ontario in 2013.

### 3.2.3 Nova Scotia

The Nova Scotia Protocol for Determining Groundwater Under the Direct Influence of Surface Water (2002) consists of three steps. The first is a screening step to identify obvious non-GUDI sources. Step two is designed to determine if there is potential for a hydraulic connection between the groundwater source and surface water. If the study shows there is a hydraulic connection then step three must be completed. During step three, particulate analysis is used to further define the risk. Those with a medium to high risk score indicate a GUDI supply.

During step two, water quality data (temperature, conductivity, turbidity, pH etc) are collected for up to a year from both the well and nearby surface water sources, to determine if there is similarity between water quality changes between sources and to assess time-of-travel (TOT) from surface water to the well.

The final step is microscopic particulate analysis (MPA) to determine whether the aquifer "*provides sufficient natural filtration to remove surface water organisms and debris*".

The procedure for MPA sampling follows US EPA (1992). Timing of the MPA sampling is based on the TOT determination from step two, typically with one sample collected after a heavy rainfall (25 to 50 mm) or snow melt and the other after a prolonged dry period.



Figure 2 – Nova Scotia GUDI Assessment Flow Chart (NSE, 2012)

In 2011, Nova Scotia Environment commenced a review of its GUDI protocol. During this review, Nova Scotia identified causes of turbidity in wells and the relationship of turbidity and GUDI as being two areas requiring more study. Work on this (2012) is being conducted at Dalhousie University under the direction of Dr. Robert Jamieson.

#### 3.2.4 British Columbia

British Columbia is currently developing its Guidance Document for Determining Ground Water at Risk of Containing Pathogens (June 2009 under revision). GUDI is one situation of increased pathogen risk described in the document. Regulation requires that groundwater must be disinfected if, in the opinion of a drinking water officer, it is at risk of containing pathogens.

Similar to Nova Scotia, the BC procedure consists of four stages: a screening tool; preliminary hydrogeological investigation; advanced hydrogeological investigation and long term water quality monitoring. The stage four long term water quality monitoring is recommended practice for all water supply systems.

Water quality indicators from the screening tool include the presence of total coliform, *E.Coli*, or turbidity problems. In their discussion of the number of samples necessary to have confidence in the results, they suggest that the common practice of requiring three consecutive results is inappropriate, as it provides less than a 10% assurance of the results. Based on information in the Australia (2011) research, as many as 150 sample results would be required to have a 98% confidence level in the results.

The stage two preliminary hydrogeologic investigations seek to determine:

- 1. If there is a hydraulic connection between the well and surface water;
- 2. If there is filtration that would eliminate pathogen transport to the well from surface water; and,
- 3. If the time of travel from surface water to the well is > 100 days.

The advanced hydrogeological investigation could include test drilling and monitoring well construction, aquifer testing, computer modeling/capture zone analysis/reverse particle tracking, extended monitoring and water quality sampling (isotopes, parasites etc), particle counting, microscopic particulate analysis, tracer testing etc.

The work in BC was conducted in association with regulators across Canada.

In March, 2012, the Province of British Columbia published Draft 8 Guidance Document for Determining Ground Water at Risk of Containing Pathogens (GARP), including Ground Water under Direct Influence of Surface Water (GWUDI), dated March 15, 2012.

### 3.3 Key Points from the Jurisdictional Review

The key points from the jurisdictional review are:

- 1. The absence of indicators does not conclusively indicate a non-GUDI situation.
- 2. *E.Coli* is considered to be a definitive indicator of fecal contamination; total coliforms are a less definitive indicator.
- 3. The presence of *E.Coli*, Entercocci and coliphage are considered by the US EPA to be good indicators of recent fecal contamination.
- 4. Some of the components of MPA are thought to be reasonable indicators of a surface water impact however the absence of microscopic particles at a given point in time is not conclusive evidence that a supply is non-GUDI. Furthermore, the surrogates used in MPA analysis are not necessarily good indicators for turbidity transport from the surface to the well.
- 5. The behaviour of hydrogeological systems under extreme weather events is poorly understood.
- 6. Inclusion of TOT in GUDI evaluations is based on risk reduction as a result of pathogen die-off. There is a wide range of uncertainty in calculation of TOT, particularly in fractured rock hydrogeological systems.
- Many jurisdictions, including NL and Ontario take the position that all wells, regardless of their GUDI status, require disinfection. The degree of treatment largely depends on the nature and risk of particles or organic matter being present in the groundwater supply.
- 8. The distances put forward for arbitrary setbacks from surface water as a GUDI indicator, need to be better founded in science.

# 4. Evaluation of 36 Public Water Supplies in Newfoundland

### 4.1 Scope

The objective of the well field site visits was to conduct an assessment of the physical conditions of the wells, document local physiography and surface water features relevant to understanding potential surface water and groundwater interactions, and to speak with well operators to gain first-hand knowledge of past or current water quality issues. Where possible, aerial photographs of each well site and surrounding area were provided by NL WRMD. AECOM prepared preliminary site location figures using the aerial photography, provincial topography data (scale 1: 12,500) and provincial road network information. A circle showing a 500 m buffer from each well was shown on the site plan to aid the site assessors during the site visits and to identify site features to be investigated during the site visits. The well field visits were conducted by licensed geoscientists.

### 4.2 Preparation

Prior to conducting the site visits, AECOM prepared a GUDI questionnaire that would be completed by the AECOM site assessors during the ensuing well site inspections and interviews with well operators. A copy of a blank questionnaire is included in Appendix A. The following topics were included in the GUDI questionnaire:

- Project Details;
- Well Designation and Location Information;
- Questions for the well operator on historic water quality;
- Source of Water supply / Well Type/ Sensitive Setting;
- Well Construction Details;
- Well Condition Assessment and compliance with NL Well Drilling Regulations (NL Reg 63/03) and Regulation 903 under the Ontario Water Resources Act on wells. (OReg 903);
- Aquifer Characteristics;
- Proximity to sources of surface water bodies;
- Documentation of other wells on-site, including un-used wells and abandoned wells;
- Description of land uses within 500 m of wellhead including land uses specified as risks under NL Reg 63/03; and,
- Notes.

AECOM telephoned each well operator in advance to arrange a suitable time to conduct the site visit, well inspection and interview. During the introductory phone call, AECOM provided a brief explanation on what the site visit entailed and where possible a copy of the well survey questionnaire was emailed to the well operator.

#### 4.3 Approach and Procedure

The site visits involved a visual inspection of each well head and an interview with the well owner or water system operator. All relevant information was compiled on the GUDI Questionnaire Form. The following information was collected, where possible, by the AECOM site assessor:

- Photographs of each well head and the surrounding area;
- A GPS location for each well head;
- Site mapping showing locations of well, buildings, and potential constraints;
- Well pumping rate records or daily water usage records, where available;
- Water level records, where available;
- Recent (last few months) bacteria monitoring results for each well;
- Annual or available chemistry data;
- Well maintenance history; and,

• Historical water quality or quantity problems.

#### 4.4 Results

Site visits and well inspections were conducted by two AECOM site assessors who are licensed geoscientists, between November 28, 2011 and December 16, 2011. The sites were divided amongst the AECOM assessors by region, with one assessor visiting wells in western Newfoundland and the other visiting wells in eastern Newfoundland (Table 3). Site visits to West St. Modeste, St. Lunaire-Griquet, Bear Cove and Shetshatsheits, were cancelled by NL WRMD upon initiation of the project. Due to the remoteness of these locations and poor weather conditions, NL WRMD indicated site visits to these locations would be conducted at a later date. All work was conducted under the direction of Nora Doran, P.Geo. (PEGNL Geoscientist No. 06365).

#### Table 3 – Communities by Region having Wells included in the GUDI study

Western Newfoundland	Eastern Newfoundland	
Badger	Baine Harbour	
Bay St. George	Bunyan's Cove	
Bay St. George South	Deep Bight	
Black Duck (Siding)	Frenchman's Cove	
Flat Bay West	Glenwood	
Fox Roost-Margaree	Holyrood	
Piccadilly Slant-Abraham's Cove	Hopeall	
Port au Port West-Aguathuna-Felix Cove	Makinsons	
Sheaves Cove	Marysvale	
Ship Cove-Lower Cove-Jerry's Nose	Port Rexton	
St. Andrew's	Swift Current	
Tompkins	Wabana	
AECOM Hydrogeologist: Amanda Sills, M.Sc., P.Geo.	AECOM Hydrogeologist: Nora Doran, P.Geo. (NL &	
(Ont.)	NS)	

Results of the site visits and well inspections are included in the completed survey questionnaires in the supporting sections of this report. The supporting sections/tabs are organized by region and alphabetically by community. Information included in each tab section includes a completed well survey questionnaire for each well in the community, site location mapping and surficial geology mapping. For communities with more than one potential GUDI well, multiple well survey questionnaires are included. For each well, there is a figure showing the relative well location and surrounding site features, an aerial photograph and elevation contours and a second figure showing the well location and underlying surficial geology conditions. Where available, a well driller's log is included.

In general, a majority of the wells visited by AECOM had unsanitary well heads and there was very little information, if any, regarding well construction. Examples of some of the unsanitary well heads are shown in photographs 1 through 8.

"Unsanitary wellhead" refers to any wellhead that is not equipped with a casing that extends an appropriate height above the surrounding ground and/or does not have an appropriately vented, watertight and vermin-proof well cover and/or is not designed to support the pumping equipment in the well. All of these features must be in place to prevent entry of material that may impair the quality of the water in the well.

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Examples of unsanitary wellheads found during this study are shown in the photos below.







**Photo 2** – Drilled well in Sheaves Cove is unsanitary due to the lack of a well cap, saw cuts in the casing, and insufficient height of casing above ground. The exposed electrical wires also present a threat of electrical shock.



**Photo 3** – Well #1 in Holyrood may be unsanitary due to penetrations in the well cap and the insufficient well casing height (< 30 cm).



**Photo 4** – Well # 2 in Bunyan's Cove is unsanitary due to inadequate well seal (holes in well cap, rope coming through well cap), and insufficient well casing height (< 30 cm).

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**Photo 5** – Well pit, Holyrood Well No. 3 is unsanitary due to penetrations in the well cap, well casing does not extend >30 cm above ground surface, and the well is constructed in a manner where surface water can enter around the wellhead.



**Photo 6** – Drilled well in Marysvale is unsanitary because of penetrations in well seal, it is not properly vented and the well casing stick up is not > 30 cm above the ground surface. Pump seems to be supported on well seal using a gear clamp, which is inappropriate.



**Photo 7** – Gilbert Hill Well in Hopeall is unsanitary due to hole in casing (improper well seal), insufficient well casing height (< 30 cm), untidy housekeeping in well house (evidence of rodents). Pump seems to be supported on well seal using a gear clamp, which is inappropriate.



**Photo 8** – Champney's Arm well in Port Rexton is unsanitary due to improper well cap (not vermin proof or properly vented), and insufficient well casing height (< 30 cm). Pump seems to be supported on well seal using a gear clamp, which is inappropriate.

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properly А secured bedrock-sourced groundwater supply well has an appropriate length of steel well casing sealed into competent bedrock, affixed with a drive shoe and having an annular space (e.g. the resulting gap between the pilot drill hole and the well casing) filled with an appropriate sealant from the bottom end of the casing at the drive shoe extending upward the full length of the casing to a point just below the pitless adapter. The well casing should extend at least 30 cm above the highest point on the ground surface within three metres radially from the outside of the casing, and above the 100 year storm level. The well should be affixed with a vermin-proof well cap that is vented and secure.

Following the site visits and visual inspection of 36 wells in Newfoundland, the results and GUDI status of the wells can be summarized into one of six categories (Table 4).



Photo 9 – Drilled well in Badger, NL as an example of a sanitary well head.

Well Classification/ Category	Observation / Results	GUDI Classification
Type 1	Type 1 wells include dug wells or shallow overburden wells that are clearly under the influence of surface water as they are very shallow and in a sensitive hydrogeological setting.	GUDI
Type 2	Type 2 wells are drilled wells with clearly unsanitary wellheads. Examples include wells equipped with a well cap that is broken, the well casing stickup is less than 30 cm above grade, the top of the well is equipped with a well cap that does not provide a waterproof or vermin proof seal, or wellheads where there are holes cut into the casing for various reasons (e.g. rope coming out of the casing to secure the pump) or other poorly sealed penetrations into the cap. These also include wells that the pump appears to be supported on the well seal using a gear clamp that causes the well seal to come apart or fail.	Potentially GUDI
Туре 3	Type 3 wells have wellheads that appear to meet the regulatory requirements, however, there is no information about the well's construction or setting (e.g. well depth, casing length, drive shoe, properly sealed annular space surrounding the casing, thickness and nature of overburden).	Potentially GUDI
Type 4	Type 4 wells are wells having unsanitary wellheads because the well is out of compliance; however these wells are not as bad as the Type 2 wells. For example, the top of well casing is less than 30 cm above ground surface.	Potentially GUDI
Type 5	Type 5 wells include wells where water quality data or anecdotal information provided by the well operator suggests there is a connection to surface. For example, the water becomes cloudy after it rains.	GUDI
Type 6	Review of water quality or other indicators, such as temperature provided by NLDEV suggests a connection to surface.	Potentially GUDI

#### Table 4 – Summary of Results of Well Inspections

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#### Table 5 – Results of Site Visits and Visual Well Inspections – Central and Western Newfoundland

Community	Source Name	Water Supply	Comments	Classification (Type)						GUDI Status	Recommendation
Name	Name	No.		1	2	3	4	5	6		
	Well A (1) Old well		Well head appears to be compliant.				х			Potentially GUDI	Determine well construction information.
Badger	Well B (2)	WS-G-0010	Well head appears to be compliant.			х	х			Potentially GUDI	Determine well construction information.
	Well C (3)		Well head appears to be compliant.				х	x		Potentially GUDI	Determine well construction information.
Bay St. George	#3 Well Jeffery's	WS-G-0859	Wellhead is not compliant. Stick-up is too low (< 30 cm) compared to NL guideline.			Х	х			Potentially GUDI	Upgrade wellhead by extending well casing. Confirm well construction details.
Bay St. George South	#2B Lions Club Well	WS-G-0844	Wellhead is not compliant. Upgrade well cap to new style.				х			Potentially GUDI	Upgrade wellhead by installing new well cap. Confirm well construction details.
Black Duck (Siding)	#1 Well	WS-G-0059	Wellhead is not compliant. Upgrade well cap to new style.				х			Potentially GUDI	Upgrade wellhead by installing a new well cap. Confirm the well construction details.
Flat Bay West	#1 Well	WS-G-0244	Wellhead is not compliant. Upgrade well cap to new style.				х			Potentially GUDI	Upgrade wellhead by installing a new well cap. Confirm well construction details.
Fox Roost- Margaree	Drilled 8 inch	WS-G-0852	Evidence of GUDI based on well operator's interview (pond levels drop when well is pumping). Wellhead is not sanitary.					x	x	GUDI	Upgrade wellhead to sanitary conditions. Confirm well construction details. Assess GUDI conditions once wellhead is secure.
Piccadilly Slant- Abraham's Cove	#2 Well – Abraham's Cove	WS-G-0540	Pump is falling into the well. Unsanitary conditions. Exposed electrical wires are a safety hazard.		x					Potentially GUDI	Upgrade wellhead to sanitary conditions by extending well casing, installing a new well cap and cover wires in accordance with the Electrical Safety Code. Determine well construction details.
Port au Port West-Aguathuna- Felix Cove	#1 Well	WS-G-0574	Unsanitary well head. Exposed electrical wires are a safety hazard. There is no cap on this well – open hole. Significant risk of animals and		x					Potentially GUDI	Upgrade wellhead to sanitary conditions by extending well casing, installing a new well cap and cover

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Community Name	Source Name	Water Supply	Comments	Classification (Type)						GUDI Status	Recommendation
Hamo	rianio	No.		1	2	3	4	5	6		
			insects entering the well. Casing stick up is < 30 cm guideline.								wires in accordance with the Electrical Safety Code. Determine well construction details.
Port au Port West-Aguathuna- Felix Cove (con't)	# 3 Well	WS-G-0574	Unsanitary well head. Exposed electrical wires are a safety hazard. There is no cap on this well – open hole. Significant risk of animals and insects entering the well. Casing stick up is < 30 cm guideline.							Potentially GUDI	Upgrade wellhead to sanitary conditions by extending well casing, installing a new well cap and cover wires in accordance with the Electrical Safety Code. Determine well construction details.
Sheaves Cove	Drilled	WS-G-0643	Evidence of GUDI conditions based on interview with well operator (water becomes cloudy after it rains). There is no seal in this well. Electrical wires are exposed. This wellhead is unsanitary.					x	x	GUDI	Upgrade wellhead to sanitary conditions by extending well casing, installing a new well cap and cover wires in accordance with the Electrical Safety. Determine well construction details. Conduct scoped hydrogeological evaluation.
Ship Cove-Lower Cove-Jerry's Nose	#4 Well – Nancy Rowe	WS-G-0839	Well casing stick-up is too low (22 cm). Evidence of GUDI conditions based on interview with well operator (water becomes cloudy after it rains).				x	x		Potentially GUDI	Extend well casing. Install vehicle protection. Determine well construction. Re-assess GUDI conditions once well is secure.
St. Andrew's	#2 Well	WS-G-0680	Reported issues with the operator no longer checking chlorine residuals, UV has been disconnected, door of pumphouse is left unlocked. Old style well cap requires upgrade			x				Potentially GUDI	Concern for public health due to lack of/cessation of disinfection. AECOM concerns communicated to NL ENV by email December 5, 2011. Replace well cap with a new vermin-proof and vented well cap. Remedy issues with operator and reactivate chlorination/disinfection system.
Tompkins	Greg Wall Well	WS-G-0738	The well operator has reportedly turned off the UV system for this well and the chlorine levels are often not maintained. Wellhead is unsanitary because out of old style well cap. Possible rodent feces observed in pump house. Water supply is on a boil order advisory.				x			Potentially GUDI	Concern for public health due to lack of/cessation of disinfection. AECOM concerns communicated to NL ENV by email December 5, 2011. Replace well cap with a new vermin-proof and vented well cap. Remedy issues with operator and reactivate chlorination/disinfection system.

#### Table 6 - Results of Site Visits and Visual Well Inspections - Eastern Newfoundland

Community	Source	Water Supply	Comments	Classification (Type)				ion		GUDI	Recommendation
Name Name		No.			2	3	4	5	6	Status	
Baine Harbour	#1 Dug Well	WS-G-0013	Dug well with a direct connection to surface water. GUDI. Community is on a boil order. No active/current chlorination/disinfection at this location. Well head is not sanitary.	х						GUDI	Apply treatment to this water supply as a surface water system. Upgrade wellhead. Secure well cover is required.
	Well #1	WS-G-0094	Original well in pump house. Not in use. Wellhead is not sanitary.		х					Potentially GUDI	Extend well casing and install a new well cap. Confirm well construction details.
	Well #1B	WS-G-0094	Dry. Well not in use			х				Potentially GUDI	Properly abandon this well.
	Well #1C	WS-G-0094	Emergency Main well. Drilled in 2005, in use.			х				Potentially GUDI	Confirm well construction information.
Bunyan's Cove	#2 Well	WS-G-0095	Well is not sanitary. A surface water body is directly connected to this water supply source (i.e. surface water directed to above-ground storage in the pumphouse). Cannot differentiate between chemistry of surface water and well	x	x					GUDI	As long as the pond water source continues to be mixed and directly connected with the groundwater supply at this location, treatment should be applied to the 'mixed water' as surface water system.
	Deep Bight Well #1	WS-G-0213	Well was recently re-drilled due to lost pump. Follow up site visit to confirm construction and surface completion is to the NL Reg 63/03 stand. Take a closer look at the chemistry			x				Potentially GUDI	Conduct a follow-up visit to confirm final conditions of wellhead. Confirm well construction details and assess groundwater chemistry.
Deep Bight	Deep Bight Well #2	WS-G-0213	Stick-up is < 30 cm guideline requirement. Extension of well casing is required.				х			Potentially GUDI	Extend well casing. Install a new well cap. Confirm well construction.
	Deep Bight Well #3	WS-G-0213	Appears compliant. Confirm what the white tubing is coming from the well. Have a closer look at chemistry.			х	х			Potentially GUDI	Confirm well construction details. Assess groundwater chemistry and assess white tubing at wellhead.
Frenchman's Cove	Dug Well	WS-G-0261	Needs treatment. Surface water source. Wellhead is not sanitary.	х						GUDI	This well should be considered as a surface water source. Apply treatment based on surface water criteria/conditions. GUDI well.

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Community	Source	Water Supply	Comments	Classification (Type)				ion		GUDI	Recommendation
Name	Name	No.		1	2	3	4	5	6	Status	
Glenwood	Handpump Well	WS-G-0800	We need to know more about this well. Vulnerable unless proven otherwise. Unsanitary well head.		x					Potentially GUDI	Upgrade wellhead to sanitary conditions. Extension of well casing and installation of a new well cap is required. Determine well construction details.
	Well # 1 (Holyrood Access Road)	Well # 1 (Holyrood Access Road)WS-G-0356 Source Wells #1 Well, #3Well may be unsanitary due to penetrations in the well cap and well casing is too short (< 30 cm).XPotential GUDI		Potentially GUDI	Upgrade wellhead to sanitary conditions. Extension of well casing and installation of a new well cap. Determine well construction details.						
Holyrood	Well #3 (Holyrood Access Road - well in pit)	Vell #3 WS-G-0356 Well is unsanitary due to penetrations in the well cap, well casing does not extend >30 cm above ground surface, and well is X Pote   vell in pit) Wells #1 Well, #3 constructed in a manner where X GI	Potentially GUDI	Upgrade wellhead to sanitary conditions. Extension of well casing and installation of a new well cap. Determine well construction details. Decommission well pit.							
	Well #5 Salmonier Line (ballfield well)	WS-G-0356 Source Well #5 Ballfield well	Upgrade well cap to new style.				х			Potentially GUDI	Install a new well cap. Determine well construction information.
Hopeall	Gilberts Hill Well	WS-G-0826	Well is unsanitary due to hole in casing (improper well seal), stick up is too short (< 30 cm), untidy housekeeping in well house (evidence of rodents), Pump seems to be supported on well seal using a gear clamp which is inappropriate. Well water turns cloudy after it rains. No chlorination at this location, always on a boil order advisory.		x			x		GUDI	Upgrade wellhead to sanitary conditions. Extension of well casing and installation of a new well cap. Determine well construction details. Apply treatment.
	Taylor's Well #1 (Front)	WS-G-0442	Sanitary but no knowledge on well construction.			х				Potentially GUDI	Determine well construction information.
Makinsons	Taylor's Well #2 (Back)		Sanitary but no knowledge on well construction			х				Potentially GUDI	Determine well construction information.

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Community	Source	Water Supply	Comments	Classification (Type)			ssification (Type)			GUDI	Recommendation
Name	Name	No.			2	3	4	5	6	Status	
Marysvale	Drilled	WS-G-0449	Drilled well in Marysvale is unsanitary because of penetrations in well seal, it is not properly vented and the well casing stick up is not > 30 cm. Pump seems to be supported on well seal using a gear clamp which is inappropriate.		x					Potentially GUDI	Upgrade wellhead to sanitary conditions. Extension of well casing and installation of a new well cap. Determine well construction details.
	St. Edward's Memorial St.	WS-G-0774	Well may be unsanitary due to penetrations in the well cap and well casing is too short (< 30 cm).		x					Potentially GUDI	Upgrade wellhead to sanitary conditions. Extension of well casing and installation of a new well cap. Determine well construction details.
Wabana	Fancy Hill Main Street	WS-G-0766	Well may be unsanitary due to penetrations in the well cap and well casing is too short (< 30 cm).		x					Potentially GUDI	Upgrade wellhead to sanitary conditions. Extension of well casing and installation of a new well cap. Determine well construction details.
	Main Street	WS-G-0769	Well may be unsanitary due to penetrations in the well cap and well casing is too short (< 30 cm).		x					Potentially GUDI	Upgrade wellhead to sanitary conditions. Extension of well casing and installation of a new well cap. Determine well construction details.
Port Rexton	#5 Well – Mabel Clarke's	WS-G-0586	Well is unsanitary due to penetrations in the well cap, well casing does not extend >30 cm above ground surface, and well is constructed in a manner where surface water can enter around the wellhead. Well is < 5 m from a source of potential contamination (above ground fuel storage tank)		x					Potentially GUDI	Upgrade wellhead to sanitary conditions. Extension of well casing and install a new well cap. Determine well construction details. Decommission well pit. Assess options for relocating the fuel AST or assess alternative groundwater supplies.
	Champney's Arm Well	WS-G-0588	Well is unsanitary due to improper well cap (not vermin proof or properly vented), and well casing stick up is too short (< 30 cm). Pump seems to be supported on well seal using a gear clamp which is inappropriate.		×					Potentially GUDI	Upgrade well head to sanitary conditions. Extension of well casing and installation of a new well cap is required. Determine well construction details.
Swift Current	Drilled	WS-G-0725	Well casing stick up is 25.4 cm < 30 cm guideline requirement. Replace well cap				x			Potentially GUDI	Extend well casing and install at new well cap.

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#### Table 7 – Summary of Wells by Well Type Category

Well Classification/ Category	Observation / Results							
Type 1	Type 1 wells include dug wells or shallow overburden wells that are clearly under the influence of surface water as they are very shallow and in a sensitive hydrogeological setting							
Type 2	Type 2 wells are drilled wells with clearly unsanitary wellheads. Examples include wells equipped with a well cap that is broken, the well casing stickup is less than 30 cm above grade, the top of the well is equipped with a well cap that does not provide a waterproof or vermin proof seal , or wellheads where there are holes cut into the casing for various reasons (e.g. rope coming out of the casing to secure the pump) or other poorly sealed penetrations into the cap. These also include wells that the pump appears to be supported on the well seal using a gear clamp that causes the well seal to come apart or fail							
Туре 3	Type 3 wells have wellheads that appear to meet the regulatory requirement, however, there is no information about the well's construction or setting (e.g. well depth, casing length, drive shoe, properly sealed annular space surrounding the casing, thickness and nature of overburden?)							
Type 4	Type 4 wells are wells having unsanitary wellheads because the well is out of compliance; however these wells are not as bad as the Type 2 wells. For example, the top of well casing is less than 30 cm above ground surface.							
Type 5	Type 5 wells include wells where water quality data or anecdotal information provided by the well operator suggests there is a connection to surface. For example, the water becomes cloudy after it rains.							
Type 6	Type 6 Review of water quality or other indicators, such as temperature provided by NLDEV suggests a connection to surface.							

### 4.5 Discussion

Many of the wellheads observed by AECOM were not in compliance with the NL Well Construction Regulations (NL Reg. 63/03). As a result, implementation of a sampling program designed to characterize the wells as being GUDI or non GUDI would likely be biased by the well condition. Furthermore, it was difficult to interpret source water chemistry information provided by NL ENVC, since the non-compliance condition of many of the wells may be a contributing factor to the observed poor water quality. Many of the wells have either an unsanitary and unacceptable well seal, and are not compliant with the NL Well Regulations (63/03). Other wells appear to have a sanitary well seals based on a visual assessment, however little is known about their construction.

Given these findings, any evaluation of the raw groundwater chemistry is not considered reliable for GUDI evaluation and any recommendations for future sampling would be premature given that these wellheads are not secure. Considering this, a draft groundwater sampling program is not practical at this stage of the GUDI evaluation. It would be premature to recommend a GUDI sampling program ahead of securing the wellheads and determining well construction information for the subject wells.

# 5. Scoped Hydrogeological Assessments

For confirmed GUDI wells and wells where anecdotal information provided by the well operator suggests there is a connection to surface water, AECOM has compiled available information to support a future scoped hydrogeological assessment for each location. There are 6 wells in this category:

- Baine Harbour (dug well);
- Frenchman's Cove (dug well);
- Bunyan's Cove (surface water source directly connected to groundwater supply);
- Sheaves Cove (drilled well water that reportedly turns cloudy after it rains);
- Fox Roose Margaree (drilled well water that reportedly turns cloudy after it rains); and,
- Hopeall (drilled well water that reportedly turns cloudy after it rains).

From experience, it is recognized that regional and local hydrogeological information in the Province can be limited. The following information should be considered when preparing scoped hydrogeological assessments:

- Assessment of storm frequency and intensity in the areas of potential GUDI wells;
- Evaluation of local well records from the most recent version of the province's Drilled Well Database;
- Pumping test results from the most recent version of the province's Pumping Test Database for the aquifer source;
- Raw water quality analyses for the aquifer source;
- Available groundwater studies and/or literature on the area;
- Consultation with appropriate provincial agencies and well contractors familiar with the area to obtain information on local groundwater resources;
- Where available, local bedrock and surficial geology, including stratigraphy, depth, thickness, composition, texture, known relevant weathering/alteration/structural features (i.e. joints, fractures, faults, or bedding planes), water-bearing potential, and lateral continuity based on existing information;
- Local hydrogeology, including identification of hydrostratigraphic units and the hydraulic and hydrochemical characteristics of each unit based on existing information; and,
- Identification of primary, secondary and tertiary sub-watersheds within the suspected groundwater recharge area and surface-water features within 500 metres of the site boundaries, including the types of surface-water features and the location of surface-water features relative to the site.

Since 2007, a total of four regional-scale hydrogeology reports have been commissioned by NLDEC WRMD, covering all areas of Newfoundland and Labrador. The main objective of the studies was to determine the physical characteristics of the major geological units in relation to the occurrence, availability, and quality of the constituent groundwater and to define the former in terms the aquifer potential. The studies were based entirely on available data sources for the groundwater resources of four areas of Newfoundland and Labrador including separate reports for each of western, central and eastern Newfoundland and a separate report for Labrador. They include the following reports:

- AMEC (2008) Final Report on the Hydrogeology of Western Newfoundland, dated May, 2008;
- AMEC (2009) Draft Report on the Hydrogeology of Central Newfoundland, dated March 31, 2009;
- AMEC (2010) Draft Report on the Hydrogeology of Eastern Newfoundland, dated May, 2010; and,
- AECOM (2011) Draft Report on the Hydrogeology of Labrador, dated March, 2011.

Where possible, the following information has been included in the applicable appendix section for each well location. However, it should be noted that a majority of this information is not available for the six (6) wells identified as requiring future scoped hydrogeological assessments.

Hydrogeology mapping for Central and Eastern Newfoundland was not available for inclusion into this report. However, hydrogeology mapping as presented in AMEC (2008) has been included in the supporting information section for applicable public supplies assessed by AECOM located in Western Newfoundland.

## 6. Recommendations for a GUDI Evaluation Process

### 6.1 Proposed Designation Criteria for GUDI wells in Newfoundland and Labrador

This section adopts key components from the jurisdictional review to develop designation criteria that enable wells to be characterized as being "true" groundwater, GUDI or GUDI but with effective in-situ filtration.

For the purposes of this section, GUDI is defined as a communal well supply that is susceptible to contamination from pathogens.

There are two fundamental criteria that need to be established during the GUDI evaluation process. The first is to assess whether viable pathogens may reach the well, under what environmental conditions they will do so and at what levels they are likely to be found in the well. The second is to assess whether turbidity or particulate matter could reach the well, or be produced by the well, and interfere with disinfection.

#### 6.1.1 Step 1 GUDI Screening

The objective of the initial screening is to identify wells that appear to be true groundwater and thus do not need further investigation other than routine monitoring. This initial step would involve a background information review, paying particular attention to well construction details, and a site visit. In the event that well construction/completion deficiencies are observed, i.e., the well is not in compliance with current NL regulations, and/or other aspects of well construction that may put the well at risk, then rectification of those deficiencies must be made immediately, before proceeding with any other aspects of the GUDI screening.

For a groundwater source to be considered as non-GUDI, then <u>none</u> of the criteria set out below can apply to the well, otherwise the well is potentially GUDI and the subsequent steps must be completed.

- 1) The well is completed in any area where the any of the Public Health Risk Factors apply. Any well completed in the following hydrogeological settings where there is an increased likelihood that pathogenic bacteria or viruses will arrive at the well in an infectious state. These include (after US EPA, 2008):
  - a) Sensitive aquifers (karst, fractured bedrock or gravel);
  - b) Aquifers in which viruses may travel faster and farther than bacteria (fractured rock);
  - c) Shallow unconfined aquifers;
  - d) Aquifers with thin or absent soil cover;
  - e) Wells previously identified as having been fecally contaminated; and,
  - f) Wells in an area of high population density with on-site sewage disposal systems.
- 2) Proximity to surface water or other significant source of pathogens a bedrock well within 500 m of surface water or an overburden well within 100 m of surface water (after Ontario, 2001). In this case, surface water includes an area that would be flooded, or where ponding would occur in the event of a storm of a given intensity, frequency and duration. Significant sources of pathogens would include manure storage facilities, wastewater treatment plants, communal on-site waste water sources, etc.
- 3) Well Construction a well that does not meet current NL well construction regulations and any well without casing grouted to a depth of 30 m or where the first water producing zone is within 30 m of the surface. We

recognize that this will require an amendment to the well drilling regulations. We also recognize that 30 m is an arbitrary depth that requires discussion with the Province.

4) Water quality – any well with total coliform and/or E-Coli detections or at any time turbidity of between 1 and 5 NTU.

In addition to commenting on the above, key elements that should be documented for the Province's review are set out in the following table.

#### Table 8 - Elements that should be considered for a preliminary hydrogeological investigation

#### (modified, after BC 2009)

	Торіс	Elements
(a)	Site location, topography and general drainage features	site plan at suitable scale, location of well(s) and surface water features (type, size, natural and constructed), topographic features and contours, drainage flow directions, drainage features such as dry ditches, swales or depressions near the wellhead, vegetation, distances from potential sources of contamination
(b)	Climatic conditions	location of nearest climate stations, monthly and annual precipitation normals, extreme rainfall events, seasonal patterns, timing of snowmelt
(c)	General soils and geology (unconsolidated and bedrock)	type, thickness and distribution of soils, surficial or unconsolidated deposits and bedrock units; general stratigraphic succession, geomorphological features of deposits and structural features in bedrock
(d)	Well and wellhead conditions	well type, age, design, construction details and physical condition; UTM location coordinates; measured distances from surface water features and neighbouring wells, edge of floodplain, edge of channel, edge of bank, high water mark; type, diameter and depth of casings and liners; annular space; depth, thickness and condition of surface seal; screen type and location; location of perforated intervals; well cap type, condition and venting; stick up, elevation of wellhead and ground elevation; pump type and condition; pitless adapter depth and condition, condition of check valves, well pits and drainage provisions; lithologic log, depth of water-bearing zones, well yield and well efficiency
(e)	Hydrogeologic conditions and aquifer characteristics	origin, nature and type of both aquifer and confining units, grain size, primary or secondary porosity, thickness and extent; unsaturated zone thickness; hydrogeological cross sections to scale showing, stratigraphy, aquifers, confining layers, well construction features, non-pumping water levels and relationship to surface water features; pumping test data; conceptual hydrogeological model, including hydrostratigraphic units and geologic boundaries; aquifer parameters including transmissivity, hydraulic conductivity and storativity; recharge boundaries; infiltration from extreme rainfall event in proximity to well; aquifer conditions (unconfined, confined); assessment of spring sources
(f)	Surface water hydrology and general watershed conditions	historic streamflow data, river stage data, peak flow timing, tidal effects; high and low flow monitoring records, normal range, seasonal variations; floodplain conditions and history of flooding, 100, 50 and 20 year flood levels
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	Торіс	Elements
(g)	Hydraulic gradients, water level fluctuations and directions of groundwater flow under ambient and pumping conditions	non-pumping (ambient) and pumping conditions, presence of artesian or flowing artesian conditions, water levels trends from observation wells, seasonal variations, correlation with precipitation and surface water data, water table and potentiometric surface maps, evidence of vertical gradients, calculation of horizontal gradients, map with flow directions, unsaturated zone flow conditions
(h)	Pumping conditions, capture zones and time of travel estimates	well yield and pumping conditions, pumping rates and volumes with time, normal well operation; preliminary delineation of well capture zone, estimates of time-of- travel between nearby surface water and well under various pumping and water level conditions; distance-drawdown effects
(i)	Groundwater and surface water quality characteristics	comparison of inorganic (major cations and anions) and microbiological parameters to temperature, conductivity, pH and turbidity; observed variations between groundwater and surface water quality with time; role of geochemical reactions
(j)	Land use and potential sources of contamination	type of activity, potential contaminants and distances from wells and surface water drainage features, distances from permitted waste discharges, nearby poorly constructed and/or abandoned wells
(k)	Conclusions	Summary of the evidence and the need, if any, for additional investigations, long- term monitoring considerations and any mitigative measures. Supporting reasons, including uncertainties, should be provided.
(I)	Recommendations	Include recommendations for further investigations and/or mitigative strategies, if any.

At the end of this step, the well can be classified as non-GUDI, or requiring further study.

#### 6.1.2 Step 2 Hydrogeological Evaluation and Threat Assessment

This step can also be described as characterization of pathogen threat or the pathogen risk assessment.

The objective of this step is to provide information that could be used to further characterize whether the hydrogeological setting would allow rapid recharge of surface water or infiltrating precipitation from snow melt, temporary flooding or ephemeral ponds that occur during extreme weather events. At the end of this step the well can be classified as either:

- Non-GUDI;
- In hydraulic connection with the surface;
- In hydraulic connection with the surface but hydrogeological factors will be effective in eliminating the risk of
  pathogens reaching the well (i.e., >100 day TOT, an acceptable degree of in-situ filtration); and,
- Potentially in hydraulic connection with the surface, if there is significant uncertainty.

It is anticipated that much of the step 2 work will focus on characterizing the pathogen threat and assessing the potential for pathogen die-off based on determination of TOT from surface to the well and further water quality characterization to characterize the potential for hydraulic connection with the surface.

Elements that should be considered for inclusion in the Step 2 study are set out in Table 9.

### Table 9 - Suggested elements for an advanced hydrogeological investigation (modified after, BC 2009)

	Торіс	Elements
(a)	Test drilling and completion of monitor wells	construction of monitor wells for: water level and water quality monitoring, confirmation of the thickness and extent of aquifers and confining units, preparation of water table and potentiometric surface maps; hydrogeological cross sections to scale showing, stratigraphy, aquifers, confining layers, well construction features, non-pumping water levels and relationship to surface water features; UTM well locations
(b)	Characterization of pumping well	static and pumping video survey and dynamic flow profile to document location, nature and proportion of flow from each the producing zones. Confirmatory packer testing in fractured bedrock settings, depending on results of flow profile.
	Extended aquifer pumping tests to determine aquifer parameters	testing of monitor wells and water supply wells, , monitoring of observation wells during testing
(c)	Computer flow modeling and simulation of extended pumping periods	description of numerical model employed, assumptions and limitations, boundary conditions; simulate groundwater equipotential contours and flow directions, sensitivity analysis
(d)	Advanced capture zone analysis	use of water level data from monitor wells, description of numerical model employed, assumptions and limitations, boundary conditions; simulate groundwater equipotential contours and flow directions, sensitivity analysis
(e)	Reverse particle-tracking and advanced time of travel determinations	description of numerical model employed, assumptions and limitations, boundary conditions; simulate groundwater equipotential contours and flow directions, sensitivity analysis
(f)	Monitoring of water levels and water quality (groundwater and surface water) over extended periods of time	frequent monitoring of water levels and water quality in wells and nearby surface water locations for periods of 6 to 12 months; key quality parameters to include are: total coliforms and <i>E.coli</i> , conductivity, turbidity and field determinations of temperature, pH, DO and ORP; correlate variations in groundwater with surface water employing statistical methods; correlation with precipitation data; sampling locations; role of geochemical reactions; quality control procedures during sampling
(g)	Particle counting	sampling and testing of groundwater for number and size of particles, comparison with typical sizes of pathogens, one or more samples at different times of the year, quality control procedures during sampling; sampling locations
(h)	Microscopic particle analysis (MPA) testing	sampling and testing for surface water organisms including <i>Giardia</i> and <i>Cryptosporidium</i> in groundwater, one or more samples at different times of the year, quality control procedures during sampling; sampling locations
(j)	Isotope testing	sampling and testing of natural isotopes of oxygen and hydrogen, tritium, helium- tritium ratios; observed variations between groundwater and surface water; origin, probable age and flow history, quality control procedures during sampling; sampling locations
(k)	Other advanced techniques	geophysical surveys, down-hole surveys, environmental or applied tracer tests using dyes, bromide, or other soluble species to assess flow paths and travel times

#### 6.1.2.1 Well Characterization Assessment:

The purpose of the well characterization assessment is to determine if there is a direct hydraulic connection from the surface into the well within the immediate area influenced by well construction. Using appropriate geophysical tools, the assessment will confirm the depth of the well casing, the presence or absence of an annular seal and the depth to which the seal extends, and the location and proportion of flow to the well under normal and peak pumping rates from any water producing zones <30 m below ground and >30 m below ground.

#### 6.1.2.2 Water Quality Sampling Program:

The purpose of the water quality sampling program is to identify what pathogens are likely to be present in the well, when they are most likely to be found and at what relative concentration they are present.

The purpose of a groundwater sampling program (raw water) is to confirm that treatment is appropriate for the risk. The jurisdictional review has identified three key indicators of recent fecal contamination: *E-Coli*, Enterococci and coliphage (US EPA, 2008). The presence of any of these indicators in the raw water would provide conclusive evidence that the time of travel from the surface to the well is short enough for pathogens to remain viable.

The presence of these indicators would suggest that the aquifer is not providing filtration and it would then be necessary to assess if parasitic pathogens and/or turbidity transport from the surface poses a threat. Continuous raw water monitoring of turbidity may provide a reliable method of assessing this risk.

Depending on the risk factor, as summarized in Table 9, collect appropriate indicator samples as set out in the following table (adapted from US EPA 2008) to delineate the wells as being potentially GUDI.

# Table 10 – Summary of Risk Factors for Targeting Susceptible Systems for Assessment Source Water Monitoring (adapted after, US EPA 2008)

Risk Factor	Aquifer Type	Recommended Indicator
Sonsitive Aquifers	Karst, fractured bedrock,	E. coli, Enterococci, or
Sensitive Aquilers	or gravel	Coliphage
Aquifers in which viruses may travel faster	Alluvial or coastal plain	Coliphage
and further than bacteria	sand aquifers	
Shallow unconfined aquifers	Any	Coliphage
Wells previously identified as having been	A.p.y	Based on historical
fecally-contaminated	Ally	contamination
High population density combined with on-	Barrier island sand	Colinhago
site wastewater treatment system	aquifers	Coliphage
Other rick Eastern <sup>1</sup>	Any	E.Coli, Enterococci,
Other fisk Factors	Any	Coliphage
<sup>1</sup> Including but not limited to: well near a source of fecal contamin surface or subsurface seal); well of unknown construction (e.g.,	ation; well in a flood zone; improperly no driller's log or other record of constr	constructed well (e.g., improper ruction); other non-microbial

surface or subsurface seal); well of unknown construction (e.g., no driller's log or other record of construction); other non-microbial indicators of potential for fecal contamination (e.g., Methylene blue active substances (MBAS), high chloride or nitrate levels from baseline or historic trends).

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One of the aims in any sampling program, particularly with microbial sampling, is to have a high degree of confidence that the water quality as measured in the laboratory is representative of that actually used by the consumer, not just at the time of sampling, but all the time. The degree of confidence is related to the number of samples analyzed.

Figure 2 depicts a plot of the level of confidence that 98% of water in a supply is free of fecal contamination for a different number of samples when all samples collected are free of fecal contamination. (Australia Government, 2011).

For example, if 50 samples are analyzed and all are free of fecal contamination, then there is only 70% confidence that 98% of the water system is free of fecal contamination.

Future sampling studies undertaken by or on behalf of NL WRMD should consider the number of samples needed for a given sampling program and the degree of confidence desired. A level of confidence of at least 90% is suggested.

#### 6.1.2.3 Time of travel determination



Figure 3 – Level of Confidence that 98% of water in a supply is free of fecal contamination for different numbers of samples when all samples tested are free of fecal contamination. (Source: Ellis, 1989, as presented in Australian Government, 2011)

The consultant is to estimate time of travel (TOT)

from the surface to the well, using "reverse particle-tracking" or other advanced time of travel determination to determine if the TOT is < or > 100 days at the average rate of pumping and the peak rate of pumping. The proposed method is to be approved by NL prior to implementation.

#### 6.1.2.4 Microscopic particulate analysis

Collect samples and conduct MPA. A minimum of three samples are to be collected based on TOT estimates following storm events that exceed an intensity, duration and frequency to be established by further study.

#### 6.1.3 Step 3 Treatment Needs Assessment

Step 3 is required if it has been shown in Step 2 that pathogens may reach the well. The purpose of step 3 is to provide information to assess the treatment needs assessment of the supply. This step will require:

- Evaluation of the potential for biofilm development within the well;
- Characterization of physical water quality during the initial 30 minutes of pumping of the well at start up; and,
- Assessment of the potential for particle transport either from the surface or within the aquifer and the potential for the particles to interfere with disinfection.

A major component of this step is to assess whether there is a risk that the well will produce turbidity >1 NTU at any point during its operation and to identify the cause and nature of the turbidity. This evaluation can utilize both

turbidity measurements and particle counters. Evaluation of turbidity/particles is to take place for a long enough duration and under a wide range of operating and environmental conditions to adequately characterize the risk. Unfortunately, evaluation of particle count data is complicated and studies have shown that wells may produce particles under three scenarios:

- Due to well design and construction issues, that result in particle production during start-up;
- Due to aquifer issues, that result in the release of sediment during pumping; and,
- Due to adverse weather events, where turbid surface water travels from the surface to the well (either from a nearby surface water feature, or ponding of turbid water within the capture zone of the well).

#### 6.2 Methods for Designating a Wellhead Protection Area

Designating a wellhead protection area (WHPA) around wells is considered one of the most effective methods of protecting groundwater supplies. Although jurisdictions across North America have used different methods to determine WHPA, they are generally all based on an understanding of the recharge area or capture zone of the well, and the travel time from surface recharge to the well. Methods for calculating travel time can include 3D numerical models, 2D analytical methods, fixed radius, simplified variable shape or uniform flow. Designated zones within the WHPA based on travel time (eg. 2 year, 25 year) provides a risk-based approach to protecting groundwater supplies. Detailed water budget analysis and an understanding of aquifer characteristic is a critical component to understanding water availability (quantity) and for properly designating the recharge areas for the well.

A significant proportion of the public supply wells in Newfoundland and Labrador are sourced by groundwater from wells completed in bedrock aquifers. Understanding of groundwater flow through fractured rock is a complex topic. Because of the complex distribution of fractures in almost every type of rock, no single method can unambiguously map fractures and their capacity for fluid movement (USGS, 2002). Development of WHPA's in fractured rock is considered to be a complex undertaking that is beyond the scope of the subject study.

Given the limited amount of hydrogeologic data available for many of the wells in this study, and until such time when more information is available, the simplified variable shape method according to US EPA (1987) is recommended for adoption. Regardless of the approach adopted, until there is a better understanding of how the water gets into the wells (i.e. better well characterization to identify proportion of flow from water producing zones), then there are limitations for recommending methods for designating WHPA's, given the current conditions.

In a simplified variable shapes method, "standardized forms" are generated using analytical models with both flow boundaries and TOT used as criteria (US EPA 1987). The appropriate 'standardized form' is selected for hydrogeologic and pumping conditions. According to US EPA (1987), "The variable shapes are calculated by first computing the distance to downgradient and later extents of the groundwater flow boundaries around a pumping well and then using a time of travel criterion to calculate the upgradient extent. Standardized forms for various criteria are calculated for different sets of hydrogeologic conditions. Input data for the standardized shapes include basic hydrogeological parameters and well pumping rates."

Advantages of the simplified variable shapes method are that it can be easily implemented once the shapes of the standardized forms are calculated and that it requires a relatively small amount of field data. A disadvantage of this method is that it may not be accurate in areas with many geologic heterogeneities and hydrologic boundaries (US EPA 1987).

# 7. Evaluation of Drinking Water Quality Issues

This section presents an overview of treatment considerations for GUDI wells based on currently accepted standards, regulations governing drinking water quality standards (e.g. GCDWQ) and ENVC guidelines. Suggested monitoring guidelines for GUDI wells consistent with current accepted methods are also provided.

### 7.1 Treatment Considerations

Primary disinfection can be accomplished by either chemical and/or physical means such as the use of chlorine, chlorine dioxide, ozone, ultraviolet light and membranes. However, some of these processes may not be adequately effective on well water of inferior biological, physical or chemical quality.

In Ontario "true" groundwater is considered to be water found in an aquifer where the overburden and soil acts as an effective filter that removes micro-organisms and other particles by straining. For this type of environment the treatment system must consist of disinfection that achieves a 99% (2 log) removal or inactivation of viruses. Typically this can be achieved using chlorination.

For a groundwater supply designated as GUDI but with effective in-situ filtration, the treatment system must consist of disinfection that achieves 99.99% (4 log) removal or inactivation of viruses. Typically, this can be achieved using a combination of UV and chlorination. Note that wellhead protection is also required.

For a groundwater supply that is GUDI, the treatment system must be capable of producing water of equal or better quality than a combination of well-operated chemically assisted filtration and disinfection would provide. The process must provide 99% removal or inactivation of *Cryptosporidium* oocysts, 99.9% removal or inactivation of *Giardia* cysts and 99.99% removal or inactivation of viruses before water is delivered to the first consumer.

When implementing the Ontario rules, it has been typical, for a small groundwater supply, to use cartridge/bag or membrane filtration to achieve log reduction of particles comparable to that which would be achieved using conventional chemical filtration.

For NL, this report recommends that groundwater supplies are considered as either GUDI or non-GUDI. All wells should be treated, with the minimum treatment being disinfection that provides 99.99% removal or inactivation of viruses, as per Health Canada Guidelines (2010). In the case of a GUDI designation, this report recommends additional treatment suitable for the risk established for each system. During the risk assessment, an exemption from filtration criteria could be developed.

In the interim, for the systems designated as GUDI, or where there is uncertainty whether the supply is non-GUDI, until there is evidence to indicate that chemically assisted filtration is not required; this report recommends that each system be equipped with the following:

- 1. Cartridge or bag filtration with a nominal size rating of 5-10 microns (as a pre-filter) followed by cartridge or bag filtration with a 1 micron absolute rating;
- 2. UV;
- 3. Chlorination; and,
- 4. Continuous turbidity monitoring, with shut off if raw water turbidity exceeds 1 NTU, or other value based on the operational characteristics of the well, combined with manual re-start (not auto) by operator.

### 7.2 On-going monitoring of GUDI wells

Parameters for on-going raw water monitoring of GUDI wells should include:

- 1. On-line turbidity, for those wells without engineered filtration, to allow confirmation that engineered filtration is not required;
- 2. Total coliforms as an indicator of degrading water quality; and,
- 3. *E. Coli,* enterococci and coliphage, as indicators of recent fecal pollution.

Ideally, sampling should occur weekly for the first year, with a decision on the sampling frequency made after the initial year of designation of the well as GUDI.

The Province should be notified in the event that turbidity equals or exceeds 1 NTU, or the presence of any of the microbial parameters.

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## 8. Conclusions

Based on the scope of work conducted by AECOM, the following conclusions are made:

- A review of GUDI requirements in United States and Canada revealed the following key points:
  - The absence of indicators does not conclusively indicate a non GUDI situation.
  - *E.Coli* is considered to be a definitive indicator of fecal contamination; total coliforms are a less definitive indicator.
  - The presence of *E.Coli*, Entercocci and coliphage are considered by the US EPA to be good indicators of recent fecal contamination
  - Some of the components of MPA are thought to be reasonable indicators of a surface water impact however the absence of microscopic particles at a given point in time is not conclusive evidence that a supply is non-GUDI. Furthermore, the surrogates used in MPA analysis are not necessarily good indicators for turbidity transport from the surface to the well.
  - The behaviour of hydrogeological systems under extreme weather events is poorly understood.
  - Inclusion of TOT in GUDI evaluations is based on risk reduction as a result of pathogen die-off. There is a wide range of uncertainty in the calculation of TOT, particularly in fractured rock hydrogeological systems.
  - Many jurisdictions, including NL and Ontario take the position that all wells, regardless of their GUDI characterization, require disinfection. The degree of treatment largely depends on the nature and risk of particles or organic matter being present in the groundwater supply.
  - The distances put forward for arbitrary setbacks from surface water as a GUDI indicator need to be better founded in science.
- Based on the results of evaluation of 36 public groundwater supplies in Newfoundland, the following conclusions are offered:
  - There is a general lack of bacteriological groundwater quality data for raw groundwater samples (i.e. before any treatment) in the information reviewed by AECOM.
  - Of the 36 public groundwater supplies assessed as a part of this study, 21 out of 36 had wellheads or well seals that are unsanitary.
  - There is an overall significant lack of information on the well construction for all 36 wells assessed by AECOM.
  - Information reported to AECOM revealed two public water supplies (Tompkins and St. Andrews) had treatment systems that were either being ignored and/or records of chlorination/treatment were falsified by the well operator.
  - Inadequate housekeeping of pumphouse infrastructure was observed at one location, Hopeall, where conditions were observed to be unsanitary and pose a risk to human health.
  - There are 6 water supplies that are considered as groundwater under the direct influence of surface water (GUDI). They include water supply wells in the communities of Baine Harbour, Frenchman's Cove, Bunyan's Cove Well #2, Sheaves Cove, Fox Roost Margaree and Hopeall.
- The two fundamental criteria that need to be established during the GUDI evaluation process are: 1) assessment of whether viable pathogens may reach the well, under what environmental conditions they will do so and at what levels they are likely to be found in the well, and 2) assessment of whether turbidity or particulate matter could reach the well, or be produced by the well, that would interfere with disinfection.
- Due to the complexity of groundwater flow in fractured rock environments, development of methods for wellhead protection in these environments is considered to be beyond the scope of this report.

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- The simplified variable shapes method may be an appropriate method for developing wellhead protection areas when limited hydrogeological information is available.
- Scoped hydrogeological assessments should be completed for the following locations:
  - Baine Harbour (dug well)
  - Frenchman's Cove (dug well)
  - o Bunyan's Cove (surface water source directly connected to groundwater supply)
  - o Sheaves Cove (drilled well water that reportedly turns cloudy after it rains)
  - Fox Roose Margaree (drilled well water that reportedly turns cloudy after it rains)
  - Hopeall (drilled well water that reportedly turns cloudy after it rains).

## 9. Recommendations

The unsanitary condition of many of the examined wells prevents reliable interpretation of any pathogen indicators in water samples and ultimately poses a public health threat. This report recommends that all communal wellheads be upgraded to a sanitary condition as soon as is possible.

The relatively shallow depth of casings and absence of annular seal makes wells vulnerable to surface water contamination. This report recommends that a minimum casing depth be established for communal wells. There is little or no technical basis to establish depths at this time and as a result this report recommends an arbitrary depth of 30 m be established for wells constructed in the future.

In the case of existing wells, including the 32 wells classified as potentially GUDI, the following recommendations are presented:

- All wellheads should be upgraded to a sanitary condition as soon as possible; and,
- A testing program should be undertaken to determine if the existing casing is sealed at the point of contact with the bedrock and the location of any water producing zones from the base of the casing to a depth of 30 m.

For the 6 wells classified as GUDI, the following recommendations are presented:

- Scoped hydrogeological evaluations should be conducted; and,
- Conduct a treatment needs evaluation to determine additional treatment requirements based on risk established for each system.

This report recommends that the Government of Newfoundland and Labrador considers updating NL Reg 63/03 to include a minimum casing length, requirement for grouting and requirement for a vermin-proof well seal.

As a minimum, all communal wells should be disinfected for 99.99% removal or inactivation of viruses. If wells are GUDI, then additional treatment suitable for the risk established for each system should be applied. In the interim, for the systems designated as GUDI, or where there is uncertainty whether the supply is non-GUDI, until it is determined that chemically assisted filtration is not required; we recommend that each system be equipped with the following:

- Cartridge or bag filtration with a nominal size rating of 5-10 microns (as a pre-filter) followed by cartridge or bag filtration with a 1 micron absolute rating;
- UV;
- Chlorination; and,

• Continuous turbidity monitoring, with shut off if raw water turbidity exceeds 1 NTU, or other value based on the operational characteristics of the well, combined with manual re-start (not auto) by the operator.

Parameters for on-going raw water monitoring of GUDI wells should include:

- 1. On-line turbidity, for those wells without engineered filtration, to allow confirmation that engineered filtration is not required;
- 2. Total coliforms as an indicator of degrading water quality; and,
- 3. *E. Coli,* enterococci and coliphage, as indicators of recent fecal pollution.

Ideally, sampling should occur weekly for the first year, with a decision on the sampling frequency made after the initial year of designation of the well as GUDI. The Province should be notified in the event that turbidity equals or exceeds 1 NTU, or the presence of any of the microbial parameters.

A method of applying an exemption from chemically assisted filtration should be determined. This would likely be based on an assessment of the condition of the wellhead, the depth to the first producing zone in the well, an appropriate level of raw water quality sampling to demonstrate confidence in the absence of pathogens and consistent raw water turbidity <1 NTU during normal and extreme weather events, routine well maintenance to control biofilm development in the wells and implementation of a wellhead protection zone surrounding the well.

This report recommends an update to the terms of reference for study of NL wells that may require "treatment other than disinfection" (i.e., eliminate the reference to GUDI) once the current Ontario, BC and NS studies are complete to allow incorporation of their key findings.

Elements of a future GUDI evaluation process recommended for the Province of Newfoundland and Labrador should be completed under a three-step process comprising:

- 1) Step I GUDI Screening
- 2) Step 2 Hydrogeological Evaluation and Threat Assessment
  - a. Well Characterization Assessment
  - b. Water Quality Sampling Program
  - c. Time of travel determination
  - d. Microscopic particulate analysis
- 3) Step 3 Treatment Needs Assessment.

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# **Appendix A**

# **Eastern Sites**





# **Baine Harbour**







Map Document. (P:\602363511000-CADD/050 GIS WIP\MXDs\FieldMapMXDs\60236351WellLocations\_BaineHarbour\_SurfGeologymxd) 3/27/2012 - 2:24:14 PM



	Question	Answer	Comments
1 Project Details:	Project No:	60236351	
n roject Detana.		Newfoundland and Labrador, Department of Environment and	
	Client:	Conservation, WRMD	
	Date of Inspection:	13-Dec-11	
	AECOM Inspector:	Nora Donald	
	Site Contact (Name Phone #):		
	one contact (Name, 1 none #).		
	Weather:		
2. Well Designation:	Well ID:	Dug Well	
	Well Type/Usage:	In use - Dug well - gravity fed	
	Well Status (Pumping, Backup, Obs.):	Pumping - supplies 1/2 of community. Remaining 1/2 of the community receives water from a surface water source (pond).	
3. Location	Water Supply No	WS-G-0013	
	Community:	Baine Harbour	
	Stroot		
		-	
(Community, Street, GPS	GPS Northing:	21T 5247313	
Grid, Well Elevation	GPS Fasting	217.0658461	
	Well Elevation (masl):	~150 masl	
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)	Good	
Interview with well	Do Storms Change the Weil Chemistry (i.e. increased TSS)	Νο	(If ves, go to step II) (O Reg 170/03)
	Is the well water chemistry similar to nearby surface water bodies (take conductivity measurement of nearby		( ), <u>3-</u> p "/ (enteg ( ) (90)
	surface water if possible):	No	(If yes, go to stop II) (O Bee (70/00)
	Is there an observable change in nearby surface water	INU	(ii yes, go to step ii) (0.Keg 170/03)
	levels when the well is pumping:	No pump, gravity fed	(If yes, go to step II) (MOE GUDI Guidelines, 2001)
	Historic issues with bacteria, TSS, boil water advisories?		
	Has the well ever had particle counting or microscopic	Boil order has been in place forever - because no treatment	(If yes, go to step II) (O.Reg 170/03)
	particulate analysis completed on it? If so when, results, copy of report available?	No	
	Are there increasing/concerning trends of any other parameters at the well not mentioned yet:	No	
	Additonal Raw Water Chemistry Available that we could have:		
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc.	"Perrect water", according to H. Kenwall.	
	Does the well water ever taste salty? Is there any	"Perfect water", according to H. Kenwall.	
	evidence of salt water intrusion at the well or in the surrounding area?	"Perfect water", according to H. Kenwall.	
	What is the current well treatment:	No treatment	



	Question	Answer	Comments
	Has the well ever needed treatment upgrades or remediation (if so, when, why, records available?):	People drink this water, although there is a boil order. People from pond (surface water source supplying other homes in town) come to take this water.	
			(If yes and a contrary report was not written after August 1, 2000, go to step II) (O.Reg
	Historic Reports Indicating GUDI status (Y/N):	No	170/03)
	Obtain a copy (Y/N):	No	
	Name of Preparer:	No	
	Reason for GUDI Status:	No	
	Average Annual Pumping Rate:	N/A Gravity fed	
	Maximum Monthly Pumping Rate:	N/A Crowity find	(If <u>cannot</u> pump at greater than 0.58 L/s and is within 15 m of surface water or if the well <u>can</u> supply water at greater than 0.58 L/s and is in overburden within 100 m of surface water or <u>can</u> supply water at greater than 0.58 L/s and is in bedrock within 500 m of surface water, go to step II) (O.Reg 170/03)
	Other (specify):		
5. Sensitive Setting:	Spring:	Potential - yes	(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:	No	(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well:	No	(If yes, go to step II)
	Karst Aquifer:	No	(If yes, go to step II)
	Exposed Fractured Bedrock:	No	(If yes, go to step II)
	Thin or absent soil cover over bedrock? How far away from the well?	No	
	High K Unconfined Aquifer:	No	(If yes, go to step II) (O.Reg 170/03)
	Enhanced Recharge:	No	(If yes, go to step II) (MOE Guidelines on GUDI, 2001)
	Dug Well:	Yes	(If not Drilled Well, Go To Step II) (O.Reg 170/03)
	Drilled Well (in overburden or bedrock):	No	
6. Well	Well Log Found (Y/N):	No	
Construction	Driller (Name; ID):	Dug by hand	
Details	Construction Date:	Sometimes in 1970's - no changes since construction	
	Well Depth:	49"	
	Casing Type:	None	
	Firmly seated in bedrock (Y/N)	None	





	Question	Answer	Comments
	Water Tight Casing to 6mbgs (Y/N)	None	(If No go to Step II) (O.Reg 903)
	Casing Diameter:	12' wide x 10' (3.65 m by 3.05 m)	
		· · ·	
			<i></i>
	Casing Length:	n/a	(If < 12 m or 40 ft, go to Step II)
	Has the well ever been disinfected (when, why, most re	No	
	When was the well pump last serviced or replaced?	- 1-	
	was it disinfected before being placed back in well:	n/a	
	Well Yield:	Unknown, gravity fed	
	Statia Water Level	44" below cover	
	Overburden Thickness:	>49"	
	Rump type:	Nora	
	r unip type.	NONE	
	Pump Setting:	None	
		Na	
	Drive Shoe (Y/N):	NO	
	Grouted Casing (Y/N):	No	
	Thickness of Grout around well:	No	
	Water Level Monitoring Pipe in Well (Y/N):	No	
	Raw Water Sampling Tap (Y/N):	No	
	Otherm	Concrete well everlying reak well	
	Other:		
7. Well Condition	Located in a Well House (Y/N):	No	
A	Well Terred er Identified:	Vee	
Assessment (O.Reg 9	Well Lagged or Identified:	Yes	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):	No. Unsanitary wellhead.	
	Any Rust or Holes Evident on Casing	N/Δ	
	Any reast of fibres Evident off Casility.	1 V/A	
	Above Ground Casing Height (mags) (If stickup, provide	N/A	
	Flush Mount Well (mbas) (If flush mount, provide detail	N/A	
	n den mount wen (mogo) (n nuen mount, provide detail		
	Is the Well Located in a Well Pit (mbgs):	N/A	
	Covered with solid. watertight cover (Y/N):	N/A	
	Casing is above bttm of pit floor:	N/A	
	Is the pit equipped to drain (provide details)?	N/A	
	· · · · · · · · · · · · · · · · · · ·		
	Is the pit equipped with a sump pump (Y/N)?	N/A	



	Question	Answer	Comments
	The casing vent is at what height above the pit floor	N/A	
	Height of Ground Surface for 5 m around well is at least 60 cm above the highest known surface water level (Y/N):	No	
	Is the topography around the well indicative of surface ponding and flow towards the well	Yes	
	Is drainage at the well adequate (any standing water or evidence of ponding):	Yes	
	Protective Cap Found on Well (Acceptable Seal?):	Νο	
	Is the Well Locked (Secure?):	No	
	Pit-less adapter:	n/a	
	Screened air vent:	no	
	Flood protection (has it ever flooded):	no	
	Vehicle impact protection:	n/a No	
8. Aquifer	Surficial (type of geology, depth, observed surficial info):	Yes	
Characteristics	Bedrock (type, depth, exposed at surface):	No	
	Show the Geology Mapping or borehole,does it match with their understanding?	Νο	
	Unconfined Municipal Aquifer:	Yes	(If yes, go to step II)
	Confined Municipal Aquifer:	No	
	Pumping Test Done (Y/N)	No	
	When was test done, is the data available?	No	
9. Proximity to sources of potential surface water contamination	Perennial Stream/Pond (metres awav from well):	< 100m	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	Ephemeral Stream (metres away from well):	No	Water and bedrock well, go to Step II) (If < 100 m from Surface Water and an
(500 m for bedrock,	Ditch (metres away from well):	No	overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
100m for overburden)	Is there water in the ditch (Y/N):	No	
	ditch? Does the ditch drain quickly?	No	(If < 100 m from Surface Water and an
	River:	Νο	overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Lake:	No	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)



	Question	Answer	Comments
	Wetlands/Marshes:	No	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:	n/a	
	Highway/Road:	Yes; 75m; hydraulically upgradient from dug well	
	Unused wells found on site:	Yes	
	Should they be abandoned:	Yes	
	Abandoned wells on site:	Yes - 3 other large diameter holes dug in vicinity of dug well	
	Abandonment Log Available (Y/N):	No	
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):	No	
	Artesian wells found on adjacent properties:	No	
	Are there Well Pits Located on Adjacent Properties:	No	
	Other (Specify):	no	
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	Private	
	If on private services, how many septics/wells (based on # of homes):	Some on septic, others raw discharge to the harbour	
	Distance of closest septics (approx. to house):	200m	
	Communal septics used nearby:	No	
	Are domestic wells within municipal aquifer:	Yes, one dug well on other side of harbour; one drilled	
	Are there wells found within well pits on surrounding properties:	No	
	Any historic well interference complaints:	No	
	Historic Contamination Issues Noted at Domestic Wells:	No	
	Parkland:	No	
	Fertilizer used?	No	
	Forestry:	No	
	Agriculture:	No	
	Evidence of Manure Storage (liquid or solid):	No	
	Animal Grazing:	No	



	Question	Answer	Comments
	Industrial:	No	
	Type of Industrial Use:	No	
	AST's or UST's at site:	No	
	Other Risks (large septics etc):	No	
	Land Uses Specified in NL Reg 63/03 as risks:	No	
	Cesspool receiving raw sewage that is less than or		
	equal to 4 m deep ( >= 30 m away from well):	No	
	Cesspool or seepage pit that is >= 4 m deep unless it		
	prevents seepage has to be >= 60 m away from a well	No	
	Seepage Pit, Filter Bed, Soil Absorption Field, Earth		
	Filly Fillor similar (>=10 m away nom wen).	No	
	Sewer of cast iron with leaded joints or approved mechanical joints independent clean water drain or		
	cistern (>= 3 m away from well):	No	
	Sopitory Londfill or Corbogo Dump:		
	Sanitary Landnii of Garbage Dump.	No	
	Is there a pumphouse cast iron floor drain with leaded		
	joints draining to ground surface? (>=1 m from well)	No	
	Septic(s), concrete vault privy, sewer or tightly jointed		
	tile or equivalent material or sewer connected foundation drain (>=16 m away from well):		
		No	
	Future Land Use Changes that could impact wells:	No	
11 Notes:	Other please specify (i.e. sources of microbial contam.)	No	

#### Photo Log - Baine Harbour

Well cover







Dug Well



Side View of dug well.



View of interior of well - rock lined



Concrete wall above rock-lined wall and plywood cover.



# **Bunyans Cove**





locument: (P:i60236351000-CADDI050 GIS WIP\MXDs\FieldMapMXDs\60236351WellLocations\_BunyansCove1.mxd)





	Question	Answer	Comments
1. Project Details:	Project No:	60236351	
	Client:	Newfoundland and Labrador, Department of Environment and Conservation, WRMD	
	Date of Inspection:	30-Nov-11	
	AECOM Inspector:	Nora Donald	
	Site Contact (Name, Phone #):	Operator - Wade Bowring; Treasurer - Bruce Tucker	
	Weather:	Overcast; 8°C	
2. Well Designation:	Well ID:	Well #1C	
	Well Type/Usage:	Domestic water supply for ~ 75 homes	
	Well Status (Pumping, Backup, Obs.):	Active water supply well (pumping)	
3. Location:	Water Supply No.:	WS-G-0094	
	Community:	Bunyan's Cove	
	Street:	Peters Cove Road	
(Community, Street, GPS measured in field. Map	GPS Northing:	21 U5364835	
Grid, Well Elevation provided by well operator)	GPS Easting:	21 U0720571	
	Well Elevation (masl):	< 50 masl	
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc) Do Storms Change the Well Chemistry (i.e.	High iron and manganese, pH 6.9. HAA's and THM's are high	
Based on interview with the well operator	increased TSS)	No	(If yes, go to step II) (O.Reg 170/03)
	surface water bodies (take conductivity measurement of nearby surface water if Is there an observable chance in nearby	No	(If yes, go to step II) (O.Reg 170/03)
	surface water levels when the well is pumping: Historic issues with bacteria. TSS, boil water	No	(If yes, go to step II) (MOE GUDI Guidelines, 2001)
	advisories? Has the well ever had particle counting or	No - Rudder Engineering indicated iron bacteria in well	(If yes, go to step II) (O.Reg 170/03)
	microscopic particulate analysis completed on it? If so when, results, copy of report Are there increasing/concerning trends of any	No	
	other parameters at the well not mentioned yet: Additonal Raw Water Chemistry Available that	No	
	we could have:	Report completed by ADI with additional water chemistry information	
	What is the nature of the dirty water i.e. sandy, iron (red) etc Does the well water ever taste saltv? Is there	No	
	any evidence of salt water intrusion at the well or in the surrounding area?	No	
	What is the current well treatment:	Chlorination, javex (Used to treat for iron and manganese, old equipment not being used	
	or remediation (if so, when, why, records available?):		



	Question	Answer	Comments
	Historic Reports Indicating GUDI status (Y/N):	No	(If yes and a contrary report was not written after August 1, 2000, go to step II) (O.Reg 170/03)
	Obtain a copy (Y/N):	Νο	
	Date of Report:	Νο	
	Name of Preparer:	Νο	
	Reason for GUDI Status:	Νο	
	Average Annual Pumping Rate:	unknown	
	Maximum Monthly Pumping Rate:	unknown	(If <u>cannot</u> pump at greater than 0.58 L/s and is within 15 m of surface water or if the well <u>can</u> supply water at greater than 0.58 L/s and is in overburden within 100 m of surface water or <u>can</u> supply water at greater than 0.58 L/s and is in bedrock within 500 m of surface water, go to step II) (O.Reg 170/03)
	Other (specify):		
5. Sensitive Setting:	Spring:	No	(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:	No	(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well:	No	(If yes, go to step II)
	Karst Aquifer:	No	(If yes, go to step II)
	Exposed Fractured Bedrock:	No	(If yes, go to step II)
	Thin or absent soil cover over bedrock? How far away from the well?	Thin	
	High K Unconfined Aquifer:	Νο	(If yes, go to step II) (O.Reg 170/03)
	Enhanced Recharge:	Νο	(If yes, go to step II) (MOE Guidelines on GUDI, 2001)
	Dug Well:	Νο	(If not Drilled Well, Go To Step II) (O.Reg 170/03)
	Drilled Well (in overburden or bedrock):	Bedrock	
6. Well	Well Log Found (Y/N):	Yes	
Construction	Driller (Name; ID):		
Details	Construction Date:		
	Well Depth:		
	Casing Type:		
	Firmly seated in bedrock (Y/N)		





	Question	Answer	Comments
	Water Tight Casing to 6mbgs (Y/N)		(If No go to Step II) (O.Reg 903)
	Casing Diameter:	6"	
	Casing Length:		(If < 12 m or 40 ft, go to Step II)
	Has the well ever been disinfected (when, why, most re		
	When was the well pump last serviced or replaced? Was it disinfected before being placed back in well:		
	Well Yield:		
	Static Water Level:		
	Overburden Thickness:		
	Pump type:		
	Pump Setting:		
	Drive Shoe (Y/N):		
	Grouted Casing (Y/N):	Νο	
	Thickness of Grout around well:		
	Water Level Monitoring Pipe in Well (Y/N):		
	Raw Water Sampling Tap (Y/N):	Yes	
	Other:		
7. Well Condition	Located in a Well House (Y/N):	No	
Assessment (O.Reg 9	Well Tagged or Identified:	Yes	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):	Appears to meet regs	
	Any Rust or Holes Evident on Casing:	No	
	Above Ground Casing Height (mags) (If stickup, provide	0.58 m	
	Flush Mount Well (mbgs) (If flush mount, provide details	Νο	
	Is the Well Located in a Well Pit (mbos).	Νο	
	Covered with solid, watertight cover (Y/N):	n/a	
	Casing is above bttm of pit floor:	n/a	
	Is the pit equipped to drain (provide details)?	n/a	
	Is the pit equipped with a sump pump (Y/N)?	n/a	



	Question	Answer	Comments
	The casing vent is at what height above the pit		
	tioor (cm)? Height of Ground Surface for 5 m around well is at least 60 cm above the highest known surface water level (Y/N):	n/a Yes	
	Is the topography around the well indicative of surface ponding and flow towards the well	No	
	Is drainage at the well adequate (any standing water or evidence of ponding):	Adequate drainage	
	Protective Cap Found on Well (Acceptable Seal?):	Yes	
	Is the Well Locked (Secure?):	yes	
	Pit-less adapter:	yes	
	Screened air vent:	yes	
	Flood protection (has it ever flooded):	unknown	
	Vehicle impact protection:	no	
	Fencing:	no	
8. Aquifer	Surficial (type of geology, depth, observed surficial info):	ablation drift	
Characteristics	Bedrock (type, depth, exposed at surface):	Yes	
	Show the Geology Mapping or borehole,does it match with their understanding?		
	Unconfined Municipal Aquifer:	No	(If yes, go to step II)
	Confined Municipal Aquifer:	Yes	
	Pumping Test Done (Y/N)	unknown	
	When was test done, is the data available?	n/a	
9. Proximity to sources of potential surface water contamination	Perennial Stream/Pond (metres awav from well):	Νο	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	Ephemeral Stream (metres away from well):	No	Water and bedrock well, go to Step II) (If < 100 m from Surface Water and an
(500 m for bedrock, 100m for overburden)	Ditch (metres away from well):	No	Water and bedrock well, go to Step II)
	Is there water in the ditch (Y/N): When did it last rain? If recent is there water in	No	
	the ditch? Does the ditch drain quickly?	No	(If < 100 m from Surface Water and an
	River:	No	overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Lake:	No	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)



	Question	Answer	Comments
	Wetlands/Marshes:	Bog, < 75 m	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:	Νο	
	Highway/Road:	>75 m	
	nignway/Kuau.	>/3 III	
	Unused wells found on site:	Yes; 2 others. Well 1A (original well in pump house) and Well 1B, 'dry' well located behind the pumphouse	
	Should they be abandoned:	Yes	
	Abandoned wells on site:	Νο	
	Abandonment Log Available (Y/N):	No	
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):	No	
	Artesian wells found on adjacent properties:	Νο	
	Are there Well Pits Located on Adiacent Properties:	Νο	
	Other (Specify):	none	
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	Residential, ~ 10-15 homes	
	If on private services, how many septics/wells (based on # of homes):	Yes, all ~10-15 homes on individual septic systems.	
	Distance of closest septics (approx. to house):	150 ft	
	Communal septics used nearby:	Septic systems overflow to nearby bog, located ~ 70 m in a southwest direction from Well 1C.	
	Are domestic wells within municipal aquifer:	Νο	
	Are there wells found within well pits on surrounding properties:	No	
	Any historia wall interference complaints:	No	
	Historic Contamination Issues Noted at		
	Domestic Weils:	N0	
	Parkland:	no	
	Fertilizer used?	n/a	
	Forestry:	no	
	Agriculture:	No	
	Evidence of Manure Storage (liquid or solid):	No	
	Animal Grazing:	Νο	



Industrial: no Type of Industrial Use: n/a AST's or UST's at site: most homes are on electric heat.	
Industrial:     no       Type of Industrial Use:     n/a       AST's or UST's at site:     most homes are on electric heat.	
Type of Industrial Use:     n/a       AST's or UST's at site:     most homes are on electric heat.	
Type of Industrial Use:     n/a       AST's or UST's at site:     most homes are on electric heat.	
AST's or UST's at site: most homes are on electric heat.	
AST's or UST's at site: most homes are on electric heat.	
Other Risks (large sentics etc.): Sentic overflow to bogs should be evaluated	
I and Uses Specified in NL Reg 63/03 as risks:	
Cesspool receiving raw sewage that is less	
than or equal to 4 m deep (>= 30 m away from well): Depth of bog/cesspool is unknown. Distance from well is ~ 70 m	
Cesspool or seepage pit that is >= 4 m deep	
unless it prevents seepage has to be >= 60 m away from a well Depth of bog/cesspool is unknown. Distance from well is ~ 70 m	
Seepage Pit, Filter Bed, Soil Absorption Field,	
Earth Privy Pit or similar (>=16 m away from	
Sewer of cast iron with leaded joints or	
approved mechanical joints, independent clean water drain or cistern (>= 3 m away from	
well): n/a	
Sanitary Landfill or Garbage Dump: n/a	
Is there a pumphouse cast iron floor drain with leaded ioints draining to ground surface? (>=1	
m from well) n/a	
Septic(s), concrete vault privy, sewer or tightly initiated the or equivalent material or sewer	
connected foundation drain (>=16 m away	
from well): n/a	
Future Land Use Changes that could impact wells: unknown	
Uther please specify (i.e. sources of microbial contam.): 11 Notes: Water usage last year was in the order of 4 000 000 imperial gallons, however there are reportedly many leaks in the distribution system. There	is a numn
installed in Well 1A (original well) but it is not used.	io a pump

#### Photo Log - Bunyan's Cove Well #1







Pumphouse



Well 1b "Dry" in foreground, pumphouse in background



Well 1C "Emergency" Active well



Well 1A - original well located in the pumphouse



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	Question	Answer	Comments
1. Project Details:	Project No:	60236351	
	Client <sup>,</sup>	Department of Environment Newfoundland and Labrador, WRMD	
	Dete of Inconstion:	20 Nov 11	
	AECOM Inspector:	Nora Donaid	
	Site Contact (Name, Phone #):	Operator - Wade Bowring; Treasurer - Bruce Tucker	
	Weather:	Overcast; 8°C	
2. Well Designation:	Well ID:	Well #2 - WSG-0095/ Pumphouse #2	
	Well Type/Usage:	Domestic supply	
	Well Status (Pumping, Backup, Obs.):	Pumping well + supplemented by direct connection to surface water source	
3. Location:	Water Supply No.:	WS-G-0095	20 homes and one business
	Community:	Bunyan's Cove	
	Street:	Main Road	
(Community, Street, GPS	GPS Northing:	0278340	
Grid, Well Elevation provided by well operator)	GPS Easting:	5365371	
	Well Elevation (masl):	~100 masl	(205 ft)
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)	Well only - arsenic @11 ug/L, pH 9.6- when they lowered the arsenic standard (Guidelines for Canadian Drinking Water Quality)10 ug/l (from 20 ug/L), arsenic became an issue. Good water otherwise	
(Questions for well operators)	Do Storms Change the Well Chemistry (i.e. increased TSS)	Yes, storms change the chemistry. This is associated with the direct connection to the pond.	(If yes, go to step II) (O.Reg 170/03)
	Is the well water chemistry similar to nearby surface water bodies (take conductivity measurement of nearby surface water if possible):	Yes - directly related to bog/surface water that is connected to this water system. The existing drilled well (Well #2) and	(If yes, go to step II) (O.Reg 170/03)
	Is there an observable change in nearby surface water levels when the well is pumping:	No-dug well gravity fed	(If yes, go to step II) (MOE GUDI Guidelines, 2001)
	Historic issues with bacteria, TSS, boil water advisories?	Bacteria related to dug well; On a boil order since dug well was connected 3 years ago.	(If yes, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or microscopic particulate analysis completed on it? If so when, results, copy of report available?	Νο	As + pH issues before dug well connected, otherwise good.
	Are there increasing/concerning trends of any other parameters at the well not mentioned yet:	Νο	
	Additonal Raw Water Chemistry Available that we could have:	Yes	
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc	Dirty water related to dug well; changes filter after rain stomr	
	Does the well water ever taste salty? Is there any evidence of salt water intrusion at the well or in the surrounding area?		
	What is the current well treatment:	Javex for chlorination	


	Question	Answer	Comments
	Has the well ever needed treatment upgrades or remediation (if so, when, why, records available?):	Blasting, pump replacement	
			(If yes and a contrary report was not written after August 1, 2000, go to step II) (O.Reg
	Historic Reports Indicating GUDI status (Y/N):	No	170/03)
	Obtain a copy (Y/N):	No	
	Date of Report:	No	
	Name of Preparer:	No	
	Reason for GUDI Status:	No	
	Average Annual Pumping Rate:	Yield was approximately 2-3 igpm when drilled. The well would 'run dry in one day'.	
	Maximum Monthly Pumping Rate:	The drilled well was blasted to years ago (dynamite was reportedly used in the well). They also connected the water supply to the surface water source (pond) approximately 2 years ago. It now takes a couple of weeks before they run out of water. Now 3-4 igpm.	(If <u>cannot</u> pump at greater than 0.58 L/s and is within 15 m of surface water or if the well <u>can</u> supply water at greater than 0.58 L/s and is in overburden within 100 m of surface water or <u>can</u> supply water at greater than 0.58 L/s and is in bedrock within 500 m of surface water, go to step II) (O.Reg 170/03)
	Other (specify):	Water demand is approximately 3,000 gal/day.	
5. Sensitive Setting:	Spring:	no	(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:	Yes - surface water source.	(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well:	no	(If yes, go to step II)
	Karst Aquifer:	no	(If yes, go to step II)
	Exposed Fractured Bedrock:	Yes	(If yes, go to step II)
	Thin or absent soil cover over bedrock? How far away from the well?	yes	
	High K Unconfined Aquifer:	no	(If yes, go to step II) (O.Reg 170/03)
	Enhanced Recharge:	no	(If yes, go to step II) (MOE Guidelines on GUDI, 2001)
	Dug Well:	no	(If not Drilled Well, Go To Step II) (O.Reg 170/03)
	Drilled Well (in overburden or bedrock):	bedrock	
6. Well	Well Log Found (Y/N):	Yes - suspect this well is NL Well ID No. 11592.	Confirmation is required that this well log is the correct log for Well #2.
Construction	Driller (Name; ID):	Dynamic Drilling Co.	
Details	Construction Date:	8-Jun-05	
	Well Depth:	420 ft (125 m)	
	Casing Type:	Steel	
	Firmly seated in bedrock (Y/N)	unknown	



	Question	Answer	Comments
	Water Tight Casing to 6mbgs (Y/N)	9.4 m casing. It is not known whether casing is water-tight.	(If No go to Step II) (O.Reg 903)
	Casing Diameter:	152 mm (6 inch)	
	Casing Length:	9.4m	(If < 12 m or 40 ft, go to Step II)
	Has the well ever been disinfected (when, why, most recently):	No	
	When was the well pump last serviced or replaced? Was it disinfected before being placed back in well:	Last year	
	Well Yield:	4 imperial gallons per minute (according to operator), 11 L/min according to well log	Note the well operator indicated dyanamite was used in this well to improve its yield.
	Static Water Level:	~150 ft	According to the operator
	Overburden Thickness:	9 m	According to well log
	Pump type:	Berkley - New pump last year. Replaced because there was issues with cave-in.	According to the operator
	Pump Setting:	400ft	
	Drive Shoe (Y/N):	unknown	
	Grouted Casing (Y/N):	unknown	
	Thickness of Grout around well:	unknown	
	Water Level Monitoring Pipe in Well (Y/N):	no	
	Raw Water Sampling Tap (Y/N):	Yes	
	Other:		
7. Well Condition	Located in a Well House (Y/N):	Yes	
Assessment (O.Reg 9	Well Tagged or Identified:	No	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):	Yes	
	Any Rust or Holes Evident on Casing:	Rust, no holes	
	Above Ground Casing Height (mags) (If stickup, provide	Yes, 0.15m	
	Flush Mount Well (mbgs) (If flush mount, provide details	No	
	Is the Well Located in a Well Pit (mbgs):	No	
	Covered with solid, watertight cover (Y/N):	No	
	Casing is above bttm of pit floor:	No	
	Is the pit equipped to drain (provide details)?	No	
l	Is the pit equipped with a sump pump (Y/N)?	No	



	Question	Answer	Comments
	The casing vent is at what height above the pit	No	
	Height of Ground Surface for 5 m around well is at least 60 cm above the highest known surface water level (Y/N):	Yes	
	Is the topography around the well indicative of surface ponding and flow towards the well	No (drilled)	
	Is drainage at the well adequate (any standing water or evidence of ponding):	Yes	
	Protective Cap Found on Well (Acceptable Seal?):	No	
	Is the Well Locked (Secure?):	Yes - Pumphouse	
	Pit-less adapter:	No	
	Screened air vent:	No - Hole in cover for rope for pump	
	Flood protection (has it ever flooded):	Unknown	
	Vehicle impact protection:	Yes	
	Fencing:	No - N/A	
8. Aquiter	Sufricial (type of geology, depth, observed sufricial into)		
Characteristics	Show the Geology Mapping or borehole,does it match with their understanding?	no	
	Unconfined Municipal Aquifer:	no	(If yes, go to step II)
	Confined Municipal Aquifer:	no	
	Pumping Test Done (Y/N)	No.	
9. Proximity to sources	When was test done, is the data available?	n/a	
of potential surface water contamination	Perennial Stream/Pond (metres away from well):	Yes and dug well	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	Ephemeral Stream (metres away from well):	No	Water and bedrock well, go to Step II) (If < 100 m from Surface Water and an
(500 m for bedrock,	Ditch (metres away from well):	No	overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is there water in the ditch (Y/N):	No	
	the ditch? Does the ditch drain quickly?		(If < 100 m from Surface Water and an
	River:	No	overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Lake:	No	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)



	Question	Answer	Comments
	Wetlands/Marshes:	Yes ~500ft	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:	Νο	
	Highway/Road:	<75 m	
	Unused wells found on site:	4	
	Should they be abandoned:	Yes	
	Abandoned wells on site:	No	
	Abandonment Log Available (Y/N):		
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):	No	
	Artesian wells found on adjacent properties:	No	
	Are there Well Pits Located on Adjacent Properties:	unknown	
	Other (Specify):	<u> </u>	
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):		
	If on private services, how many septics/wells (based on # of homes):	Hobbs S&H Enterprises	
	Distance of closest septics (approx. to house):	>50 m	
	Communal septics used nearby:	Farm on private well	
	Are domestic wells within municipal aquifer:	No (Wade 1-1.5 igpm	
	Are there wells found within well pits on surrounding properties:	unknown	
	Any historic well interference complaints:	unknown	
	Historic Contamination Issues Noted at Domestic Wells:	unknown	
	Parkland:	no	
	Fertilizer used?	unknown	
	Forestry:	no	
	Agriculture:	1 mile east of here 210 cattle - fields surrounding	
	Evidence of Manure Storage (liquid or solid):	no	
	Animal Grazing:	unknown	



	Question	Answer	Comments
	Industrial:		
	Type of Industrial Use:	Mechanic/ garage within 150 m.	
	AST's or UST's at site:	unknown	
	Other Risks (large septics etc):	no	
	Land Uses Specified in NL Reg 63/03 as risks:	No	
	Cesspool receiving raw sewage that is less than or equal to $4 \text{ m} \text{ deep}$ ( $z = 20 \text{ m} \text{ areas}$		
	from well):	No	
	Cesspool or seepage pit that is $>= 4 \text{ m}$ deep		
	away from a well	No	
	Seepage Pit, Filter Bed, Soil Absorption Field, Farth Privy Pit or similar (>=16 m away from		
	well):	No	
	Sewer of cast iron with leaded joints or approved mechanical joints, independent		
	clean water drain or cistern (>= 3 m away from	No	
	wen).	INU	
	Sanitary Landfill or Garbage Dump:	No	
	Is there a pumphouse cast iron floor drain with		
	leaded joints draining to ground surface? (>=1 m from well)	No	
	Septic(s), concrete vault privy, sewer or tightly		
	jointed tile or equivalent material or sewer		
	from well):	No	
	Future Land Use Changes that could impact wells:	No	
	Other please specify (i.e. sources of microbial contam.):	No	
11. Notes:	This water supply is GUDI. A surface water source	ater source is directly connected to the potable water being distribut	ed from this location. Treatment should

#### Photo Log - Bunyan's Cove Well #2

Pumphouse

## AECOM





Well #2 - active well



Pumphouse interior. Wellhead and chlorination equipment



Surface water pond and infiltration gallery that is connected to the water storage tank in the pump house



Interior of infiltration gallery



Water storage tank



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR

Department of Environment and Conservation Water Resources Management Division

# Water Well Record

Well Owner Name: TOWN COUNCIL Address:	Lithology Listing: RED TPSL 001 BRWN OBDN 009 GREY TPSL 125		
Well Location Town: BUNYAN'S COVE GPS Coordinates N ° ' "	Total Depth:    125.00    m    Depth to Bedrock:    m      Water Bearing Zone(s)     Lpm at    m     Lpm at    m      Lpm at    m     Lpm at    m		
W ° ' " Map Number: 2D/8 NAD: UTM Zone: 21	Casing Type:    Casing Length:  9.40 m  Diameter:  mm    Casing Thickness:  mm    Drive Shoe Used:		
Northing: 5364200 Easting: 720775 	Well Grouted: fromm tom Grout Type:		
Well / Water Use: PS Type of Work Completed: Drilling Method:	Screen Info:		
Pump Recommendations    Pump Type:    Intake Setting:  m    Pumping Rate:  Lpm    Estimated Safe Yield of Well:  11.00  Lpm	Pumping Test    Method:    Pumping Rate:  Lpm    Well Overflowing:  Overflow Rate:  Lpm		

**Drillers Comments:** 

Name of Drilling Company Dynamic Drilling Co. Ltd. Licence Number 2

Date Well Completed 24 /01/1986

This Record Modified by: Modified date:



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR

Department of Environment and Conservation Water Resources Management Division

# Water Well Record

Well Owner Name: TOWN COUNCIL Address:	Lithology Listing: RED TPSL 001 BRWN OBDN 010 GREY ROCK 032		
Well Location Town: BUNYAN'S COVE GPS Coordinates N ° ' "	Total Depth:    32.00    m    Depth to Bedrock:    m      Water Bearing Zone(s)     Lpm at    m     Lpm at    m      Lpm at    m     Lpm at    m		
W ° ' " Map Number: 2D/8 NAD: UTM Zone: 21	Casing Type:    Casing Length:  11.60  m  Diameter:  mm    Casing Thickness: mm    Drive Shoe Used: mm		
Northing: 5364500 Easting: 720550 Type of Water Encountered:FR	Well Grouted:  fromm tom    Grout Type:  Grout Type:		
Well / Water Use: PS Type of Work Completed: Drilling Method:	Screen Info: 0		
Pump Recommendations    Pump Type:    Intake Setting:  m    Pumping Rate:  Lpm    Estimated Safe Yield of Well:  94.00  Lpm	Pumping Test    Method:    Pumping Rate:  Lpm Durationmin    Well Overflowing:  Overflow Rate: Lpm		

**Drillers Comments:** 

Name of Drilling Company Dynamic Drilling Co. Ltd. Licence Number 2

Date Well Completed 23 /01/1986

This Record Modified by: Modified date:



# **Deep Bight**





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	Question	Answer	Comments
1. Project Details:	Project No:	60236351	
	Client:	Newfoundland and Labrador, Department of Environment and Conservation, WRMD	
	Detection		
	Date of Inspection:	1-DeC-11	
	AECOM Inspector:	Nora Donald	
	Site Contact (Name, Phone #):	Darrell Payne (darrelInfld@yahoo.ca)	
	Weather:	Raining	
2. Well Designation:	Well ID:	Well #1	
	Well Type// Joogo	Bublic Supely Well	
	weii Type/Osage.		
	Well Status (Pumping, Backup, Obs.):	Pumping Well	
3. Location:	Water Supply No.:	WS-G-0213	
	Community:	Deep Bight	
	Street:	Trans Canada Highway	
(Community, Street, GPS	GPS Northing:	21 U 5364822	
Grid, Well Elevation provided by well operator)	GPS Easting:	21 U 0720584	
	Well Elevation (masl):	~ 140 masl	
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)	"good". Some complaints of the smell of the water	
(Questions for well	Do Storms Change the Well Chemistry (i.e. increased TSS)	No	(If yes, go to step II) (O. Reg 170/03)
	Is the well water chemistry similar to nearby surface water bodies (take conductivity measurement of nearby surface water if	Doop Bight Piyor	(if yes, go to step II) (O Reg 170/03)
	Is there an observable change in nearby surface water levels when the well is pumping:	No	(If yes, go to step II) (MOE GUDI Guidelines, 2001)
	Historic issues with bacteria, TSS, boil water advisories?	Boil order on now because re-drilled well #1 two weeks ago	(If ves, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or microscopic particulate analysis completed on it? If so when, results, copy of report available?	No	
	Are there increasing/concerning trends of any other parameters at the well not mentioned yet:	No	
	Additonal Raw Water Chemistry Available that we could have:	No	
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc.	Νο	
	Does the well water ever taste salty? Is there	10	
	any evidence of salt water intrusion at the well or in the surrounding area?	No	
	What is the current well treatment:	chlorine - javex	



	Question	Answer	Comments
	Has the well ever needed treatment upgrades or remediation (if so, when, why, records available?):	Had to re-drill well #1 because they couldn't get the pump out when trying to replace pump	
	Historia Reports Indianting CUDI status (VAII)	Na	(If yes and a contrary report was not written after August 1, 2000, go to step II) (O.Reg
	Obtain a conv (Y/N).	No	17003)
	Date of Report:	No	
	Name of Preparer:	No	
	Reason for GUDI Status:	No	
	Average Annual Pumping Rate:	9 igpm	
	Maximum Monthly Pumping Rate:	unknown	(If <u>cannot</u> pump at greater than 0.58 L/s and is within 15 m of surface water or if the well <u>can</u> supply water at greater than 0.58 L/s and is in overburden within 100 m of surface water or <u>can</u> supply water at greater than 0.58 L/s and is in bedrock within 500 m of surface water, go to step II) (O.Reg 170/03)
	Other (specify):		
5. Sensitive Setting:	Spring:	>500 m away	(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:	Νο	(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well:	No	(If yes, go to step II)
	Karst Aquifer:	No	(If yes, go to step II)
	Exposed Fractured Bedrock:	Yes	(If yes, go to step II)
	Thin or absent soil cover over bedrock? How far away from the well?	< 20m	
	High K Unconfined Aquifer:	no	(If yes, go to step II) (O.Reg 170/03)
	Enhanced Recharge:	No	(If yes, go to step II) (MOE Guidelines on GUDI, 2001)
	Dug Well:	No	(If not Drilled Well, Go To Step II) (O.Reg 170/03)
	Drilled Well (in overburden or bedrock):	Bedrock	
6. Well	Well Log Found (Y/N):	No	
Construction	Driller (Name; ID):	Sullivan's or O'Brien's	
Details	Construction Date:	2 - 3 weeks ago	
	Well Depth:	420 ft	
	Casing Type:	Steel	
	Firmly seated in bedrock (Y/N)	Unknown. Operator estimates 50 ft	



	Question	Answer	Comments
	Water Tight Casing to 6mbgs (Y/N)	Linknown	(If No go to Step II) (O Reg 903)
	Hater Hight Babing to Shibgo (111)	charown -	(
	Occian Discontan	01	
		0	
	Casing Length:	Estimated 50 ft (by operator)	(If < 12 m or 40 ft, go to Step II)
	Has the well ever been disinfected (when, why, most		
	recently):	Unknown	
	When was the well pump last serviced or replaced?		
	Was it disinfected before being placed back in well:	within 2-3 weeks	
	Well Yield:	9 iqpm	
		UL UL	
	Static Water Level	Linknown	
		en a com	
		Linkesure	
		UTIKNOWN	
	Pump type:	J-Class Sandhandler	
	Pump Setting:	380 ft / Model 7JS1S4-PE	
	Drive Shoe (Y/N):	Unknown	
	Grouted Casing (Y/N):	Linknown	
		Chikiowi	
		University	
	Thickness of Grout around well:	UTIKITOWI	
	Water Level Monitoring Pipe in Well (Y/N):	No	
	Raw Water Sampling Tap (Y/N):	No	
	Other:	No	
7. Well Condition	Located in a Well House (Y/N):	No	
Assessment (O.Reg 90	Well Tagged or Identified:	No	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not)	No- Under repair	
and the rieg 05/05/	Consider of Annual Gear (meets itey, of Does NOL).		
	Any Bust of Holoo Evident on Casin -	No	
	Any Rust of Holes Evident on Casing:	UNI	
		<b></b>	
	Above Ground Casing Height (mags) (If stickup, provide	Under construction	
	Flush Mount Well (mbgs) (If flush mount, provide details	No	
	Is the Well Located in a Well Pit (mbgs):	No	
	Covered with solid, watertight cover (Y/N):	No	
	Casing is above bttm of pit floor:	No	
	Is the pit equipped to drain (provide details)?	Νο	
		··	
	Is the nit equipped with a sump nump (V/N)?	No	
	is the pit equipped with a sump pump (Y/N)?	INU	



	Question	Answer	Comments
	The casing vent is at what height above the pit		
	floor (cm)? Height of Ground Surface for 5 m around well is at	No	
	least 60 cm above the highest known surface water level (Y/N):	Yes	
	Is the topography around the well indicative of surface ponding and flow towards the well	Yes	
	Is drainage at the well adequate (any standing water or evidence of ponding):	Yes	
	Protective Cap Found on Well (Acceptable Seal?):	Yes	
	Is the Well Locked (Secure?):	Yes	
	Pit-less adapter:	Yes	
	Screened air vent:	Yes	
	Flood protection (has it ever flooded):	No	
	Vehicle impact protection:	No	
	Fencing:	No	
8. Aquifer	Surficial (type of geology, depth, observed surficial info)	Glaciofluvial	
Characteristics	Bedrock (type, depth, exposed at surface):	yes	
	Show the Geology Mapping or borehole,does it match with their understanding?		
	Unconfined Municipal Aquifer:	no	(If yes, go to step II)
	Confined Municipal Aquifer:	Yes	
	Pumping Test Done (Y/N)	No - trying to get pump tests done on these wells.	
	When was test done, is the data available?	No	
9. Proximity to sources of potential surface water contamination	Perennial Stream/Pond (metres away from well):	No	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and hedrock well or to Sten II)
			(If < 100 m from Surface Water and an
	Ephemeral Stream (metres away from well):	No	Water and bedrock well, go to Step II)
(FOO m for hodroals	Ditch (metres away from well):	No	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
(500 m for bedrock, 100m for overburden)	Is there water in the ditch (Y/N):	No	
	When did it last rain? If recent is there water in the ditch? Does the ditch drain quickly?	No	
	River:	Deep Bight River	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, oo to Step II)
			(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	Lake:	No	Water and bedrock well, go to Step II)



	Question	Answer	Comments
	Wetlands/Marshes:	Southwest of well <500 m	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:	No	
	Highway/Road:	<50 m	
	Unused wells found on site:	no	
	Should they be abandoned:	n/a	
	Abandoned wells on site:	no	
	Abandonment Log Available (Y/N):	n/a	
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):	n/a	
	Artesian wells found on adjacent properties:	n/a	
	Are there Well Pits Located on Adjacent Properties:	no	
	Other (Specify):		
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	150 m downgradient	
	If on private services, how many septics/wells (based on # of homes):		
	Distance of closest septics (approx. to house):	150m downgradient	
	Communal septics used nearby:	No	
	Are domestic wells within municipal aquifer:	Yes	
	Are there wells found within well pits on surrounding properties:	Νο	
	Any historic well interference complaints:	Smell	
	Historic Contamination Issues Noted at Domestic Wells:		
	Parkland:	No	
	Fertilizer used?	Νο	
	Forestry:	Νο	
	Agriculture:	Νο	
	Evidence of Manure Storage (liquid or solid):	No	
	Animal Grazing:	Νο	



	Question	Answer	Comments
	Industrial	Noro	
	industrial.	None	
	Type of Industrial Use:	None	
	AST's or UST's at site:	None	
	Other Risks (large septics etc):	None	
	Land Haas One sife die NIL Dare 00/00 as risker	Alexa	
	Land Uses Specified in NL Reg 63/03 as risks:	None	
	than or equal to 4 m deep ( >= 30 m away		
	from well):	None	
	Cesspool or seepage pit that is $>= 4 \text{ m deep}$		
	away from a well:	None	
	Seepage Pit, Filter Bed, Soil Absorption Field,		
	Earth Privy Pit or similar (>=16 m away from	None	
	Sewer of cast iron with leaded joints or	None	
	approved mechanical joints, independent		
	clean water drain or cistern (>= 3 m away from well):	None	
	Sonitony Londfill or Corbogo Dump:	Nero	
	Is there a pumphouse cast iron floor drain with	None	
	leaded joints draining to ground surface? (>=1		
	m from well):	None	
	Septic(s), concrete vault privy, sewer or tightly iointed tile or equivalent material or sewer		
	connected foundation drain (>=16 m away		
	from well):	None	
	Future Land Use Changes that could impact wells:	None	
	Other please specify (i.e. sources of microbial contam.):		
15. Notes:	All wells are active (Well's 1,2 & 3). When Well #1	was down in September, 2011, they hooked up to the spring on the	side of a hill approximately 600 m north
	of well field. Refer to AECOM site plan for spring lo	cation. Receives water from ditch. They've also hooked up to the s	pring and set up a community car wash.
	Deep Bight has been on a boil order for several yea	ars because the wells go dry in the summer. They typically hook up	to the spring in this scenario.
	committee meets once every 2 weeks	sight since April, 2011. Since the new committee was formed, there	e have been many upgrades. The
	Committe: Chair = Derrick Short, Vice Chair = Darr	ell Payne, Secretary= Viola Short, Treasurer: Randy Hunter, 2 mer	n: Tony Green & Paul Stagg.
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	Question	Answer	Comments
1. Proiect Details:	Proiect No:	60236351	
	Client:	Newfoundland and Labrador, Department of Environment and Conservation. WRMD	
	Date of Inspection:	1-Dec-11	
	AECOM Inspector:	Nora Donald	
	Site Contact (Name, Phone #):	Darrell Payne (darrellnfld@yahoo.ca)	
	Weather:	Raining	
2. Well Designation:	Well ID:	Well #2	
	Well Type/Usage:	Public Supply Well	
	Well Status (Pumping, Backup, Obs.):	Pumping Well	
3. Location:	Water Supply No.:	WS-G-0213	
	Community:	Deep Bight	
	Street:	Trans Canada Highway	
(Community, Street, GPS	GPS Northing:	Refer to site plan	
Grid, Well Elevation provided by well operator)	GPS Easting:	Refer to site plan	
	Well Elevation (masl):	~ 140 masl	
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)	"good". Some complaints of the smell of the water	
(Questions for well operators)	Do Storms Change the Well Chemistry (i.e. increased TSS)	No	(If yes, go to step II) (O.Reg 170/03)
	surface water bodies (take conductivity measurement of nearby surface water if	Deep Bight River	(If yes, go to step II) (O.Reg 170/03)
	Is there an observable change in nearby surface water levels when the well is pumping:	No	(If yes, go to step II) (MOE GUDI Guidelines, 2001)
	Historic issues with bacteria, TSS, boil water advisories?	Boil order on now because re-drilled well #1 two weeks ago	(If yes, go to step II) (O.Reg 170/03)
	microscopic particulate analysis completed on it? If so when, results, copy of report available?	Νο	
	Are there increasing/concerning trends of any other parameters at the well not mentioned yet:	No	
	Additonal Raw Water Chemistry Available that we could have:	No	
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc	No	
	Does the well water ever taste salty? Is there any evidence of salt water intrusion at the well or in the surrounding area?		
		No	
l	What is the current well treatment:	chlorine - javex	



	Question	Answer	Comments
	Has the well ever needed treatment upgrades or remediation (if so, when, why, records available?):	Not known for Well #2	
			(If yes and a contrary report was not written after August 1, 2000, go to step II) (O.Reg
	Historic Reports Indicating GUDI status (Y/N):	No	170/03)
	Obtain a copy (Y/N):	No	
	Date of Report:	No	
	Name of Preparer:	No	
	Reason for GUDI Status:	No	
	Average Annual Pumping Rate:	unknown	
	Maximum Monthly Pumping Rate:	unknown	(If <u>cannot</u> pump at greater than 0.58 L/s and is within 15 m of surface water or if the well <u>can</u> supply water at greater than 0.58 L/s and is in overburden within 100 m of surface water or <u>can</u> supply water at greater than 0.58 L/s and is in bedrock within 500 m of surface water, go to step II) (0.Reg 170/03)
	Other (specify):		
5. Sensitive Setting:	Spring:	>500 m away	(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:	No	(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well:	No	(If yes, go to step II)
	Karst Aquifer:	No	(If yes, go to step II)
	Exposed Fractured Bedrock:	Yes	(If yes, go to step II)
	Thin or absent soil cover over bedrock? How far away from the well?	< 20m	
	High K Unconfined Aquifer:	no	(If yes, go to step II) (O.Reg 170/03)
	Enhanced Recharge:	No	(If yes, go to step II) (MOE Guidelines on GUDI, 2001)
	Dug Well:	No	(If not Drilled Well, Go To Step II) (O.Reg 170/03)
	Drilled Well (in overburden or bedrock):	Bedrock	
6. Well	Well Log Found (Y/N):	Νο	
Construction	Driller (Name; ID):	unknown	
Details	Construction Date:	1990's	
	Well Depth:	300 ft	
	Casing Type:	Steel	
	Firmly seated in hedrock (V/N)	unknown	
			ſ



	Question	Answer	Comments
	Water Tinks Opering to Operand (A)	Halanun	
	water Light Casing to ombgs (Y/N)	Unknown	(if No go to Step II) (O.Reg 903)
	Casing Diameter:	6"	
	Casing Length:	unknown	(If < 12 m or 40 ft, go to Step II)
	Has the well ever been disinfected (when, why, most recently):	Unknown	
	When was the well pump last serviced or replaced? Was it disinfected before being placed back in well:	unknown	
	Well Yield:	5 igpm	
	Static Water Level:	Unknown	
	Overburden Thickness:	Unknown	
	Pump type:	Same as Well#1 (J-Class Sandhandler)	
	Pump Setting:	20 ft from bottom	
	Drive Shoe (Y/N):	Unknown	
	Grouted Casing (Y/N):	Unknown	
	Thickness of Grout around well:	Unknown	
	Water Level Monitoring Pipe in Well (Y/N):	Νο	
	Raw Water Sampling Tap (Y/N):	No	
	Other:	No	
7. Well Condition	Located in a Well House (Y/N):	No	
Assessment (O.Reg 9	Well Tagged or Identified:	No	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):	meets	
	Any Rust or Holes Evident on Casing:	No	
	Above Ground Casing Height (mags) (If stickup, provide details):	Stick up = 10 cm; too low	
	Flush Mount Well (mbgs) (If flush mount, provide details):	n/a	
	Is the Well Located in a Well Pit (mbgs):	Νο	
	Covered with solid, watertight cover (Y/N):	Νο	
	Casing is above bttm of pit floor:	Νο	
	Is the pit equipped to drain (provide details)?	No	
	Is the pit equipped with a sump pump (Y/N)?	No	



	Question	Answer	Comments
	The casing vent is at what height above the pit	Νο	
	Height of Ground Surface for 5 m around well is at least 60 cm above the highest known surface water level (Y/N):	No	
	Is the topography around the well indicative of surface ponding and flow towards the well	Yes - poor drainage from wellhead	
	Is drainage at the well adequate (any standing water or evidence of ponding):	No, not adequate	
	Protective Cap Found on Well (Acceptable Seal?):	No (old style cap)	
	Is the Well Locked (Secure?):	Not locked but appears secure	
	Pit-less adapter:	Yes	
	Screened air vent:	Yes	
	Flood protection (has it ever flooded):	unknown	
	Vehicle impact protection:	Νο	
	Fencing:	Νο	
8. Aquifer	Surficial (type of geology, depth, observed surficial info)	Glaciofluvial	
Characteristics	Bedrock (type, depth, exposed at surface):	yes	
	Show the Geology Mapping or borehole,does it match with their understanding?		
	Unconfined Municipal Aquifer:	no	(If yes, go to step II)
	Confined Municipal Aquifer:	Yes	
	Pumping Test Done (Y/N)	No - trying to get pump tests done on these wells.	
	When was test done, is the data available?	Νο	
9. Proximity to sources of potential surface water contamination	Perennial Stream/Pond (metres away from well):	Νο	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	Ephemeral Stream (metres away from well):	No	Water and bedrock well, go to Step II)
(E00 m far hadrock	Ditch (metres away from well):	No	(if < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
100m for overburden)	Is there water in the ditch (Y/N):	No	
	When did it last rain? If recent is there water in the ditch? Does the ditch drain quickly?	No	
	River:	Deep Bight River	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
l	Lake:	No	Water and bedrock well, go to Step II)



Environment

	Question	Answer	Comments
	Wetlands/Marshes:	Southwest of well <500 m	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:	No	
	Highway/Road:	~30 m from Trans Canada Highway	
	Unused wells found on site:	no	
	Should they be abandoned:	n/a	
	Abandoned wells on site:	no	
	Abandonment Log Available (Y/N):	n/a	
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):	n/a	
	Artesian wells found on adjacent properties:	n/a	
	Are there Well Pits Located on Adjacent Properties:	no	
	Other (Specify):		
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	150 m downgradient	
	If on private services, how many septics/wells (based on # of homes):		
	Distance of closest septics (approx. to house):	150m downgradient	
	Communal septics used nearby:	Νο	
	Are domestic wells within municipal aquifer:	Yes	
	Are there wells found within well pits on surrounding properties:	Νο	
	Any historic well interference complaints:	Smell	
	Historic Contamination Issues Noted at Domestic Wells:		
	Parkland:	Νο	
	Fertilizer used?	Νο	
	Forestry:	No	
	Agriculture:	No	
	Evidence of Manure Storage (liquid or solid):	No	
	Animal Grazing:	No	



	Question	Answer	Comments
	Industrial	Noro	
	industrial.	None	
	Type of Industrial Use:	None	
	AST's or UST's at site:	None	
	Other Risks (large septics etc):	None	
	Land Haas One sife die NIL Dare 00/00 as risker	Alexa	
	Land Uses Specified in NL Reg 63/03 as risks:	None	
	than or equal to 4 m deep ( >= 30 m away		
	from well):	None	
	Cesspool or seepage pit that is $>= 4 \text{ m deep}$		
	away from a well:	None	
	Seepage Pit, Filter Bed, Soil Absorption Field,		
	Earth Privy Pit or similar (>=16 m away from	None	
	Sewer of cast iron with leaded joints or	None	
	approved mechanical joints, independent		
	clean water drain or cistern (>= 3 m away from well):	None	
	Sonitony Londfill or Corbogo Dump:	Nero	
	Is there a pumphouse cast iron floor drain with	None	
	leaded joints draining to ground surface? (>=1		
	m from well):	None	
	Septic(s), concrete vault privy, sewer or tightly iointed tile or equivalent material or sewer		
	connected foundation drain (>=16 m away		
	from well):	None	
	Future Land Use Changes that could impact wells:	None	
	Other please specify (i.e. sources of microbial contam.):		
15. Notes:	All wells are active (Well's 1,2 & 3). When Well #1	was down in September, 2011, they hooked up to the spring on the	side of a hill approximately 600 m north
	of well field. Refer to AECOM site plan for spring lo	cation. Receives water from ditch. They've also hooked up to the s	pring and set up a community car wash.
	Deep Bight has been on a boil order for several yea	ars because the wells go dry in the summer. They typically hook up	to the spring in this scenario.
	committee meets once every 2 weeks	sight since April, 2011. Since the new committee was formed, there	e have been many upgrades. The
	Committe: Chair = Derrick Short, Vice Chair = Darr	ell Payne, Secretary= Viola Short, Treasurer: Randy Hunter, 2 mer	n: Tony Green & Paul Stagg.
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	Question	Answer	Comments
1. Project Details:	Project No:	60236351	
	Client:	Newfoundland and Labrador, Department of Environment and Conservation, WRMD	
	Date of Inspection:	1-Dec-11	
	AECOM Inspector:	Nora Donald	
	Site Contact (Name, Phone #):	Darrell Payne (darrellnfld@yahoo.ca)	
	Weather:	Raining	
2. Well Designation:	Well ID:	Well #3	
	Well Type/Usage:	Public Supply Well	
	Well Status (Dumping Dealure Ohe )		
	Weir Status (Pumping, Backup, Obs.):	rumping wei	
3. Location:	Water Supply No.:	WS-G-0213	
	Community:	Deep Bight	
	Street:	Trans Canada Highway	
(Community, Street, GPS measured in field. Map	GPS Northing:	Refer to site plan	
Grid, Well Elevation provided by well operator)	GPS Easting:	Refer to site plan	
	Well Elevation (masl):	~ 155 masl	
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)	"good". Some complaints of the smell of the water	
(Questions for well operators)	Do Storms Change the Well Chemistry (i.e. increased TSS)	No	(If yes, go to step II) (O.Reg 170/03)
	Is the well water chemistry similar to nearby surface water bodies (take conductivity measurement of nearby surface water if	Deep Bight River	(If yes, go to step II) (O.Reg 170/03)
	Is there an observable change in nearby surface water levels when the well is pumping:	No	(If yes, go to step II) (MOE GUDI Guidelines, 2001)
	Historic issues with bacteria, TSS, boil water advisories?	Boil order on now because re-drilled well #1 two weeks ago	(If yes, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or microscopic particulate analysis completed on it? If so when, results, copy of report available?	No	
	Are there increasing/concerning trends of any other parameters at the well not mentioned yet:	No	
	Additonal Raw Water Chemistry Available that we could have:	No	
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc.	Νο	
	Does the well water ever taste salty? Is there	10	
	any evidence of salt water intrusion at the well or in the surrounding area?	Νο	
l	What is the current well treatment:	chlorine - javex	



	Question	Answer	Comments
	Has the well ever needed treatment upgrades or remediation (if so, when, why, records available?):	Not known for Well#3	
			(If yes and a contrary report was not written after August 1, 2000, go to step II) (O.Reg
	Historic Reports Indicating GUDI status (Y/N):	No	170/03)
	Obtain a copy (Y/N):	No	
	Date of Report:	No	
	Name of Preparer:	No	
	Reason for GUDI Status:	No	
	Average Annual Pumping Rate:	unknown	
	Maximum Monthly Pumping Rate:	unknown	(If <u>cannot</u> pump at greater than 0.58 L/s and is within 15 m of surface water or if the well <u>can</u> supply water at greater than 0.58 L/s and is in overburden within 100 m of surface water or <u>can</u> supply water at greater than 0.58 L/s and is in bedrock within 500 m of surface water, go to step II) (0.Reg 170/03)
	Other (specify):		
5. Sensitive Setting:	Spring:	>500 m away	(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:	No	(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well:	No	(If yes, go to step II)
	Karst Aquifer:	No	(If yes, go to step II)
	Exposed Fractured Bedrock:	Yes	(If yes, go to step II)
	Thin or absent soil cover over bedrock? How far away from the well?	< 20m	
	High K Unconfined Aquifer:	no	(If yes, go to step II) (O.Reg 170/03)
	Enhanced Recharge:	No	(If yes, go to step II) (MOE Guidelines on GUDI, 2001)
	Dug Well:	No	(If not Drilled Well, Go To Step II) (O.Reg 170/03)
	Drilled Well (in overburden or bedrock):	Bedrock	
6. Well	Well Log Found (Y/N):	Νο	
Construction	Driller (Name; ID):	unknown	
Details	Construction Date:	2008	
	Well Depth:	320 ft	
	Casing Type:	Steel	
	Firmly seated in bedrock (Y/N).	unknown	
•	,		



	Question	Answer	Comments
	Water Tight Casing to 6mbgs (Y/N)	Unknown	(If No go to Step II) (O.Reg 903)
	Casing Diameter:	6"	(•····· )• ··· •·· •· • (······ • ) •··· (
	Casing Length: Has the well ever been disinfected (when, why, most	unknown	(If < 12 m or 40 ft, go to Step II)
	recently): When was the well pump last serviced or replaced?	Unknown	
	Was it disinfected before being placed back in well:	unknown	
	Well Yield:	5 igpm	
	Static Water Level:	Unknown	
	Overburden Thickness:	Unknown	
	Pump type:	unknown	
	Pump Setting:	20 ft from bottom	
	Drive Shoe (Y/N):	Unknown	
	Grouted Casing (Y/N):	Unknown	
	Thickness of Grout around well:	Unknown	
	Water Level Monitoring Pipe in Well (Y/N):	No	
	Raw Water Sampling Tap (Y/N):	Νο	
	Other:	No	
7. Well Condition	Located in a Well House (Y/N):	No	
Assessment (O.Reg 9	Well Tagged or Identified:	Νο	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):	meets	
	Any Rust or Holes Evident on Casina:	No	
	Above Ground Casing Height (mags) (If stickup, provide details):	Estimated 15 cm	
	Flush Mount Well (mbgs) (If flush mount, provide details)	n/a	
	Is the Well Lessted in a Well Dit (mbra):	No	
	Coursed with a lide of the offen	Na	
	Covereo with solid, watertight cover (Y/N):	0//	
	Casing is above bttm of pit floor:	NO	
	Is the pit equipped to drain (provide details)?	No	
	Is the pit equipped with a sump pump (Y/N)?	No	



	Question	Answer	Comments
	The casing vent is at what height above the pit		
	tioor (cm)? Height of Ground Surface for 5 m around well is at least 60 cm above the highest known surface water level (Y/N):	No	
	Is the topography around the well indicative of surface ponding and flow towards the well	yes	
	Is drainage at the well adequate (any standing water or evidence of ponding):	yes	
	Protective Cap Found on Well (Acceptable Seal?):	Yes, appears to be acceptable	
	Is the Well Locked (Secure?):	Not locked but appears secure	
	Pit-less adapter:	Yes	
	Screened air vent:	Yes	
	Flood protection (has it ever flooded):	unknown	
	Vehicle impact protection:	No	
8. Aquifer	Surficial (type of geology, depth, observed surficial info)	Glaciofluvial	
Characteristics	Bedrock (type, depth, exposed at surface):	yes	
	Show the Geology Mapping or borehole,does it match with their understanding?		
	Unconfined Municipal Aquifer:	no	(If yes, go to step II)
	Confined Municipal Aquifer:	Yes	
	Pumping Test Done (Y/N)	No - trying to get pump tests done on these wells.	
	When was test done, is the data available?	No	
9. Proximity to sources of potential surface water contamination	Perennial Stream/Pond (metres away from well):	No	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, do to Step II)
			(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	Ephemeral Stream (metres away from well):	No	Water and bedrock well, go to Step II) (If < 100 m from Surface Water and an
(500 m for bedrock,	Ditch (metres away from well):	No	overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is there water in the ditch (Y/N): When did it last rain? If recent is there water in	No	
	the ditch? Does the ditch drain quickly?	No	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	River:	Deep Bight River	Water and bedrock well, go to Step II) (If < 100 m from Surface Water and an
	Lake:	No	overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)



Environment

	Question	Answer	Comments
	Wetlands/Marshes:	Southwest of well <500 m	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:	No	
	Highway/Road:	~30 m from Trans Canada Highway	
	Unused wells found on site:	no	
	Should they be abandoned:	n/a	
	Abandoned wells on site:	no	
	Abandonment Log Available (Y/N):	n/a	
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):	n/a	
	Artesian wells found on adjacent properties:	n/a	
	Are there Well Pits Located on Adjacent Properties:	no	
	Other (Specify):		
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	150 m downgradient	
	If on private services, how many septics/wells (based on # of homes):		
	Distance of closest septics (approx. to house):	150m downgradient	
	Communal septics used nearby:	Νο	
	Are domestic wells within municipal aquifer:	Yes	
	Are there wells found within well pits on surrounding properties:	Νο	
	Any historic well interference complaints:	Smell	
	Historic Contamination Issues Noted at Domestic Wells:		
	Parkland:	Νο	
	Fertilizer used?	Νο	
	Forestry:	No	
	Agriculture:	No	
	Evidence of Manure Storage (liquid or solid):	No	
	Animal Grazing:	No	



	Question	Answer	Comments		
	Industrial	None			
		None			
	Type of Industrial Use:	None			
	AST's or UST's at site:	None			
	Other Risks (large septics etc):	None			
	Land Haas One sitiad in NIL Day 20/00 as sides	Maria			
	Land Uses Specified in NL Reg 63/03 as risks:	None			
	than or equal to 4 m deep ( >= 30 m away				
	from well):	None			
	Cesspool or seepage pit that is $>= 4 \text{ m}$ deep upless it prevents seepage has to be $>= 60 \text{ m}$				
	away from a well:	None			
	Seepage Pit, Filter Bed, Soil Absorption Field,				
	Earth Privy Pit or similar (>=16 m away from	None			
	Sewer of cast iron with leaded joints or	None			
	approved mechanical joints, independent				
	clean water drain or cistern (>= 3 m away from well):	None			
	Sanitary Landfill or Carbago Dump	Nere			
	Is there a pumphouse cast iron floor drain with	None			
	leaded joints draining to ground surface? (>=1				
	m from well):	None			
	Septic(s), concrete vault privy, sewer or tightly				
	connected foundation drain (>=16 m away				
	from well):	None			
	Future Land Use Changes that could impact wells:	None			
	Other please specify (i.e. sources of microbial contam.):				
15. Notes:	All wells are active (Well's 1,2 & 3). When Well #1 v	was down in September, 2011, they hooked up to the spring on the	side of a hill approximately 600 m north		
	of well field. Refer to AECOM site plan for spring location. Receives water from ditch. They've also hooked up to the spring and set up a community car wash.				
	Deep Bight has been on a boil order for several years because the wells go dry in the summer. They typically hook up to the spring in this scenario.				
	committee meets once every 2 weeks.				
	Committe: Chair = Derrick Short, Vice Chair = Darrell Payne, Secretary= Viola Short, Treasurer: Randy Hunter, 2 men: Tony Green & Paul Stagg.				

## Photo Log - Deep Bight







Signage









Well #1



Well #1, Looking toward TCH

## Photo Log - Deep Bight







Well #2

Well #2 - Proximity to highway





Well #3

Well #3



Deep Bight - view from the Trans Canada Highway (looking west). Approximate well locations



# Frenchman's Cove







lap Document. (P.1602363511000-CADD1050 GIS WIPIMXDs\FieldMapMXDs\60236351WellLocations\_FrenchmansCove\_SurfGeolgoy.mxd) 1/352011---11:32-42 AM



	Question	Answer	Comments
1. Project Details:	Project No:	60236351	
	Client:	Newfoundland and Labrador, Department of Environment and Conservation, WRMD	
	Date of Inspection:	12-Dec-11	
	AECOM Inspector:	Nora Donald	
	Site Contact (Name, Phone #);	Phonse Stacev	
	Weather	Snowing1°C	
2. Well Designation:	Well ID:	Frenchman's Cove	
	Well Type/Usage:	Dug Well	
	Well Status (Pumping, Backup, Obs.):	Pumping	
3. Location:	Water Supply No.:	WS-G-0261	
	Community:	Frenchman's Cove	
	Street:	Pumphouse Road	
(Community, Street, GPS	GPS Northing:	21 T 5230171	
Grid, Well Elevation provided by well operator)	GPS Easting:	21 T 0620471	
	Well Elevation (masl):	near sea level	
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)		
(Questions for well operators)	Do Storms Change the Well Chemistry (i.e. increased TSS)	Yes - affects residuals, a little cloudy	(If yes, go to step II) (O.Reg 170/03)
	Is the well water chemistry similar to nearby surface water bodies (take conductivity measurement of nearby surface water if		
	possible):	Unknown	(If yes, go to step II) (O.Reg 170/03)
	surface water levels when the well is pumping:	Unknown	(If yes, go to step II) (MOE GUDI Guidelines, 2001)
	Historic issues with bacteria, TSS, boil water advisories?	2 boil orders in last 2 years - new connection and new pumphouse - precautionary only	(If yes, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or microscopic particulate analysis completed on it? If so when, results, copy of report available?	no	
	Are there increasing/concerning trends of any other parameters at the well not mentioned	low old without tractment old 5.0	
	Additonal Raw Water Chemistry Available that we could have:	iow pri winiou, treatment, pri 5.9	
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc.	n/a	
	Does the well water ever taste salty? Is there any evidence of salt water intrusion at the well	iva	
	or in the surrounding area?	No	
	What is the current well treatment:	Soda ash treatment for pH and liquid chlorine	

Page 1 of 6



	Question	Answer	Comments
	Has the well ever needed treatment upgrades		
	or remediation (if so, when, why, records	No well hasn't been changed since 1979/1980, new pumphouse 2 years	
	available?):	ago	
			(If yes and a contrary report was not written
	Historia Reports Indicating CLIDL status (V/NI):	No	after August 1, 2000, go to step II) (O.Reg
	HISTORIC REPORTS Indicating GODI Status (17N).	NO	170/03)
	Obtain a copy (Y/N):	No	
	Date of Report:	No	
	Name of Preparer:	No	
	Bassan for CUDI Status	No	
	Reason for GODI Status.	NO	
	Average Annual Pumping Rate:	Unknown	
			(If cannot pump at greater than 0.58 L/s and
	Maximum Monthly Pumping Rate:		is within 15 m of surface water or if the well
	in a second and the second sec		is in overburden within 100 m of surface
			water or <u>can</u> supply water at greater than
		Unknown	0.58 L/s and is in bedrock within 500 m of surface water, go to step II) (O.Reg 170/03)
	Other (specify):		
5. Sensitive Setting:	Spring:	No	(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:	No	(If yes, go to step II) (O.Reg 170/03)
	· · · · · · · · · · · · · · · · · · ·		
	Harizantal Collection Walls	No	
		NO	(If yes, go to step II)
	Karst Aquifer:	No	(If yes, go to step II)
	Exposed Fractured Bedrock:	No	(If yes, go to step II)
	<b>T</b>		
	I hin or absent soil cover over bedrock? How far away from the well?	n/a	
	Link K Upperfined Amilian	Vee	
		Tes	(ii yes, go to step ii) (O.Reg 17003)
			(If yes, go to step II) (MOE Guidelines on
	Enhanced Recharge:	No	GUDI, 2001)
			(If not Drilled Well. Go To Step II) (O.Reg
	Dug Well:	Yes	170/03)
	Drilled Well (in overburden or bedrock):	no	
	i		
6. Well	Well Log Found (Y/N):	Νο	
		10	
Construction	Driller (Name; ID):	Dug Well	
Details	Construction Date:	1979/1980	Poured cement
	Well Depth:	~12 ft; 6ft of water static	
	Casing Type:	poured compat	
	сазну туре.	poured cement	
I	Firmly seated in bedrock (Y/N)	No	


	Question	Answer	Comments
	Water Tight Casing to 6mbgs (Y/N)	No	(If No go to Step II) (O.Reg 903)
	Casing Diameter	Well is 2.28 m long by 2.26 m wide (estimated)	
	Danieler.	Weir is 2.20 in ong by 2.20 in wide (estimated)	
	Casing Longth:	Linknown ostimated 12 ft	(If a 12 m or 40 ft ag to Stap II)
	Casing Lengui.	Onknown, esumated 12 n.	(ii < 12 iii 0i 40 ii, go to step ii)
	Has the well ever been disinfected (when, why, most	un la num	
	recently):	unknown	
	When was the well pump last serviced or replaced?		
	Was it disinfected before being placed back in well:	un	
	Well Yield:	~ 55 igpm	
	Static Water Level:	6 ft of water	
	Overburden Thickness:	Unknown	
	Pump type:	2x jet pumps run in tandem	
	Pump Setting:	intake at bottom ~12ft	
	Drive Shoe (Y/N):	n/a	
	Grouted Casing (Y/N):	No seal	
	Thickness of Grout around well:	n/a	
	Water Level Monitoring Pipe in Well (Y/N):	No	
	Raw Water Sampling Tap (Y/N):	Yes	
	Other:		
7 Well Condition	Located in a Well House (Y/N):	Ves - Pumphouse (huilt 2 years ago)	
	Wall Taggad as Identifiad:	No	
Assessment (O.Reg 90		NU	
	One difference ( Annual an One L (Manufa Dana an Dana Mari)		
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):	10	
	Any Rust or Holes Evident on Casing:	NO	
	Above Ground Casing Height (mags) (If stickup,		
	provide details):	NO	
	Flush Mount Well (mbgs) (If flush mount, provide		
	details):	Yes	
	Is the Well Located in a Well Pit (mbgs):	No	
	Covered with solid, watertight cover (Y/N):	No - No known grout or sealant	
	Casing is above bttm of pit floor:	No	
	Is the pit equipped to drain (provide details)?	No	
	Is the pit equipped with a sump pump (Y/N)?	No	



	Question	Answer	Comments
	The casing vent is at what height above the pit		
	floor (cm)?	No	
	Height of Ground Surface for 5 m around well is at		
	least 60 cm above the highest known surface water	Ves	
		163	
	Is the topography around the well indicative of		
	surface ponding and flow towards the well:	No	
	Is drainage at the well adequate		
	(any standing water or evidence of ponding):	yes	
	Protective Cap Found on Well (Acceptable Seal?):	No	
		N	
	Is the Well Locked (Secure?):	Yes	
	Pit-less adapter:	No	
	·		
	Screened air vent:	No	
	Flood protection (has it ever flooded):	No	
	Vehicle impact protection:	(Yes)	
	Fencing:	(Yes)	
	i orionig.	(••••)	
	Surficial (type of geology, depth, observed surficial		
8. Aquifer	info):	glaciomarine. Beach stone gravel. See attached photo.	
Charactoristics	Redreck (type, depth, expected at surface);	Linknown	
Gliaracteristics	bedrock (type, depth, exposed at surface).	UIRIOWI	
	Show the Geology Mapping or borehole.does		
	it match with their understanding?		
	Uncertined Municipal Aguiter	Vee	(Marine and the extens II)
	Unconlined Municipal Aquiler:	res	(if yes, go to step ii)
	Confined Municipal Aquifer:	no	
	Pumping Test Done (Y/N)	No	
	When was test done, is the data available?		
9. Proximity to sources			
of potential surface			(If < 100 m from Surface Water and an
water contamination			overburden well or if < 500 m from Surface
	Perennial Stream/Pond (metres away from well):	no	Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an
	Ephemeral Stream (metres away from well):	no	Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an
			overburden well or if < 500 m from Surface
	Ditch (metres away from well):	no	Water and bedrock well, go to Step II)
(500 m for bedrock,			
100m for overburden)			
	Is there water in the ditch (Y/N):	no	
	When did it last rain? If recent is there water in		
	the ditch? Does the ditch drain quickly?	no	
			(If < 100 m from Surface Water and an
	Disar		overburden well or if < 500 m from Surface
	KIVEF:	<200 m from The Gut - fresh/salt water.	water and bedrock well, go to Step II)
			(It < 100 m from Surface Water and an
	Lake:	no	Water and bedrock well. go to Step II)
-			



	Question	Answer	Comments
	Wetlands/Marshes:	no	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:	no	
	Highway/Road:	Houses - ~100 homes, a golf course and a park	
	Unused wells found on site:	no	
	Should they be abandoned:	n/a	
	Abandoned wells on site:	no	
	Abandonment Log Available (Y/N):	n/a	
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):	n/a	
	Artesian wells found on adjacent properties:	n/a	
	Are there Well Pits Located on Adjacent Properties:	unknown	
	Other (Specify):	< 500 m from ocean	
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	~100 homes, 1 golf course ,1 park	
	If on private services, how many septics/wells (based on # of homes):	yes, all on septic. Years ago some raw discharge	
	Distance of closest septics (approx. to house):	~100m	
	Communal septics used nearby:	No	
	Are domestic wells within municipal aquifer:	Used to be not anymore - maybe 1 in town	
	Are there wells found within well pits on surrounding properties:	unknown	
	Any historic well interference complaints:	unknown	
	Historic Contamination Issues Noted at Domestic Wells:	unknown	
	Parkland:	Frenchman's Cove Provincial Park > 500 m from wellhead	
	Fertilizer used?	unknown	
	Forestry:	N/A	
	Agriculture:	N/A	
	Evidence of Manure Storage (liquid or solid):	N/A	
	Animal Grazing:	N/A	
	Industrial:	No	



	Question	Answer	Comments
	Type of Industrial Use:		
	AST's or LIST's at site:	Mostly oil and electric	
	Other Risks (large septics etc):		
	Land Lisos Specified in NIL Reg 63/03 as risks:	No N/A	
	Cosspective in the Key 00/03 as tisks.	NON/A	
	than or equal to 4 m deep ( >= 30 m away		
	from well):	No N/A	
	Cesspool or seepage pit that is >= 4 m deep		
	unless it prevents seepage has to be >= 60 m	No N/A	
	away from a well:	NO N/A	
	Earth Privy Pit or similar (>=16 m away from		
	well):	No N/A	
	Sewer of cast iron with leaded joints or		
	approved mechanical joints, independent		
	clean water drain of cistern (>= 5 m away from well):	No N/A	
	Sanitary Landfill or Garbage Dump:	No N/A	
	Is there a pumphouse cast iron floor drain with		
	leaded joints draining to ground surface? (>=1 m from well):	No N/A	
	Sontia(a) concrete yoult prive cover or tightly		
	jointed tile or equivalent material or sever		
	connected foundation drain (>=16 m away		
	from well):	No N/A	
	Future Land Use Changes that could impact wells:		
	i ataro zana ese enangoo tiat oedia impact iroko.		
	Other please specify (i.e. sources of microbial contam.):		
15. Notes:			
From meter readings:	Daily Usage (US Gal)		
rioni meter readings.	1-Dec-11 34,981		
	2-Dec-11 14,394		
	3-Dec-11 36,736		
	5-Dec-11 28,389		
	6-Dec-11 32,023		
	7-Dec-11 15,404		
	8-Dec-11 27,567 9-Dec-11 36.394		
	10-Dec-11 12,977		
	11-Dec-11 39,918		
	12-Dec-11 24,201		
	Average 27.632		
	5 21,002		

#### Photo Log - Frenchman's Cove







Signage

Pumphouse



Pumphouse and well head protection area



Interior of pumphouse



Wellhead











Beach gravel



## Glenwood





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	Question	Answer	Comments
1. Project Details:	Project No:	60236351	
	Client:	Newfoundland and Labrador, Department of Environment and Conservation, WRMD	
	Date of Inspection:	29-Nov-11	
	AECOM Inspector:	Nora Donald	
	Site Contact (Name. Phone #):	Rvan Ellis 709.424.1939	
		Quarter 5 4000	
	Weather:	Overcast; 5-10 C	
2. Well Designation:	Well ID:	Hand Pump Well	
	Well Type/Usage	Drilled used adhoc	
	······///·······	Publically accessible well - some residents use it, unsure of how many	
	Well Status (Pumping, Backup, Obs.):	or how often	
3. Location:	Water Supply No.:	WS-G-0800	
	Community:	Glenwood	
	Street:	River Road	
(Community, Street, GPS	GPS Northing:	21 u 0655929	
Grid, Well Elevation provided by well operator)	GPS Easting:	5429389	
	Well Elevation (masl):	31m	
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)	Unknown	
(Questions for well operators)	Do Storms Change the Well Chemistry (i.e. increased TSS)	Unknown	(If yes, go to step II) (O.Reg 170/03)
. ,	Is the well water chemistry similar to nearby		
	measurement of nearby surface water if possible):	Unknown	(If yes, go to step II) (O.Reg 170/03)
	Is there an observable change in nearby surface water levels when the well is pumping:	Unknown	(If yes, go to step II) (MOE GUDI Guidelines,
	Historic issues with bacteria, TSS, boil water	UNNOWN	2001)
	advisories?	Unknown	(If yes, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or microscopic particulate analysis completed on		
	it? If so when, results, copy of report available?	Unknown	
	Are there increasing/concerning trends of any other parameters at the well not mentioned	Linke er m	
	yet: Additonal Raw Water Chemistry Available that	Unknown	
	we could have:	Unknown	
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc	Unknown	
	Does the well water ever taste salty? Is there any evidence of salt water intrusion at the well or in the surrounding area?	Unknown	
	What is the current well treatment:	None	



	Question	Answer	Comments
	Has the well ever needed treatment upgrades or remediation (if so, when, why, records available?).	Unknown	
		Charlown	(If yes and a contrary report was not written after August 1, 2000, go to step II) (O Reg
	Historic Reports Indicating GUDI status (Y/N):	Νο	170/03)
	Obtain a copy (Y/N):	No	
	Date of Report:	No	
	Name of Preparer:	No	
	Reason for GUDI Status:	No	
	Average Annual Pumping Rate:	N/A - Handpump - pumped only when used	
	Maximum Monthly Pumping Rate:		(If <u>cannot</u> pump at greater than 0.58 L/s and is within 15 m of surface water or if the well <u>can</u> supply water at greater than 0.58 L/s and is in overburden within 100 m of surface water or <u>can</u> supply water at greater than 0.58 L/s and is in bedrock within 500 m of
	Other (specify):	N/A - Handpump - pumped only when used	surface water, go to step II) (O.Reg 170/03)
5 Sensitive Setting-	Spring	No	//f ves. go to step II)
5. Genalive Getting.	Spinig.	110	(ii yes, go to step ii)
(Source of Water Supply)	Infiltration Gallery:	No	(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well:	No	(If yes, go to step II)
	Karst Aquifer:	No	(If yes, go to step II)
	Exposed Fractured Bedrock:	No	(If yes, go to step II)
	Thin or absent soil cover over bedrock? How far away from the well?	No	
	High K Unconfined Aquifer:	Νο	(If yes, go to step II) (O.Reg 170/03)
	Enhanced Recharge:	No	(If yes, go to step II) (MOE Guidelines on GUDI, 2001)
	Dug Well:	No	(If not Drilled Well, Go To Step II) (O.Reg 170/03)
	Drilled Well (in overburden or bedrock):	Bedrock	
6. Well	Well Log Found (Y/N):	No	
Construction	Driller (Name; ID):	Unknown	
Details	Construction Date:	Drilled in 1960's	Poured cement
	Well Depth:	160ft	
	Casing Type:	Unknown - assumed steel (ref:Susan Gillanham)	
	Firmly sested in hadrock (V/M)	Linknown	
8	Finning Sealed in DeurOCK ( f/N)	UTINIUWII	1





	Question	Answer	Comments
	Water Tight Casing to 6mbgs (X/N)		(If No go to Step II) (O Reg 903)
	Water right Casing to onbys (174)	UINIOWI	(ii No go to Step ii) (O.Keg 903)
	Casing Diameter:	Unknown	
	Casing Length:	Unknown - No - Not accessible	(If < 12 m or 40 ft, go to Step II)
	Has the well over been disinfected (when why most re	NI/A	
	Thas the well ever been disinfected (when, why, most re	1.1.75	
	When was the well pump last serviced or replaced?		
	Was it disinfected before being placed back in well:	Unknown	
	Well Yield:	Unknown	
	Static Water Level:	Unknown	
	Querburden Thiskness	Linksaus	
	Overburden Enickness:	UTIKNOWN	
	Pump type:	hand pump	
	Pump Setting:	Unknown	
		Liekeowe	
	Drive Shoe (17N):	UIKIOWI	
	Grouted Casing (Y/N):	Unknown	
	Thickness of Grout around well:	Unknown	
	Water Level Monitoring Pipe in Well (Y/N):	No	
		Vee	
	Raw Water Sampling Tap (Y/N):	fes	
	Other:		
7. Well Condition	Located in a Well House (Y/N):	No	
Assossment (O Peg 0	Wall Taggod or Identified:	No	
Assessment (O.Reg 5		10	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):	No	
	Any Rust or Holes Evident on Casing:	n/a	
	Above Ground Casing Hoight (mage) (If stickup		
	provide details):	n/a	
	Hush Mount Well (mbgs) (If flush mount, provide	Vec	
	dotailoj.	,000	
	is the vvell Located in a Well Pit (mbgs):	no	
	Covered with solid, watertight cover (Y/N):	no	
	Casing is above bttm of pit floor:	no	
	i		
	Is the pit equipped to drain (provide details)?	no	
	is the preodupped to drain (provide details) !	10	
I	Is the pit equipped with a sump pump (Y/N)?	no	



	Question	Answer	Comments
	The casing vent is at what height above the pit		
	floor (cm)? Height of Ground Surface for 5 m around well is at least 60 cm above the highest known surface water least (V(N)):	no Vac	
	Is the topography around the well indicative of surface ponding and flow towards the well:	No	
	Is drainage at the well adequate (any standing water or evidence of ponding):	No	
	Protective Cap Found on Well (Acceptable Seal?):	no	
	Is the Well Locked (Secure?):	No	
	Pit-less adapter:	N/A	
	Screened air vent:	N/A	
	Flood protection (has it ever flooded):	N/A	
	Vehicle impact protection:	Yes - Guard rail	
	Fencing:	Yes	
8. Aquifer	Surficial (type of geology, depth, observed surficial info)	N/A	
Characteristics	Bedrock (type, depth, exposed at surface):	Assumed yes	
	it match with their understanding?		
	Unconfined Municipal Aquifer:	No	(If yes, go to step II)
	Confined Municipal Aquifer:	No	
	Pumping Test Done (Y/N)	n/a	
0. Provimity to courses	When was test done, is the data available?	n/a	
of potential surface water contamination	Perennial Stream/Pond (metres away from well):	Νο	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	Ephemeral Stream (metres away from well):	No	Water and bedrock well, go to Step II) (If < 100 m from Surface Water and an
(500 m for bedrock,	Ditch (metres away from well):	No	overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
100m for overburden)	Is there water in the ditch (Y/N):	No	
	When did it last rain? If recent is there water in the ditch? Does the ditch drain quickly?	No	
	River:	Yes, <25 m	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	Lake:	No	Water and bedrock well, go to Step II)



	Question	Answer	Comments
	Wetlands/Marshes:	No	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:	No	
	Highway/Road:	Yes; River Road within 10 m and TCH <100m	
	Unused wells found on site:	Unknown	
	Should they be abandoned:	unknown	
	Abandoned wells on site:	Not asked	
	Abandonment Log Available (Y/N):	Not asked	
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):	Not asked	
	Artesian wells found on adjacent properties:	Not asked	
	Are there Well Pits Located on Adjacent Properties:	Not asked	
	Other (Specify):		
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	yes,	
	If on private services, how many septics/wells (based on # of homes):	No - All on central services - neighbouring residences on municipal water supply	
	Distance of closest septics (approx. to house):	N/A	
	Communal septics used nearby:	Downstream	
	Are domestic wells within municipal aquifer:	Not known	
	Are there wells found within well pits on surrounding properties:	No	
	Any historic well interference complaints:	Not known	
	Historic Contamination Issues Noted at Domestic Wells:	Not known	
	Parkland:	No	
	Fertilizer used?	N/A	
	Forestry:	Unknown	
	Agriculture:	Νο	
	Evidence of Manure Storage (liquid or solid):	N/A	
	Animal Grazing:	N/A	



Environment

	Question	Answer	Comments
	Industrial:	Heavy equipment within 50m of well head. lumber storage, excavator.	
	Type of Industrial Lise:		
		I shown and post of well. I leading is min of wood, fuel or electric	
	ASTS OF US I'S ALSILE.	Tobserved east of well. Heating is this of wood, fuel of electric	
	Other Risks (large septics etc):	lift station across the road from Glenwood well.	
	Land Uses Specified in NL Reg 63/03 as risks:	N/A	
	than or equal to 4 m deep ( >= 30 m away		
	from well):	N/A	
	Cesspool or seepage pit that is >= 4 m deep unless it prevents seepage has to be >= 60 m		
	away from a well:	N/A	
	Seepage Pit, Filter Bed, Soil Absorption Field, Farth Privy Pit or similar (>=16 m away from		
	well):	N/A	
	Sewer of cast iron with leaded joints or approved mechanical joints, independent		
	clean water drain or cistern (>= 3 m away from		
	weil):	N/A	
	Sanitary Landfill or Garbage Dump:	N/A	
	leaded joints draining to ground surface? (>=1		
	m from well):	N/A	
	Septic(s), concrete vault privy, sewer or tightly iointed tile or equivalent material or sewer		
	connected foundation drain (>=16 m away		
	from weil):	N/A	
	Future Land Use Changes that could impact wells:		
15 Notos	Other please specify (i.e. sources of microbial contam.):	tor supply for the town's of Clenwood and Appleton. A majority of th	a homes in both communities are
15. Notes.	hooked up to the central supply. The site contact k	nocked on doors of homes nearby the hand pump well to determine	e whether the hand pump well is used
	anymore and if so, how often and by whom. AECO	M spoke with the Glenwood Town Clerk, Susan Gillingham, who in	dicated there are some residents who
	use the hand-pump well, although she said it is not	used very often. She indicated the well was drilled sometime in the	e 1960's. The Government
	times per year. The Town collects the samples and	I submits them to Government Services. Or, samples are collected	whenever the town staff think of it.
	Assessor's note: investigate sampling methods und	dertaken by Town staff. Determine if they are purging the well suffic	iently ahead of sample collection.

## AECOM

#### Photo Log - Glenwood









View of handpump well with traffic protection



View of proximity to river

Handpump well



Well head



# Holyrood





Map Document. (P:60236351000-CADD/050 GIS WIP/MXDs/FieldMapMXDs/60236351WellLocations\_Holyrood\_2and3.mxd) 11/242011--2:34303 PM



Map Document (P:160236351000-CADD\050 GIS WIP\MXDs\FieldMapMXDs\60236351WellLocations\_Holyrood\_2and3\_SurfGeology.mxd) 11/25/2011 --- 10809 PM



	Question	Answer	Comments
1 Broject Details:	Project No:	60236351	
1. Project Details.		0020001	
		Newfoundland and Labrador, Department of Environment and	
	Client:	Conservation, WRMD	
	Date of Inspection:	28-Nov-11	
	AECOM Inspector:	Nora Donald, P. Geo	
		Nora Bonard, 1.000.	
	Site Contact (Name, Phone #):	Wayne Hynes	
	Weather:	Clear, ~ 5 deg	
2. Well Designation:	Well ID:	Well #1	
-			
	Well Type // Jacque	Dublia Supply Mall	
	Weii Type/Osage.	Fublic Supply Well	
	Well Status (Pumping, Backup, Obs.):	Active fulltime never down	
3. Location:	Water Supply No.:	WS-G-0356	
	Community:	Holvrood	
		.,,	
	Oter etc	Millers Deviller	
	Street:	wittess Bay line	
(Community, Street, GPS	GPS Northing:	(N 0339755 / 5249618 E)	
Grid Well Flevation			
provided by well operator)	GPS Easting:		
	Well Elevation (masl):	~ 10 masl	
4 Historic Water Quality	What is the historic raw water quality of the well	acad water	
4. Instone water quality		good water	
(Questions for well	Do Storms Change the Well Chemistry (i.e. increased TSS)		
operators)		None	(If yes, go to step II) (O.Reg 170/03)
	Is the well water chemistry similar to nearby surface water bodies (take conductivity		
	measurement of nearby surface water if		
	possible):	Mahers River	(If yes, go to step II) (O.Reg 170/03)
	Is there an observable change in nearby		(If yes, go to step II) (MOE GUDI Guidelines,
	surface water levels when the well is pumping:	No	2001)
	Historic issues with bacteria, TSS, boil water		
	advisories?	No	(If yes, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or		
	microscopic particulate analysis completed on it? If so when, results, copy of report		
	available?	No	
	Are there increasing/concerning trends of any		
	other parameters at the well not mentioned vet:	No	
	Additonal Pow Water Chemistry Augilation to		
	we could have:	Chomietry is available in the town office	
	Does the well produce dirty water on start up?	Chemistry is available in the town onice.	
	What is the nature of the dirty water i.e.		
	sandy, iron (red) etc	Always on well #1 (pumping all the time) and ball field well.	
	Does the well water ever taste salty? Is there any evidence of salt water intrusion at the well		
	or in the surrounding area?	No	
	What is the current well treatment:	Liquid chlorine (iavex)	
		- 0	



	Question	Answer	Comments
	Has the well ever needed treatment upgrades or remediation (if so, when, why, records available?):	Liquid chlorine (javex)	
			(If yes and a contrary report was not written after August 1, 2000, go to step II) (O.Reg
	Historic Reports Indicating GUDI status (Y/N):	No	170/03)
	Obtain a copy (Y/N):	No	
	Date of Report:	No	
	Name of Preparer:	No	
	Reason for GUDI Status:	No	
	Average Annual Pumping Rate:	unknown	
	Maximum Monthly Pumping Rate:	unknown	(If <u>cannot</u> pump at greater than 0.58 L/s and is within 15 m of surface water or if the well <u>can</u> supply water at greater than 0.58 L/s and is in overburden within 100 m of surface water or <u>can</u> supply water at greater than 0.58 L/s and is in bedrock within 500 m of surface water, go to step II) (O.Reg 170/03)
	Other (specify):	-	
5. Sensitive Setting:	Spring:	No	(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:	no	(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well:	no	(If yes, go to step II)
	Karst Aquifer:	no	(If yes, go to step II)
	Exposed Fractured Bedrock:	thin soils	(If yes, go to step II)
	Thin or absent soil cover over bedrock? How far away from the well?	-	
	High K Unconfined Aquifer:	no	(If yes, go to step II) (O.Reg 170/03)
	Enhanced Recharge:	no	(If yes, go to step II) (MOE Guidelines on GUDI, 2001)
	Dug Well:	no	(If not Drilled Well, Go To Step II) (O.Reg 170/03)
	Drilled Well (in overburden or bedrock):	bedrock	
6. Well	Well Log Found (Y/N):	No	
Construction	Driller (Name; ID):	unknown	
Details	Construction Date:	unknown	Poured cement
	Well Depth:	~ 200 ft	
	Casing Type:	steel	
	Firmly seated in bedrock (Y/N)	unknown	



	Question	Answer	Comments
	Water Tight Casing to Embras (V(N)	upknown	(If No go to Stop II) (O Rog 903)
	Water right Casing to ombgs (1/14)	UINIOWI	(ii No go to Step ii) (O.Keg 503)
	Casing Diameter:	8"	
	Casing Length:	unknown	(If < 12 m or 40 ft, go to Step II)
	Has the well ever been disinfected (when, why, most recently):	unknown	
		unktown	
	When was the well pump last serviced or replaced?		
	Was it disinfected before being placed back in well:	unknown	
	Well Yield:	unknown	
	Static Water Level:	unknown	
	Overburden Thickness:	unknown	
		Pleuger of Canada - three phase; 7.5 HP, Model NE62-10 + M6-17 Oct.	
	Pump type:	1990	
	Pump Setting:	unknown	
	Drive Shoe (Y/N):	unknown	
	Created Casing (V/b))	uskrours	
	Grouted Casing (Y/N):	Unknown	
	Thickness of Grout around well:	unknown	
	Water Level Monitoring Pipe in Well (Y/N):	no	
	Raw Water Sampling Tap (Y/N):	Νο	
	Others	20	
	Other:	10	
7. Well Condition	Located in a Well House (Y/N):	Yes	
Assessment (O.Reg 9	Well Tagged or Identified:	No	
and NL Rog 63/03)	Condition of Annular Seal (Mosts Pog. or Door Not):	Yee	
	Condition of Annual Sear (Meets Rey. of Does NOL):	1 65	
	Any Rust or Holes Evident on Casing:	Yes	
	Above Ground Casing Height (mags) (If stickup,		
	provide details):	~3". Does not meet NL 63/03 regs	
	Flush Mount Well (mbgs) (If flush mount, provide		
	details):	N/A	
	Is the Well Located in a Well Pit (mbos).	Νο	
		10	
		Y.	
	Covered with solid, watertight cover (Y/N):	Yes	
	Casing is above bttm of pit floor:	N/A	
	Is the pit equipped to drain (provide details)?	N/A	
	Is the nit equipped with a sump nump (V/N)2	N/A	
	is the pit equipped with a sump pullip (f/N)?	1N/A	



	Question	Answer	Comments
	The casing vent is at what height above the pit	n/a	
	Height of Ground Surface for 5 m around well is at least 60 cm above the highest known surface water level (Y/N):	yes	
	Is the topography around the well indicative of surface ponding and flow towards the well	yes	
	Is drainage at the well adequate (any standing water or evidence of ponding):	yes	
	Protective Cap Found on Well (Acceptable Seal?):	no	
	Is the Well Locked (Secure?):	Yes	
	Pit-less adapter:	no	
	Screened air vent:	No	
	Flood protection (has it ever flooded):	no	
	Vehicle impact protection:	Yes	
	Fencing:		
8. Aquifer	Surficial (type of geology, depth, observed surficial info)	-	
Characteristics	Bedrock (type, depth, exposed at surrace): Show the Geology Mapping or borehole,does it match with their understanding?	yes -	
	Unconfined Municipal Aquifer:	-	(If yes, go to step II)
	Confined Municipal Aquifer:	assumed confined	
	Pumping Test Done (Y/N)	unknown	
9 Proximity to sources	When was test done, is the data available?		
of potential surface water contamination	Perennial Stream/Pond (metres away from well):	Mahers River within 30 m.	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Enhemeral Stream (metres away from well)	unknown	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and hedrock well or to Step II)
	Ditch (metres away from well):	within 20 m	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well on to Step II)
(500 m for bedrock, 100m for overburden)	Is there water in the ditch (Y/N):	not assessed	Water and bedrock wen, go to otep ny
	When did it last rain? If recent is there water in the ditch? Does the ditch drain quickly?	unknown	
	River:	< 30 m from Mahers River	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Lake:	no	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)



	Question	Answer	Comments
	Wetlands/Marshes:	unknown	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:		
	Highway/Road:	< 20 m	
	Unused wells found on site:	None	
	Should they be abandoned:		
	Abandoned wells on site:	No	
	Abandonment Log Available (Y/N):	-	
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):		
	Artesian wells found on adjacent properties:	-	
	Are there Well Pits Located on Adjacent Properties:		
	Other (Specify):	<u> </u>	
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	> 150 m	
	If on private services, how many septics/wells (based on # of homes):		
	Distance of closest septics (approx. to house):		
	Communal septics used nearby:		
	Are domestic wells within municipal aquifer:		
	Are there wells found within well pits on surrounding properties:		
	Any historic well interference complaints:		
	Historic Contamination Issues Noted at Domestic Wells:		
	Parkland:	none	
	Fertilizer used?		
	Forestry:	unknown	
	Agriculture:		
	Evidence of Manure Storage (liquid or solid):		
	Animal Grazing:		



	Question	Answer	Comments
	Industrial:	no	
	Type of Industrial Use:	_	
	AST's or LIST's at site:	_	
	Other Picks (large conting ate.):		
	Land Lloss Crestind in NL Dec (2/02 se risks)	Name	
	Land Uses Specified In NL Reg 63/03 as risks: Cesspool receiving raw sewage that is less	None	
	than or equal to 4 m deep ( >= 30 m away		
	from well):	-	
	unless it prevents seepage has to be >= 60 m		
	away from a well	-	
	Earth Privy Pit or similar (>=16 m away from		
	well):	-	
	approved mechanical joints, independent		
	clean water drain or cistern (>= 3 m away from well):	_	
	Sanitary Landfill or Garbage Dump:		
	Is there a pumphouse cast iron floor drain with		
	leaded joints draining to ground surface? (>=1		
	m from well)	-	
	jointed tile or equivalent material or sewer		
	connected foundation drain (>=16 m away		
	nom weny.		
	Future Land Line Observes that evold immediate		
	Future Land Use Changes that could impact wells:	-	
15 Notes:	Uther please specify (i.e. sources of microbial contam.): Hammonds Well Drilling did a video - 2	- 20 years ago to see where the water bearin fractures are located. C	bloring levels are $\sim 3.0$ Wellbead is not
10. 10.03.		sanitary.	
		-	



	Question	Answer	Comments
1. Project Details:	Project No:	60236351	
	Client:	Newfoundland and Labrador, Department of Environment and Conservation, WRMD	
	Date of Inspection:	28-Nov-11	
	AECOM Inspector:	Nora Donald	
	Site Contact (Name, Phone #):	Wayne Hynes	
	Weather:	Clear ~ 5 deg	
		olour, o dog	
2. Well Designation:	Well ID:	Holyrood Well #3 - well located in well pit	
	Well Type/Usage:	Pumping well	
	Well Status (Pumping, Backup, Obs.):	(Back up) feeds into distribution in pumphouse at 6"	
3. Location:	Water Supply No.:	WS-G-0356	
	Community:	Holyrood Well #3	
	Street:		
(Community, Street, GPS	GPS Northing:	339742	
Grid, Well Elevation provided by well operator)	GPS Easting:	5249391	
	Well Elevation (masl):		
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)	Same as well #1. good water	
(Questions for well operators)	Do Storms Change the Well Chemistry (i.e. increased TSS)	unknown	(If yes, go to step II) (O.Reg 170/03)
. ,	Is the well water chemistry similar to nearby surface water bodies (take conductivity measurement of nearby surface water if		
	possible):	Mahers River	(If yes, go to step II) (O.Reg 170/03)
	Is there an observable change in nearby surface water levels when the well is pumping:	Νο	(If yes, go to step II) (MOE GUDI Guidelines, 2001)
	Historic issues with bacteria, TSS, boil water advisories?	Νο	(If yes, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or microscopic particulate analysis completed on it? If so when, results, copy of report available?	No	
	Are there increasing/concerning trends of any other parameters at the well not mentioned yet:	Νο	
	Additonal Raw Water Chemistry Available that we could have:	Chemistry is available in the town office.	
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc	Well #3 is a back up well.	
	Does the well water ever taste salty? Is there any evidence of salt water intrusion at the well or in the surrounding area?	No	
	What is the current well treatment:	Liquid chlorine (javex)	



	Question	Answer	Comments
	Has the well ever needed treatment upgrades or remediation (if so, when, why, records available?):	Liquid chlorine (javex)	
			(If yes and a contrary report was not written after August 1, 2000, go to step II) (O.Reg
	Historic Reports Indicating GUDI status (Y/N):	No	170/03)
	Obtain a copy (Y/N):	No	
	Date of Report:	No	
	Name of Preparer:	No	
	Reason for GUDI Status:	No	
	Average Annual Pumping Rate:	unknown	
	Maximum Monthly Pumping Rate:	unkasun	(If <u>cannot</u> pump at greater than 0.58 L/s and is within 15 m of surface water or if the well <u>can</u> supply water at greater than 0.58 L/s and is in overburden within 100 m of surface water or <u>can</u> supply water at greater than 0.58 L/s and is in bedrock within 500 m of surface tracks of the the l/(0.000 to 2000)
		unknown	surrace water, go to step II) (O.Reg 170/03)
	Other (specify):	-	
5. Sensitive Setting:	Spring:	Νο	(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:	no	(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well:	no	(If yes, go to step II)
	Karst Aquifer:	no	(If yes, go to step II)
	Exposed Fractured Bedrock:	thin soils	(If yes, go to step II)
	Thin or absent soil cover over bedrock? How far away from the well?		
	High K Unconfined Aquifer:	no	(If yes, go to step II) (O.Reg 170/03)
	Enhanced Recharge:	no	(If yes, go to step II) (MOE Guidelines on GUDI, 2001)
	Dug Well:	no	(If not Drilled Well, Go To Step II) (O.Reg 170/03)
	Drilled Well (in overburden or bedrock):	bedrock	
6. Well	Well Log Found (Y/N):	No	
Construction	Driller (Name; ID):	unknown	
Details	Construction Date:	unknown	Poured cement
	Well Depth:	unknown	
	Casing Type:	steel	
	Firmly seated in bedrock (Y/N)	unknown	



	Question	Answer	Comments
	Water Tight Casing to 6mbgs (Y/N)	unknown	(If No go to Step II) (O.Reg 903)
	Casing Diameter:	Could not measure. Estimated diameter of 8 inches	
	Casing Length:	unknown	(If < 12 m or 40 ft, go to Step II)
	Has the well ever been disinfected (when, why, most re	unknown	
	When was the well pump last serviced or replaced?		
	Was it disinfected before being placed back in well:	unknown	
	Well Yield:	unknown	
	Otatia Matan Lawah	un la num	
	Static Water Level:	UNKNOWN	
	Overburden Thickness:	unknown	
	Pump type:	unknown	
	r աпբ type.	UNKNOWN	
	Pump Setting:	unknown	
	Drive Shoe (Y/N):	unknown	
	Grouted Casing (Y/N):	unknown	
	Thickness of Grout around well:	unknown	
	water Level Monitoring Pipe in Well (17N).	10	
	Raw Water Sampling Tap (Y/N):	no	
	Other:	Well #3 located in a well pit	
7. Well Condition	Located in a Well House (Y/N):	No	
Assessment (O.Reg 90	Well Tagged or Identified:	unknown	
and NL Bog 62(02)	Condition of Annular Soal (Moote Rog. or Doos Not)	unknown	
	Condition of Annular Ocar (Meets Key, of Does Not).	unitri/UWII	
	Any Rust or Holes Evident on Casing:	no	
	Above Ground Casing Height (mags) (If stickup		
	provide details):		
	Flush Mount Well (mbgs) (If flush mount, provide	No	
	uetalis).	UNI	
	Is the Well Located in a Well Pit (mbgs):	Yes	
	Covered with solid, watertight cover (Y/N):	No	
	Casing is above bitm of pit floor:	yes	
	Is the pit equipped to drain (provide details)?	no	
	Is the pit equipped with a sump pump (Y/N)?	unknown	
	· · · · · · · · · · · · · · · · · · ·		



	Question	Answer	Comments
	The casing vent is at what height above the pit		
	floor (cm)?	unknown	
	least 60 cm above the highest known surface water		
	level (Y/N):	no	
	Is the topography around the well indicative of surface ponding and flow towards the well	N/A - Pit	
	Surface ponding and now towards the weil	NA-FIL	
	Is drainage at the well adequate		
	(any standing water or evidence of ponding):	No - Pit	
	Protective Cap Found on Well (Acceptable Seal?):	no	
	Is the Well Locked (Secure?):	secure but not locked	
	Pit-less adapter:	no	
	Screened air vent:	no	
	Flood protection (has it ever flooded):	no	
		-	
	Mahiala incarat marta di		
	Vehicle impact protection:	yes	
	Fencing:	no	
	Surficial (type of geology, depth, observed surficial		
8. Aquifer	info):	-	
-			
Charactoristics	Redrock (type, depth, exposed at surface);	Ves	
Characteristics	Bedrock (type, depth, exposed at surface).	yes	
	Show the Geology Mapping or borehole, does		
	it match with their understanding?	-	
	Unconfined Municipal Aquifer:	-	(If yes, go to step II)
	Confined Municipal Aquifer:	assumed confined	
		abbarried commod	
	Pumping Test Done (Y/N)	unknown	
	When was test done, is the data available?	-	
9. Proximity to sources			
water contamination			(If < 100 m from Surface Water and an
	Perennial Stream/Pond (metres away from well):	Mahers River within 30 m.	Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an
	Ephemeral Stream (metres away from well):	unknown	overburden well or if < 500 m from Surface Water and bedrock well go to Step II)
		dilatovi	
			(If < 100 m from Surface Water and an
			overburden well or if < 500 m from Surface
(EQQ m for bodrook	Ditch (metres away from well):	within 20 m	Water and bedrock well, go to Step II)
(SUU IN TOF DEGROCK, 100m for overburden)			
	Is there water in the ditch (Y/N):	not assessed	
	When did it last rain? If recent is there water in the ditch? Does the ditch drain quickly?	unknown	
		a netomi	
			(If < 100 m from Surface Water and an
	Pivor	20 m from Moham Diver	overburden well or if < 500 m from Surface
	NIVEI.	< 30 m from Maners River	water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an
			overburden well or if < 500 m from Surface
	Lake:	no	Water and bedrock well, go to Step II)



	Question	Answer	Comments
	Wetlands/Marshes:	unknown	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:	<u> </u>	
	Highway/Road:	< 20 m	
	Unused wells found on site:	None	
	Should they be abandoned:		
	Abandoned wells on site:	No	
	Abandonment Log Available (Y/N):	-	
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):	•	
	Artesian wells found on adjacent properties:		
	Are there Well Pits Located on Adjacent Properties:	<u> </u>	
	Other (Specify):	-	
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	> 150 m	
	If on private services, how many septics/wells (based on # of homes):		
	Distance of closest septics (approx. to house):	-	
	Communal septics used nearby:	-	
	Are domestic wells within municipal aquifer:		
	Are there wells found within well pits on surrounding properties:		
	Any historic well interference complaints:	<u> </u>	
	Historic Contamination Issues Noted at Domestic Wells:		
	Parkland:	none	
	Fertilizer used?		
	Forestry:	unknown	
	Agriculture:	-	
	Evidence of Manure Storage (liquid or solid):		
	Animal Grazing:	<u>.</u>	



	Question	Answer	Comments
	Industrial:	no	
	Type of Industrial Lise:	_	
	AST's or UST's of sites		
	ASTS or USTS at site:	-	
	Other Risks (large septics etc):	-	
	Land Uses Specified in NL Reg 63/03 as risks:	None	
	Cesspool receiving raw sewage that is less than or equal to 4 m deep ( >= 30 m away		
	from well):	-	
	Cesspool or seepage pit that is $>= 4$ m deep unless it prevents seepage has to be $>= 60$ m		
	away from a well:	-	
	Seepage Pit, Filter Bed, Soil Absorption Field,		
	well):	-	
	Sewer of cast iron with leaded joints or		
	clean water drain or cistern (>= 3 m away from		
	well):		
	Sanitary Landfill or Garbage Dump:	-	
	Is there a pumphouse cast iron floor drain with leaded joints draining to ground surface? (>=1		
	m from well):	-	
	Septic(s), concrete vault privy, sewer or tightly		
	connected foundation drain (>=16 m away		
	from well):	-	
	Future Land Use Changes that could impact wells:		
	Other please specify (i.e. sources of microbial contam.):	-	
15. Notes:	Well #3 is located in a well pit. Well #3 is connected	d to the distribution system of Well #1. Wellhead is not sanitary.	

#### Photo Log - Holyrood - Well #1 and #3

## AECOM





Interior of pumphouse for well #1 and #3

Signage





Well #1 wellhead



Access to well

Well pit access for Well #3



Pit access looking west towards watercourse

### Photo Log - Holyrood - Well #1 and #3

## AECOM



Well head - Well #3



Well #3 - close up view



Distribution chamber adjacent to wellhead



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	Question	Answer	Comments
1 Broject Details:	Project No:	60236351	
1. Floject Details.		00230031	
		Newfoundland and Labrador, Depatment of Environment and	
	Client:	Conservation, WRMD	
	Date of Inspection:	28-Nov-11	
	AECOM Inspector	Nora Donald	
		Hold Donald	
	Site Contact (Name, Phone #):	Wayne Hynes	
	Weather:		
2. Well Designation:	Well ID:	Holyrod #5 - ballfield	
		Drilled well active	
	Wein Type/Osage.	Drilled woll, active.	
	Well Status (Pumping, Backup, Obs.):	pumping well	
3. Location:	Water Supply No.:	WS-G-0356	
	Community:	Holyrod #5 - ballfield	
	,	·	
	Street	Selmenier Line	
	Sileei.	Samoner Line	
(Community, Street, GPS	GPS Northing:	337500	
Grid. Well Elevation			
provided by well operator)	GPS Easting:	5249578	
	Well Elevation (masl):	> 250 masl	
4 Historic Water Quality	What is the historic raw water quality of the well	high manganese - stained chlorinator	
A motorio Mater Quality			
(Questions for well	Do Storms Change the Well Chemistry (i.e. increased TSS)		
operators)		unknown	(If yes, go to step II) (O.Reg 170/03)
	surface water bodies (take conductivity		
	measurement of nearby surface water if		
	possible):	unknown	(If yes, go to step II) (O.Reg 170/03)
	Is there an observable change in nearby surface water levels when the well is sumping		(If yes, go to step II) (MOE GUDI Guidelines,
	Sundos water levels when the weir is pullipling.	unknown	2001)
	Historic issues with bacteria, TSS, boil water		
	advisories?	unknown	(If yes, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or		
	it? If so when, results, copy of report		
	available?	unknown	
	Are there increasing/concerning trends of any other parameters at the well not mentioned		
	yet:	unknown	
	Additonal Raw Water Chemistry Available that		
	we could have:	unknown	
	Does the well produce dirty water on start up?		
	What is the nature of the dirty water i.e.	unknown	
	Does the well water ever taste salty? Is there	UNKIOWI	
	any evidence of salt water intrusion at the well		
	or in the surrounding area?	unknown	
	What is the current well treatment:	liquid chlorine	


	Question	Answer	Comments
	Has the well ever needed treatment upgrades		
	or remediation (if so, when, why, records		
	available?):	unknown	
			(If yes and a contrary report was not written
			after August 1, 2000, go to step II) (O.Reg
	Historic Reports Indicating GUDI status (Y/N):	no	170/03)
	Obtain a copy (Y/N):		
	Date of Report:		
	Name of Preparer:		
	Reason for GUDI Status:		
	Average Annual Pumping Rate:	unknown	
			(If cannot pump at greater than 0.58 L/s and
	Maximum Monthly Pumping Rate:		is within 15 m of surface water or if the well
			is in overburden within 100 m of surface
			water or <u>can</u> supply water at greater than
			0.58 L/s and is in bedrock within 500 m of
		unknown	surface water, go to step II) (O.Reg 170/03)
	Other (specify):		
5 Sonsitive Setting	Spring	<b>n</b> 0	(If yes, go to stop II)
5. Sensitive Setting:	opning.	10	(ii yes, go to step ii)
(Source of Water Supply)	Infiltration Gallery:	no	(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well	<b>n</b> 0	(If yes, go to stop II)
		110	(ii yes, go to step ii)
	Karst Aquifer:	no	(If yes, go to step II)
	Exposed Fractured Bedrock	Ves	(If yes, go to sten II)
		100	( yoo, go to stop ii)
	Thin or absent soil cover over bedrock? How		
	far away from the well?	thin soils	
	High K Unconfined Aquifer:	no	(If yes, go to step II) (O.Reg 170/03)
	Enhanced Dephares		(If yes, go to step II) (MOE Guidelines on
	Ennanced Recharge:	no	GUDI, 2001)
			(If not Drilled Well, Go To Step II) (O.Reg
	Dug Well:	no	170/03)
	Drilled Well (in overburden or bedrock):	bedrock	
6. Well	Well Log Found (Y/N):	no	
Construction	Driller (Name: ID):	unknown	
Details	Construction Date:	unknown	
	Well Depth:	unknown	
l	Casing Type:	steel	





	Question	Answer	Comments
	Firmly sected in hadroak (VAI)	unkooun	
	Plinity seared in bedrock (1/14)	unknown	
	Water Tight Casing to 6mbgs (Y/N)	unknown	(If No go to Step II) (O.Reg 903)
	Casing Diameter:	10 inch	
	Casing Length:	unknown	(If < 12 m or 40 ft, go to Step II)
	Has the well ever been disinfected (when, why, most recently):	unknown	
	When was the well pump last serviced or replaced? Was it disinfected before being placed back in well:	unknown	
	Well Yield:	94 igal/min	
	Static Water Level:	unknown	
	Overburden Thickness:	unknown	
	Pump type:	unknown	
	Pump Setting:	~230ft	
	Drive Shoe (Y/N):	unknown	
	Grouted Casing (Y/N):	unknown	
	Thickness of Grout around well:	unknown	
	Water Level Monitoring Pipe in Well (V/N)	00	
		10	
	Raw Water Sampling Tap (Y/N):	no	
	Other:	-	
7. Well Condition	Located in a Well House (Y/N):	Yes	
Assessment (O.Reg 9	Well Tagged or Identified:	no	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):	Yes - cemented - additional casting added 1 year ago	
	Any Rust or Holes Evident on Casing:	Yes - heavily rusted	
	Above Ground Casing Height (mags) (If stickup, provide details):	0.86 m above floor	
	Flush Mount Well (mbgs) (If flush mount, provide	N/A	
	Is the Well Located in a Well Dit (mbas):	No	
	Covered with solid unstatisht over 0/01-	No	
	Covereu with Solid, waterlight cover (Y/N):		
	Casing is above bttm of pit floor:	No	
	Is the pit equipped to drain (provide details)?	No	



	Question	Answer	Comments
	Is the pit equipped with a sump pump (Y/N)?	No	
	The casing yent is at what height above the pit		
	floor (cm)?	No	
	Height of Ground Surface for 5 m around well is at		
	least 60 cm above the highest known surface water	Voc	
		165	
	Is the topography around the well indicative of		
	surface ponding and flow towards the well:	Yes	
	Is drainage at the well adequate		
	(any standing water or evidence of ponding):	Yes - drain in pumphouse	
	Protective Con Found on Wall (Accortable Soci2)	Yee	
	Protective Cap Found on Well (Acceptable Sear?):	165	
	Is the Well Locked (Secure?):	Yes - in building	
	Pit-less adapter:	No - above ground	
	Soroonod oir vont	Vee	
	Screened alf vent:	Yes	
	Flood protection (has it ever flooded):	Yes - in building	
	Vehicle impact protection:	Yes	
	Fereirer	NI/A	
	Fencing:	IV/A	
8. Aquifer	Surficial (type of geology, depth, observed surficial info)	-	
Characteristics	Bedrock (type, depth, exposed at surface):	Yes	
	Show the Geology Mapping or borehole, does		
	Unconfined Municipal Aquifer:	-	(If yes, go to step II)
	Confined Municipal Aquifer:	Yes	
	Pumping Test Done (V/N)	unknown	
		UIINIOWI	
	140		
9 Provimity to sources	When was test done, is the data available?	-	
of potential surface			
water contamination		-	(IT < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	Perennial Stream/Pond (metres away from well):		Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an
	Ephemeral Stream (metres away from well):	-	Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an
			overburden well or if < 500 m from Surface
(500 m for bodrock	Ditch (metres away from well):	-	Water and bedrock well, go to Step II)
100m for overburden)			
, ·	Is there water in the ditch (Y/N):	-	
	when did it last rain? If recent is there water in the ditch? Does the ditch drain quickly?	-	
			(If < 100 m from Surface Water and an
	River	North Arm River $> 500 \text{ m}$	overburden well or if < 500 m from Surface
			trater and bear out wen, go to otep II)



	Question	Answer	Comments
	Lake:		(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II) (If < 100 m from Surface Water and an
	Wetlands/Marshes:	<200m wetland	overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:	No	
	Highway/Road:	Salmonier Line < 100 m	
	Unused wells found on site:	Νο	
	Should they be abandoned:	-	
	Abandoned wells on site:	Yes, reportedly near playaround	
	Abandonment Log Available (Y/N):	unknown	
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):	unknown	
	Artesian wells found on adjacent properties:	unknown	
	Are there Well Pits Located on Adjacent Properties:		
	Other (Specify):		
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	~ 450 m	
	If on private services, how many septics/wells (based on # of homes):	yes	
	Distance of closest septics (approx. to house):	~450 m	
	Communal septics used nearby:		
	Are domestic wells within municipal aquifer:		
	Are there wells found within well pits on surrounding properties:		
	Any historic well interference complaints:		
	Historic Contamination Issues Noted at Domestic Wells:		
	Parkland:	yes - baseball field	
	Fertilizer used?	unknown	
	Forestry:	No	
	Agriculture:	 No	
	Evidence of Manure Storage (liquid or solid):		



Animal Grazing:       -         Industrial:       unknown         Type of Industrial Use:       -         ASTs or USTs at site:       -         ASTs or USTs at site:       -         Other Risks (large septics etc):       -         Land Uses Specified in NL Reg 63/03 as risks:       -         Cesspool receiving raw sewage that is less than or equal to 4 m deep (>= 30 m away from well):       -         Cesspool or seepage pit that is >= 4 m deep under the to be to	
Animal Grazing:     -       Industrial:     unknown       Type of Industrial Use:     -       Type of Industrial Use:     -       AST's or UST's at site:     -       Other Risks (large septics etc):     -       Cesspool receiving raw sewage that is less than or equal to 4 m deep (>= 30 m away from well):     -       Cesspool or seepage pit that is >= 4 m deep     -	
Industrial:       unknown         Type of Industrial Use:       -         AST's or UST's at site:       -         Other Risks (large septics etc):       -         Land Uses Specified in NL Reg 63/03 as risks:       -         Cesspool receiving raw sewage that is less than or equal to 4 m deep (>= 30 m away from well):       -         Cesspool or seepage pit that is >= 4 m deep unless it threatened bas to ba >= 60 m       -	
Industrial:     unknown       Type of Industrial Use:     -       AST's or UST's at site:     -       AST's or UST's at site:     -       Other Risks (large septics etc):     -       Land Uses Specified in NL Reg 63/03 as risks:     -       Cesspool receiving raw sewage that is less than or equal to 4 m deep (>= 30 m away from well):     -       Cesspool or seepage pit that is >= 4 m deep     -	
Type of Industrial Use:     -       AST's or UST's at site:     -       Other Risks (large septics etc):     -       Uses Specified in NL Reg 63/03 as risks:     -       Cesspool receiving raw sewage that is less than or equal to 4 m deep (>= 30 m away from well):     -       Cesspool or seepage pit that is >= 4 m deep unless it reavents reserves the to be >= 60 m	ľ
Type of Industrial Use:       -         AST's or UST's at site:       -         Other Risks (large septics etc):       -         Land Uses Specified in NL Reg 63/03 as risks:       -         Cesspool receiving raw sewage that is less than or equal to 4 m deep (>= 30 m away from well):       -         Cesspool or seepage pit that is >= 4 m deep values       -         Use to pay that is pay that pay	
AST's or UST's at site:       -         Other Risks (large septics etc):       -         Land Uses Specified in NL Reg 63/03 as risks:       -         Cesspool receiving raw sewage that is less than or equal to 4 m deep (>= 30 m away from well):       -         Cesspool or seepage pit that is >= 4 m deep unless to that compare that to be >= 60 m       -	ľ
AST's or UST's at site:       -         Other Risks (large septics etc):       -         Land Uses Specified in NL Reg 63/03 as risks:       -         Cesspool receiving raw sewage that is less than or equal to 4 m deep (>= 30 m away from well):       -         Cesspool or seepage pit that is >= 4 m deep unlest it prevents seepage pit that is >= 4 m deep       -	
Other Risks (large septics etc):     -       Land Uses Specified in NL Reg 63/03 as risks:     -       Cesspool receiving raw sewage that is less than or equal to 4 m deep (>= 30 m away from well):     -       Cesspool or seepage pit that is >= 4 m deep unless it orgenets seepage pat to be >= 60 m	ľ
Other Risks (large septics etc):     -       Land Uses Specified in NL Reg 63/03 as risks:     -       Cesspool receiving raw sewage that is less than or equal to 4 m deep (>= 30 m away from well):     -       Cesspool or seepage pit that is >= 4 m deep unless it prevents esenage has to ha >= 60 m     -	
Land Uses Specified in NL Reg 63/03 as risks:       -         Cesspool receiving raw sewage that is less than or equal to 4 m deep (>= 30 m away from well):       -         Cesspool or seepage pit that is >= 4 m deep unless it receives to be >= 60 m       -	ľ
Land Uses Specified in NL Reg 63/03 as risks:       -         Cesspool receiving raw sewage that is less than or equal to 4 m deep (>= 30 m away from well):       -         Cesspool or seepage pit that is >= 4 m deep unless to request seepage pit that is >= 4 m deep       -	
Cesspool receiving raw sewage that is less than or equal to 4 m deep (>= 30 m away from well):     -       Cesspool or seepage pit that is >= 4 m deep unless it prevents seepage pit to be >= 60 m	
than or equal to 4 m deep (>= 30 m away from well): - Cesspool or seepage pit that is >= 4 m deep unless it prevents seepage bas to be >= 60 m	
Cesspool or seepage pit that is >= 4 m deep	ľ
unless it prevents seenage has to be $>-60$ m	
	ľ
Seepage Pit, Filter Bed, Soil Absorption Field,	
Earth Privy Pit or similar (>=16 m away from well):	ľ
Sewer of cast iron with leaded joints or	
approved mechanical joints, independent clean water drain or cistern (>= 3 m away from	ľ
well):	
	ľ
Sanitary Landfill or Garbage Dump: -	
Is there a pumphouse cast iron floor drain with leaded ioints draining to ground surface? (>=1	ľ
m from well):	
Septic(s), concrete vault privy, sewer or tightly jointed tile or equivalent material or sewer	ľ
connected foundation drain (>=16 m away	ľ
trom well):	
Uther please specify (i.e. sources of microbial contam.):	

### Photo Log - Holyrood - Well #5

### AECOM





Signage

Pumphouse



Pumphouse interior



Well #5 wellhead



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR

Department of Environment and Conservation Water Resources Management Division

### Water Well Record

Well Owner Name: TOWN COUNCIL Address: MAIN HY	Lithology Listing: BRWN OBDN 001 RED ROCK 023 GREY ROCK 061		
Well Location Town: HOLYROOD GPS Coordinates N ° ' "	Total Depth:         61.00         m         Depth to Bedrock:         m           Water Bearing Zone(s)         Lpm at         m         Lpm at         m           Lpm at         m         Lpm at         m		
W ° ' " Map Number: NAD: UTM Zone:	Casing Type:         Casing Length:       6.70 m       Diameter: mm         Casing Thickness:       mm         Drive Shoe Used:		
Northing: Easting:  Type of Water Encountered:FR	Well Grouted: fromm tom Grout Type:		
Well / Water Use: PS Type of Work Completed: Drilling Method:	Screen Info:		
Pump Recommendations         Pump Type:         Intake Setting:       m         Pumping Rate:       Lpm         Estimated Safe Yield of Well:       157.50       Lpm	Pumping Test         Method:         Pumping Rate:       Lpm Durationmin         Well Overflowing:       Overflow Rate: Lpm		

**Drillers Comments:** 

**Name of Drilling Company** P. O'Brien Well Drilling Ltd. Licence Number 8 Date Well Completed 04 /11/1991

This Record Modified by: Modified date:



# Hopeall





Map Document. (P.:80236351'000-CADD/050 GIS WIP/MXDs/HeidMapMXDs/60236351WellLocations\_Hopeall.mxd) 11/2/2011 - - - - 1-922 PM



Map Document (P:60236351000-CADD050 GIS WIP/MXDs/FleidMapMXDs/60236351Well.ocations\_Hopeall\_SurfGeology.mxd) 11/22/2011---11-42:36 AM



	Question	Answer	Comments
1. Proiect Details:	Project No:	60236351	
	Client:	Newfoundland and Labrador, Department of Environment and Conservation, WRMD	
	Date of Inspection:	2-Dec-11	
	AECOM Inspector:	Nora Donald	
	Site Contact (Name, Phone #):	Stewart Pitcher (709)582-2806 the.pitchers@hotmail.com	
	Weather:		
2. Well Designation:	Well ID:	Gilbert's Hill Well	
	Well Type/Usage:	Pumping - Public Supply	
	Well Status (Pumping, Backup, Obs.):	Pumping	
3. Location:	Water Supply No.:	WS-G-0826	
	Community:	Hopeall	
	Street:	Old Hopeall Road	
(Community, Street, GPS	GPS Northing:	22 U 5331129	
measured in field. Map Grid, Well Elevation provided by well operator)	GPS Easting:	22 U 0280482	
	Well Elevation (masl):	~100 masl	
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)	Not very good	
(Questions for well operators)	Do Storms Change the Well Chemistry (i.e. increased TSS)	Cloudy sometimes but not all the time	(If yes, go to step II) (O.Reg 170/03)
	Is the well water chemistry similar to nearby surface water bodies (take conductivity measurement of nearby surface water if possible):	Yes, there is a ditch within 15 m	(If yes, go to step II) (O.Reg 170/03)
	Is there an observable change in nearby surface water levels when the well is pumping:	Unknown	(If yes, go to step II) (MOE GUDI Guidelines, 2001)
	Historic issues with bacteria, TSS, boil water advisories?	Always on a boil order because this water isn't chlorinated	(If yes, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or microscopic particulate analysis completed on it? If so when, results, copy of report available?	Residue in bathtub	
	Are there increasing/concerning trends of any other parameters at the well not mentioned yet:		
	Additonal Raw Water Chemistry Available that we could have:		
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc		
	Does the well water ever taste salty? Is there any evidence of salt water intrusion at the well or in the surrounding area?	No	
	What is the current well treatment:	No treatment	



	Question	Answer	Comments
	Has the well ever needed treatment upgrades or remediation (if so, when, why, records available?):		
			(If yes and a contrary report was not written after August 1, 2000, go to step II) (O.Reg
	Historic Reports Indicating GUDI status (Y/N):	No	170/03)
	Obtain a copy (Y/N):	No	
	Date of Report:	No	
	Name of Preparer:	No	
	Reason for GUDI Status:	No	
	Average Annual Pumping Rate:	No	
	Maximum Monthly Pumping Rate:		(If <u>cannot</u> pump at greater than 0.58 L/s and is within 15 m of surface water or if the well <u>can</u> supply water at greater than 0.58 L/s and is in overburden within 100 m of surface water or <u>can</u> supply water at greater than 0.58 L/s and is in bedrock within 500 m of surface water, go to step II) (O.Reg 170/03)
	Other (specify):	Comment from Stewart Pitcher -	
5. Sensitive Setting:	Spring:		(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:		(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well:		(If yes, go to step II)
	Karst Aquifer:		(If yes, go to step II)
	Exposed Fractured Bedrock:		(If yes, go to step II)
	Thin or absent soil cover over bedrock? How far away from the well?		
	High K Unconfined Aquifer:		(If yes, go to step II) (O.Reg 170/03)
	Enhanced Recharge:		(If yes, go to step II) (MOE Guidelines on GUDI, 2001)
	Dug Well:		(If not Drilled Well, Go To Step II) (O.Reg 170/03)
	Drilled Well (in overburden or bedrock):	Bedrock	
6. Well	Well Log Found (Y/N):	Yes 10# 14903	
Construction	Driller (Name; ID):		
Details	Construction Date:	3-Aug-90	
	Well Depth:	110m	
	Casing Type:	Steel	



Environment



	Question	Answer	Comments
	Firmly seated in bedrock (Y/N)	Unknown	
	Water Tight Casing to 6mbgs (Y/N)	Unknown	(If No go to Step II) (O.Reg 903)
	Casing Diameter	6"	
	Casing Length:	Well log - 15m	(If < 12 m or 40 ft, go to Step II)
	Has the well ever been disinfected (when, why, most recently):	Unknown	
	When was the well pump last serviced or replaced? Was it disinfected before being placed back in well:		
	Well Yield:	27 L/min	
	Static Water Level:	Unknown	
	Overburden Thickness:	Unknown	
	Pump type:	Franklin Electric Model - 280 1084915 1HP	
	Pump Setting:	Unknown	
	Drive Shoe (Y/N):	Unknown	
	Grouted Casing (Y/N):	Unknown	
	Thickness of Grout around well:	Unknown	
	Water Level Monitoring Pipe in Well (Y/N):	No	
	Raw Water Sampling Tap (Y/N):	No	
	Other:	No	
7. Well Condition	Located in a Well House (Y/N):	Yes	
Assessment (O.Reg 9	Well Tagged or Identified:	No	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):	No	
	Any Rust or Holes Evident on Casing:	Rust	
	Above Ground Casing Height (mags) (If stickup, provide details):	~0.10m	
	Flush Mount Well (mbgs) (If flush mount, provide details):	No	
	Is the Well Located in a Well Pit (mbgs):	No	
	Covered with solid, watertight cover (Y/N):	 No	
	Casing is above bttm of pit floor:	No	
	Is the pit equipped to drain (provide details)?	Νο	



	Question	Answer	Comments
	Is the pit equipped with a sump pump (Y/N)?	No	
	The casing vent is at what height above the pit		
	floor (cm)? Height of Ground Surface for 5 m around well is at	No	
	least 60 cm above the highest known surface water		
	level (Y/N):	Yes	
	Is the topography around the well indicative of surface ponding and flow towards the well	No	
	s drainage at the well adequate		
	(any standing water or evidence of ponding):	Yes	
	Protective Cap Found on Well (Acceptable Seal?):	No	
	Is the Well Locked (Secure?):	Yes	
	Pit-less adapter:	No	
	Screened air vent:	No	
	Flood protection (has it ever flooded):	?	
	Vehicle impact protection:	Yes	
	Fencing:	No	
8. Aquifer	Surficial (type of geology, depth, observed surficial info):		
Characteristics	Bedrock (type, depth, exposed at surface):		
	Show the Geology Mapping or borehole, does		
	it match with their understanding?		
	Unconfined Municipal Aquifer:		(If yes, go to step II)
	Confined Municipal Aquifer:		
	Pumping Test Done (Y/N)		
	M/L		
9. Proximity to sources	vvnen was test done, is the data available?		
of potential surface			(If < 100 m from Surface Water and an
water contamination	Perennial Stream/Pend (motros quiou from well)		overburden well or if < 500 m from Surface
	r erenniai Stream/Fond (metres away from well):		water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an
	Ephemeral Stream (metres away from well):		overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an
	Ditch (metres away from well):	15m and overland run-off	overburden weil or it < 500 m from Surface Water and bedrock well, go to Step II)
(500 m for bedrock,			
room or overburden)	Is there water in the ditch (Y/N):	Yes	
	When did it last rain? If report is there water in		
	the ditch? Does the ditch drain quickly?	Yesterday, yes	
			(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	River:		Water and bedrock well, go to Step II)



	Question	Answer	Comments
	Lake:		(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Wetlands/Marshes:		(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:		
	Highway/Road:		
	Unused wells found on site:	one well drilled in driveway but produced salt water	
	Should they be abandoned:		
	Abandoned wells on site:		
	Abandonment Log Available (Y/N): Artesian wells found on site (Is the well fixed		
	or does it need to be abandoned): Artesian wells found on adiacent properties:		
	Are there Well Pits Located on Adjacent Properties:		
	Other (Specify):		
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	11 homes	
	If on private services, how many septics/wells (based on # of homes):	Individuals on septic tanks	
	Distance of closest septics (approx. to house):	50m	
	Communal septics used nearby:	None	
	Are domestic wells within municipal aquifer:	yes - 2 drilled wells, 3dug wells	
	Are there wells found within well pits on surrounding properties:	Νο	
	Any historic well interference complaints:	No	
	Historic Contamination Issues Noted at Domestic Wells:	Dug well - stained	
	Parkland:	No	
	Fertilizer used?	No	
	Forestry:	None	
	Agriculture:	No	
	Evidence of Manure Storage (liquid or solid):	No	



Animal Grazing:     No       Industrial:     Wood / AST's /electricity       Type of Industrial Use:	Question	Answer	Comments
Animal Grazing:     No       Industrial:     Wood / AST's /electricity       Type of Industrial Use:			
Industrial:     Wood / AST's /electricity       Industrial:     Wood / AST's /electricity       Type of industrial Use:	Animal Grazing:	No	
Industrial:     Wood / AST's /electricity       Type of Industrial Use:		10	
Industrial:     Wood / As is relectinity       Type of Industrial Use:	to show to be		
Type of Industrial Use:	Industriai:	Wood / AST s /electricity	
Type of Industrial Use:			
AST's or UST's at site:	Type of Industrial Use:		
AST's or UST's at site:			
Other Risks (large septics etc):         Land Uses Specified in NL Reg 63/03 as risks:         No         Cesspool receiving raw sewage that is less than or equal to 4 m deep (>= 30 m away from well):         No         Cesspool or seepage pit that is >= 4 m deep unless it prevents seepage has to be >= 60 m away from a well:         No         Seepage Pit, Filter Bed, Soil Absorption Field, Earth Privy Pit or similar (>=16 m away from well):         No         Sewer of cast iron with leaded joints or approved mechanical joints, independent clean water drain or cistern (>= 3 m away from well):         No	AST's or UST's at site:		
Other Risks (large septics etc):       Image: constraint of the section of the secti			
Land Uses Specified in NL Reg 63/03 as risks:       No         Cesspool receiving raw sewage that is less than or equal to 4 m deep (>= 30 m away from well):       No         Cesspool or seepage pit that is >= 4 m deep unless it prevents seepage has to be >= 60 m away from a well:       No         Seepage Pit, Filter Bed, Soil Absorption Field, Earth Privy Pit or similar (>=16 m away from well):       No         Seever of cast iron with leaded joints or approved mechanical joints, independent clean water drain or cistern (>= 3 m away from well):       No	Other Risks (large septics etc):		
Land Uses Specified in NL Reg 63/03 as risks:       No         Cesspool receiving raw sewage that is less than or equal to 4 m deep (>= 30 m away from well):       No         Cesspool or seepage pit that is >= 4 m deep unless it prevents seepage has to be >= 60 m away from a well:       No         Seepage Pit, Filter Bed, Soli Absorption Field, Earth Privy Pit or similar (>=16 m away from well):       No         Seever of cast iron with leaded joints or approved mechanical joints, independent clean water drain or cistern (>= 3 m away from well):       No			
Cesspool receiving raw sewage that is less than or equal to 4 m deep (>= 30 m away from well);       No         Cesspool or seepage pit that is >= 4 m deep unless it prevents seepage has to be >= 60 m away from a well:       No         Seepage Pit, Filter Bed, Soli Absorption Field, Earth Privy Pit or similar (>=16 m away from well);       No         Seever of cast iron with leaded joints or approved mechanical joints, independent clean water drain or cistern (>= 3 m away from well);       No	Land Uses Specified in NL Reg 63/03 as risks:	No	
than or equal to 4 m deep (>= 30 m away from well):     No       Cesspool or seepage pit that is >= 4 m deep unless it prevents seepage has to be >= 60 m away from a well:     No       Seepage Pit, Filter Bed, Soil Absorption Field, Earth Privy Pit or similar (>=16 m away from well):     No       Sewer of cast iron with leaded joints or approved mechanical joints, independent clean water drain or cistern (>= 3 m away from well):     No	Cesspool receiving raw sewage that is less		
Cesspool or seepage pit that is >= 4 m deep unless it prevents seepage has to be >= 60 m away from a well:       No         Seepage Pit, Filter Bed, Soil Absorption Field, Earth Privy Pit or similar (>=16 m away from well):       No         Sewer of cast iron with leaded joints or approved mechanical joints, independent clean water drain or cistern (>= 3 m away from well):       No	than or equal to 4 m deep ( >= 30 m away from well):	No	
unless it prevents seepage has to be >= 60 m away from a well:     No       Seepage Pit, Filter Bed, Soil Absorption Field, Earth Privy Pit or similar (>=16 m away from well):     No       Sewer of cast iron with leaded joints or approved mechanical joints, independent clean water drain or cistern (>= 3 m away from well):     No	Cesspool or seepage pit that is >= 4 m deep	10	
away from a weil:     NO       Seepage Pit, Filter Bed, Soil Absorption Field, Earth Privy Pit or similar (>=16 m away from well):     No       Sewer of cast iron with leaded joints or approved mechanical joints, independent clean water drain or cistern (>= 3 m away from well):     No	unless it prevents seepage has to be >= 60 m	Ne	
Earth Privy Pit or similar (>=16 m away from       well):       No       Sewer of cast iron with leaded joints or approved mechanical joints, independent clean water drain or cistern (>= 3 m away from       well):       No	away from a well: Seenage Pit Filter Bed, Soil Absorption Field	Nδ	
well):     No       Sewer of cast iron with leaded pints or approved mechanical joints, independent clean water drain or cistern (>= 3 m away from well):     No	Earth Privy Pit or similar (>=16 m away from		
approved mechanical joints, independent clean water drain or cistern (>= 3 m away from well): No	Well): Sewer of cast iron with leaded joints or	No	
clean water drain or cistern (>= 3 m away from well): No	approved mechanical joints, independent		
	clean water drain or cistern (>= 3 m away from well):	No	
		10	
Destinged and dill as Optimers	Ossitanu kanatili as Ostana Dunau	M-	
Sanitary Lanoni or Garbage Durip: No	Sanitary Landhii or Garbage Dump:	Nδ	
leaded joints draining to ground surface? (>=1	leaded joints draining to ground surface? (>=1		
m from well): No	m from well):	No	
Septic(5), concrete vault privy, sewer or tightly iointed tile or equivalent material or sewer	Septic(s), concrete vault privy, sewer or tightly iointed tile or equivalent material or sewer		
connected foundation drain (>=16 m away	connected foundation drain (>=16 m away		
rrom weil): NO	trom well):	NO	
Future Land Use Changes that could impact wells: No	Future Land Use Changes that could impact wells:	No	
Other please specify (i.e. sources of microbial contam.):	Other please specify (i.e. sources of microbial contam.):		
15. Notes:	15. Notes:		

Completed by:

Date:

### Photo Log - Hopeall







Pumphouse





Water storage and well head

Well head - unsanitary



Rodent feces near well head



Slugs on walls of pumphouse

Signage





Mould and water damage above water storage



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR

Department of Environment and Conservation Water Resources Management Division

### Water Well Record

Well Owner Name: LOCAL SERVICE DISTRICT Address: MAIN ROAD	Lithology Listing: GREY GRVL 013 GREY SHLE 110	
Well Location         Town: HOPEALL         GPS Coordinates         N       °       "         W       °       "	Total Depth:       110.00       m       Depth to Bedrock:       m         Water Bearing Zone(s)        Lpm at       m        Lpm at       m         Lpm at       m        Lpm at       m        Lpm at       m         Casing Type:	
Map Number: 1N/12 NAD: UTM Zone: 22	Casing Length: 15.00 m Diameter: mm Casing Thickness: mm Drive Shoe Used:	
Northing: 5275642 Easting: 310213 Type of Water Encountered:FR	Well Grouted: fromm tom Grout Type:	
Well / Water Use:PSType of Work Completed:Drilling Method:	Screen Info:	
Pump Recommendations         Pump Type:         Intake Setting:      m         Pumping Rate:      pm         Estimated Safe Yield of Well:       27.00       Lpm	Pumping Test         Method:         Pumping Rate:       Lpm Duration 60min         Well Overflowing:       Overflow Rate: Lpm	

Drillers Comments: ENCLOSED IN PUMPHOUSE Name of Drilling Company Martin B. Hammond Co. Ltd.

Licence Number 1 Date Well Completed 08 /03/1990

This Record Modified by: Modified date:



## Makinsons





Map Document. (P:802863611000-CADD1050 GIS WIP\MXDs\FieldMapMXDs\60236351WelLocations\_Makinsons.mxd) 11/242011 -- 2-07701 PM



Map Document. (P:602363511000-CADD/050 GIS WIP\MXDs\FieldMapMXDs\60236351WellLocations\_Makinsons\_SurfGeologymxd) 11/12/2011 --- 11.44:09 AM



	Question	Answer	Comments
1. Project Details:	Project No:	60236351	
	Client:	Newfoundland and Labrador, Department of Environment and Conservation, WRMD	
	Date of Inspection:	14 Decebmer 2011	
	AECOM Inspector:	Nora Donald	
	Site Contact (Name, Phone #):	Junior Taylor - junior.taylor@persona.ca	
	Weather:	Clear, ~ 8 deg.	
2. Well Designation:	Well ID:	Well #1 - located in front of pump house	
	Well Type/Usage:	potable supply	
	Well Status (Pumping, Backup, Obs.):	pumping	
3. Location:	Water Supply No.:	WS-G-0442	
	Community:	Makinsons - Taylor's Wells	
	Street:	Juniper Stump Road	
(Community, Street, GPS measured in field. Map	GPS Northing:	21T 5247288	
Grid, Well Elevation provided by well operator)	GPS Easting:	21T 0658298	
	Well Elevation (masl):	~100 masi	
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)	No problems with water quality	
(Questions for well operators)	Do Storms Change the Well Chemistry (i.e. increased TSS)	No	(If yes, go to step II) (O.Reg 170/03)
	Is the well water chemistry similar to nearby surface water bodies (take conductivity measurement of nearby surface water if possible):	unknown	(If yes, go to step II) (O.Reg 170/03)
	Is there an observable change in nearby surface water levels when the well is pumping:	no	(If yes, go to step II) (MOE GUDI Guidelines, 2001)
	Historic issues with bacteria, TSS, boil water advisories?	Yes, historical issues with bacteria. This is related to improper chlorine levels in the well. Operator is hesitant to put too much chlorine in the water. Have been on a boil order in the past. Currently not on a boil order.	(If yes, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or microscopic particulate analysis completed on it? If so when, results, copy of report available?	Νο	
	Are there increasing/concerning trends of any other parameters at the well not mentioned yet:	None that he is aware of.	
	Additonal Raw Water Chemistry Available that we could have:	No	
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc	unknown	
	Does the well water ever taste salty? Is there any evidence of salt water intrusion at the well or in the surrounding area?	no	
	What is the current well treatment:	chlorine	



	Question	Answer	Comments
	Has the well ever needed treatment upgrades or remediation (if so, when, why, records available?):	unknown	
		unkilowii	(If yes and a contrary report was not written
	Historic Reports Indicating GUDI status (Y/N):	no	170/03)
	Obtain a copy (Y/N):	n/a	
	Date of Report:	n/a	
	Name of Preparer:	n/a	
	Reason for GUDI Status:	n/a	
	Avorage Appual Pumping Pate:	unkagung	
	Average Annuart unping Nate.	undown	
	Maximum Monthly Pumping Rate:		(If <u>cannot</u> pump at greater than 0.58 L/s and is within 15 m of surface water or if the well <u>can</u> supply water at greater than 0.58 L/s and is in overburden within 100 m of surface water or <u>can</u> supply water at greater than
		unknown	0.58 L/s and is in bedrock within 500 m of surface water, go to step II) (O.Reg 170/03)
	Other (specify):	no	
5. Sensitive Setting:	Spring:	No	(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:	No	(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well:	Νο	(If yes, go to step II)
	Karst Aquifer:	No	(If yes, go to step II)
	Exposed Fractured Bedrock:	Νο	(If yes, go to step II)
	Thin or absent soil cover over bedrock? How far away from the well?	Νο	
	High K Unconfined Aquifer:	No	(If yes, go to step II) (O.Reg 170/03)
	Enhanced Recharge:	Νο	(If yes, go to step II) (MOE Guidelines on GUDI, 2001)
	Dug Well:	 No	(If not Drilled Well, Go To Step II) (O.Reg 170/03)
	Drilled Well (in overburden or bedrock):	Bedrock	
6. Well	Well Log Found (Y/N):	Unknown	
		Martin Hammond - Drilled well # 1 & 2 to replace original well (referred	
Construction	Uriller (Name; ID):	to as well 3) in pumphouse	
Details	Construction Date:	1999	
	Well Depth:	350 ft	
	Casing Type:	Steel	
	Firmly seated in bedrock (Y/N)	unknown	



	Question	Answer	Comments
	Water Tight Casing to 6mbgs (X/N)	unknown	(If No go to Step II) (O Reg 903)
		UINIOWI	(ii No go to step ii) (O.Keg 903)
	Casing Diameter:	6"	
	Casing Length:	unknown	(If < 12 m or 40 ft, go to Step II)
	Has the well ever been disinfected (when why most		
	recently):	when drilled	
	When was the well pump last serviced or replaced? Was it disinfected before being placed back in well:	unknown	
	14/-11 12:-1-1.	University	
	vveli yleid:	Unknown	
	Static Water Level:	Unknown	
	Overburden Thickness:	Unknown	
	Pump type:	Unknown	
	Pump Setting:	Unknown	
	,	Childforn	
		11-1-	
	Drive Shoe (Y/N):	Unknown	
	Grouted Casing (Y/N):	Unknown	
	Thickness of Grout around well:	Unknown	
	Water Level Monitoring Pipe in Well (Y/N):	Unknown	
	Raw Water Sampling Tap (Y/N):	Unknown	
		Note: One well log was found for Makinsons - Well ID Number 19209.	
		Unsure if this is Well No. 1 or Well No. 2. Well was drilled October 21,	
		casing. Water bearing zone encountered at 109.7 m. Depth to bedrock	
		is 5.2 m. Estimated safe yield is 13.5 Lpm. Stratigraphy described by	
		the driller is gravel (5 m) overlying grey rock (122 m).	
	Other:		
7. Well Condition	Located in a Well House (Y/N):	No. Well #1 is in front of the pump house	
Assessment (O.Reg 90	Well Tagged or Identified:	Yes; Taylor's #1 Well	Drilled by Martin Hammond Well Drilling
Contraction (on log of			
and NL Box (2/02)	Condition of Annular Sool (Maste Day, or Deer Math	Voc. approars to most rog	
anu NL Keg 03/03)	Condition of Annular Sear (Weets Reg. of Does Not):	i es, appears to meet reg.	
	Any Rust or Holes Evident on Casing:	casing is rusted	
	Above Ground Casing Height (mags) (If stickup,		
	provide details):	0.46 m	
	Flush Mount Well (mbgs) (If flush mount, provide		
	details):	n/a	
	Is the Well Located in a Well Pit (mbgs):	No	
	Covered with solid, watertight cover (Y/N):	No	
	Casing is above bitm of pit floor:	Νο	
1	caoing is above built of pit libor.		



	Question	Answer	Comments
	Is the pit equipped to drain (provide details)?	No	
	Is the pit equipped with a sump pump (Y/N)?	No	
	The casing vent is at what height above the pit	No	
	Height of Ground Surface for 5 m around well is at	10	
	least 60 cm above the highest known surface water	Voc	
		165	
	Is the topography around the well indicative of	No	
	Surface ponding and now towards the wen	110	
	Is drainage at the well adequate	Voc	
	(any standing water of evidence of ponding).	165	
	Distanting Can Found on Wall (Accordable Soci2):	Voc. opposite to most roce	
	Protective Cap Found on Weil (Acceptable Seal?):	res, appears to meet regs	
	la the Well Leaked (Secure?)	Vac	
		Tes	
	Dit land a desiter	N	
	Pit-less adapter:	Yes	
	Screened air vent:	Yes	
	Flood protection (has it ever flooded):	Unknown, did not ask.	
	Vehicle impact protection:	No	
	Fencing:	No	
	Surficial (type of geology, depth, observed surficial		
8. Aquifer	info):	no	
		bedrock aquifer. No exposed bedrock observed during site visit,	
Characteristics	Bedrock (type, depth, exposed at surface):	however snow covered.	
	Show the Geology Mapping or borehole, does		
	it match with their understanding?	n/a	
	Unconfined Municipal Aquifer:	no	(If yes, go to step II)
	Confined Municipal Aquifer:	yes	
	Pumping Test Done (Y/N)	unknown	
9. Proximity to sources	When was test done, is the data available?	unknown	
of potential surface			(If < 100 m from Surface Water and an
water contamination		<b>-</b>	overburden well or if < 500 m from Surface
	Perennial Stream/Pond (metres away from well):	Brook <15m	Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an
	Enhameral Stream (metres away from well):	No	overburden well or if < 500 m from Surface
		NU	water and bedrook well, go to step ii)
			(If < 100 m from Surface Water and an
	Ditch (metres away from well):	No	overburden well or if < 500 m from Surface
(500 m for bedrock,	Enor thous away non welly.	NU	water and bedrook well, go to step ii)
100m for overburden)	is there water in the ditch (V/N)-	No	
		NU	
	When did it last rain? If recent is there water in the ditch? Does the ditch drain guidely?	No	
1	the uton: Does the uton utail quickly?	140	



	Question	Answer	Comments
	River:	 No	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Lake:	Νο	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well. go to Sten II)
	Wetlands/Marshes:	potential wet area northeast of wells/pump house	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:	no	
	Highway/Road:	yes, < 50 m from side-road	
	Unused wells found on site:	Yes - one in pumphouse. It is reportedly scheduled to be properly abandoned.	
	Should they be abandoned:	yes	
	Abandoned wells on site:	No	
	Abandonment Log Available (Y/N):	n/a	
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):	n/a	
	Artesian wells found on adjacent properties:	n/a	
	Are there Well Pits Located on Adjacent Properties:	unknown	
	Other (Specify):	None	
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	~ 27 homes are on the Makinson's water system	
	If on private services, how many septics/wells (based on # of homes):	All homes on septic systems	
	Distance of closest septics (approx. to house):	~ 30 - 40 m.	
	Communal septics used nearby:	unknown	
	Are domestic wells within municipal aquifer:	Νο	
	Are there wells found within well pits on surrounding properties:	no	
	Any historic well interference complaints:	unknown	
	Historic Contamination Issues Noted at Domestic Wells:	unknown	
	Parkland:	no	
	Fertilizer used?	n/a	
	Forestry:	no	
	Agriculture:	no	



	Question	Answer	Comments
	Evidence of Manure Storage (liquid or solid):	n/a	
	Animal Grazing:	n/a	
		1//a	
	Industrial:	no	
	<b>—</b> (1.1.1.1)	- 1-	
	I ype of Industrial Use:	n/a	
		Yes - ASTs and electice heat for homes within the community. There is	
	AST's or UST's at site:	one AST approximately 25 m from Well No. 1.	
	Other Risks (large septics etc):	no	
	Land Lloss Specified in NL Bag 62/02 as risks:	No	
	Land Uses Specified III NE Reg 63/03 as fisks.	NO	
	than or equal to 4 m deep ( >= 30 m away		
	from well):	No	
	Cesspool or seepage pit that is >= 4 m deep		
	unless it prevents seepage has to be >= 60 m		
	away from a well:	No	
	Seepage Pit, Filter Bed, Soil Absorption Field,		
	Earth Privy Pit of similar (>=16 m away from well):	No	
	Sewer of cast iron with leaded joints or	10	
	approved mechanical joints, independent		
	clean water drain or cistern (>= 3 m away from	N	
	weil):	NO	
	Sanitary Landfill or Garbage Dump:	No	
	Is there a pumphouse cast iron floor drain with		
	leaded joints draining to ground surface? (>=1		
	m from well):	No	
	Septic(s), concrete vault privy, sewer or tightly		
	jointed tile or equivalent material or sewer		
	from well):	Νο	
	Future Land Use Changes that could impact wells:	No	
	Other places specify (i.e. sources of microbial contam):		
15 Notes:	There are approximately 27 houses on this system	There have been complaints of chlorine smell and taste in the com	munity. The first book up to the line is
10. 110103.	quite close to the pump house (i.e. 25 m from well)	The operator indicated they have fears of putting too much chlorin	e in the water. This has resulted in the
	past, of not putting enough chlorine in the water of	ausing boil orders, Well's No, 1 & 2 are in use. Well #2 is the original	I well that is in the pump house. It is
	scheduled to be properly decommissioned. Pat Ma	ahoney is the Vice Chair of the water committee. There were proble	ems with the pump in Well No. 1
	yesterday. AECOM Assessor's comment - above of	round water storage tanks were observed to be rusted during the si	te visit.
		5 5 5 5	



	Question	Answer	Comments
1. Project Details:	Project No:	60236351	
	Client:	Newfoundland and Labrador, Department of Environment and Conservation, WRMD	
	Date of Inspection:	14 Decebmer 2011	
	AECOM Inspector:	Nora Donald	
	Site Contact (Name, Phone #):	Junior Taylor - junior.taylor@persona.ca	
	Weather:	Clear, ~ 8 deg.	
2. Well Designation:	Well ID:	Taylor's Well - Well No. 2	Well is located behind the pump house
	Well Type/Usage:	potable supply	
	Well Status (Pumping, Backup, Obs.):	pumping	
3. Location:	Water Supply No.:	WS-G-0442	
	Community:	Makinsons - Taylor's Wells	
	Street:	Juniper Stump Road	
(Community, Street, GPS	GPS Northing:	21T 5247288	
Grid, Well Elevation provided by well operator)	GPS Easting:	21T 0658298	
	Well Elevation (masl):	~100 masl	
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)	No problems with water quality, same as Well No. 1	
(Questions for well operators)	Do Storms Change the Well Chemistry (i.e. increased TSS)	No	(If yes, go to step II) (O.Reg 170/03)
	Is the well water chemistry similar to nearby surface water bodies (take conductivity measurement of nearby surface water if possible):	unknown	(If yes, go to step II) (O.Reg 170/03)
	Is there an observable change in nearby surface water levels when the well is pumping:	no	(If yes, go to step II) (MOE GUDI Guidelines, 2001)
	Historic issues with bacteria, TSS, boil water advisories?	Yes, historical issues with bacteria. This is related to improper chlorine levels in the well. Operator is hesitant to put too much chlorine in the water. Have been on a boil order in the past. Currently not on a boil order.	(If yes, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or microscopic particulate analysis completed on it? If so when, results, copy of report available?	No	
	Are there increasing/concerning trends of any other parameters at the well not mentioned yet:	None that he is aware of.	
	Additonal Raw Water Chemistry Available that we could have:	No	
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc	unknown	
	Does the well water ever taste satty? Is there any evidence of salt water intrusion at the well or in the surrounding area?	no	
	What is the current well treatment:	chlorine	



	Question	Answer	Comments
	Has the well ever needed treatment upgrades or remediation (if so, when, why, records available?):	unknown	
			(If yes and a contrary report was not written after August 1, 2000, go to step II) (O.Reg
	Historic Reports Indicating GUDI status (Y/N):	no	170/03)
	Obtain a copy (Y/N):	n/a	
	Date of Report:	n/a	
	Name of Preparer:	n/a	
	Reason for GUDI Status:	n/a	
	Average Annual Pumping Rate:	unknown	
	Maximum Monthly Pumping Rate:	unknown	(If <u>cannot</u> pump at greater than 0.58 L/s and is within 15 m of surface water or if the well <u>can</u> supply water at greater than 0.58 L/s and is in overburden within 100 m of surface water or <u>can</u> supply water at greater than 0.58 L/s and is in bedrock within 500 m of surface water. oo to sten III (O.Red 170/03)
	Other (specify):	no	
5. Sensitive Setting:	Spring:	No	(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:	No	(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well:	No	(If yes, go to step II)
	Karst Aquifer:	No	(If yes, go to step II)
	Exposed Fractured Bedrock:	No	(If yes, go to step II)
	Thin or absent soil cover over bedrock? How far away from the well?	No	
	High K Unconfined Aquifer:	No	(If yes, go to step II) (O.Reg 170/03)
	Enhanced Recharge:	Νο	(If yes, go to step II) (MOE Guidelines on GUDI, 2001)
	Dug Well:	No	(If not Drilled Well, Go To Step II) (O.Reg 170/03)
	Drilled Well (in overburden or bedrock):	Bedrock	
6. Well	Well Log Found (Y/N):	Unknown	
Construction	Driller (Name; ID):	Martin Hammond - Drilled well # 1 & 2 to replace original well (referred to as Well 3) in pumphouse	
Details	Construction Date:	1999 - drilled at same time as Well No. 1	
	Well Depth:	350 ft	
	Casing Type:	Steel	
l	Firmly seated in bedrock (Y/N)	unknown	





	Question	Answer	Comments
	Water Tight Casing to 6mbgs (Y/N)	unknown	(If No go to Step II) (O.Reg 903)
	Casing Diameter:	6"	
	Casing Length:	unknown	(If < 12 m or 40 ft, go to Step II)
	Has the well ever been disinfected (when why most		
	recently):	when drilled	
	When was the well pump last serviced or replaced?		
	Was it disinfected before being placed back in well:	Did not ask	
	Well Yield:	Unknown	
	Static Water Level:	Unknown	
	Overdurden Thickness:	Unknown	
	Pump tupo:	Linkersure	
	rump type:	υτικποψη	
	Pump Setting:	linknown	
	r unp setting.	UTIKIUWI	
		Linknown	
		Children	
	Grouted Casing (Y/N):	Unknown	
	Thickness of Grout around well:	Unknown	
	Water Level Monitoring Pipe in Well (Y/N):	Unknown	
	Raw Water Sampling Tap (Y/N):	Unknown	
		Note: One well log was found for Makinsons - Well ID Number 19209.	
		1999, total depth of 121.9 m having 12.8 m of steel 150mm diameter	
		casing. Water bearing zone encountered at 109.7 m. Depth to bedrock is 5.2 m. Estimated safe yield is 13.5 Lpm. Stratigraphy described by	
		the driller is gravel (5 m) overlying grey rock (122 m).	
	Other:		
7. Well Condition	Located in a Well House (Y/N):	No. Well #2 located behind pump house	
Assessment (O.Reg 90	Well Tagged or Identified:	Yes; Taylor's #2 Well	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):	Yes, apppears to meet reg.	
	Any Rust or Holes Evident on Casing:	Casing is rusted	
	Above Ground Casing Height (mags) (If stickup,	0.40	
	provide details):	U.49 M	
	Flush Mount Well (mbgs) (If flush mount, provide	n/a	
	uotanoj.	11/2	
	Is the Well Located in a Well Pit (mbos):	Νο	
	Covered with solid, watertight cover (Y/N):	No	
	Casing is above bttm of pit floor:	No	



	Question	Answer	Comments
	Is the pit equipped to drain (provide details)?	No	
	Is the pit equipped with a sump pump (Y/N)?	No	
	The casing vent is at what height above the pit	No	
	Height of Ground Surface for 5 m around well is at	10	
	least 60 cm above the highest known surface water	Voc	
		165	
	Is the topography around the well indicative of	No	
	Surface ponding and now towards the wen	110	
	Is drainage at the well adequate	Voc	
	(any standing water of evidence of ponding).	165	
	Distanting Can Found on Wall (Accordable Soci2):	Voc. opposite to most roce	
	Protective Cap Found on Weil (Acceptable Seal?):	res, appears to meet regs	
	la the Well Leaked (Secure?)	Vac	
		Tes	
	Dit land a desiter	N	
	Pit-less adapter:	Yes	
	Screened air vent:	Yes	
	Flood protection (has it ever flooded):	Unknown, did not ask.	
	Vehicle impact protection:	No	
	Fencing:	No	
	Surficial (type of geology, depth, observed surficial		
8. Aquifer	info):	no	
		bedrock aquifer. No exposed bedrock observed during site visit,	
Characteristics	Bedrock (type, depth, exposed at surface):	however snow covered.	
	Show the Geology Mapping or borehole, does		
	it match with their understanding?	n/a	
	Unconfined Municipal Aquifer:	no	(If yes, go to step II)
	Confined Municipal Aquifer:	yes	
	Pumping Test Done (Y/N)	unknown	
9. Proximity to sources	When was test done, is the data available?	unknown	
of potential surface			(If < 100 m from Surface Water and an
water contamination		<b>-</b>	overburden well or if < 500 m from Surface
	Perennial Stream/Pond (metres away from well):	Brook <15m	Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an
	Enhameral Stream (metres away from well):	No	overburden well or if < 500 m from Surface
		NU	water and bedrook well, go to step ii)
			(If < 100 m from Surface Water and an
	Ditch (metres away from well):	No	overburden well or if < 500 m from Surface
(500 m for bedrock,	Enor thous away non welly.	NU	water and bedrook well, go to step ii)
100m for overburden)	is there water in the ditch (V/N)-	No	
		NU	
	When did it last rain? If recent is there water in the ditch? Does the ditch drain guidely?	No	
1	the uton: Does the uton utail quickly?	140	



	Question	Answer	Comments
	River:	 No	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Lake:	Νο	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well. go to Sten II)
	Wetlands/Marshes:	potential wet area northeast of wells/pump house	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:	no	
	Highway/Road:	yes, < 50 m from side-road	
	Unused wells found on site:	Yes - one in pumphouse. It is reportedly scheduled to be properly abandoned.	
	Should they be abandoned:	yes	
	Abandoned wells on site:	No	
	Abandonment Log Available (Y/N):	n/a	
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):	n/a	
	Artesian wells found on adjacent properties:	n/a	
	Are there Well Pits Located on Adjacent Properties:	unknown	
	Other (Specify):	None	
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	~ 27 homes are on the Makinson's water system	
	If on private services, how many septics/wells (based on # of homes):	All homes on septic systems	
	Distance of closest septics (approx. to house):	~ 30 - 40 m.	
	Communal septics used nearby:	unknown	
	Are domestic wells within municipal aquifer:	Νο	
	Are there wells found within well pits on surrounding properties:	no	
	Any historic well interference complaints:	unknown	
	Historic Contamination Issues Noted at Domestic Wells:	unknown	
	Parkland:	no	
	Fertilizer used?	n/a	
	Forestry:	no	
	Agriculture:	no	



	Question	Answer	Comments
	Evidence of Manure Storage (liquid or solid):	n/a	
	Animal Grazing:	n/a	
		1//a	
	Industrial:	no	
	<b>—</b> (1 ) (1 )	- 1-	
	Type of Industrial Use:	n/a	
		Yes - ASTs and electice heat for homes within the community. There is	
	AST's or UST's at site:	one AST approximately 25 m from Well No. 1.	
	Other Risks (large septics etc):	no	
	Land Llass Specified in NL Reg 62/02 on ricks:	No	
	Land Uses Specified III NL Reg 03/03 as fisks.	NO	
	than or equal to 4 m deep ( >= 30 m away		
	from well):	No	
	Cesspool or seepage pit that is >= 4 m deep		
	unless it prevents seepage has to be >= 60 m		
	away from a well:	No	
	Seepage Pit, Filter Bed, Soil Absorption Field,		
	Earth Privy Pit or similar (>=16 m away from well):	No	
	Sewer of cast iron with leaded joints or	NO	
	approved mechanical joints, independent		
	clean water drain or cistern (>= 3 m away from		
	well):	No	
	Sanitary Landfill or Garbage Dump:	No	
	Is there a pumphouse cast iron floor drain with		
	leaded joints draining to ground surface? (>=1		
	m from well):	No	
	Septic(s), concrete vault privy, sewer or tightly		
	jointed tile or equivalent material or sewer		
	from well):	No	
	Future Land Use Changes that could impact wells:	No	
	Other places specify (i.e. sources of microhial center ):		
15 Notes:	There are approximately 27 houses on this system	There have been complaints of chloring small and taste in the com	munity. The first book up to the line is
10. NOIC3.	quite close to the number house (i.e. 25 m from well)	The operator indicated they have fears of putting too much chlorin	e in the water. This has resulted in the
	past, of not putting enough chlorine in the water, causing boil orders. Well's No. 1 & 2 are in use. Well #2 is the original well that is in the pump house. It is scheduled to be properly decommissioned. Pat Mahonev is the Vice Chair of the water committee. There were problems with the pump in Well No. 1		
	vesterday. AECOM Assessor's comment - above d	round water storage tanks were observed to be rusted during the si	te visit.

### Photo Log - Makinsons







Pumphouse



Well #1 in relation to pumphouse



Signage









Well #2

### Photo Log - Makinsons





Pressure tanks and water storage tanks



Water storage tanks



Pumphouse


GOVERNMENT OF NEWFOUNDLAND AND LABRADOR

Department of Environment and Conservation Water Resources Management Division

## Water Well Record

Well Owner Name: LOCAL SERVICE DISTRICT Address: JUNIPER STUMP ROAD	Lithology Listing: GRVL 5 GREY ROCK 122	
Well Location Town: MAKINSONS GPS Coordinates N ° ' "	Total Depth:         121.90         m         Depth to Bedrock:         5.20         m           Water Bearing Zone(s)	
W ° ' " Map Number: NAD: UTM Zone:	Casing Type:     ST       Casing Length:     12.80     m     Diameter:     150.00     mm       Casing Thickness:     7.10     mm       Drive Shoe Used:     Y	
Northing: Easting: 	Well Grouted:     N       from     m       Grout Type:	
Well / Water Use:MUType of Work Completed:NWDrilling Method:RO	Screen Info:	
Pump Recommendations         Pump Type:         Intake Setting:       m         Pumping Rate:       Lpm         Estimated Safe Yield of Well:       13.50       Lpm	Pumping Test         Method:         Pumping Rate:       13.50         Lpm       Duration         Well Overflowing:       Overflow Rate:	

**Drillers Comments:** 

Name of Drilling Company Martin B. Hammond Co. Ltd. Licence Number 1 Date Well Completed 21 /10/1999

This Record Modified by: Modified date:



# Marysvale







Map Document (P:602363511000-CADD\050 GIS WIP\MXDs\FieldMapMXDs\60236351WellLocations\_Marysvale\_SurfGeology.mxd) 11/25/2011 -- 11.47/24 AM



	Question	Answer	Comments
1. Proiect Details:	Project No:	60236351	
	Client:	Newfoundland and Labrador, Department of Environment and Conservation, WRMD	
	Date of Inspection:	14-Dec-11	
	AECOM Inspector:	Nora Donald	
	Site Contact (Name, Phone #):	Ron Rose rrose@persona.ca	
	Weather:	Clear	
2. Well Designation:	Well ID:	Well 1	
	Well Type/Usage:	Drilled Well. Active supply well	
	Well Status (Pumping, Backup, Obs.):	Pumping	
3. Location:	Water Supply No.:	WS-G-0449	
	Community:	Marysvale	
	Street:	Highway (Conception Bay Highway)	
(Community, Street, GPS	GPS Northing:		
measured in field. Map Grid, Well Elevation provided by well operator)	GPS Easting:		
	Well Elevation (masl):		
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)	High Manganese, iron	
(Questions for well operators)	Do Storms Change the Well Chemistry (i.e. increased TSS)	Nora Donald	(If yes, go to step II) (O.Reg 170/03)
	Is the well water chemistry similar to nearby surface water bodies (take conductivity measurement of nearby surface water if		
	possible): Is there an observable change in nearby surface water levels when the well is oumpina:	Yes - pond	(If yes, go to step II) (O.Reg 170/03) (If yes, go to step II) (MOE GUDI Guidelines,
	Historic issues with bacteria, TSS, boil water advisories?	Unknown Bacteria, 1 year on boil order and filter not in use - On a boil order now,	2001)
	Has the well ever had particle counting or microscopic particulate analysis completed on it? If so when, results, copy of report	nigh iron , not enough chiorine.	(It yes, go to step II) (O.Reg 170/03)
	available? Are there increasing/concerning trends of any other parameters at the well not mentioned	Unknown	
	Additonal Raw Water Chemistry Available that we could have:	Unknown	
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc	continuously pumping	
	Does the well water ever taste salty? Is there any evidence of salt water intrusion at the well or in the surrounding area?	N/A	
	What is the current well treatment:	chlorine but also equipped with potassium permanganate for iron and manganese removal.	



	Question	Answer	Comments
	Has the well ever needed treatment upgrades or remediation (if so, when, why, records available?):	Chlorine	
			(If yes and a contrary report was not written after August 1, 2000, go to step II) (O.Reg
	Historic Reports Indicating GUDI status (Y/N):	No	170/03)
	Obtain a copy (Y/N):	No	
	Date of Report:	No	
	Name of Preparer:	No	
	Average Annual Pumping Rate:	No	
	Maximum Monthly Pumping Rate:		(If <u>cannot</u> pump at greater than 0.58 L/s and is within 15 m of surface water or if the well <u>can</u> supply water at greater than 0.58 L/s and is in overburden within 100 m of surface water or <u>can</u> supply water at greater than 0.58 L/s and is in bedrock within 500 m of surface water, go to step II) (O.Reg 170/03)
	Other (specify):	Issues with people in the community who are hooked up to this water supply who are not paying for their water.	
5. Sensitive Setting:	Spring:	No	(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:	No	(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well:	No	(If yes, go to step II)
	Karst Aquifer:	No	(If yes, go to step II)
	Exposed Fractured Bedrock:	No	(If yes, go to step II)
	Thin or absent soil cover over bedrock? How far away from the well?	No	
	High K Unconfined Aquifer:	No	(If yes, go to step II) (O.Reg 170/03)
	Enhanced Recharge:	No	(If yes, go to step II) (MOE Guidelines on GUDI, 2001)
	Dug Well:	No	(If not Drilled Well, Go To Step II) (O.Reg 170/03)
	Drilled Well (in overburden or bedrock):	Yes - pond	
6. Well	Well Log Found (Y/N):	Yes - pond	
Construction	Driller (Name; ID):	P.Sullivan & Sons #6	
Details	Construction Date:	Oct. 21/85	
	Well Depth:	135m	
	Casing Type:	Steel	
	Firmly seated in bedrock (Y/N)	Unknown	



	Question	Answer	Comments
	Water Tight Casing to 6mbgs (Y/N)	Unknown	(If No go to Step II) (O.Reg 903)
	Casing Diameter:	6"	
	Casing Length:	25m	(If < 12 m or 40 ft, go to Step II)
		2011	
	Has the well ever been disinfected (when, why, most	Linknown	
	lecentry).	OTIGIOWI	
	When was the well pump last serviced or replaced?	2001 Kaapaa Bumpa	
	was it disinfected before being placed back in well.	2001 - Realles Fullips	
	vveli Yleid:	45 Lpm (vveii log)	
	Static Water Level:	Unknown	
	Overburden Thickness:	Unknown	
	Pump type:	Submersible	
	Pump Setting:	Unknown	
	Drive Shoe (Y/N):	Unknown	
	Grouted Casing (Y/N):	Unknown	
	Thickness of Grout around well:	Unknown	
	Water Level Monitoring Pine in Well (Y/N):	Νο	
	Raw Water Sampling Tap (Y/N):	no	
		10	
	046		
		,	
7. Well Condition	Located in a Well House (Y/N):	Yes	
Assessment (O.Reg 90	Well Tagged or Identified:	Yes	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):	-	
	Any Rust or Holes Evident on Casing:	Yes - significant rust	
	Above Ground Casing Height (mags) (If stickup,		
	provide details):	0.3m	
	Flush Mount Well (mbgs) (If flush mount, provide		
	details):	No	
	Is the Well Located in a Well Pit (mbgs):	No	
	Covered with solid, watertight cover (Y/N):	No	
	Casing is above bttm of pit floor:	No	
	Is the pit equipped to drain (provide details)?	No	
	Is the pit equipped with a sump pump (Y/N)?	No	
		-	



	Question	Answer	Comments
	The casing vent is at what height above the pit		
	floor (cm)?	No	
	Height of Ground Surface for 5 m around well is at		
	level (Y/N):	Yes	
	Is the topography around the well indicative of		
	surface ponding and flow towards the well:	•	
	(any standing water or evidence of ponding):	-	
	Protective Cap Found on Well (Acceptable Seal?):	No	
	Is the Well Locked (Secure?):	Yes	
	Pit-less adapter:	No	
	Screened air vent:	NO	
	Flood protection (bog it such that it is	V	
	Flood protection (has it ever flooded):	Yes	
	Vehicle impact protection:	Yes	
	Foncing	_	
	i encing.	-	
	Surficial (type of geology, depth, observed surficial		
8. Aquifer	info):	No	
Characteristics	Bedrock (type, depth, exposed at surface):	No	
onaracteristics	Dedrock (type, depth, exposed at surface).	10	
	Show the Geology Mapping or borehole, does		
	it match with their understanding?	No	
	Unconfined Municipal Aquifer:	No	(If yes, go to step II)
	Confined Municipal Aquifer:	Yes	
	Pumping Test Done (Y/N)	Unknown	
	When we test deep to the test of the	l la la sum	
9 Provimity to come	vvnen was test done, is the data available?	Unknown	
of potential surface			
water contamination			(If < 100 m from Surface Water and an
	Perennial Stream/Pond (metres away from well):	Yes - long pond 200m	Water and bedrock well. go to Step II)
			(If < 100 m from Surface Water and an
			overburden well or if < 500 m from Surface
	Ephemeral Stream (metres away from well):	No	Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an
	Ditch (metres away from well):	No	overburgen well or it < 500 m from Surface Water and bedrock well go to Step II)
(500 m for bedrock.		10	Tate: and Sourook wen, go to otep ii)
100m for overburden)			
	Is there water in the ditch (Y/N):	No	
	When did it last spin0 If second is there are the		
	the ditch? Does the ditch drain quickly?	Νο	
			(If < 100 m from Surface Water and an
			overburden well or if < 500 m from Surface
	River:	No	Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an
	Lake:	No	Water and bedrock well. go to Step II)
			, , , , , , , , , , , , , , , , , , ,



	Question	Answer	Comments
	Wetlands/Marshes:	No	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:	Νο	
	Highway/Road:	Yes; Conception Bay highway	
	Unused wells found on site:	None	
	Should they be abandoned:	None	
	Abandoned wells on site:	No - Drilled 5 or 6 others but didn't get enough	
	Abandonment Log Available (Y/N):	No	
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):	No	
	Artesian wells found on adjacent properties:	No	
	Are there Well Pits Located on Adjacent Properties:	No	
	Other (Specify):		
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	Septic	
	If on private services, how many septics/wells (based on # of homes):	~10	
	Distance of closest septics (approx. to house):	40 m	
	Communal septics used nearby:	No	
	Are domestic wells within municipal aquifer:	Same	
	Are there wells found within well pits on surrounding properties:	Unknown	
	Any historic well interference complaints:		
	Historic Contamination Issues Noted at Domestic Wells:		
	Parkland:	No	
	Fertilizer used?	No	
	Forestry:	Νο	
	Agriculture:	No	
	Evidence of Manure Storage (liquid or solid):	Νο	
	Animal Grazing:	No	



	Question	Answer	Comments
	Industrial:	No	
	Type of Industrial Lise:	No	
		NO	
	ASTS of USTS at site:	Nδ	
	Other Risks (large septics etc):	No	
	Land Uses Specified in NL Reg 63/03 as risks:	No	
	Cesspool receiving raw sewage that is less than or equal to 4 m deep ( >= 30 m away		
	from well):	No	
	Cesspool or seepage pit that is $>= 4 \text{ m}$ deep		
	away from a well:	No	
	Seepage Pit, Filter Bed, Soil Absorption Field,		
	Earth Privy Pit or similar (>=16 m away from well):	No	
	Sewer of cast iron with leaded joints or		
	clean water drain or cistern (>= 3 m away from		
	well):	No	
	Sanitary Landfill or Garbage Dump:	No	
	Is there a pumphouse cast iron floor drain with		
	m from well):	No	
	Septic(s), concrete vault privy, sewer or tightly		
	jointed tile or equivalent material or sewer		
	from well):	No	
	Future Land Use Changes that could impact wells:		
	Other please specify (i.e. sources of microbial contam.):		
15. Notes: According	g to Ron Rose, this area used to flood before the well	went in. After the well went in, no more flooding. Approximate usage	ge of 13,000 usgal/day. Average use of
16,000 usgal/day on w	veekends.		







Pumphouse exterior





Well head, well #1

Signage



Well #1



Treatment and storage equipment

### Photo Log - Marysvale







Proximity of pumphouse building to road

Treatment equipment



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR

Department of Environment and Conservation Water Resources Management Division

## Water Well Record

Well Owner Name: TOWN COUNCIL Address:	Lithology Listing: GREY TILL 025 BLCK SLTE 135	
Well Location Town: MARYSVALE GPS Coordinates N ° ' "	Total Depth:         135.00         m         Depth to Bedrock:         m           Water Bearing Zone(s)          Lpm at         m          Lpm at         m            Lpm at         m          Lpm at         m	
W ° ' " Map Number: 1N/6 NAD: UTM Zone: 22	Casing Type:         Casing Length:       25.00 m       Diameter: mm         Casing Thickness:       mm         Drive Shoe Used:	
Northing: 5262275 Easting: 332100 Type of Water Encountered:FR	Well Grouted: fromm tom Grout Type:	
Well / Water Use: PS Type of Work Completed: Drilling Method:	Screen Info: 0	
Pump Recommendations         Pump Type:         Intake Setting:       m         Pumping Rate:       Lpm         Estimated Safe Yield of Well:       45.00       Lpm	Pumping Test         Method:         Pumping Rate:       Lpm Duration _4,320min         Well Overflowing:       Overflow Rate: Lpm	

**Drillers Comments:** 

**Name of Drilling Company** P. Sullivan and Sons Co. Ltd. Licence Number 6 Date Well Completed 21 /10/1985

This Record Modified by: Modified date:



## **Port Rexton**





Map Document. (P.160236351000-CADD1050 GIS WIPIMXDs/FieldMapMXDs/60236351WellLocations\_PortRexton2.mxd) 11/24/2011 -- 1:13:22 PM



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	Question	Answer	Comments
1. Proiect Details:	Project No:	60236351	
	Client:	Newfoundland and Labrador, Department of Environment and Conservation, WRMD	
	Date of Inspection:	30-Nov-11	
	AECOM Inspector:	Nora Donald	
	Site Contact (Name, Phone #):	Lois Long	
	Weather:		
2. Well Designation:	Well ID:	Champney's Arm Well	
	Well Type/Usage:	Drilled Well - active	
	Well Status (Pumping, Backup, Obs.):	Pumping	
3. Location:	Water Supply No.:	WS-G-0588	
	Community:	Port Rexton	
	Street:	unknown	
(Community, Street, GPS measured in field. Map	GPS Northing:		
Grid, Well Elevation provided by well operator)	GPS Easting:		
	Well Elevation (masl):	~ 100 masl	
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)		
(Questions for well operators)	Do Storms Change the Well Chemistry (i.e. increased TSS)	No complaints	(If yes, go to step II) (O.Reg 170/03)
	surface water bodies (take conductivity measurement of nearby surface water if possible):	unknown	(If yes, go to step II) (O.Reg 170/03)
	Is there an observable change in nearby surface water levels when the well is pumping:	unknown	(If yes, go to step II) (MOE GUDI Guidelines, 2001)
	Historic issues with bacteria, TSS, boil water advisories?	Boil order because no chlorination	(If yes, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or microscopic particulate analysis completed on it? If so when, results, copy of report available?	unknown	
	Are there increasing/concerning trends of any other parameters at the well not mentioned yet:	unknown	
	Additonal Raw Water Chemistry Available that we could have:	unknown	
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc	unknown	
	Does the well water ever taste salty? Is there any evidence of salt water intrusion at the well or in the surrounding area?	unknown	
	What is the current well treatment:	no treatment. Always on a boil order at this location.	



Environment

	Question	Answer	Comments
	Has the well ever needed treatment upgrades or remediation (if so, when, why, records available?):	Well was upgraded last year.	
			(If yes and a contrary report was not written after August 1, 2000, go to step II) (O.Reg
	Historic Reports Indicating GUDI status (Y/N):	no	170/03)
	Obtain a copy (Y/N):	-	
	Date of Report:		
	Name of Preparer:		
	Reason for GUDI Status:	<u> </u>	
	Average Annual Pumping Rate:	unknown	
	Maximum Monthly Pumping Rate:		(If <u>cannot</u> pump at greater than 0.58 L/s and is within 15 m of surface water or if the well <u>can</u> supply water at greater than 0.58 L/s and is in overburden within 100 m of surface water or <u>can</u> supply water at greater than 0.58 L/s and is in bedrock within 500 m of
		unknown	surface water, go to step II) (O.Reg 170/03)
	Other (specify):	9 households sourced water from this well.	
5. Sensitive Setting:	Spring:	no	(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:	no	(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well:	no	(If yes, go to step II)
	Karst Aquifer:	no	(If yes, go to step II)
	Exposed Fractured Bedrock:	yes	(If yes, go to step II)
	Thin or absent soil cover over bedrock? How far away from the well?	thin soils	
	High K Unconfined Aquifer:	no	(If yes, go to step II) (O.Reg 170/03)
	Enhanced Recharge:	no	(If yes, go to step II) (MOE Guidelines on GUDI, 2001)
	Dug Well:	no	(If not Drilled Well, Go To Step II) (O.Reg 170/03)
	Drilled Well (in overburden or bedrock):	yes, bedrock	
6. Well	Well Log Found (Y/N):	no	
Construction	Driller (Name; ID):	Drilled 1978 - old well issues with road salt - down the hill and other side of the road	
Details	Construction Date:	1978	cable tool drilled well.
	Well Depth:	~300 ft	
	Casing Type:	steel	
	Firmly seated in bedrock (Y/N)	unknown	





	Question	Answer	Comments
	Water Tight Casing to 6mbgs (Y/N)	unknown	(If No go to Step II) (O Reg 903)
	Casica Dispoten		
		-	
	Casing Length:	2 lengths of casing (40ft)	(If < 12 m or 40 ft, go to Step II)
	Has the well ever been disinfected (when, why, most recently):	unknown	
	When was the well pump last serviced or replaced? Was it disinfected before being placed back in well:	Have replaced a number of pumps in this well. They burn out easily because of a lack of water.	
	Well Yield:	2.5 igpm (after hydrofracking by forced water/ water under pressure)	
	Static Water Level:	unknown	
	Overburden Thickness:	unknown	
	Pump type:	unknown	
	Pump Setting:	unknown	
	Drive Shoe (Y/N):	unknown	
	Grouted Casing (Y/N):	unknown	
	Thickness of Grout around well:	unknown	
	Water Level Monitoring Pipe in Well (Y/N):	no	
	Raw Water Sampling Tap (Y/N):	unknown	
	Other:		
7. Well Condition	Located in a Well House (Y/N):	yes	
Assessment (O.Reg 90	Well Tagged or Identified:	yes, well is tagged	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):	unknown	
	Any Rust or Holes Evident on Casing		
	Above Ground Casing Height (mags) (If stickup, provide details):	< 30 cm. Does not meet NL 63/03 reas	
	Flush Mount Well (mbgs) (If flush mount, provide details):	no	
	Is the Well Located in a Well Pit (mhos):	no	
	Covered with solid watertight cover (V/N)-		
	Casing is above httm of nit floor		
	Is the pit equipped to drain (provide details)?		
	Is the pit equipped with a sump pump (Y/N)?	-	
•			



	Question	Answer	Comments
	The casing vent is at what height above the pit		
	floor (cm)?	no	
	Height of Ground Surface for 5 m around well is at		
	level (Y/N):	ves	
		,	
	Is the topography around the well indicative of		
	surface ponding and flow towards the well:	-	
	Is drainage at the well adequate		
	(any standing water or evidence of ponding):	-	
	Protective Cap Found on Well (Acceptable Seal?):	no	
	Is the Well Locked (Secure?):	yes	
	Pit-less adapter:	no	
	Screened air vent:	no	
	Flood protection (bas it over floods -)	20	
	nood protection (has it ever flooded):	110	
	Vehicle impact protection:	yes	
	Fencina:	-	
	, crienty.		
	Surficial (type of geology, depth, observed surficial		
8. Aquifer	info):	-	
Characteristics	Bedrock (type, depth, exposed at surface):	-	
	Show the Geology Mapping or borehole, does		
	it match with their understanding?	-	
	Unconfined Municipal Aquifer:	-	(If yes, go to step II)
	Confined Municipal Aquifer:	assumed ves	
		dodanod, you	
	Pumping Test Done (Y/N)	unknown	
	When was test done, is the data available?	unknown	
9. Proximity to sources			
of potential surface			(If < 100 m from Surface Water and an
water contamination	Demonstral Oter and (Demol (mark)		overburden well or if < 500 m from Surface
	Perennial Stream/Pond (metres away from well):	-	water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an
			overburden well or if < 500 m from Surface
	Ephemeral Stream (metres away from well):	-	Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an
	Ditch (motros away from well):		overburden well or if < 500 m from Surface
(500 m for bedrock		-	water and bedrock well, go to Step II)
100m for overburden)			
	Is there water in the ditch (Y/N):	-	
	the ditch? Does the ditch drain guickly?	-	
			(If < 100 m from Surface Water and an
	<b>D</b> :		overburden well or if < 500 m from Surface
	KIVEF:	-	water and bedrock well, go to Step II)
			(if < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	Lake:	-	Water and bedrock well, go to Step II)



	Question	Answer	Comments
	Wetlands/Marshes:	no	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:		
	Highway/Road:	Bonavista Penninsual Highway within 100 m	
	Unused wells found on site:	no	
	Should they be abandoned:	-	
	Abandoned wells on site:	no	
	Abandonment Log Available (Y/N):	-	
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):		
	Artesian wells found on adjacent properties:		
	Are there Well Pits Located on Adjacent Properties:	-	
	Other (Specify):	Ocean within 250 m from well.	
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	yes	
	If on private services, how many septics/wells (based on # of homes):	~ 9 homes	
	Distance of closest septics (approx. to house):	10 m - to 100 m	
	Communal septics used nearby:	unknown	
	Are domestic wells within municipal aquifer:	unknown	
	Are there wells found within well pits on surrounding properties:	unknown	
	Any historic well interference complaints:	unknown	
	Historic Contamination Issues Noted at Domestic Wells:	unknown	
	Parkland:	no	
	Fertilizer used?		
	Forestry:	no	
	Agriculture:	no	
	Evidence of Manure Storage (liquid or solid):		
	Animal Grazing:		



	Question	Answer	Comments
	Industrial:	no	
	Type of Industrial Use:		
	AST's or UST's at site:		
	Other Risks (large sentics etc.):		
	Land Uses Specified in NL Reg 63/03 as risks:	no	
	Cesspool receiving raw sewage that is less		
	than or equal to 4 m deep ( >= 30 m away from well):		
	Cesspool or seepage pit that is >= 4 m deep		
	unless it prevents seepage has to be >= 60 m away from a well:		
	Seepage Pit, Filter Bed, Soil Absorption Field,		
	Earth Privy Pit or similar (>=16 m away from		
	Sewer of cast iron with leaded joints or		
	approved mechanical joints, independent clean water drain or cistern (>= 3 m away from		
	well):		
	Sanitary Landfill or Garbage Dump:		
	Is there a pumphouse cast iron floor drain with leaded joints draining to ground surface? (>=1		
	m from well):		
	Septic(s), concrete vault privy, sewer or tightly ignited tile or equivalent material or sewer		
	connected foundation drain (>=16 m away		
	from well):		
	Future Land Use Changes that could impact wells:		
15 Notes:	Other please specify (i.e. sources of microbial contam.):		

Recently upgraded last year

9 households

storage tank in well







Back of pumphouse, looking south



Profile view of pumphouse, looking west



Well head and pressure tanks

#### Signage







Distribution lines and storage tank



Interior of pumphouse

Well head



Map Document (P:)60236351\000-CADD\050 GIS WIP\MXDs\FieldMapMXDs\60236351WellLocations\_PortRexton.mxd)



Map Document. (P:60236351000-CADD/050 GIS WIP\MXDs\FieldMapMXDs(60236351WellLocations\_PortRexton\_SurfGeology.mxd) 11/25/2011 -- 11:59:08 AM



	Question	Answer	Comments
1. Project Details:	Proiect No:	60236351	
	Client:	Newfoundland and Labrador, Department of Environment and Conservation, WRMD	
	Date of Inspection:	30-Nov-11	
	AECOM Inspector:	Nora Donald	
	Site Contact (Name, Phone #):	Lois Long	
	Weather:		
2. Well Designation:	Well ID:	Mabel Clark's Well	
	Well Type/Usage:	active	
	Well Status (Pumping, Backup, Obs.):	pumping	
3. Location:	Water Supply No.:	WS-G-0586	
	Community:	Port Rexton	
	Street:	Sam's Hill Road	
(Community, Street, GPS measured in field. Map	GPS Northing:		
Grid, Well Elevation provided by well operator)	GPS Easting:		
	Well Elevation (masl):	~50 masl	
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)	"never had any complaints"	
(Questions for well operators)	Do Storms Change the Well Chemistry (i.e. increased TSS)	unknown	(If yes, go to step II) (O.Reg 170/03)
	surface water offennsuly similar to rearby surface water bodies (take conductivity measurement of nearby surface water if possible):	unknown	(If yes, go to step II) (O.Reg 170/03)
	Is there an observable change in nearby surface water levels when the well is pumping:	unknown	(If yes, go to step II) (MOE GUDI Guidelines, 2001)
	Historic issues with bacteria, TSS, boil water advisories?	Boil order because no chlorine	(If yes, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or microscopic particulate analysis completed on it? If so when, results, copy of report available?	unknown	
	Are there increasing/concerning trends of any other parameters at the well not mentioned yet:	unknown	
	Additonal Raw Water Chemistry Available that we could have:	unknown	
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc	unknown	
	Does the well water ever taste salty? Is there any evidence of salt water intrusion at the well or in the surrounding area?	No	
	What is the current well treatment	110	
1			



Environment

	Question	Answer	Comments
	Has the well ever needed treatment upgrades or remediation (if so, when, why, records available?):		
			(If yes and a contrary report was not written after August 1, 2000, so to step II) (O.Reg
	Historic Reports Indicating GUDI status (Y/N):	no	170/03)
	Obtain a copy (Y/N):		
	Late of Report:		
	Reason for GLIDI Status:		
	Average Annual Pumping Rate:	unknown	
	Maximum Monthly Pumping Rate:	unknown	(If <u>cannot</u> pump at greater than 0.58 L/s and is within 15 m of surface water or if the well <u>can</u> supply water at greater than 0.58 L/s and is in overburden within 100 m of surface water or <u>can</u> supply water at greater than 0.58 L/s and is in bedrock within 500 m of surface water, go to step II) (O.Reg 170/03)
	Other (specify):		
5. Sensitive Setting:	Spring:	no	(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:	no	(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well:	no	(If yes, go to step II)
	Karst Aquifer:	no	(If yes, go to step II)
	Exposed Fractured Bedrock:	yes	(If yes, go to step II)
	Thin or absent soil cover over bedrock? How far away from the well?	thin soils	
	High K Unconfined Aquifer:	no	(If yes, go to step II) (O.Reg 170/03)
	Enhanced Recharge:	no	(If yes, go to step II) (MOE Guidelines on GUDI, 2001)
	Dug Well:	no	(If not Drilled Well, Go To Step II) (O.Reg 170/03)
	Drilled Well (in overburden or bedrock):	yes, bedrock	
6. Well	Well Log Found (Y/N):	No	
Construction	Driller (Name; ID):		
Details	Construction Date:	1969 - before council incorporated	
	Well Depth:	180-200 feet	
	Casing Type:	unknown	
	Firmly seated in bedrock (Y/N)	unknown	



	Question	Answer	Comments
	water Fight Casing to embgs (Y/N)		(If No go to Step II) (O.Reg 903)
	Casing Diameter:	cable tool drilled well, estimated at 5"	
	Casing Length:	1 length of casing ~ 20ft	(If < 12 m or 40 ft, go to Step II)
	Has the well ever been disinfected (when, why, most	under ause	
		UNKNOWN	
	When was the well pump last serviced or replaced?		
	Was it disinfected before being placed back in well:		
	Well Yield:	Unsure - 7 households	
	Static Water Level:	unknown	
	Overburden Thickness:	unknown	
	Pump type:	unknown	
	Pump Setting:	unknown	
	i unp coung.	dina/0001	
	Drive Shoe (Y/N):	unknown	
	Grouted Casing (Y/N):	None	
	Thickness of Grout around well:	None	
	Weter Level Meritering Dine in Mell (M/N).	No	
	water Level Monitoring Pipe in Well (17N).	INO	
	Raw Water Sampling Tap (Y/N):	No - No treatment sample one of houses	
	Other:		
7 Well Condition	Located in a Well House (Y/N):	Yes	
		100	
Assessment (O.Reg 90	Well Tagged or Identified:	No	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):	no	
	Any Rust or Holes Evident on Casing:	Rust	
	Above Ground Casing Height (mags) (If stickup, provide details):	no	
	(o.u.o).		
	Flush Mount Well (mbgs) (If flush mount, provide		
	oetaiis):	no	
	Is the Well Located in a Well Pit (mbgs):	Yes - confined space	
	Covered with solid, watertight cover (Y/N):	No	
	Casing is above bttm of pit floor:	Yes	
		. 50	
	is the pit equipped to drain (provide details)?	dian't check	
	Is the pit equipped with a sump pump (Y/N)?	No	



The casing vent is at what height above the pit floor (cm)?		
leight of Ground Surface for 5 m around well is at aast 60 cm above the highest known surface water avel (Y/N):	Yes	
Is the topography around the well indicative of surface ponding and flow towards the well	Yes	
Is drainage at the well adequate (any standing water or evidence of ponding):	Yes	
Protective Cap Found on Well (Acceptable Seal?):	No	wellhead is not sanitary
Is the Well Locked (Secure?):	Yes	
it-less adapter:	No	
creened air vent:	No - vent not screened	
lood protection (has it ever flooded):	No	
ehicle impact protection:	Yes	
encing: suficial (type of geology, depth, observed sufficial	Yes	
todesel (time, depth, support at surface)		
Show the Geology Mapping or borehole,does it match with their understanding?	_	
Inconfined Municipal Aquifer:	_	(If yes, go to step II)
Confined Municipal Aquifer:	assumed yes	
Pumping Test Done (Y/N)	unknown	
When was test done, is the data available?	-	
Perennial Stream/Pond (metres away from well):	Νο	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
		(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
phemeral Stream (metres away from well):	No	Water and bedrock well, go to Step II) (If < 100 m from Surface Water and an
Ditch (metres away from well):	No	overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
Is there water in the ditch (Y/N):	No	
the ditch? Does the ditch drain quickly?	No	//f < 100 m from Surface Weter and a
liver:	No	(ii < 100 m from Sufface Water and an overburden well or if < 500 m from Sufface Water and bedrock well, go to Step II)
ake.	No	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, or to Step IN
	The casing vent is at what height above the pit floor (cm)? eight of Ground Surface for 5 m around well is at ast 60 cm above the highest known surface water vel (Y/N): Is the topography around the well indicative of surface ponding and flow towards the well te drainage at the well adequate (any standing water or evidence of ponding): rotective Cap Found on Well (Acceptable Seal?): Is the Well Locked (Secure?): it-less adapter: creeened air vent: lood protection (has it ever flooded): ehicle impact protection: encing: urficial (type of geology, depth, observed surficial fo): edrock (type, depth, exposed at surface): Show the Geology Mapping or borehole,does it match with their understanding? nconfined Municipal Aquifer: umping Test Done (Y/N) When was test done, is the data available? erennial Stream/Pond (metres away from well): itch (metres away from well): Is there water in the ditch (Y/N); When did it last rain? If recent is there water in the ditch? Does the ditch drain quickly? iver:	The casing vent is at what height above here it loor (any) loor (any) loor (any) loor density vent (VN): Is the heighest known surface water vent is the topography sround the well indication of surface pooling and flow towards the well (any standing water or evidence of ponding): Vent (any standing water or evidence of ponding): rotactive Cap Found on Well (Acceptable Seal?): No Is the Well Locked (Secure?): Vent rotactive Cap Found on Well (Acceptable Seal?): No reteremed air vent: No creened air vent: No creened air vent: No ending: Wes were flooded): No creened air vent: No creened air vent: No No No No No No No No No No



	Question	Answer	Comments
	Wetlands/Marshes:	no	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:		
	Highway/Road:	Sam's Hill Road	
	Unused wells found on site:	no	
	Should they be abandoned:		
	Abandoned wells on site:	no	
	Abandonment Log Available (Y/N):		
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):		
	Artesian wells found on adjacent properties:		
	Are there Well Pits Located on Adjacent Properties:	unknown	
	Other (Specify):		
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):		
	If on private services, how many septics/wells (based on # of homes):	Yes	
	Distance of closest septics (approx. to house):	25 m	
	Communal septics used nearby:	No	
	Are domestic wells within municipal aquifer:	unknown	
	Are there wells found within well pits on surrounding properties:	unknown	
	Any historic well interference complaints:	unknown	
	Historic Contamination Issues Noted at Domestic Wells:	unknown	
	Parkland:	no	
	Fertilizer used?		
	Forestry:	no	
	Agriculture:	no	
	Evidence of Manure Storage (liquid or solid):		
	Animal Grazing:		



	Question	Answer	Comments
	Industrial:	no	
	Type of Industrial Use:		
	AST's or UST's at site:	ves - within 5 m of wellhead	
		joo manino mol nomoda.	
	Other Risks (large sentics atc.):		
	Other Make (angle deputed etc).		
	Land Lless Specified in NL Reg 62/03 as risks:	Noro	
	Cesspool receiving raw sewage that is less	NULLE	
	than or equal to 4 m deep ( >= 30 m away	Nore	
	Cesspool or seepage pit that is >= 4 m deep	NULLE	
	unless it prevents seepage has to be >= 60 m	Nore	
	Seepage Pit, Filter Bed, Soil Absorption Field,	None	
	Earth Privy Pit or similar (>=16 m away from	Nere	
	Sewer of cast iron with leaded joints or	None	
	approved mechanical joints, independent		
	well):	None	
	Sanitary Landfill or Garbage Dump:	None	
	Is there a pumphouse cast iron floor drain with		
	m from well):	None	
	Septic(s), concrete vault privy, sewer or tightly		
	jointed tile or equivalent material or sewer connected foundation drain (>=16 m away		
	from well):	None	
	Future Land Use Changes that could impact wells:		
48 N 4	Other please specify (i.e. sources of microbial contam.):		
15. Notes:	Well is > 30 years old. Water quality issues in this we be within 5 metres of well	ell associated with Hurricane Igor. Wellhead is not sanitary. Above	e ground fuel storage tank obeserved to

## AECOM





Pumphouse (Note: above-ground fuel tank is directly behind the pumphouse



Openings of pumphouse



Well is located in back corner of pumphouse and is at depth

#### Signage







Close-up view of well head

Proximity of domestic fuel tank to well



Pumphouse and domestic fuel oil tank, looking west





GOVERNMENT OF NEWFOUNDLAND AND LABRADOR

Department of Environment and Conservation Water Resources Management Division

## Water Well Record

Well Owner Name: TOWN COUNCIL Address:	Lithology Listing:
Well Location         Town: PORT REXTON         GPS Coordinates         N       °       '         W       °       '       ''	Total Depth:         57.90         m         Depth to Bedrock:         m           Water Bearing Zone(s)        Lpm atm        Lpm atm        m           Lpm atm        Lpm atm        m        m
Map Number: NAD: UTM Zone:	Casing Length:       6.40       m       Diameter:       mm         Casing Thickness:       mm       mm         Drive Shoe Used:       mm
Northing: Easting: 	Well Grouted:       fromm tom         Grout Type:       Grout Type:
Well / Water Use: Type of Work Completed: Drilling Method:	Screen Info:
Pump Recommendations         Pump Type:         Intake Setting:       m         Pumping Rate:       Lpm         Estimated Safe Yield of Well:       27.30       Lpm	Pumping Test         Method:         Pumping Rate:       Lpm Durationmin         Well Overflowing:       Overflow Rate: Lpm

**Drillers Comments:** 

Name of Drilling Company Lewis A. Potter Licence Number 12 Date Well Completed 15 /10/1969

This Record Modified by: Modified date:



# **Swift Current**




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	Question	Answer	Comments
1. Proiect Details:	Project No:	60236351	
	Client:	Newfoundland and Labrador, Department of Environment and Conservation, WRMD	
	Date of Inspection:	November, 2011	
	AECOM Inspector:	Nora Donald	
	Site Contact (Name, Phone #):	Bruce Mercer, Vice Chair of LSD; brucemercer@eastlink.ca	
	Weather:	Cold and rainy	
2. Well Designation:	Well ID:	Well #1	
	Well Type/Usage:	public supply to 7 or 8 homes	
	Well Status (Pumping, Backup, Obs.):	active - pumping	
3. Location:	Water Supply No.:	WS-G-0725	
	Community:	Swift Current	
	Street:	Hollett Point Road	
(Community, Street, GPS measured in field. Map	GPS Northing:		
Grid, Well Elevation provided by well operator)	GPS Easting:		
	Well Elevation (masl):	~75 masl	
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)	Some filter water - not good, coloured sediment in water	
(Questions for well operators)	Do Storms Change the Well Chemistry (i.e. increased TSS)	No filter	(If yes, go to step II) (O.Reg 170/03)
	Is the well water chemistry similar to nearby surface water bodies (take conductivity measurement of nearby surface water if possible):	Yes	(If yes, go to step II) (O.Reg 170/03)
	Is there an observable change in nearby surface water levels when the well is pumping:	unknown	(If yes, go to step II) (MOE GUDI Guidelines, 2001)
	Historic issues with bacteria, TSS, boil water advisories?	Unknown	(If yes, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or microscopic particulate analysis completed on it? If so when, results, copy of report available?	unknown	
	Are there increasing/concerning trends of any other parameters at the well not mentioned yet:	Arsenic in water	
	Additonal Raw Water Chemistry Available that we could have:	unknown	
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc	unknown	
	Does the well water ever taste salty? Is there any evidence of salt water intrusion at the well or in the surrounding area?	unknown	
	What is the current well treatment:	None - Boil water advisory	



	Question	Answer	Comments
	Has the well ever needed treatment upgrades or remediation (if so, when, why, records		
	available?):	Unsure about who comes to do water quality testing	(If ves and a contrary report was not written
	Historic Reports Indicating GUDI status (Y/N):	no	after August 1, 2000, go to step II) (O.Reg 170/03)
	Obtain a copy (Y/N):		
	Date of Report:		
	Name of Preparer:		
	Reason for GUDI Status:		
	Average Annual Pumping Rate:		
	Maximum Monthly Pumping Rate:		(If <u>cannot</u> pump at greater than 0.58 L/s and is within 15 m of surface water or if the well <u>can</u> supply water at greater than 0.58 L/s and is in overburden within 100 m of surface water or <u>can</u> supply water at greater than 0.58 L/s and is in bedrock within 500 m of surface water, go to step II) (O.Reg 170/03)
	Other (specify):		
5. Sensitive Setting:	Spring:	potential	(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:	no	(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well:	no	(If yes, go to step II)
	Karst Aquifer:	no	(If yes, go to step II)
	Exposed Fractured Bedrock:	no	(If yes, go to step II)
	Thin or absent soil cover over bedrock? How		
	far away from the well?	no	
	High K Unconfined Aquifer:	no	(If yes, go to step II) (O.Reg 170/03)
	Enhanced Recharge:	no	(If yes, go to step II) (MOE Guidelines on GUDI, 2001)
	Dug Well:	no	(If not Drilled Well, Go To Step II) (O.Reg 170/03)
	Drilled Well (in overburden or bedrock):	drilled bedrock well	
6. Well	Well Log Found (Y/N):	no	
Construction	Driller (Name; ID):	unknown	
Details	Construction Date:	~20 years ago	
	Well Depth:	Unknown	
	Casing Type:	steel	





	Question	Answer	Comments
	Firmly seated in bedrock (X/N)	unknown	
	Timiy sealed in bedrock (T/N)	unnown	
	Water Tight Casing to 6mbgs (Y/N)	unknown	(If No go to Step II) (O.Reg 903)
	Casing Diameter:		
	Casing Length:	unknown	(If < 12 m or 40 ft, go to Step II)
	Has the well ever been disinfected (when, why, most recently):	unknown	
	When was the well pump last serviced or replaced? Was it disinfected before being placed back in well:		
	Well Yield:	~ 46 igpm - designed to serve this part of town	
	Static Water Level:	unknown	
	Overburden Thickness:	unknown	
	Pump type:	unknown	
	Pump Setting:	unknown	
	Drive Shoe (Y/N):	unknown	
	Grouted Casing (Y/N):	unknown	
	Thickness of Grout around well:	unknown	
	Water Level Monitoring Pipe in Well (Y/N):	unknown	
	Raw Water Sampling Tap (Y/N):	unknown	
	Other:	unknown	
7. Well Condition	Located in a Well House (Y/N):	no, located ~20 m to the East of pump house	
Assessment (O.Reg 9	Well Tagged or Identified:	Yes	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):	Unknown	
	Any Rust or Holes Evident on Casing:	Yes	
	Above Ground Casing Height (mags) (If stickup, provide details):	< 30 cm stickup	
	Flush Mount Well (mbgs) (If flush mount, provide details):	no	
	Is the Well Located in a Well Pit (mbgs):	no	
	Covered with solid, watertight cover (Y/N):		
	Casing is above bttm of pit floor:		
	Is the pit equipped to drain (provide details)?		



	Question	Answer	Comments
	Is the pit equipped with a sump pump (Y/N)?		
	The casing vent is at what height above the pit		
	floor (cm)?		
	Height of Ground Surface for 5 m around well is at		
	least 60 cm above the highest known surface water		
	Is the topography around the well indicative of		
	surface ponding and flow towards the well		
	Is drainage at the well adequate		
	(any standing water or evidence of ponding):		
	Dretestive Can Found on Wall (Assentable Soci2)	recommend replacing	
	Protective Cap Found on Well (Acceptable Sear?):	recommend replacing	
	Is the Well Locked (Secure?):	yes	
	Pit-less adapter:	yes	
	Correspond allower to		
	Screened all vent:	UTIKNOWN	
	Flood protection (has it ever flooded):	no	
	Vehicle impact protection:	n/a	
	Francisco	20	
	Fencing:	110	
	Surficial (type of geology, depth, observed surficial		
8. Aquifer	info):	no	
Characteristics	Bedrock (type, depth, exposed at surface):	no	
	Show the Geology Mapping or borehole, does		
	Unconfined Municipal Aquifer:	no	(If yes, go to step II)
	Confined Municipal Aquifer:	assumed yes	
	Pumping Test Done (Y/N)	upknown	
		UNKIOWI	
9. Proximity to sources	when was test done, is the data available?		
of potential surface			//f < 100 m from Surface Water and
water contamination			overburden well or if < 500 m from Surface
	Perennial Stream/Pond (metres away from well):	-	Water and bedrock well, go to Step II)
			(It < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	Ephemeral Stream (metres away from well):	-	Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an
			overburden well or if < 500 m from Surface
(500 m for bedrock	Ditch (metres away from well):	yes, witnin 25 m	water and bedrock well, go to Step II)
100m for overburden)			
	Is there water in the ditch (Y/N):	yes	
	When did it last rain? If recent is there water is	temperature = 7.4 deg C nH = 6.4 conductivity = 180 $\mu$ C m TDS =	
	the ditch? Does the ditch drain quickly?	120 mg/L	
			(If < 100 m from Surface Water and an
	River:	-	overburden well or it < 500 m from Surface Water and bedrock well, go to Step II)



	Question	Answer	Comments
	Lake:	-	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Wetlands/Marshes:	-	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:		
	Highway/Road:	Immediately downgradient of Highway 210 (Burin Penninsula Highway)	
	Unused wells found on site:	unknown	
	Should they be abandoned:		
	Abandoned wells on site:		
	Abandonment Log Available (Y/N): Artesian wells found on site (Is the well fixed		
	or does it need to be abandoned):		
	Are there Well Pits Located on Adjacent Properties:		
	Other (Specify):		
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):		
	If on private services, how many septics/wells (based on # of homes):	unknown	
	Distance of closest septics (approx. to house):	at least 50 m	
	Communal septics used nearby:	unknown	
	Are domestic wells within municipal aquifer:	unknown	
	surrounding properties:	unknown	
	Any historic well interference complaints: Historic Contamination Issues Noted at	unknown	
	Domestic Wells:	unknown	
	Fertilizer used?		
	Forestry:	no	
	Agriculture:	no	
	Evidence of Manure Storage (liquid or solid):		



	Question	Answer	Comments
	Animal Grazing:		
	Industrial:	no	
	Type of Industrial Use:		
	AST's or UST's at site:		
	Other Risks (large septics etc):		
	Land Uses Specified in NL Reg 63/03 as risks:	no	
	Cesspool receiving raw sewage that is less than or equal to 4 m deep ( >= 30 m away		
	from well):		
	Cesspool or seepage pit that is $>= 4 \text{ m}$ deep unless it prevents seepage has to be $>= 60 \text{ m}$		
	away from a well		
	Seepage Pit, Filter Bed, Soil Absorption Field, Earth Privy Pit or similar (>=16 m away from		
	well):		
	approved mechanical joints, independent		
	clean water drain or cistern (>= 3 m away from well):		
	Sanitary Landfill or Garbage Dump:		
	Is there a pumphouse cast iron floor drain with		
	leaded joints draining to ground surface? (>=1 m from well)		
	Septic(s), concrete vault privy, sewer or tightly		
	jointed tile or equivalent material or sewer connected foundation drain (>=16 m away		
	from well):		
	Future Land Use Changes that could impact wells:		
15 Notes:	Other please specify (i.e. sources of microbial contam.): Iron stained fixtures in homes that use water from	this well. No smell to the water. There is another section of town w	ith 13 families all using one well. It isn't a
10. 10103.		public well but they do chlorinate.	to ranning an using one werk it fail ta

# Photo Log - Swift Current







Pumphouse



Pumphouse interior



Pumphouse interior

# Signage

# Photo Log - Swift Current







Close up view of well head



Well in foreground, Hollett Point Road in background

Well head



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR

Department of Environment and Conservation Water Resources Management Division

# Water Well Record

Well Owner Name: TOWN COUNCIL Address:	Lithology Listing: OBDN OO2 ROCK 079	
Well Location Town: SWIFT CURRENT GPS Coordinates N ° ' "	Total Depth:    79.30    m    Depth to Bedrock:    m      Water Bearing Zone(s)    m    Lpm at    m    Lpm at    m      Lpm at    m    Lpm at    m    Lpm at    m	
W ° ' " Map Number: 1M/16 NAD: UTM Zone: 21	Casing Type: Casing Length: 6.70 m Diameter: mm Casing Thickness: mm Drive Shoe Used:	
Northing: 5306712 Easting: 710829 	Well Grouted: fromm tom Grout Type:	
Well / Water Use: MU Type of Work Completed: Drilling Method:	Screen Info:	
Pump Recommendations    Pump Type:    Intake Setting:  m    Pumping Rate:  Lpm    Estimated Safe Yield of Well:  135.00  Lpm	Pumping Test    Method:    Pumping Rate:	

**Drillers Comments:** 

**Name of Drilling Company** P. O'Brien Well Drilling Ltd. Licence Number 8 Date Well Completed 08 /02/1990

This Record Modified by: Modified date:



# Wabana









	Question	Answer	Comments
1. Project Details:	Project No:	60236351	
	Client:	Newfoundland and Labrador, Department of Environment and Conservation, WRMD	
	Date of Inspection:	15-Dec-11	
	AECOM Inspector:	Nora Donald	
	Site Contact (Name, Phone #):	Jim Pentergast / Ben Noseworthy	
	Weather:	Sunny, cold -3°c	
2. Well Designation:	Well ID.	Fancy Hill	
2. Wen Designation.		i and i m	
	Well Type/Lisage:	Drilled not in use	
	Wein Type/Osage.	Dilica, norm use	
	Well Status (Pumping Backup, Obs.):	Not currently in use due to low yield	
	Weir Otatus (Fumping, Dackup, Obs.).		
3 Location	Water Supply No :	WS-G-0766	
5. Location.			
	Community	Wabapa Bollo Island	
	Community.	Wabana, Delle Island	
	Street	Main Street at insection with Murphy's Hill	
	Street:	Main Street at insection with Murphy's Hill	
	ODO Nacihian		
measured in field. Map	GPS Northing:	WP #142	
Grid, Well Elevation			
provided by well operator)	GPS Easting:		
4 Historic Water Quality	What is the historic raw water quality of the well	No	
4. Thistoric Water Quality	(general chem, bactena etc)	NO	
(Questions for well	Do Storms Change the Well Chemistry (i.e.	No	
operators)	Is the well water chemistry similar to nearby	No	(ii yes, go to step ii) (O.Keg 17003)
	surface water bodies (take conductivity measurement of pearby surface water if		
	possible):	No	(If yes, go to step II) (O.Reg 170/03)
	ls there an observable change in nearby		(If yes, go to step II) (MOE GUDI Guidelines
	surface water levels when the well is pumping:	No	(in yes, go to step if) (inor coor culdenies, 2001)
	Historic issues with bacteria TSS boil water		
	advisories?	No	(If yes, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or microscopic particulate analysis completed on		
	it? If so when, results, copy of report	No	
	Are there increasing/concerning trends of any	NU	
	other parameters at the well not mentioned	high income and many second	
	yet:	nigh fron and mangarlese	
	Additonal Raw Water Chemistry Available that	No	
	Does the well produce dirty water on start up?	INU	
	What is the nature of the dirty water i.e.	Didate cale	
	sandy, iron (red) etc	Dian t ask	
	Does the well water ever taste salty? Is there		
	or in the surrounding area?	No	
	What is the current well treatment:	Chlorinated at tank	



	Question	Answer	Comments
	Has the well ever needed treatment upgrades		
	or remediation (if so, when, why, records		
	available?):	high iron and manganese	
			(If yes and a contrary report was not written
			after August 1, 2000, go to step II) (O.Reg
	Historic Reports Indicating GUDI status (Y/N):	No	170/03)
	Obtain a copy (Y/N):	No	
	Data of Report:	No	
		No	
	Name of Preparer:	No	
	Reason for GUDI Status:	No	
	Average Appuel Dumping Date:	Na	
	Average Annual Pumping Kate:	NO	
			(If cannot pump at greater than 0.58 L/s and
	Maximum Monthly Rumping Poto:		is within 15 m of surface water or if the well
	imaximum monuniy Fumping Kale:		can supply water at greater than 0.58 L/s and
			water or can supply water at greater than
			0.58 L/s and is in bedrock within 500 m of
		No	surface water, go to step II) (O.Reg 170/03)
	Other (specify):		
5. Sensitive Setting:	Spring:		(If yes, go to step II)
or contained coming.	opinig.		
(Source of Water Supply)	Infiltration Gallery:		(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well:		(If yes, go to step II)
	Karet Aquifer:		(If yes, go to step II)
			(ii yes, go to step ii)
	Exposed Fractured Bedrock:		(If yes, go to step II)
	Thin or absent soil cover over bedrock? How		
	far away from the well?		
	High K Unconfined Aquifer:		(If yes, go to step II) (O Reg 170/03)
			(
			(If yes, go to step II) (MOE Guidelines on
	Enhanced Recharge:		GUDI, 2001)
			(If not Drilled Well, Go To Step II) (O.Reg
	Dug Well:		170/03)
	Drilled Well (in overburden or bedrock):	Bedrock	
6 Woll	Well Log Found (X/N):	No	
O. WEII	wen Log Found (T/N):	INU	
Construction	Driller (Name; ID):	Unknown	
Details	Construction Date:	Unknown	
	Mall Deaths	11.1	
	Well Depth:	Unknown	
	Casing Type:	Steel	





	Question	Answer	Comments
	Firmly soated in hadrock (V/N)	Unkoun	
	Finniy Sealed in Dedrock (1/14)	CHRIGWI	
	Water Tight Casing to 6mbgs (Y/N)	Unknown	(If No go to Step II) (O.Reg 903)
	Casing Diameter:	6"	
	Casing Length:	Unknown	(If < 12 m or 40 ft, go to Step II)
	Has the well ever been disinfected (when, why, most		
	When was the well pump last serviced or replaced? Was it disinfected before being placed back in well:	New pump 2 years ago	
	Well Yield:	4 igpm	
	Static Water Level	Unknown	
	Overburden Thickness:	Unknown	
	Pumo type:	Submersible. unknown	
	Pump Satting:	200'	
	runp Setting.	200	
	Drive Shoe (Y/N):	Unknown	
	Grouted Casing (Y/N):	Unknown	
	Thickness of Grout around well:	Unknown	
	Water Level Monitoring Pipe in Well (Y/N):	No	
	Raw Water Sampling Tap (Y/N):		
	Other:		
7. Well Condition	Located in a Well House (Y/N):	Yes	
Assessment (O.Reg 90	Well Tagged or Identified:		
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):		
	Any Rust or Holes Evident on Casing:	Yes - rust	
	Above Ground Casing Height (mags) (If stickup, provide details):		
	Flush Mount Well (mbgs) (If flush mount, provide details):	No	
	Is the Well Located in a Well Pit (mbgs):	No	
	Covered with solid, watertight cover (Y/N):	No	
	Casing is above bttm of pit floor:	 No	
	Is the pit equipped to drain (provide details)?	Νο	



	Question	Answer	Comments
	Is the pit equipped with a sump pump (V/N)?	No	
	is the pit equipped with a sump pump (1/14):	NO	
	The casing vent is at what height above the pit	N.	
	Height of Ground Surface for 5 m around well is at	Nδ	
	least 60 cm above the highest known surface water		
	level (Y/N):	Yes	
	Is the topography around the well indicative of		
	surface ponding and flow towards the well:	No	
	Is drainage at the well adequate		
	(any standing water or evidence of ponding):	Yes	
	Protective Cap Found on Well (Acceptable Seal?):	no	
	Is the Well Locked (Secure?):		
	Pit-less adapter:	No	
	Screened air vent:	No	
	Flood protection (has it ever flooded);	No	
	Vehicle impact protection:	Yes	
	Fencina:	No	
	i onong.		
8 Aquifer	Surficial (type of geology, depth, observed surficial	No	
o. Aquilei	iiii).	10	
Characteristics	Dedroek (type, don'th, eveneed at eveters).	No	
Characteristics	bedrock (type, deptri, exposed at surface).	NO	
	Show the Geology Mapping or borehole,does	Mi	
	it match with their understanding?	Nδ	
	Uncontined Municipal Aquiter:	Nδ	(if yes, go to step ii)
	Confined Municipal Aquiter:	Yes	
	Pumping Test Done (Y/N)	Unknown	
9 Provimity to sources	When was test done, is the data available?	N/A	
of potential surface			(If < 100 m from Surface Water and an
water contamination			overburden well or if < 500 m from Surface
	Perennial Stream/Pond (metres away from well):	No	Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an
			overburden well or if < 500 m from Surface
	Ephemeral Sucan (meucs dway nom wen).		water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an
			overburden well or if < 500 m from Surface
(500 m for bedrock,	Ditch (metres away from well):		water and bedrock well, go to Step II)
100m for overburden)			
	Is there water in the ditch (Y/N):		
	When did it last rain? If recent is there water in		
	the ditch? Does the ditch drain quickly?		
			(If < 100 m from Surface Water and an
	River		overburden well or if < 500 m from Surface
			mater and bedrock well, go to step II)



	Question	Answer	Comments
	Lake:		(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Wetlands/Marshes:		(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:		
	Highway/Road:		
	Unused wells found on site:		
	Should they be abandoned:		
	Abandoned wells on site:		
	Abandonment Log Available (Y/N): Artesian wells found on site (Is the well fixed or does it need to be abandonativ		
	Artesian wells found on adjacent properties:		
	Are there Well Pits Located on Adjacent Properties:		
	Other (Specify):		
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):		
	If on private services, how many septics/wells (based on # of homes):		
	Distance of closest septics (approx. to house):		
	Communal septics used nearby:		
	Are domestic wells within municipal aquifer: Are there wells found within well pits on		
	Anv historic well interference complaints:		
	Historic Contamination Issues Noted at Domestic Wells:		
	Parkland:		
	Fertilizer used?		
	Forestry:		
	Agriculture:	Yes	
	Evidence of Manure Storage (liquid or solid):	No	



	Question	Answer	Comments
	Animal Grazing:	No	
		110	
	Industrial:	No	
	Type of Industrial Use:	No	
	AST's or UST's at site:	No	
	Other Picks (large sentics etc.):	No	
	Other Histo (large septics etc).		
	Land Uses Specified in NL Reg 63/03 as risks:	No	
	than or equal to 4 m deep ( >= 30 m away		
	from well):	No	
	Cesspool or seepage pit that is $>= 4 \text{ m deep}$		
	away from a well:	No	
	Seepage Pit, Filter Bed, Soil Absorption Field,		
	Earth Privy Pit or similar (>=16 m away from well):	No	
	Sewer of cast iron with leaded joints or		
	approved mechanical joints, independent		
	well):	No	
	Sanitary Landfill or Garbage Dump:	No	
	Is there a pumphouse cast iron floor drain with		
	leaded joints draining to ground surface? (>=1		
	m from well):	NO	
	jointed tile or equivalent material or sewer		
	connected foundation drain (>=16 m away		
	trom well):	NO	
	Future Land Use Changes that could impact wells:	No	
	Other please specify (i.e. sources of microbial contam.):		
15. Notes:			

# Photo Log - Wabana - Fancy Hill Well







Pumphouse - front view



Pumphouse - view from rear, looking west



Interior and well head



Well head

Signage



	Question	Answer	Comments
1. Project Details:	Project No:	60236351	
·····	Client:	Newfoundland and Labrador, Department of Environment and	
	Date of Inspection:	15 Doc 11	
	AECOM Inspector:	Nora Donaid	
	Site Contact (Name, Phone #):	Jim Pentergast / Ben Noseworthy	
	Weather:	Cold, Sunny -3°C	
2. Well Designation:	Well ID:	Main Street	
	Well Type/Usage:		
	Well Status (Pumping, Backup, Obs.):	Not in use due to arsenic	
3. Location:	Water Supply No.:	WS-G- 0769	
	Community:	Wabana, Belle Island	
	Street:	Main Street	
(Community, Street, GPS	GPS Northing:	WP #143	
Grid, Well Elevation provided by well operator)	GPS Easting:		
	Well Elevation (masl):		
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)	Νο	
(Questions for well operators)	Do Storms Change the Well Chemistry (i.e. increased TSS)	No	(If yes, go to step II) (O.Reg 170/03)
	Is the well water chemistry similar to nearby surface water bodies (take conductivity measurement of nearby surface water if possible):	Νο	(If ves. go to step II) (O.Reg 170/03)
	Is there an observable change in nearby	No	(If yes, go to step II) (MOE GUDI Guidelines,
	Historic issues with bacteria, TSS, boil water advisories?	No	(If yes, go to step II) (0 Reg 170/03)
	Has the well ever had particle counting or microscopic particulate analysis completed on it? If so when, results, copy of report available?	No	(n <b>j - 6</b> ) go - 2 - 2 - p ( j - 1 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2
	Are there increasing/concerning trends of any other parameters at the well not mentioned yet:	No	
	Additonal Raw Water Chemistry Available that we could have:	No	
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc	No	
	Does the well water ever taste saity? Is there any evidence of salt water intrusion at the well or in the surrounding area?	No	
	What is the current well treatment:	Chlorine	



	Question	Answer	Comments
	Has the well ever needed treatment upgrades		
	or remediation (if so, when, why, records		
	available?):	high iron, manganese, arsenic	
			()f
			(If yes and a contrary report was not written after August 1, 2000, go to step II) (O Reg
	Historic Reports Indicating GUDI status (Y/N):	No	170/03)
		10	
	Obtain a copy (Y/N):	No	
	Data of Departs	Ne	
		No	
	Name of Preparer:	No	
	Reason for GUDI Status:	No	
	Average Annual Pumping Rate:	Νο	
			(If cannot pump at greater than 0.58 L/s and
			is within 15 m of surface water or if the well
	Maximum Monthly Pumping Rate:		can supply water at greater than 0.58 L/s and
			is in overburden within 100 m of surface
			water or <u>can</u> supply water at greater than
		Linknown	surface water, go to step II) (O.Reg 170/03)
		Chindown	Surface water, go to step if (onteg if 0.00)
	Other (specify):	Unknown	
E Consitive Setting	Carriera	No	(lá voc. go to stop II)
5. Sensitive Setting.	Spring:	NO	(il yes, go to step il)
(Source of Water Supply)	Infiltration Gallery:	No	(If yes, go to step II) (O.Reg 170/03)
(*****************			
	Horizontal Collection Well:	No	(If yes, go to step II)
	Karst Aquifer:	No	(If yes, go to step II)
		10	
	Exposed Fractured Bedrock:	No	(If yes, go to step II)
	Thin or absent soil cover over bedrock? How	Ne	
	rar away from the Well?	INU	
	High K Unconfined Aquifer:	No	(If yes, go to step II) (O.Reg 170/03)
			<b>_</b>
			(If yes, go to step II) (MOE Guidelines on
	Ennanced Recharge:	No	GUDI, 2001)
			(If not Drilled Well, Go To Stop II) (O Bog
	Dua Well:	Νο	(11 1101 Drilled Well, 30 10 Step II) (U.Reg 170/03)
		X D · ·	
	Drilled Well (in overburden or bedrock):	Yes, Bedrock	
6. Well	Well Log Found (Y/N):	Νο	
Construction	Driller (Name; ID):	No	
Detail	Or and reactions Declary	U. I	
Details	Construction Date:	Unknown	
	Well Depth:		
	Casing Type:	Steel	



	Question	Answer	Comments
	Firely costed in badroaly (V(0))	lakagun	
	Finniy sealed in bedrock (1/N)	Unknown	
	Water Tight Casing to 6mbgs (Y/N)	Unknown	(If No go to Step II) (O.Reg 903)
	Casing Diameter:	10" to 6" - 6" in casing in 10" casing	
	Casing Length:	Unknown	(If < 12 m or 40 ft, go to Step II)
	Has the well ever been disinfected (when, why, most recently):	Unknown	
	When was the well pump last serviced or replaced? Was it disinfected before being placed back in well:	2 years ago	
	Well Yield:	~25 igpm	
	Static Water Level:	Unknown	
	Overburden Thickness:	Unknown	
	Pump type:	Unknown	
	Pump Setting:	Unknown	
	Drive Shoe (Y/N):	Unknown	
	Grouted Casing (Y/N):	Unknown	
	Thickness of Grout around well:	Unknown	
	Water Level Monitoring Pipe in Well (Y/N):	No	
	Raw Water Sampling Tap (Y/N):	Yes	
	Other:		
7. Well Condition	Located in a Well House (Y/N):	Yes	
Assessment (O.Reg 9	Well Tagged or Identified:	Yes	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):		
	Any Rust or Holes Evident on Casing:	Rust	
	Above Ground Casing Height (mags) (If stickup, provide details):		
	Flush Mount Well (mbgs) (If flush mount, provide details):	No	
	Is the Well Located in a Well Pit (mbqs):	Νο	
	Covered with solid, watertight cover (Y/N):	Νο	
	Casing is above bttm of pit floor:	No	
	Is the pit equipped to drain (provide details)?	No	



	Question	Answer	Comments
		,	
	Is the pit equipped with a sump pump (Y/N)?	No	
	The casing vent is at what height above the pit		
	floor (cm)?	No	
	Height of Ground Surface for 5 m around well is at		
	least 60 cm above the highest known surface water		
	level (Y/N):	Yes	
	Is the topography around the well indicative of	No	
	surface ponding and now towards the wen.		
	Is drainage at the well adequate		
	(any standing water or evidence of ponding):	Yes	
	Protective Cap Found on Well (Acceptable Seal?):	Cap yes, acceptable no	
		N N	
	Is the Well Locked (Secure?):	Yes	
	Pit-loss adaptor:	No	
	1 11-1035 auapter.	UVI	
	Screened air vent:	Yes	
	Flood protection (has it ever flooded):	Yes	
	Vehicle impact protection:	Yes	
	Family m	No	
	Fencing:	NO	
8 Aquifer	Surficial (type of geology, depth, observed surficial info)		
o. Aquilei			
Characteristics	Bedrock (type, depth, exposed at surface):	Yes	
	Show the Geology Mapping or borehole, does		
	it match with their understanding?		
	Unconfined Municipal Aquifer:	No	(If yes, go to step II)
	Confined Municipal Aquifer:	Ves	
		165	
	Pumping Test Done (Y/N)	Unknown	
	- · · · /		
	When was test done, is the data available?	Unknown	
9. Proximity to sources			
or potential surface			(If < 100 m from Surface Water and an
water contamination			overburden well or if < 500 m from Surface
	Perennial Stream/Pond (metres away from well):	No	Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an
		Na	overburden well or if < 500 m from Surface
	Lphemeral Sueam (meues away from well):	UVI	water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an
	Ditate (materia anna francus ")	N	overburden well or if < 500 m from Surface
(E00 m for hadroals	Ditch (metres away from well):	No	Water and bedrock well, go to Step II)
(OUU III IUF DEGFOCK,			
	is there water in the ditch (V/N):	No	
		110	
	When did it last rain? If recent is there water in		
	the ditch? Does the ditch drain quickly?	No	
			(If < 100 m from Surface Water and an
			overburden well or if < 500 m from Surface
	River:	No	Water and bedrock well, go to Step II)



	Question	Answer	Comments
	Lake:	Νο	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Wetlands/Marshes:	Νο	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:		
	Highway/Road:	<15 m	
	Unused wells found on site:	Νο	
	Should they be abandoned:	No	
	Abandoned wells on site:	No	
	Abandonment Log Available (Y/N): Artesian wells found on site (Is the well fixed	No	
	or does it need to be abandoned):	No	
	Arresian weils round on adjacent properties:	No	
	Other (Specify):		
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	No	
	If on private services, how many septics/wells (based on # of homes):		
	Distance of closest septics (approx. to house):		
	Communal septics used nearby:		
	Are domestic wells within municipal aquifer: Are there wells found within well pits on		
	surrounding properties:		
	Any historic Well interference complaints: Historic Contamination Issues Noted at Domestic Wells:		
	Parkland:	No	
	Fertilizer used?	No	
	Forestry:	No	
	Agriculture:	Yes, some farms	
	Evidence of Manure Storage (liquid or solid):	Unknown	



	Question	Answer	Comments
	Animal Grazing:	No	
		10	
	Industrial:	No	
	Type of Industrial Use:	No	
	AST's or UST's at site:	No	
	Other Risks (large septics etc):	No	
	Land Uses Specified in NL Reg 63/03 as risks:	No	
	Cesspool receiving raw sewage that is less		
	than or equal to 4 m deep ( >= 30 m away from well):	No	
	Cesspool or seepage pit that is >= 4 m deep	NO	
	unless it prevents seepage has to be >= 60 m		
	away from a well:	NO	
	Earth Privy Pit or similar (>=16 m away from		
	well):	No	
	approved mechanical joints, independent		
	clean water drain or cistern (>= 3 m away from	No	
	wei).	NO	
	Sanitary Landfill or Garbage Dump:	No	
	leaded joints draining to ground surface? (>=1		
	m from well):	No	
	Septic(s), concrete vault privy, sewer or tightly iointed tile or equivalent material or sewer		
	connected foundation drain (>=16 m away		
	from well):	No	
	Future Land Use Changes that could impact wells:		
45 No.100	Other please specify (i.e. sources of microbial contam.):		
15. NOTES:			

# Photo Log - Wabana - Main Street Well







Well head



Close-up view of well head



Treatment equipment

Signage

# Photo Log - Wabana - Main Street Well

# AECOM



Interior of pumphouse - unsanitary conditions



Overhead access above well head





Pumphouse exterior

Interior of pumphouse



	Question	Answer	Comments
1. Project Details:	Project No:	60236351	
	Client:	Newfoundland and Labrador, Department of Environment and Conservation, WRMD	
	Date of Inspection:	15-Dec-11	
	AECOM Inspector:	Nora Donald	
	Site Contact (Name, Phone #):	Jim Pentergast / Ben Noseworthy	
	Weather:	Cold, Sunny -3°c	
2. Well Designation:	Well ID:	St.Edwards Well	
	Well Type/Usage:		
	Well Status (Pumping, Backup, Obs.):	Yes - pumping; in use	
3. Location:	Water Supply No.:	WS-G-0774	
	Community:	Wabana, Belle Island	
	Street:		
(Community, Street, GPS measured in field. Map	GPS Northing:	WP #144	
Grid, Well Elevation provided by well operator)	GPS Easting:		
	Well Elevation (masl):		
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)	high iron, manganese	
(Questions for well operators)	Do Storms Change the Well Chemistry (i.e. increased TSS)	nothing noticeable, no	(If yes, go to step II) (O.Reg 170/03)
	Is the well water chemistry similar to nearby surface water bodies (take conductivity measurement of nearby surface water if possible):	Νο	(If yes, go to step II) (O.Reg 170/03)
	Is there an observable change in nearby surface water levels when the well is pumping:	No	(If yes, go to step II) (MOE GUDI Guidelines, 2001)
	Historic issues with bacteria, TSS, boil water advisories?	Boil order ~9-10 years - due to chlorine levels	(If yes, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or microscopic particulate analysis completed on it? If so when, results, copy of report available?	Νο	
	Are there increasing/concerning trends of any other parameters at the well not mentioned yet:	No	
	Additonal Raw Water Chemistry Available that we could have:	No	
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc	No	
	Does the well water ever taste salty? Is there any evidence of salt water intrusion at the well or in the surrounding area?	No	
	What is the current well treatment:	Chlorination	



	Question	Answer	Comments
	Has the well ever needed treatment upgrades		
	or remediation (if so, when, why, records		
	available?):	high iron, manganese	
			(If yes and a contrary report was not written
			after August 1, 2000, go to step II) (O.Reg
	Historic Reports Indicating GUDI status (Y/N):	No	170/03)
		A1-	
	Obtain a copy (Y/N):	NO	
	Date of Report:	No	
	Name of Preparer:	No	
	Reason for GUDI Status:	No	
	Average Annual Pumping Rate:	No	
			(If cannot pump at greater than 0 59 1 /s and
			is within 15 m of surface water or if the well
	Maximum Monthly Pumping Rate:		can supply water at greater than 0.58 L/s and
			is in overburden within 100 m of surface
			water or <u>can</u> supply water at greater than
		No	U.58 L/S and IS IN bedrock within 500 m of Surface water, go to step II) (O Reg 170/03)
		10	canade match, go to step in (onteg 170/03)
	Other (specify):	No	
5 Sensitive Setting	Spring	No	(If yes, go to step II)
or benshive betting.	opning.	10	
(Source of Water Supply)	Infiltration Gallery:	No	(If yes, go to step II) (O.Reg 170/03)
	Levizontal Callection Walk	Na	
		NO	(if yes, go to step ii)
	Karst Aquifer:	No	(If yes, go to step II)
	Eveneed Freedured Dedreedu	Na	life and the stern ID
	Exposed Fractured Bedrock:	NO	(if yes, go to step ii)
	Thin or absent soil cover over bedrock? How		
	far away from the well?	No	
	Llink K Upsenfined Acuitory	Ν-	
	nign n Uncontinea Aquiter:	NO	(IT yes, go to step II) (O.Reg 170/03)
			(If yes, go to step II) (MOF Guidelines on
	Enhanced Recharge:	No	GUDI, 2001)
	Dure Mall	λ.	(If not Drilled Well, Go To Step II) (O.Reg
		NO	170/03)
	Drilled Well (in overburden or bedrock):	Yes, bedrock	
6 Well	Well Log Found (X/N):	No	
o. wen		INU	
Construction	Driller (Name; ID):	Unknown	
Detaile	Construction Data:	Lakrown	
Details		UTIKITUWI	
	Well Depth:	Unknown	
	Casing Turses	Liele	
I	Casing Type:	UNKNOWN	





	Question	Answer	Comments
	Firmly seated in hadrock (V/N)	Unknown	
	Finniy sealed in bedrock (1/N)	Oriknown	
	Water Tight Casing to 6mbgs (Y/N)	Unknown	(If No go to Step II) (O.Reg 903)
	Casing Diameter:	6"	
	Casing Length:	Unknown	(If < 12 m or 40 ft, go to Step II)
	Has the well ever been disinfected (when, why, most	Unknown	
	When was the well pump last serviced or replaced? Was it disinfected before being placed back in well:	Unknown	
	Well Yield:	10 igpm	
	Static Water Level:	Unknown	
	Overburden Thickness:	Unknown	
	Pump type:	Unknown	
	Pump Setting:	Unknown	
	r ump ootung.		
	Drive Shoe (Y/N):	Unknown	
	Grouted Casing (Y/N):	Unknown	
	Thickness of Grout around well:	Unknown	
	Water Level Monitoring Pipe in Well (Y/N):	Unknown	
	Pow Water Sempling Tep (V/N):	Linkown	
		Onknown	
	Other:		
7. Well Condition	Located in a Well House (Y/N):	Yes	
Assessment (O.Reg 9	Well Tagged or Identified:	Yes	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):		
	Any Rust or Holes Evident on Casing	Rust	
	Above Ground Casing Height (mags) (If stickup, provide details):	1" 3/4" (4.5cm)	
	Flush Mount Well (mbgs) (If flush mount, provide	No	
	Is the Well Located in a Well Pit (mbgs):	No	
	Covered with solid, watertight cover (Y/N):	No	
	Casing is above bttm of pit floor:	No	
	Is the pit equipped to drain (provide details)?	No	



	Question	Answer	Comments
		,	
	Is the pit equipped with a sump pump (Y/N)?	No	
	The casing vent is at what height above the pit		
	floor (cm)?	No	
	Height of Ground Surface for 5 m around well is at		
	least 60 cm above the highest known surface water	Voc	
		Tes	
	Is the topography around the well indicative of		
	surface ponding and flow towards the well	Yes	
	· • •		
	Is drainage at the well adequate		
	(any standing water or evidence of ponding):	Yes	
	Distantive Can Found on Wall (Assentable Capita)		
	Protective Cap Found on Well (Acceptable Sear?):		
	Is the Well Locked (Secure?):	Yes	
	Pit-less adapter:	No	
		, , , , , , , , , , , , , , , , , , ,	
	Screened air vent:	Yes	
	Flood protection (bas it ever flooded):	No	
		UNU	
	Vehicle impact protection:	Yes	
	· ·		
	Fencing:	No	
	Curficial (type of goology, donth, choosy and surficial		
8 Aquifor	sufficial (type of geology, depth, observed sufficial	No	
o. Aquilei	ino).		
Characteristics	Bedrock (type, depth, exposed at surface):	No	
	Show the Geology Mapping or borehole, does		
	it match with their understanding?	No	
	Upconfined Municipal Aquifor:	No	(If yes, go to stop II)
		No	(il yes, go to step il)
	Confined Municipal Aquifer:	Yes	
	Pumping Test Done (Y/N)	Unknown	ļ
	When was test done is the data available?	Unknown	
9. Proximity to sources		Charlown	
of potential surface			
water contamination			(IT < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	Perennial Stream/Pond (metres away from well):	No	Water and bedrock well. go to Step II)
			(If < 100 m from Surface Water and an
			overburden well or if < 500 m from Surface
	Ephemeral Stream (metres away from well):	No	Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an
			overburden well or if < 500 m from Surface
	Ditch (metres away from well):	No	Water and bedrock well, go to Step II)
(500 m for bedrock,			
100m for overburden)			
	Is there water in the ditch (Y/N):	No	<u> </u>
	When did it last rain? If recent is there water in		
	the ditch? Does the ditch drain guickly?	Νο	
		-	
			(If < 100 m from Surface Water and an
			overburden well or if < 500 m from Surface
	River:	No	Water and bedrock well, go to Step II)



	Question	Answer	Comments
	Lake:	No	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Watlands/Marshes	No	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well go to Step II)
		10	Water and bedrook wen, go to otep inj
	Is drainage towards the well possible:	Νο	
	Highway/Road:	Yes	
	Unused wells found on site:	Unknown	
	Should they be abandoned:	Unknown	
	Abandoned wells on site:	Unknown	
	Abandonment Log Available (Y/N):	Unknown	
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):	Unknown	
	Artesian wells found on adjacent properties:	Unknown	
	Are there Well Pits Located on Adjacent Properties:	Unknown	
	Other (Specify):		
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):		
	If on private services, how many septics/wells (based on # of homes):		
	Distance of closest septics (approx. to house):		
	Communal septics used nearby:		
	Are domestic wells within municipal aquifer:		
	Are there wells found within well pits on surrounding properties:		
	Any historic well interference complaints:		
	Historic Contamination Issues Noted at Domestic Wells:		
	Parkland:		
	Fertilizer used?		
	Forestry:		
	Agriculture:		
	Evidence of Manure Storage (liquid or solid):		



	Question	Answer	Comments
	Animal Grazing:		
	Aumai orazing.		
	la ductria l	Ne	
	industriai:	NO	
	Type of Industrial Use:	No	
	AST's or UST's at site:	No	
	Other Risks (large septics etc):	No	
	Land Uses Specified in NL Reg 63/03 as risks:	No	
	Cesspool receiving raw sewage that is less		
	than or equal to 4 m deep ( >= 30 m away from well):	No	
	Cesspool or seepage pit that is >= 4 m deep	10	
	unless it prevents seepage has to be >= 60 m	A.	
	away from a well	NO	
	Earth Privy Pit or similar (>=16 m away from		
	well):	No	
	approved mechanical joints, independent		
	clean water drain or cistern (>= 3 m away from	No	
	wei).	NO	
	Sanitary Landfill or Garbage Dump:	No	
	leaded joints draining to ground surface? (>=1		
	m from well)	No	
	Septic(s), concrete vault privy, sewer or tightly iointed tile or equivalent material or sewer		
	connected foundation drain (>=16 m away		
	from well):	No	
	Future Land Use Changes that could impact wells:		
	Other please specify (i.e. sources of microbial contam.):		
15. Notes:			

Supplies school, B&B and priest house

6 Wells go into tower

# Photo Log - Wabana - St. Edward's Well







Signage

Pumphouse exterior



Well head



Well head - side view
## AECOM

### Photo Log - Wabana - St. Edward's Well









# **Appendix B**

## Western Sites





# Badger







Map Document. (P:602363511000-CADD1050 GIS WIPIMXDs\FieldMapMXDs\60236351WellLocations\_Badger\_SurfGeology/mxd) 31/22015 - 4:57:12 PM



	Question	Answer	Comments
1 Project Details	Project No:	60236351	
n roject Details.	Client:	Newfoundland and Labrador, Department of Environment and Conservation. WRMD	
	Date of Inspection:	5-Dec-11	
	AECOM Inspector:	Amanda Sills	
	Site Contact (Name, Phone #):	Scott Luscombe, Harry Noel	
	Weather:	1°C Cloudy	
2. Well Designation:	Well ID:	Well #2	
	Well Type/Usage:	Domestic	
	Well Status (Pumping, Backup, Obs.):	Pumping (Wells 2 and 3 are pumping, there is also a backup well)	
3. Location:	Water Supply No.:	WS-G-0010	
	Community:	Badger	
	Street:	Buchans Highway	
(Community, Street, GPS	GPS Northing:	569871	
Grid, Well Elevation provided by well operator)	GPS Easting:	5425275	
	Well Elevation (masl):	Not Available	
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)	High iron in Well #2, Municipal Office may have more chemistry data	
(Questions for well operators)	Do Storms Change the Well Chemistry (i.e. increased TSS)	No in the old improperly abandoned well, don't know for well #2	(If yes, go to step II) (O.Reg 170/03)
	Is the well water chemistry similar to nearby surface water bodies (take conductivity measurement of nearby surface water if possible):	19us, 1.5°C - in River	(If yes, go to step II) (O.Reg 170/03)
	Is there an observable change in nearby surface water levels when the well is pumping:	Νο	(If yes, go to step II) (MOE GUDI Guidelines, 2001)
	Historic issues with bacteria, TSS, boil water advisories?	Is a boil water advisory on because chlorine residual hasn't been checked since new chlorine system went in	(If yes, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or microscopic particulate analysis completed on it? If so when, results, copy of report available?	Νο	
	Are there increasing/concerning trends of any other parameters at the well not mentioned yet:	Unsure	
	Additonal Raw Water Chemistry Available that we could have:	Likely, in municipal office, contact Pansey Hurley 709.539.2406	
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc	No	
	Does the well water ever taste salty? Is there any evidence of salt water intrusion at the well or in the surrounding area?	Not relevant (No salt water nearby) - No	
	What is the current well treatment:	chlorination	



	Question	Answer	Comments
	Has the well ever needed treatment upgrades or remediation (if so, when, why, records available?):	New chlorine system added this year because old one was shot - put in Nov 2011	
	Historic Poports Indicating CUDI status (V/N)	No	(If yes and a contrary report was not written after August 1, 2000, go to step II) (O.Reg
	Obtain a conv (Y/N):	110	170/03)
	Date of Report:		
	Name of Preparer:		
	Reason for GUDI Status:		
	Average Annual Pumping Rate:	110-123gpm (See photo of log book, 2010 rate)	
	Maximum Monthly Pumping Rate:	New flowmeter put on well 3 weeks ago, prior to no flowmeter on well for approx. 1 year because old one died.	(If <u>cannot</u> pump at greater than 0.58 L/s and is within 15 m of surface water or if the well <u>can</u> supply water at greater than 0.58 L/s and is in overburden within 100 m of surface water or <u>can</u> supply water at greater than 0.58 L/s and is in bedrock within 500 m of surface water, go to step II) (0.Reg 170/03)
	Other (specify):		
5. Sensitive Setting:	Spring:	NO	(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:	No	(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well:	No	(If yes, go to step II)
	Karst Aquifer:	No	(If yes, go to step II)
	Exposed Fractured Bedrock:	No	(If yes, go to step II)
	Thin or absent soil cover over bedrock? How far away from the well?	No	
	High K Unconfined Aquifer:	No	(If yes, go to step II) (O.Reg 170/03)
	Enhanced Recharge:	No	(If yes, go to step II) (MOE Guidelines on GUDI, 2001)
	Dug Well:	No	(If not Drilled Well, Go To Step II) (O.Reg 170/03)
	Drilled Well (in overburden or bedrock):	Yes (Overburden - well #2, Bedrock - Well #3)	
6. Well	Well Log Found (Y/N):	No	
Construction	Driller (Name; ID):	Springdale Driller (operators don't have log)	
Details	Construction Date:	~12 years	
	Well Depth:	~ 57 feet	
	Casing Type:	steel	
	Firmly seated in bedrock (Y/N)	Unknown	



	Question	Answer	Comments
	Water Tight Casing to 6mbgs (Y/N)	Well #3 - 350 feet deep (bedrock well) Pump is set at depth of 120 feet.	(If No go to Step II) (O.Reg 903)
	Casing Diameter:	8"	
	Casing Length:	Unknown - likely the whole length of the well	(If < 12 m or 40 ft, go to Step II)
	Has the well ever been disinfected (when, why, most re	No	
	When was the well pump last serviced or replaced? Was it disinfected before being placed back in well:	A new pump was installed 1 to 1.5 weeks ago - the old pump was too small	
	Well Yield:	Not known	
	Static Water Level:	No (Don't take them)	
	Overburden Thickness:	Don't know	
	Pump type:	Franklin Electric (3 phase submersible pump)	
	Pump Setting:	Pump set at 51 feet	
	Drive Shoe (Y/N):	Don't know	
	Grouted Casing (Y/N):	Operators believe the well wasn't grouted but instead was backfilled around the casing	
	Thickness of Grout around well:	No	
	Water Level Monitoring Pipe in Well (Y/N):	Yes	
	Raw Water Sampling Tap (Y/N):		
	Other:	No	
7. Well Condition	Located in a Well House (Y/N):	No	
Assessment (O.Reg 9	Well Tagged or Identified:	Don't know for sure	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):	Rust, no holes	
	Any Rust or Holes Evident on Casing:	77 cm (from base of concrete pad to top of pipe	
	Above Ground Casing Height (mags) (If stickup, provide details):	No	
	Flush Mount Well (mbgs) (If flush mount, provide details):	No	
	Is the Well Located in a Well Pit (mbgs):	No	
	Covered with solid, watertight cover (Y/N):		
	Casing is above bttm of pit floor:		
	Is the pit equipped to drain (provide details)?		
	Is the pit equipped with a sump pump (Y/N)?		



	Question	Answer	Comments
	The casing vent is at what height above the pit floor (cm)?		
	Height of Ground Surface for 5 m around well is at least 60 cm above the highest known surface water level (Y/N):	Yes	
	Is the topography around the well indicative of surface ponding and flow towards the well	No	
	Is drainage at the well adequate (any standing water or evidence of ponding):	Yes	
	Protective Cap Found on Well (Acceptable Seal?):	Yes	
	Is the Well Locked (Secure?):	Bolted in place, not locked	
	Pit-less adapter:	No	
	Screened air vent:	No	
	Flood protection (has it ever flooded):	Flooded 8 years ago around well and throughout town, built up the pad since then, no flooding since	
	Vehicle impact protection:	No (other than slightly elevated concrete pad)	
	Fencing:	Yes	
8. Aquifer	Surficial (type of geology, depth, observed surficial info):	Gravelly till	
Characteristics	Bedrock (type, depth, exposed at surface):	No	
	Show the Geology Mapping or borehole,does it match with their understanding?		
	Unconfined Municipal Aquifer:	don't know	(If yes, go to step II)
	Confined Municipal Aquifer:	Don't know	
	Pumping Test Done (Y/N)	Yes (Springdale did it)	
	When was test done, is the data available?	Summer 2011, don't have data	
9. Proximity to sources of potential surface water contamination	Perennial Stream/Pond (metres away from well):	Νο	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	Ephemeral Stream (metres away from well):	No	Water and bedrock well, go to Step II) (If < 100 m from Surface Water and an
(500 m for bedrock,	Ditch (metres away from well):	Yes ~ 10-15 m	overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
100m for overburden)	Is there water in the ditch (Y/N):	No	
	When did it last rain? If recent is there water in the ditch? Does the ditch drain quickly?	~168 hours ago	
	River:	yes ~ 20-30 m	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	Lake:	No	Water and bedrock well, go to Step II)



	Question	Answer	Comments
	Wetlands/Marshes:	Marsh like around the well but not typically wet, dries out quickly	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:	Maybe	
	Highway/Road:	yes - 20-25m	
	Linused wells found on site:	Approximately 8 wells found around the site - still visible for the most	
	Should they be should and an	pun	
		yes	
	Abandoned wells on site:	original municipal well less than 5m from well #2 improperly abandoned	
	Abandonment Log Available (Y/N): Artesian wells found on site (Is the well fixed	No (flotech completed it)	
	or does it need to be abandoned):	No (With the exception of well #3, which is not flowing anymore)	
	Artesian wells found on adjacent properties:	No	
	Are there Well Pits Located on Adjacent Properties:	Unlikely (as only one domestic well in town and it is a drive point)	
	Other (Specify):		
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	all on municipal sewer	
	If on private services, how many septics/wells (based on # of homes):	not relevant	
	Distance of closest septics (approx. to house):	not relevant	
	Communal septics used nearby:	not relevant	
	Are domestic wells within municipal aquifer:	1 man has his own well in his basement (just a drive point )	
	Are there wells found within well pits on surrounding properties:	no/ unlikely	
	Any historic well interference complaints:	Not relevant	
	Historic Contamination Issues Noted at		
	Decider d	not relevant	
		10	
	Fertilizer used?		
	Forestry:	yes all around well	
	Agriculture:	no	
	Evidence of Manure Storage (liquid or solid):	well #3 is artesian (capped it and increased pipe height)	
	Animal Grazing:		



	Question	Answer	Comments
	Industrial	No	
		NO	
	Type of Industrial Use:		
	AST's or UST's at site:		
	Other Risks (large septics etc):		
	Land Haas One sife die NIL Daw 20/00 as sieles	N.	
	Land Uses Specified in NL Reg 63/03 as risks:	NO	
	than or equal to 4 m deep ( >= 30 m away		
	from well):		
	Cesspool or seepage pit that is $>= 4 \text{ m deep}$		
	away from a well:		
	Seepage Pit, Filter Bed, Soil Absorption Field,		
	Earth Privy Pit or similar (>=16 m away from		
	Sewer of cast iron with leaded joints or		
	approved mechanical joints, independent		
	clean water drain or cistern (>= 3 m away from well):		
	Sanitary Landfill or Garbage Dump:	yes, approximately 5 miles from well	
	leaded joints draining to ground surface? (>=1		
	m from well):	no	
	Septic(s), concrete vault privy, sewer or tightly		
	jointed tile or equivalent material or sewer connected foundation drain (>=16 m away		
	from well):	no	
	Future Land Use Changes that could impact wells:	no (300 ft around well is protected from development)	
	and boo ondrigoo that oodid impact wells.	Raw sewage for wastewater treatment is 1km away from well 2 at a lake	
	Other please specify (i.e. sources of microbial	which leads to the river, running by the wells. Flow is towards the	
15 Notos:	contam.):	municipal wells.	
15. NOLES:			

Completed by:

Date:

Water in well #2 is within 10 ft of the top of casing when not pumping. The old well (Well #1) drained quickly when it was pumped. Well 2 lowers in water level but does not drain.

Old well (Well #1) was not properly abandonded, a sewer cap was put over the well and then it was covered with gravel. This well is within 5 m of well 2 and is at the same depth. Well logs lost in the flood.

Old Well (Well #1) was found at the same depth as well #2. Both wells were active for a bit at the same time and appear to have a connected response/interference issue ie. Connected response when pumping

Old well had silting issue when pumped, the new well doesn't (Well #2)

The Government of Environment website has a list of drillers by community and likely has the contact information for Springdale Drillers

They recently thought that well 2 would dry out if they increased pumping. However they increased pumping and the well didn't dry out. It continues to provide a lot of water at the increased pumping rate.

### Photo Log - Badger





Water treatment building









Well A



Well B - Note: Water treatment building in background

Well B

### Photo Log - Badger





Well C - New well near water treatment building



Well C



Interior of treatment building



Interior of treatment building



# **Bay St. George South**





Map Document, (P.:80236351000-CADD\050 GIS WIP WXDs\FieldMapMXDs\60236351WelLocations\_BayS\George.mxd) 11/2/2011 - 343-17 PM



Map Document. (P-!60286511000-CADD1050 GIS WIP WXDs\FieldMapMXDs\60236351Well.ocations\_BayStGeorge\_SurfGeologymxd) 11/25/2011 - 11:13:46 AM



	Question	Answer	Comments
1. Project Details:	Project No:	60236351	
	Client:	Newfoundland and Labrador, Department of Environment and Conservation. WRMD	
	Date of Inspection:	3-Dec-11	
	AECOM Inspector	Amanda Sills	
	Site Contact (Name Phone #)	Rosemany or Calvin (Well operators)	
	Weather:	1°C Cloudy	
2. Well Designation:	Well ID:	#2B Lions Club Wells	
	Well Type/Usage:	Domestic and Lions Club (~ 20 homes)	
	Well Status (Pumping, Backup, Obs.):	Pumping	
3. Location:	Water Supply No.:	WS-G-0844	
	Community:	Jeffrey's (Bay St. George South)	
	Street:	McKay's Rd	
(Community, Street, GPS	GPS Northing:	363576	
measured in field. Map Grid, Well Elevation provided by well operator)	GPS Easting:	5343768	
	Well Elevation (masl):	Not Available	
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)	Good	
(Questions for well operators)	Do Storms Change the Well Chemistry (i.e. increased TSS)	Νο	(If yes, go to step II) (O.Reg 170/03)
	Is the well water chemistry similar to nearby surface water bodies (take conductivity measurement of nearby surface water if		
	possible):	No surface water nearby. Not applicable	(If yes, go to step II) (O.Reg 170/03)
	Is there an observable change in nearby surface water levels when the well is pumping:	No surface water nearby. Not applicable	(If yes, go to step II) (MOE GUDI Guidelines, 2001)
	Historic issues with bacteria, TSS, boil water advisories?	no	(If yes, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or microscopic particulate analysis completed on it? If so when, results, copy of report available?	no	
	Are there increasing/concerning trends of any other parameters at the well not mentioned vet:	no	
	Additonal Raw Water Chemistry Available that we could have:	- No (Rose has water chemisty data but we can get it from Municipality as well	
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc	 No	
	Does the well water ever taste salty? Is there any evidence of salt water intrusion at the well or in the surrounding area?	No	
	What is the current well treatment:	chlorination and UV treatment	



	Question	Answer	Comments
	Has the well ever needed treatment upgrades		
	or remediation (if so, when, why, records	Not auro when treatment went in (Recompry would know)	
		Not sure when treatment went in (Nosemary would know)	
			(If yes and a contrary report was not written
	Historic Reports Indicating GLIDI status (V/N):	No	after August 1, 2000, go to step II) (O.Reg
	Thistone Reports maleating GODI status (T/N).		170/03/
	Obtain a copy (Y/N):		
	Date of Report:		
	Name of Preparer:		
	Reason for GLIDI Status:		
	Average Annual Pumping Rate:	~ 8 gpm	
			(If cannot pump at greater than 0.58 L/s and
	Maximum Monthly Pumping Rate:		is within 15 m of surface water or if the well
	Maximum Wonthly Fumping Rate.		can supply water at greater than 0.58 L/s and is in overburden within 100 m of surface
			water or can supply water at greater than
			0.58 L/s and is in bedrock within 500 m of surface water, go to sten II) (O Reg 170/03)
	Other (cresit)		
	Other (specify):		
5. Sensitive Setting:	Spring:	NO	(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:	No	(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well:	No	(If yes, go to step II)
	Karst Aquifer	No	(If yes, go to step II)
			(, y.c., y.c., c.c.p. ii)
	Expand Fractured Padrock	No	
	Exposed Flactured Bedrock.	NO	(ii yes, go to step ii)
	Thin or absent soil cover over bedrock? How		
	far away from the well?		
	High K Unconfined Aquifer:	No	(If yes, go to step II) (O.Reg 170/03)
			(If yes, go to step II) (MOE Guidelines on
	Enhanced Recharge:	No	GUDI, 2001)
			(K not Drilled Well, Co. To Otors IV (C.D.
	Dug Well:	No	(ii not brilled well, Go To Step II) (O.Reg 170/03)
	Drilled Well (in overburden or bedrock):	Yes (over burden)	
6 Woll	Well Log Found (V/N):	No (ask Pasaman)	
0. WEII		inu (ask ilusellidiy)	
Construction	Driller (Name; ID):	Clearwater (Francis Gail)	
Details	Construction Date:	20-28 year old wells	
	Well Depth:	Ask Rosemary, Calvin is unsure	
	Casing Type:	Steel	
	odoling Type.	0,000	1



	Question	Answer	Comments
	Firmly seated in bedrock (Y/N)	No, is overburden well	
	Water Tight Casing to 6mbas (Y/N)	unknown	(If No go to Step II) (O.Reg 903)
	Casing Diamator	6"	(
	Casing Length: Has the well ever been disinfected (when, why, most	Not known (ask Rosemary)	(If < 12 m or 40 ft, go to Step II)
	recently): When was the well pump last serviced or replaced?	no clean pump before put it in well, has been a few years since they had to	
	Was it disinfected before being placed back in well:	remove it.	
	Well Yield:	unknown	
	Static Water Level:	Not available	
	Overburden Thickness:	Not known (ask Rosemary)	
	Pump type:	Submersible pump	
	Pump Setting:	Not known (ask Rosemary)	
	Drive Shoe (Y/N):	Not known (ask Rosemary)	
	Grouted Casing (Y/N):	Not known (ask Rosemary)	
	Thickness of Grout around well:	Not known (ask Rosemary)	
	Water Level Monitoring Pipe in Well (Y/N):	no	
	Raw Water Sampling Tap (Y/N):	yes	
	Other:		
7. Well Condition	Located in a Well House (Y/N):	no	
Assessment (O.Reg 9	Well Tagged or Identified:	yes	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):	unknown	
	Any Rust or Holes Evident on Casing:	rust but no holes	
	Above Ground Casing Height (mags) (If stickup, provide details):		
	Flush Mount Well (mbgs) (If flush mount, provide details):	no	
	Is the Well Located in a Well Pit (mbos):	no	
	Covered with solid, watertight cover (Y/N):		
	Casing is above bttm of bit floor:		
	Is the pit equipped to drain (provide details)?		



	Question	Answer	Comments
	Is the pit equipped with a sump pump (Y/N)?		
	The coording years is of what height shows the pit		
	floor (cm)?		
	Height of Ground Surface for 5 m around well is at		
	least 60 cm above the highest known surface water		
	level (Y/N):	No nearby surface H2O bodies	
	Is the topography around the well indicative of		
	surface ponding and flow towards the well	No ponding, on the base of a hill, so flow could be down towards well	
	Is drainage at the well adequate	No ovidence of it	
	(any standing water of evidence of ponding).		
	Protective Cap Found on Well (Acceptable Seal?):	yes	
	Is the Well Locked (Secure?):	bolted in place, not locked	
		· · · ·	
	Dit lang a dan tan		
	Pit-less adapter:	no	
	Screened air vent:	no	
	Flood protection (boo it over flooded);	20	
	Flood protection (has it ever flooded):	10	
	Vehicle impact protection:	no	
	Fencina:	Yes	
	Surficial (type of geology, depth, observed surficial		
8. Aquiter	info):	overburden (lots of grass)	
Characteristics	Bedrock (type, depth, exposed at surface):	no	
	Show the Geology Mapping or borehole, does it match with their understanding?	not known	
		HOL KIOWI	
	Unconfined Municipal Aquifer:	unknown (ask Rosemary)	(If yes, go to step II)
		unknown (Ask Rosemany - Calvin is not aware of a nump test being	
	Confined Municipal Aquifer:	done since he joined ~ 3 years ago)	
	Rumping Test Done (V/N)		
	rumping restidone (Y/N)	unknown (ask Kosemáry)	
	When was test done, is the data available?	unknown (ask Rosemary)	
9. Proximity to sources			
water contamination			(If < 100 m from Surface Water and an
	Perennial Stream/Pond (metres away from well):	no	Water and bedrock well, go to Step II)
	· · · · · · · · · · · · · · · · · · ·		······································
			(If < 100 m from Surface Water and an
			overburden well or if < 500 m from Surface
	Epnemeral Stream (metres away from well):	no	water and bedrock well, go to Step II)
			(It < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	Ditch (metres away from well):	~ 10-15 m	Water and bedrock well, go to Step II)
(500 m for bedrock,			· · · · · · ·
100m for overburden)	to these sectors in the start. Areas	No	
	is there water in the ditch (Y/N):	INU	
	When did it last rain? If recent is there water in		
	the ditch? Does the ditch drain quickly?	56 hours ago (ditch is on a hill sloped down and away from well)	
			(It < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	River:	no	Water and bedrock well, go to Step II)



	Question	Answer	Comments
	Lake:	no	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Watlands/Marshes	No vísible	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well go to Step II)
	Is drainage towards the well possible:	unlikely unless on top of hill above well	Water and bearbox wen; go to otep inj
	Liskusse/Deed		
	Hignway/Road:	yes 5- 10 m	
	onused weils found on site.	10	
	Abandoned wells on site:		
	Abandonment Log Available (Y/N):	10	
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):		
	Artesian wells found on adjacent properties:		
	Are there Well Pits Located on Adjacent Properties:	None on adjacent properties that he is aware of (ie. No domestic wells on adjacent properties)	
	Other (Specify):		
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	yes	
	If on private services, how many septics/wells (based on # of homes):	yes (~ 20 homes around well )	
	Distance of closest septics (approx. to house):	Within 5 - 10 m (for Lions Club, Firehall and small bar)	
	Communal septics used nearby:	Is a motel with a large septic but is a few kn away	
	Are domestic wells within municipal aquifer:	Not known	
	Are there wells found within well pits on surrounding properties:	Are well pits on properties, however not adjacent to site (as no domestic wells adjacent to site)	
	Any historic well interference complaints:	No	
	Historic Contamination Issues Noted at Domestic Wells:	No	
	Parkland:	Νο	
	Fertilizer used?		
	Forestry:	Yes is some around property	
	Agriculture:	Yes but 8 km away	
	Evidence of Manure Storage (liquid or solid):	unknown	



	Question	Answer	Comments
	Animal Grazing:	Dairy Farm	
	Industrial:	No	
	Type of Industrial Use:		
	AST's or UST's at site:		
	Other Disks (Issue section star)		
	Other Risks (large septics etc).		
	Land Uses Specified in NL Reg 63/03 as risks:	No	
	Cesspool receiving raw sewage that is less		
	than or equal to 4 m deep ( >= 30 m away from well):		
	Cesspool or seepage pit that is >= 4 m deep		
	unless it prevents seepage has to be >= 60 m		
	away from a well:		
	Seepage Pit, Filter Bed, Soil Absorption Field,		
	Earth Privy Pit or similar (>=16 m away from well):		
	Sewer of cast iron with leaded joints or		
	approved mechanical joints, independent		
	clean water drain or cistern (>= 3 m away nom well):		
	, ,		
		Yes, approximately 6 -8 km away from well closing it soon, waste going	
	Sanitary Landfill or Garbage Dump:	to Stephenville at that point	
	Is there a pumphouse cast iron floor drain with leaded joints draining to ground surface? (>-1		
	m from well):	no	
	Septic(s), concrete vault privy, sewer or tightly		
	jointed tile or equivalent material or sewer		
	connected foundation drain (>=16 m away from well):	Yes for Lions Club. Fire Hall and small bar on same propoerty as well	
	Future Land Use Changes that could impact wells:	no	
	Other please specify (i.e. sources of microbial contam.):		
15. Notes:			
	Water in well #2 is within 10 ft of the top of casir drain.	ng when not pumping. The old well (Well #1) drained quickly when it was pumpe	ed. Well 2 lowers in water level but does not
Old well (Well #1) was not properly abandonded, a sewer cap was put over the well and then it was covered with gravel. This well is within 5 m of well 2 and is at depth. Well loos lost in the flood.			rell is within 5 m of well 2 and is at the same
	- Old Well (Well #1) was found at the same depth as well #2. Both wells were active for a bit at the same time and appear to have a connected response/ interferen Connected response when pumping		
Old well had silting issue when pumped, the new well doesn't (Well #2)			
	The Government of Environment website has a	list of drillers by community and likely has the contact information for Springdale	Drillers
	They recently thought that well 2 would dry out i the increased pumping rate.	f they increased pumping. However they increased pumping and the well didn't	dry out. It continues to provide a lot of water at







Signage



Pumphouse



Well head



Pumphouse (middle) Lion's Club (right) Well behind fence in between pumphouse and Lion's Club













	Question	Answer	Comments
1 Project Details:	Project No:	60236351	
1. Project Details.		Newfoundland and Labrador, Department of Environment and	
	Chent.	Conservation, WKMD	
	Date of Inspection:	3-Dec-11	
	AECOM Inspector:	Amanda Sills	
	Site Contact (Name, Phone #):	Rosemary or Calvin (Well operators)	
	Weather:	1°C Cloudy	
2. Well Designation:	Well ID:	#3 Well - Jeffrey's (Sid Shears)	
	Well Type/Usage:	Domestic (~ 20 homes)	
	Well Status (Pumping, Backup, Obs.):	Pumping	
3. Location:	Water Supply No.:	WS-G-0859	
	Community:	Jeffrey's (in Bay St. George Area)	
	Street:	McKay's Rd	
(Community, Street, GPS	GPS Northing:	362885	
measured in field. Map Grid, Well Elevation provided by well operator)	GPS Easting:	5342753	
	Well Elevation (masl):	Not Available	
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)	Manganese in well	
(Questions for well operators)	Do Storms Change the Well Chemistry (i.e. increased TSS)	Νο	(If yes, go to step II) (O.Reg 170/03)
	Is the well water chemistry similar to nearby surface water bodies (take conductivity measurement of nearby surface water if		
	possible):	Not Applicable, no surface water bodies other than ocean	(If yes, go to step II) (O.Reg 170/03)
	Is there an observable change in nearby surface water levels when the well is pumping:	not applicable	(If yes, go to step II) (MOE GUDI Guidelines, 2001)
	Historic issues with bacteria, TSS, boil water advisories?	no	(If yes, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or microscopic particulate analysis completed on it? If so when, results, copy of report available?	no	
	Are there increasing/concerning trends of any other parameters at the well not mentioned yet:	no	
	Additonal Raw Water Chemistry Available that we could have:	no ( Rose has some but we can likely get it from Jerry)	
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc	sometimes	
	Does the well water ever taste salty? Is there any evidence of salt water intrusion at the well or in the surrounding area?	no	
	What is the current well treatment:	chlorination	



	Question	Answer	Comments
	Has the well ever needed treatment upgrades or remediation (if so, when, why, records		
	available?):	not sure when treatment went in	
			(If yes and a contrary report was not written after August 1, 2000, go to step II) (O.Reg
	Historic Reports Indicating GUDI status (Y/N):	No	170/03)
	Obtain a copy (Y/N):		
	Date of Report:		
	Name of Preparer:		
	Reason for GUDI Status:		
	Average Annual Pumping Rate:	~ 18 gpm	
	Maximum Monthly Pumping Rate:		(If <u>cannot</u> pump at greater than 0.58 L/s and is within 15 m of surface water or if the well <u>can</u> supply water at greater than 0.58 L/s and is in overburden within 100 m of surface water or <u>can</u> supply water at greater than 0.58 L/s and is in bedrock within 500 m of surface water, go to step II) (0.Reg 170/03)
	Other (enceita):		
5. Sensitive Setting:	Spring:	No	(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:	Νο	(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well:	No	(If yes, go to step II)
	Karst Aquifer:	No	(If yes, go to step II)
	Exposed Fractured Bedrock:	Νο	(If ves. go to step II)
	Thin or absent soil cover over bedrock? How		(1. 900, 30 to stop 1)
	far away from the well?		
	High K Unconfined Aquifer:	No	(If yes, go to step II) (O.Reg 170/03)
	Enhanced Recharge:	Νο	(If yes, go to step II) (MOE Guidelines on GUDI, 2001)
	Dug Well:	Νο	(If not Drilled Well, Go To Step II) (O.Reg 170/03)
	Drilled Well (in overburden or bedrock):	Drilled (overburden)	
6. Well	Well Log Found (Y/N):	no (ask Rosemary)	
Construction	Driller (Name; ID):	maybe Clearwater	
Details	Construction Date:	20-28 year old well	
	Well Depth:	Ask Rosemarv	
	Casing Type:	steel	
	Firmly seated in bedrock (V/N)	no/ not applicable	
	i inny sealed in bedrock (1/N)		1



	Question	Answer	Comments
	Water Tight Casing to 6mbgs (Y/N)	not known	(If No go to Step II) (O.Reg 903)
	Casing Diameter:	6"	
	Casing Length:	Not known	(If < 12 m or 40 ft, go to Step II)
	Has the well ever been disinfected (when, why, most	00	(
	When was the well pump last serviced or replaced? Was it disinfected before being placed back in well:	A few years since had to fix pump, do cleam pump before put in well	
	Well Yield:	not available (ask Rosemary)	
	Static Water Level:	not known (ask Rosemary)	
	Overburden Thickness:	Not known (ask Rosemary)	
	Pump type:	Submersible pump	
	Pump Setting:	Not known (ask Rosemary)	
	Drive Shoe (Y/N):	Not known (ask Rosemary)	
	Grouted Casing (Y/N):	Not known (ask Rosemary)	
	Thickness of Grout around well:	Not known (ask Rosemary)	
	Water Level Monitoring Pipe in Well (Y/N):	no	
	Raw Water Sampling Tap (Y/N):	yes	
	Other:		
7. Well Condition	Located in a Well House (Y/N):	no	
Assessment (O.Reg 9	Well Tagged or Identified:	tagged	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):	not known	
	Any Rust or Holes Evident on Casing:	Rusted, no holes	
	Above Ground Casing Height (mags) (If stickup,	30 cm (Going to raise stick up by 2 ft and slope around casing soon)	
	Flush Mount Well (mbgs) (If flush mount, provide details):	no	
	Is the Well I ocated in a Well Dit (mbac).	no.	
	Covered with solid watertight over (V/N)-	ĨŬ	
	Casing is shows hit of sit floor		
	Is the pit equipped to drain (provide details)?		
	Is the pit equipped with a sump pump (Y/N)?		



	Question	Answer	Comments
	The casing vent is at what height above the pit floor (cm)?		
	Height of Ground Surface for 5 m around well is at least 60 cm above the highest known surface water level (Y/N):	not 60 cm above ditch	
	Is the topography around the well indicative of surface ponding and flow towards the well:	could be some ponding, no flow	
	Is drainage at the well adequate (any standing water or evidence of ponding):	Need to build up soil around well but are already planning to do this	
	Protective Cap Found on Well (Acceptable Seal?):	yes, but is plastic lid, are going to replace with steel	
	Is the Well Locked (Secure?):	secured with bolts but not locked	
	Pit-less adapter:	no	
	Screened air vent:	yes	
	Flood protection (has it ever flooded):	no	
	Vehicle impact protection:	no	
	Fencing:	no	
8. Aquifer	Surficial (type of geology, depth, observed surficial info):	overburden (grassy)	
Characteristics	Bedrock (type, depth, exposed at surface):	no	
	Show the Geology Mapping or borehole,does it match with their understanding?	not known	
	Unconfined Municipal Aquifer:	not known (ask Rosemary)	(If yes, go to step II)
	Confined Municipal Aquifer:	not known (ask Rosemary)	
	Pumping Test Done (Y/N)	unknown (ask Rosemary )	
	When was test done, is the data available?		
9. Proximity to sources of potential surface water contamination	Perennial Stream/Pond (metres away from well):	no	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	Ephemeral Stream (metres away from well):	110	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
(500 m for bedrock, 100m for overburden)	Ditch (metres away from well):	yes, ~ 5-10 m	water and bedrock well, go to Step II)
	When did it last rain? If recent is there water in the dich (Y/N): the dich? Does the dich drain quickly?	54 hours	
	River:	no	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	Lake:	no	Water and bedrock well, go to Step II)



	Question	Answer	Comments
	Wetlands/Marshes:		(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:		
	Highway/Road:		
	Unused wells found on site:		
	Should they be abandoned:		
	Abandoned wells on site:		
	Abandonment Log Available (Y/N):		
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):		
	Artesian wells found on adjacent properties:		
	Are there Well Pits Located on Adjacent Properties:		
	Other (Specify):		
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):		
	If on private services, how many septics/wells (based on # of homes):		
	Distance of closest septics (approx. to house):		
	Communal septics used nearby:		
	Are domestic wells within municipal aquifer:		
	Are there wells found within well pits on surrounding properties:		
	Any historic well interference complaints:		
	Historic Contamination Issues Noted at Domestic Wells:		
	Parkland:		
	Fertilizer used?		
	Forestry:		
	Agriculture:		
	Evidence of Manure Storage (liquid or solid):		
	Animal Grazing:		



	Question	Answer	Comments	
	Industrial:	no		
	Type of Industrial Use:			
	AST's or UST's at site:			
	Other Risks (large septics etc):			
	Land Uses Specified in NL Reg 63/03 as risks:	No		
	Cesspool receiving raw sewage that is less			
	from well):			
	Cesspool or seepage pit that is >= 4 m deep			
	unless it prevents seepage has to be >= 60 m			
	Seenage Pit Filter Bed, Soil Absorption Field			
	Earth Privy Pit or similar (>=16 m away from			
	well):			
	approved mechanical joints, independent			
	clean water drain or cistern (>= 3 m away from			
	well):			
	Sanitary Landfill or Garbage Dump:	Is a dump that is 6 - 8 km from well, closing it soon		
	Is there a pumphouse cast iron floor drain with			
	m from well):	no		
	Septic(s), concrete vault privy, sewer or tightly			
	jointed tile or equivalent material or sewer			
	from well):	ves. 4 homes within 16 m on septic		
	Future Land Line Changes that sould impact wells.			
	Future Land Ose Changes that could impact wells:	Πö		
45 No. 6	Other please specify (i.e. sources of microbial contam.):			
15. Notes:				
	Water in well #2 is within 10 ft of the top of casir	ng when not pumping. The old well (Well #1) drained quickly when it was pump	ed. Well 2 lowers in water level but does not	
	orain. Old well (Well #1) was not properly abandonded	a sewer can was put over the well and then it was covered with gravel. This w	well is within 5 m of well 2 and is at the same	
	depth. Well logs lost in the flood.	i, a sewer cap was put over the weir and them it was covered with gravel. This v		
	Old Well (Well #1) was found at the same depth as well #2. Both wells were active for a bit at the same time and appear to have a connected response/ interference issue ie. Connected response when pumping			
	Old well had silting issue when pumped, the new	Old well had silting issue when pumped, the new well doesn't (Well #2) The Government of Environment website has a list of drillers by community and likely has the contact information for Springdale Drillers		
	The Government of Environment website has a			
	They recently thought that well 2 would dry out if they increased pumping. However they increased pumping and the well didn't dry out. It continues to provide a lot of water at the increased pumping rate.			
	Minister previously thought he tasted diesel in th Water was cloudy during Eric's visit. Only time t	ne water from this well. Historically had a fueling station for buses nearby (remo they can recall it was cloudy. The water is clear now.	ived - approx 1km). Samples came back clean.	







Pumphouse



Pumphouse, well head in foreground



Well head

### Signage







View of underneath of well cap

Interior



Interior



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR

Department of Environment and Conservation Water Resources Management Division

### Water Well Record

Well Owner Name: L.S.D. MCKAYS Address: MCKAYS	Lithology Listing: GREY GRVL SAND, SILT, 27.4 GREY MUDSTONE 39.6 GREY SNDS 60.9	
	Total Depth: 60.90 m Depth to Bedrock: 27.00 m	
Well Location Town: MCKAY'S	Water Bearing Zone(s)	
GPS Coordinates	45.00 Lpm at m Lpm at m	
<b>N</b> 48 ° 13 ' 56.600 "	Lpm at m Lpm at m	
<b>W</b> 58 ° 50 <b>'</b> 15.400 <b>"</b>	Casing Type: ST	
Map Number:	Casing Length: 41.70 m Diameter: 150.00 mm	
NAD:	Casing Thickness: 5.00 mm	
UTM Zone:	Drive Shoe Used: Y	
Northing:	Well Grouted: N	
Easting:	fromm tom	
Type of Water Encountered:FR	Grout Type:	
Well / Water Use: MU		
Type of Work Completed: NW	Screen Info:	
Drilling Method: RO		
Pump Recommendations Pump Type: Deep	Pumping Test Method: Air	
Intake Setting: 54.00 m	Pumping Rate: 45.00 Lpm Duration 180 min	
Pumping Rate: 45.00 Lpm		
Estimated Safe Yield of Well: 45.00 Lpm	Well Overflowing: N Overflow Rate: Lpm	

**Drillers Comments:** 

**Name of Drilling Company** Atlantic Drilling and Blasting Ltd. Licence Number 18 Date Well Completed 01 /12/2005

This Record Modified by: kguzzwell Modified date: 12 /03/2008



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR

Department of Environment and Conservation Water Resources Management Division

## Water Well Record

Well Owner Name: BAY ST. GEORGE S. DEV. Address: JEFFREY'S	Lithology Listing: UNCON. RED BRWN 20.4 CONS RED BRWN 56.1 CONG SHLE	
Well Location Town: JEFFREY'S GPS Coordinates N ° ' "	Total Depth:     56.10     m     Depth to Bedrock:     18.00     m       Water Bearing Zone(s)	
W ° ' " Map Number: NAD:	Casing Type:   S     Casing Length:   m   Diameter:   150.00   mm     Casing Thickness:   188.00   mm	
UTM Zone: Northing: Easting:	Drive Shoe Used: Y Well Grouted: from m to m	
Type of Water Encountered:	Grout Type:	
Type of Work Completed: NW   Drilling Method: RO	Screen Info:	
Pump Recommendations     Pump Type:     Intake Setting:   m     Pumping Rate:   Lpm     Estimated Safe Yield of Well:   100 00   Lpm	Pumping Test     Method:     Pumping Rate:   80.00     Lpm   Duration   240     Well Overflowing:   N   Overflow Rate:	
Estimated Safe Yield of Well: 100.00 Lpm		

**Drillers Comments:** 

WATER APPEARD GOOD (CLEAR) ODORLESS TASTELESS. DO NOT OVER PUMP. PUMP TEST DMPA.

Name of Drilling Company	Licence Number	Date Well Completed
Clearwater Drilling Ltd.	4	27 /08/2002

This Record Modified by: Modified date:



# **Black Duck Siding**








	Question	Answer	Comments
1. Project Details:	Project No:	60236351	Model 2823007103 RPM
	Client:	Newfoundland and Labrador, Department of Environment and Conservation, WRMD	
	Date of Inspection:	Tuesday, November 29th, 2011 10:30am	
	AECOM Inspector:	Amanda Sills	
	Site Contact (Name, Phone #):	Joseph King and Gerry Lahey (709) 632.0658	
	Weather:	2°C, Cloudy	
2. Well Designation:	Well ID:	Source Well #1	
	Well Type/Usage:	Domestic	
	Well Status (Pumping, Backup, Obs.):	Pumping	
3. Location:	Water Supply No.:	WS-G-0059	
	Community:	Black Duck (Siding)	
	Street:	Shandecamp road (also called Boy Scouts Rd. or Bill Water Road)	
(Community, Street, GPS measured in field. Map	GPS Northing:	397997	
Grid, Well Elevation provided by well operator)	GPS Easting:	5381546	
	Well Elevation (masl):	stickup 36cm	
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)		
(Questions for well operators)	Do Storms Change the Well Chemistry (i.e. increased TSS) Is the well water chemistry similar to nearby	No	(If yes, go to step II) (O.Reg 170/03)
	surface water bodies (take conductivity measurement of nearby surface water if possible):	Only a march, no surface water bodies	(If yes, go to step II) (O.Reg 170/03)
	Is there an observable change in nearby surface water levels when the well is pumping:	NA	(If yes, go to step II) (MOE GUDI Guidelines, 2001)
	Historic issues with bacteria, TSS, boil water advisories?	permanent boil water advisory because not on chlorine	(If yes, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or microscopic particulate analysis completed on it? If so when, results, copy of report available?	Νο	
	Are there increasing/concerning trends of any other parameters at the well not mentioned yet:	No	
	Additonal Raw Water Chemistry Available that we could have:	No	
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc	No	
	Does the well water ever taste salty? Is there any evidence of salt water intrusion at the well or in the surrounding area?	Νο	
	What is the current well treatment:		



	Question	Answer	Comments
	Has the well ever needed treatment upgrades or remediation (if so, when, why, records available?);	No treatment on the well	
			(If yes and a contrary report was not written after August 1, 2000, go to step II) (O.Reg
	Historic Reports Indicating GUDI status (Y/N):	No	170/03)
	Obtain a copy (Y/N):		
	Date of Report:		
	Name of Preparer:		
	Reason for GUDI Status:		
	Average Annual Pumping Rate:	1 1/2 HP Pump RPM 3450 Model 2823007103	
			(If <u>cannot</u> pump at greater than 0.58 L/s and is within 15 m of surface water or if the well
	Maximum Monthly Pumping Rate:	No flow meter on well - no other information available	can supply water at greater than 0.58 L/s and is in overburden within 100 m of surface water or <u>can</u> supply water at greater than 0.58 L/s and is in bedrock within 500 m of surface water, go to sten II) (O.Reg 170/03)
	Other (specify):	Water on the site and in adjacent ditches (5-10m) drains within 24 hours of rain	
5. Sensitive Setting:	Spring:	no	(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:		(If yes, go to step II) (O Reg 170/03)
(000.000.000.000.000.000.000.000.000.00			
	Horizontal Collection Well:	no	(If yes, go to step II)
	Karst Aquifer:	No	(If yes, go to step II)
	Exposed Fractured Bedrock:	No	(If yes, go to step II)
	Thin or absent soil cover over bedrock? How far away from the well?	None visible	
	High K Unconfined Aquifer:	unknown	(If yes, go to step II) (O.Reg 170/03)
	Enhanced Recharge:	no	(If yes, go to step II) (MOE Guidelines on GUDI, 2001)
	Dug Well:	No	(If not Drilled Well, Go To Step II) (O.Reg 170/03)
	Drilled Well (in overburden or bedrock):	yes (unknown if well is bedrock or overburden)	
6. Well	Well Log Found (Y/N):	Uncertain if one exists	
Construction	Driller (Name; ID):	Francis Gale	
Details	Construction Date:	uncertain	
	Well Denth:	uncertain	
	Cosing Type:	atos	
	casing i ype.	Sieel	
I	Firmly seated in bedrock (Y/N)	uncertain	

Environment





	Question	Answer	Comments
	Water Tight Casing to 6mbgs (Y/N)	uncertain	(If No go to Step II) (O.Reg 903)
	Casing Diameter:	6" well	
	Coning Longith:		(16 × 40 m or 40 fb mo to 04 m li)
	Lasing Length.	unknown	(ii < 12 iii or 40 it, go to Step ii)
	recently):	unknown	
	When was the well pump last serviced or replaced? Was it disinfected before being placed back in well:	unknown	
	Well Yield:	unknown	
	Static Water Level:	No, Gerard Lee would know (local well guru)	
	Overburden Thickness:	Unknown	
	Pump type:	unknown	
	Pump Setting:	unknown	
		linkoowo	
		unknown	
	Grouted Casing (Y/N):	unknown	
	Thickness of Grout around well:	unknown	
	Water Level Monitoring Pipe in Well (Y/N):	unknown	
	Raw Water Sampling Tap (Y/N):	Yes, it is all raw water	
	Other:		
7. Well Condition	Located in a Well House (Y/N):	No	
Assessment (O.Reg 90	Well Tagged or Identified:	Νο	
and NI Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not)	unknown	
and the frey 03/03/	Container of Annular Obar (Micels Ney, Of Dues NUL).	distori	
	Any Rust or Holes Evident on Casing:	Minor rust, no holes	
	Above Ground Casing Height (mags) (If stickup, provide details):	40 cm	
	Flush Mount Well (mbgs) (If flush mount, provide	 NA	
	oetaiis):	NA	
	Is the Well Located in a Well Pit (mbgs):	No	
	Covered with solid, watertight cover (Y/N):	ΝΑ	
	Casing is above bttm of pit floor:		
	Is the pit equipped to drain (provide details)?		
	Is the pit equipped with a sump pump (Y/N)?		



	Question	Answer	Comments
	The casing vent is at what height above the pit floor (cm)?		
	Height of Ground Surface for 5 m around well is at least 60 cm above the highest known surface water level (Y/N):	Flat, same elevation as well	
	Is the topography around the well indicative of surface ponding and flow towards the well	There could be some minor ponding, they could increase the soil around the well to cause drainage away from well	
	Is drainage at the well adequate (any standing water or evidence of ponding):		
	Protective Cap Found on Well (Acceptable Seal?):	Yes	
	Is the Well Locked (Secure?):	yes	
	Pit-less adapter:	no	
	Screened air vent:	no air vent it drains well, no pounding	
	Flood protection (has it ever flooded):		
	Vehicle impact protection:	No	
	Fencing:	no	
8. Aquifer	Surficial (type of geology, depth, observed surficial info):	gravel, maybe till	
Characteristics	Bedrock (type, depth, exposed at surface):	no	
	Show the Geology Mapping or borehole,does it match with their understanding?	unknown	
	Unconfined Municipal Aquifer:	unknown	(If yes, go to step II)
	Confined Municipal Aquifer:	unknown	
	Pumping Test Done (Y/N)	unknown	
	When was test done, is the data available?	unknown	
9. Proximity to sources of potential surface water contamination	Perennial Stream/Pond (metras away from well):	No	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well go to Step II)
	refermine offering one (means away non weir).		(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	Ephemeral Stream (metres away from well):	Νο	Water and bedrock well, go to Step II)
(500 m for bedrock.	Ditch (metres away from well):	~ 20 m away from well	(if < 100 m from Surface water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
100m for overburden)	Is there water in the ditch (Y/N):	Yes	
	When did it last rain? If recent is there water in the ditch? Does the ditch drain quickly?	yesterday, is always a little water found in this ditch	
	River:	Νο	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Lala	ч.	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
1	Lane.	ŇO	water and bedrock well, go to Step II)



Environment

	Question	Answer	Comments
	Wetlands/Marshes:	Yes, 20-30 m away	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:	The marsh ground surface is at a lower elevation than the well but it could drain at depth to the well	
	Highway/Road:	Road directly adjacent 5-10 m	
	Unused wells found on site:	None that they are aware of	
	Should they be abandoned:	ΝΑ	
	Abandoned wells on site:	None that they are aware of	
	Abandonment Log Available (Y/N):	NA	
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):	NA	
	Artesian wells found on adjacent properties:	ΝΑ	
	Are there Well Pits Located on Adjacent Properties:	None that they are aware of	
	Other (Specify):		
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	all homes on septic	
	If on private services, how many septics/wells (based on # of homes):	On Sept L2 immediately beside well	
	Distance of closest septics (approx. to house):	5 m - 10 m	
	Communal septics used nearby:	no	
	Are domestic wells within municipal aquifer:	ΝΑ	
	Are there wells found within well pits on surrounding properties:	No	
	Any historic well interference complaints:	No	
	Historic Contamination Issues Noted at Domestic Wells:	NA	
	Parkland:	No	
	Fertilizer used?		
	Forestry:	Forests around well	
	Agriculture:	Νο	
	Evidence of Manure Storage (liquid or solid):	NA	
	Animal Grazing:	NA	



	Question	Answer	Comments
	Industrial:	Νο	
	Type of Industrial Lise:		
	AST's or LIST's at site:		
	Other Biske (large caption at a)		
	Land Llass Crestified in NIL Dec (2/02 as risks)		
	Cesspool receiving raw sewage that is less		
	than or equal to 4 m deep ( >= 30 m away	N.	
	Cesspool or seepage pit that is >= 4 m deep	NO	
	unless it prevents seepage has to be >= 60 m		
	away from a well: Seenage Pit Filter Bed, Soil Absorption Field		
	Earth Privy Pit or similar (>=16 m away from		
	well): Sewer of cast iron with leaded joints or		
	approved mechanical joints, independent		
	clean water drain or cistern (>= 3 m away from well):		
	Sanitary Landfill or Garbage Dump:		
	Is there a pumphouse cast iron floor drain with		
	leaded joints draining to ground surface? (>=1 m from well):		
	Septic(s), concrete vault privy, sewer or tightly		
	jointed tile or equivalent material or sewer		
	from well):		
		Would like to develop a residential subdivision across from well ( 10	
	Future Land Use Changes that could impact wells:	m) Lots would need to be 100 x 200 ft for septic	
		Raw sewage for wastewater treatment is 1km away from well 2 at a lake which leads to the river, running by the wells. Flow is towards the	
	Other please specify (i.e. sources of microbial contam.):	municipal wells.	
15. Notes:			

### Photo Log - Black Duck







Pumphouse







Well in relation to pumphouse

#### Signage

### Photo Log - Black Duck





Pressure Tanks





GOVERNMENT OF NEWFOUNDLAND AND LABRADOR

Department of Environment and Conservation Water Resources Management Division

## Water Well Record

Well Owner Name: COMMUNITY COUNCIL Address:	Lithology Listing: RED SNDS 033	
Well Location Town: BLACK DUCK SIDING GPS Coordinates N ° ' "	Total Depth:         30.00         m         Depth to Bedrock:         m           Water Bearing Zone(s)          Lpm at         m          Lpm at         m            Lpm at         m          Lpm at         m	
W ° ' " Map Number: 12B/9 NAD: UTM Zone: 21	Casing Type: Casing Length: <u>18.80</u> m Diameter: mm Casing Thickness: mm Drive Shoe Used:	
Northing: 5381250 Easting: 398025  Type of Water Encountered:FR	Well Grouted: fromm tom Grout Type:	
Well / Water Use: PS Type of Work Completed: Drilling Method:	Screen Info: 0	
Pump Recommendations         Pump Type:         Intake Setting:       m         Pumping Rate:       Lpm         Estimated Safe Yield of Well:       2.00       Lpm	Pumping Test         Method:         Pumping Rate:	

**Drillers Comments:** 

Name of Drilling Company Newfoundland and Labrador Drilling Ltd. Licence Number 5 Date Well Completed 20 /10/1985

This Record Modified by: Modified date:



# **Flat Bay West**







Map Document (P:)60236351000-CADD1050 GIS WIP WXDs\FieldMapMXDs\60236351WellLocations\_FlatBayWest\_SurfGeologymxd) 11/25/2011 - 11:27:04 AM



	Question	Answer	Comments
1. Project Details:	Project No:	60236351 Newfoundland and Labrador, Department of Environment and	
	Client:	Conservation, WRMD	
	Date of Inspection:	1-Dec-11	
	AECOM Inspector:	Amanda Sills	
	Site Contact (Name, Phone #):	Harold Legge	
	Weather:	14°C Windy (rain overnight)	
2. Well Designation:	Well ID:	#1 Well	
	Well Type/Usage:	Domestic - 36 homes serviced	
	Well Status (Pumping, Backup, Obs.):	Pumping	
3. Location:	Water Supply No.:	WS-G-0244	
	Community:	Flay Bay West	
	Street:	Flat Bay West Street	
(Community, Street, GPS	GPS Northing:	380299	
Grid, Well Elevation provided by well operator)	GPS Easting:	5361303	
	Well Elevation (masl):	N/A	
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)	Good Quality	
(Questions for well operators)	Do Storms Change the Well Chemistry (i.e. increased TSS)	No	(If yes, go to step II) (O.Reg 170/03)
	Is the well water chemistry similar to nearby surface water bodies (take conductivity measurement of nearby surface water if		
	possible):	Closest pond is 1.5 km	(If yes, go to step II) (O.Reg 170/03)
	Is there an observable change in nearby surface water levels when the well is pumping:	N/A	(If yes, go to step II) (MOE GUDI Guidelines, 2001)
	Historic issues with bacteria, TSS, boil water advisories?	Boil water advisory is still on as it has only recently been chlorinated	(If yes, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or microscopic particulate analysis completed on it? If so when, results, copy of report available?	Νο	
	Are there increasing/concerning trends of any other parameters at the well not mentioned yet:	No	
	Additonal Raw Water Chemistry Available that we could have:		
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc	No	
	Does the well water ever taste salty? Is there any evidence of salt water intrusion at the well or in the surrounding area?	Νο	
	What is the current well treatment:	chlorination	



	Question	Answer	Comments
	Has the well ever needed treatment upgrades		
	or remediation (if so, when, why, records		
	available?):	recently added chlorination (Old pump wasn't working, recently fixed)	
			(If you and a contrary conact was not written
			(if yes and a contrary report was not written after August 1, 2000, go to step II) (O Reg
	Historic Reports Indicating GUDI status (Y/N):	No	170/03)
	Obtain a copy (Y/N):	N/A	
	Date of Report:	N/A	
	Bate of Report		
	Name of Preparer:	N/A	
	Reason for GUDI Status:	N/A	
		IV A	
	Average Annual Pumping Rate:	Not available	
			(If cannot pump at greater than 0.58 L/s and
	Maximum Monthly Pumping Rate:		is within 15 m of surface water or if the well
	, , , , , , , , , , , , , , , , , , , ,		is in overburden within 100 m of surface
			water or can supply water at greater than
			0.58 L/s and is in bedrock within 500 m of
		Not available	surface water, go to step II) (O.Reg 170/03)
	Other (specify):		
5. Sensitive Setting:	Spring:	No	(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:	No	(If ves, go to step II) (O.Reg 170/03)
(**************************************			
	Horizontal Collection Well:	No	(If yes, go to step II)
	Karst Aquifer:	No	(If ves, go to step II)
	Exposed Fractured Bedrock:	No	(If yes, go to step II)
	This or abcent soil cover over bedreck? How		
	far away from the well?	N/A	
			<b></b>
	High K Uncontined Aquiter:	No	(If yes, go to step II) (O.Reg 170/03)
			(If yes, go to step II) (MOF Guidelines on
	Enhanced Recharge:	No	GUDI, 2001)
			(If not Drilled Well, Go To Step II) (O.Reg
	ug vveil:	No	170/03)
	Drilled Well (in overburden or bedrock):	Yes (bedrock)	
6 Well	Wall Log Found (V/N);	Voc - Harold will find it and cond it to up	
o. wen	vveli Log Found (1/N):	res - maroio win nhà il and seno il lo us	
Construction	Driller (Name; ID):	Francis Gail	
Detaile	Orantzation Date:		
Details	Construction Date:	Early 1990's - Will Confirm	
	Well Depth:	N/A	
I	Casing Type:	Steel	



	Question	Answer	Comments
	Firmly seated in bedrock (Y/N)	N/A	
	Water Tight Casing to 6mbgs (Y/N)	N/A	(If No go to Step II) (O.Reg 903)
	Outline Discourse	01 mell	
	Casing Diameter:	6 Well	
	Casing Length:	Unknown	(If < 12 m or 40 ft, go to Step II)
	Has the well ever been disinfected (when, why, most recently):	No	
	When was the well pump last serviced or replaced? Was it disinfected before being placed back in well:	During summer 2011 by Gerard Lee, disinfects pump before put back in well	
	Well Yield:	No	
	Static Water Level:	No	
	Overburden Thickness:	N/A	
	Pump type:	1tp 1-1.5, Model 2832008110	
	Pump Setting:	N/A	
	Drive Shoe (Y/N):	N/A	
	Grouted Casing (Y/N):	N/A	
	Thickness of Grout around well:	N/A	
	Water Level Monitoring Pipe in Well (Y/N):	No	
	Raw Water Sampling Tap (Y/N):	Yes	
	Other:		
7. Well Condition	Located in a Well House (Y/N):	No	
Assessment (O.Reg 90	Well Tagged or Identified:	Yes (metal stamped)	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):	can't see any gaps at surface, other than that, not known	
	Any Rust or Holes Evident on Casing:	Rusted, but no holes	
	Above Ground Casing Height (mags) (If stickup, provide details):	53 cm	
	Flush Mount Well (mbgs) (If flush mount, provide details):	N/A	
	Is the Well Located in a Well Pit (mbgs):	No	
	Covered with solid, watertight cover (Y/N):	N/A	
	Casing is above bttm of pit floor:		
	Is the pit equipped to drain (provide details)?		



	Question	Answer	Comments
	Is the nit equipped with a sump nump (Y/N)?		
	The casing vent is at what height above the pit		
	tioor (cm)? Height of Ground Surface for 5 m around well is at least 60 cm above the highest known surface water	use ground is built up and alonged surger from well	
	Is the topography around the well indicative of surface ponding and flow towards the well:	ves, ground is built up and sloped away norm weil	
	Is drainage at the well adequate (any standing water or evidence of ponding):	no evidence of current ponding, gravel at ground surface is damp - just rained	
	Protective Cap Found on Well (Acceptable Seal?):	Yes	
	Is the Well Locked (Secure?):	Not locked - needs one	
	Pit-less adapter:	No	
	Screened air vent:	No	
	Flood protection (has it ever flooded):	No	
	Vehicle impact protection:	No	
	Fencing:	Νο	
8. Aquifer	Surficial (type of geology, depth, observed surficial info):	Gravelly till	
Characteristics	Bedrock (type, depth, exposed at surface):	No	
	Show the Geology Mapping or borehole,does it match with their understanding?	Not known (Don't know geology)	
	Unconfined Municipal Aquifer:	N/A	(If yes, go to step II)
	Confined Municipal Aquifer:	N/A	
	Pumping Test Done (Y/N)	No	
	When was test done, is the data available?	N/A	
of potential surface water contamination	Perennial Stream/Pond (metres away from well):	No, closest pond is 1.5 km from well	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	F. I		(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	Ephemeral Stream (metres away from well):	N0	Water and bedrock well, go to Step II) (If < 100 m from Surface Water and an
(500 m for bedrock,	Ditch (metres away from well):	No formal ditches just topographic depression	overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
room tor overbuilden)	Is there water in the ditch (Y/N):	N/A	
	When did it last rain? If recent is there water in the ditch? Does the ditch drain quickly?	Within 6 hours, ground is wet/damp. No ponding	
	Disco	N.	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	River.	NO	water and bedrock well, go to Step II)



	Question	Answer	Comments
	Lake:	No	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Wetlands/Marshes:	Marsh about 100 m away	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:	No it is at the bottom of a hill, away from the well	
	Highway/Road:	There is a road 5 - 10 m away	
	Unused wells found on site:	Νο	
	Should they be abandoned:	No	is a well approx 500 m away from here -
	Abandoned wells on site:	No	not in use - filled in with cement in Agric field
	Abandonment Log Available (Y/N):	N/A	
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):	N/A	
	Artesian wells found on adjacent properties:	N/A	is a busines centre with an unsed well
	Are there Well Pits Located on Adjacent Properties:	No	approx 500 m away
	Other (Specify):		
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	Everyone on septic	
	If on private services, how many septics/wells (based on # of homes):	Closest approx 25 m, at least	
	Distance of closest septics (approx. to house):	2 septic within 100 m (at least)	
	Communal septics used nearby:	Νο	
	Are domestic wells within municipal aquifer:	No other domestic wells	
	Are there wells found within well pits on surrounding properties:	No	
	Any historic well interference complaints:	N/A	
	Historic Contamination Issues Noted at Domestic Wells:	N/A	
	Parkland:	Νο	
	Fertilizer used?	N/A	
	Forestry:	No, vacant land	
	Agriculture:	Νο	
	Evidence of Manure Storage (liquid or solid):	N/A	



	Question	Answer	Comments
	Animal Grazino:	N/A	
	Industrial	No	
		NO	
	Turse of Industrial Lies	N/A	
	i ype of industrial ose.	IV/A	
	AST's or UST's at site:		
	Other Risks (large septics etc):		
	Land Uses Specified in NL Reg 63/03 as risks:	No	
	than or equal to 4 m deep ( >= 30 m away		
	from well):	No	
	Cesspool or seepage pit that is >= 4 m deep unless it prevents seepage has to be >= 60 m		
	away from a well:		
	Seepage Pit, Filter Bed, Soil Absorption Field, Earth Privy Pit or similar (>=16 m away from		
	well):		
	Sewer of cast iron with leaded joints or approved mechanical joints, independent		
	clean water drain or cistern (>= 3 m away from		
	wen).		
	Sanitary Landill or Garbage Dump: Is there a pumphouse cast iron floor drain with		
	leaded joints draining to ground surface? (>=1		
	m from well):		
	jointed tile or equivalent material or sewer		
	connected foundation drain (>=16 m away	Sentic on all homes	36 homes in town
		oopilo on al nomeo	
	Euture Land Lise Changes that could impact wells:	None proposed	
	Other places specify (i.e. sources of microbial center );		
15. Notes:	Tomer please specify (i.e. sources of microbial contain.):		

#### Photo Log -Flat Bay West - WS-g-0825 - Source Well #3





Signage



Well head





Pumphouse



well head





# **Fox Roost-Margaree**





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	Question	Answer	Comments
1. Project Details:	Project No:	60236351	Well is mixed with surface water intake
		Newfoundland and Labrador, Department of Environment and	
	Client:	Conservation, WRMD	land around well is protected
	Date of Inspection:	1-Dec-11	Coordinates of gate on road leading into well : 0345192 & 5271454
			well pumps nearby (~ 5 m ) pond dries
	AECOM Inspector:	Amanda Sills	out
	Site Contact (Name, Phone #):	John Seymour	
	Weather:	14°C Wind	
2. Well Designation:	Well ID:	Fox Roost Margaree	
	Well Type/Usage:	Drilled Well	
	Well Status (Pumping, Backup, Obs.):	Pumping	
3 Location	Water Supply No :	W/S-G-0852	
5. Location.			
	Community:	Fox Roost Margaree	
	Street:	No name - Dirt road	
(Community, Street, GPS measured in field Map	GPS Northing:	345804	
Grid, Well Elevation		5074745	
provided by well operator)	GPS Easting:	5271715	
	Well Elevation (masl):	NA	
	What is the historic raw water quality of the well		
4. Historic Water Quality	(general chem, bacteria etc)	Just iron issues	
(Questions for well	Do Storms Change the Well Chemistry (i.e.		
operators)	increased TSS) Is the well water chemistry similar to nearby	no	(If yes, go to step II) (O.Reg 170/03)
	surface water bodies (take conductivity measurement of nearby surface water if		
	possible):	130us, 8.8°c	(If yes, go to step II) (O.Reg 170/03)
	Is there an observable change in nearby		(If yes, go to step II) (MOE GUDI Guidelines,
	surface water levels when the well is pumping:	Yes, nearby pond (~ 5 m) goes dry	2001)
	Historic issues with bacteria, TSS, boil water advisories?	Boil water advisory on when changing the chlorinator, don't know about bacteria	(If ves, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or		
	it? If so when, results, copy of report		
	available? Are there increasing/concerning trends of any	No	
	other parameters at the well not mentioned vet:	iustiron	
		,	
	Additional Raw Water Chemistry Available that we could have:	no	
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e.		
	sandy, iron (red) etc	no	
	Does the well water ever taste salty? Is there		
	any evidence of salt water intrusion at the well or in the surrounding area?	no	
	What is the current well treatment:	chlorination	



	Question	Answer	Comments
	Has the well ever needed treatment upgrades or remediation (if so, when, why, records available?):	chlorination - added around 1992	
			(If yes and a contrary report was not written after August 1, 2000, go to step II) (O.Reg
	Historic Reports Indicating GUDI status (Y/N):	No	170/03)
	Obtain a copy (Y/N):	NA	
	Date of Report:		
	Name of Preparer:		
	Reason for GUDI Status:		
	Average Annual Pumping Rate:	~ 45 gpm	
	Maximum Monthly Pumping Rate:	3 phase submersible pump 60 - 50 Hz (see photos)	(If <u>cannot</u> pump at greater than 0.58 L/s and is within 15 m of surface water or if the well <u>can</u> supply water at greater than 0.58 L/s and is in overburden within 100 m of surface water or <u>can</u> supply water at greater than 0.58 L/s and is in bedrock within 500 m of surface water, go to step II) (O.Reg 170/03)
	Other (specify):		
5. Sensitive Setting:	Spring:	Maybe	(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:	no	(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well:	no	(If yes, go to step II)
	Karst Aquifer:	unknown	(If yes, go to step II)
	Exposed Fractured Bedrock:	yes	(If yes, go to step II)
	Thin or absent soil cover over bedrock? How far away from the well?	~5 m away	
	High K Unconfined Aquifer:	unknown	(If yes, go to step II) (O.Reg 170/03)
	Enhanced Recharge:	no	(If yes, go to step II) (MOE Guidelines on GUDI, 2001)
	Dug Well:	no	(If not Drilled Well, Go To Step II) (O.Reg 170/03)
	Drilled Well (in overburden or bedrock):	yes (bedrock)	
6. Well	Well Log Found (Y/N):	no	
Construction	Driller (Name; ID):	Francis Gails (passed away)	
Details	Construction Date:	Early 1990's	
	Well Depth:	~ 85 ft	
	Casing Type:	steel	
	Firmly seated in bedrock (Y/N)	not known	



	Question	Answer	Comments
	Water Tight Casing to 6mbgs (Y/N)		(If No go to Step II) (O.Reg 903)
	Coning Diameter	0"	
	Casing Diameter:	8	
	Casing Length:	Not known	(If < 12 m or 40 ft, go to Step II)
	Has the well ever been disinfected (when, why, most recently):	no	
	When was the well pump last serviced or replaced? Was it disinfected before being placed back in well:	Replaced one pump 7 years ago	
	Well Yield:	~ 45 gpm	
	Static Water Level:	unknown	
	Overburden Thickness:	likely less than 1 m	
	Pump type:	3 phase submersible	
	Pump Setting:	not available	
	Drive Shoe (Y/N):	N/A	
	Grouted Casing (Y/N):	not known	
	Thickness of Grout around well:	not known	
	Water Level Monitoring Pipe in Well (Y/N):	not able to look in well nut none outside	
	Raw Water Sampling Tap (Y/N):	no	
	Other:		
7. Well Condition	Located in a Well House (Y/N):	yes	
Assessment (O.Reg 90	Well Tagged or Identified:	no	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):	not known	
	Any Rust or Holes Evident on Casing:	no	
	Above Ground Casing Height (mags) (If stickup, provide details):	30 cm	
	Flush Mount Well (mbgs) (If flush mount, provide details):	no	
	Is the Well Located in a Well Pit (mbgs):	no	
	Covered with solid, watertight cover (Y/N):	N/A	
	Casing is above bttm of pit floor:		
	Is the pit equipped to drain (provide details)?		
	Is the pit equipped with a sump pump (Y/N)?		



	Question	Answer	Comments
	The casing vent is at what height above the pit		
	Height of Ground Surface for 5 m around well is at least 60 cm above the highest known surface water level (Y/N):	yes, close to 60 cm	
	Is the topography around the well indicative of surface ponding and flow towards the well:	potentially in high flow, rain has never occurred historically	
	Is drainage at the well adequate (any standing water or evidence of ponding):	yes, according to well operators (no flooding)	
	Protective Cap Found on Well (Acceptable Seal?):	yes	
	Is the Well Locked (Secure?):	yes - door to house on well is locked but not well cap itself	
	Pit-less adapter:	no	
	Screened air vent:	no	
	Flood protection (has it ever flooded):	no	
	Vehicle impact protection:	yes (pumphouse)	
	Fencing:	yes (pumphouse)	
8. Aquifer	Surficial (type of geology, depth, observed surficial info):	thin overburden (gravel) < 1 m	
Characteristics	Bedrock (type, depth, exposed at surface):	yes, within 5 m of well	
	Show the Geology Mapping or borehole,does it match with their understanding?	not aware of geology	
	Unconfined Municipal Aquifer:	unknown	(If yes, go to step II)
	Confined Municipal Aquifer:	unknown	
	Pumping Test Done (Y/N)	yes, Ted Lennoyne (Municipal Aquifiers)	
	When was test done, is the data available?	~ Early 1990's	
9. Proximity to sources of potential surface water contamination	Perennial Stream/Pond (metres away from well):	yes, less than 5 m	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Enhemeral Stream (metres away from well)	no the same ponds all year	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and hedrock well go to Step II)
	Ditch (metres away from well):	no (but one ponds)	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
(500 m for bedrock, 100m for overburden)	Is there water in the ditch (Y/N):	na	
	When did it last rain? If recent is there water in the ditch? Does the ditch drain quickly?	na	
	River:	no	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Later		(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	LdNC.	no	water and bedrock well, go to Step II)



	Question	Answer	Comments
	Wetlands/Marshes:	somewhat boggy	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:	maybe, if water levels get high enough	
	Highway/Road:	yes, ~ 500 m	
	Unused wells found on site:	yes, ~50 m away	
	Should they be abandoned:	YES	
	Abandoned wells on site:	no	is a well approx 500 m away from here - not in use - filled in with cement in Agric field
	Abandonment Log Available (Y/N):	no	
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):		
	Artesian wells found on adjacent properties:		
	Are there Well Pits Located on Adjacent Properties:	no	is a busines centre with an unsed well approx 500 m away
	Other (Specify):		
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	yes, all homes in community	
	If on private services, how many septics/wells (based on # of homes):	~40 (outside of the 500 m radius likely)	
	Distance of closest septics (approx. to house):	> 500 m likely	
	Communal septics used nearby:	no	
	Are domestic wells within municipal aquifer:	no domestic wells in town	
	Are there wells found within well pits on surrounding properties:	na	
	Any historic well interference complaints:	na	
	Historic Contamination Issues Noted at Domestic Wells:	na	
	Parkland:	no, it is vacant protected land	
	Fertilizer used?	na	
	Forestry:	na	
	Agriculture:	na	
	Evidence of Manure Storage (liquid or solid):	no	
	Animal Grazing:		



	Question	Answer	Comments
	Industrial:	No	
	Turps of Industrial Lines		
	Type of industrial ose.		
	ASTS of USTS at site:		
	Other Risks (large septics etc):		
	Land Uses Specified in NL Reg 63/03 as risks:	no	
	Cesspool receiving raw sewage that is less than or equal to 4 m deep ( >= 30 m away		
	from well):		
	Cesspool or seepage pit that is $>= 4 \text{ m deep}$		
	away from a well:		
	Seepage Pit, Filter Bed, Soil Absorption Field,		
	Earth Privy Pit or similar (>=16 m away from well):		
	Sewer of cast iron with leaded joints or		
	clean water drain or cistern (>= 3 m away from		
	well):		
	Sanitary Landfill or Garbage Dump:		
	Is there a pumphouse cast iron floor drain with		
	m from well):		
	Septic(s), concrete vault privy, sewer or tightly		
	jointed tile or equivalent material or sewer connected foundation drain (>=16 m away		
	from well):	yes to septics but > 500 m away	36 homes in town
		no protected land from development. Old fish plant buildings are on	
	Future Land Use Changes that could impact wells:	property but are not in use.	
	Other please specify (i.e. sources of microbial contam.):		
15. Notes:			

#### Photo Log -Fox Roost Margaree





Signage



Well head and enclosure



Well head with chlorine gas



Well head



Well head relative to surface water body



Treatment / buliding Distribution

#### Photo Log -Fox Roost Margaree

# AECOM



Interior of treatment Distribution building



Interior of treatment Distribution building



Interior of treatment Distribution building



Well head and water treatment distribution building and surrounding environment



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR

Department of Environment and Conservation Water Resources Management Division

### Water Well Record

Well Owner Name: MARGAREE FOX ROOST Address: MAGRAREE-FOX ROOST	Lithology Listing: GRNT GREY 10.7 GRNT/QRTZ GREY RED BLCK WHIT 18.5		
Well Location Town: MARGAREE-FOX ROOST GPS Coordinates N ° ' "	Total Depth:         30.00         m         Depth to Bedrock:         1.00         m           Water Bearing Zone(s)         9.00         Lpm at 6.70         m         200.00         Lpm at 11.00         m           Lpm at         m         Lpm at         m         m         m         m		
W ° ' " Map Number: NAD: UTM Zone:	Casing Type:       S         Casing Length:       6.30       m       Diameter:       200.00       mm         Casing Thickness:       5.00       mm         Drive Shoe Used:       N		
Northing: Easting:  Type of Water Encountered:	Well Grouted:     Y       from     5.90     m     to     6.30     m       Grout Type:     BENTONITE		
Well / Water Use:     MU       Type of Work Completed:     NW       Drilling Method:     RO	Screen Info:		
Pump Recommendations         Pump Type:         Intake Setting:       m         Pumping Rate:       Lpm         Estimated Safe Yield of Well:       225.00       Lpm	Pumping Test         Method:         Pumping Rate:       225.00         Lpm       Duration       380         Well Overflowing:       N       Overflow Rate:         Lpm		

**Drillers Comments:** 

EVIDENCE OF BOG & MICA, (SEE DRILLER'S LOG).

Name of Drilling CompanyLicence NumberClearwater Drilling Ltd.4

Date Well Completed 10 /12/2001

This Record Modified by: Modified date:



# **Picadilly Slant**







Wap Document (P:\60236351\000-CADD\050 GIS WIP\MXDs\FieldMapMXDs\60236351WellLocations\_Piccadilly\_SurfGeolgoy.mxd)



	Question	Answer	Comments
1. Proiect Details:	Proiect No:	60236351	7 homes on this well
	Client <sup>,</sup>	Newfoundland and Labrador, Department of Environment and Conservation WRMD	
		30-Nov-11	
	AECOM Inspector:	Amanda Sills	
	Site Contact (Name Phase #):	Troy Skipper (700)649 5540: Claude Lepage (700)649 2752	
	Meather	1°C Cloudy	
	Weather.	i e cloudy	
2. Well Designation:	Well ID:	Well #2 - Abraham's Cove	
	Well Type/Usage:	Domestic - 7 homes serviced	
	Well Status (Pumping, Backup, Obs.):	Pumping	
3. Location:	Water Supply No.:	WS-G-0540	
	Community:	Picadilly Slant - Abraham's Cove	
	Street:	Unknown Name	
(Community, Street, GPS	GPS Northing:	358465	
Grid, Well Elevation provided by well operator)	GPS Easting:	5376305	
	Well Elevation (masl):	N/A	
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)	Good	
(Questions for well operators)	Do Storms Change the Well Chemistry (i.e. increased TSS)	no	(If yes, go to step II) (O.Reg 170/03)
	Is the well water chemistry similar to nearby surface water bodies (take conductivity measurement of nearby surface water if	NA	
	Is there an observable change in nearby	N/A	(If yes, go to step II) (O.keg 170/03)
	Historic issues with bacteria, TSS, boil water	No - (but should be) - According to well operator - given no clhlorination. Jerry clarified that public health has this location on a boil water advirosry however it is concerning that the operator isn't aware of	2001)
	Advisories? Has the well ever had particle counting or microscopic particulate analysis completed on it? If so when, results, copy of report	this.	(If yes, go to step II) (O.Reg 170/03)
	available?	N/A or not that they are aware of	
	Are there increasing/concerning trends of any other parameters at the well not mentioned yet:	N/A or not that they are aware of	
	Additonal Raw Water Chemistry Available that we could have:	No	
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc	Νο	
	Does the well water ever taste salty? Is there any evidence of salt water intrusion at the well	Na	
I	or in the surrounding area?	ino	


	Question	Answer	Comments
	What is the current well treatment:	Nothing on well	
	Has the well ever needed treatment upgrades		
	or remediation (if so, when, why, records available?):	No	
		110	
			(If yes and a contrary report was not written
			after August 1, 2000, go to step II) (O.Reg
	Historic Reports Indicating GUDI status (Y/N):	No	170/03)
	Obtain a copy (X/N):		
	Date of Report:		
	Name of Deservoir		
	Name of Preparer:		
	Reason for GUDI Status:		
	Average Annual Pumping Rate:	~ 10 gpm (1/2 HP pump)	
			(If <u>cannot</u> pump at greater than 0.58 L/s and
	Maximum Monthly Pumping Rate:		is within 15 m of surface water or if the well can supply water at greater than 0.58 l/s and
			is in overburden within 100 m of surface
			water or can supply water at greater than
			0.58 L/s and is in bedrock within 500 m of
		not available	surface water, go to step II) (O.Reg 170/03)
	Other (specify):		
5. Sensitive Setting:	Spring:	NO	(If yes, go to step II)
(Source of Water Supply)	Infiltration Callon/	No	(If yos, go to stop II) (O Bog 170/02)
(Source of Water Supply)	initiation Gallery.	NO	(ii yes, go to step ii) (O.Reg 17003)
	Horizontal Collection Well:	No	(If yes, go to step II)
	Korot Aquifar:	No	(lé vec se te ster ll)
		NO	(il yes, go to step il)
	Exposed Fractured Bedrock:	No	(If yes, go to step II)
	Thin or absent soil cover over bedrock? How		
	far away from the well?		
	High K Unconfined Aquifer:	No	(If yes, go to step II) (O.Reg 170/03)
	Enhanced Dasharma		(If yes, go to step II) (MOE Guidelines on
	Ennanced Recharge:	NO	GUDI, 2001)
			(If not Drilled Well, Go To Step II) (O Peg
	Dug Well:	No	170/03)
		Vec //c	
	Uriliea Well (in overburden or bedrock):	Yes (dearock)	
6. Well	Well Log Found (Y/N):	no	
	· · · /		
Construction	Driller (Name; ID):	not available	
Details	Construction Date:	~ 1975 or 1976	
Details			
	Well Depth:	~250 ft	
-			



	Question	Answer	Comments
	Outline Terror		
	Casing Type:	steel	
	Firmly seated in bedrock (Y/N)	not known	
	Water Tight Casing to 6mbgs (Y/N)	not known	(If No go to Step II) (O.Reg 903)
	Casing Diameter:	6"	
	Casing Length:	Not known	(If < 12 m or 40 ft, go to Step II)
	recently):	no	
	When was the well pump last serviced or replaced? Was it disinfected before being placed back in well:	New pump 1 month old	
	Well Vield	10 gam	
	weir neid.	~ 10 goni	
	Static Water Level:	~ 40 ft	
	Overburden Thickness:	not known	
	Pump type:	not known	
	Pump Setting:	~110 - 120 ft deep	
	Drive Shoe (Y/N):	Not known	
	Grouted Casing (Y/N):	not known	
	Thickness of Grout around well:	not known	
		normown	
	Water Level Monitoring Pipe in Well (Y/N):	no	
	Raw Water Sampling Tap (Y/N):	yes (it is all untreated H2O)	
	Other:		
7 Well Condition			
7. Well Condition	Localed in a well House (Y/N):	yes	
Assessment (O.Reg 9	Well Tagged or Identified:	no	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):	No, not visible	
	Any Rust or Holes Evident on Casing:	Rusted, no holes	
	Above Ground Casing Height (mags) (If stickup,		
	provide details): Flush Mount Well (mbgs) (If flush mount, provide	6 cm	
	details):	no	
	Is the Well Located in a Well Pit (mbgs):	no	
	Covered with solid, watertight cover (Y/N):		
	Casing is above bttm of pit floor:		



	Question	Answer	Comments
	Is the pit equipped to drain (provide details)?		
	Is the pit equipped with a sume pump (V/N)?		
	is the pit equipped with a sump pump (1/14):		
	The casing vent is at what height above the pit floor (cm)?		
	Height of Ground Surface for 5 m around well is at least 60 cm above the highest known surface water level (Y/N):	In pumphouse - yes	
	Is the topography around the well indicative of surface ponding and flow towards the well:	no	
	Is drainage at the well adequate (any standing water or evidence of ponding):	somewhat - need a concrete floor as it is gravel in pumphouse	
	Protective Cap Found on Well (Acceptable Seal?):	no	
	Is the Well Locked (Secure?):	no - door on pumphouse not locked and no cap on well	
	Pit-less adapter:	no	
	Screened air vent:	no	
	Flood protection (has it ever flooded):	in pumphouse - no	
	Vehicle impact protection:	in pumphouse - so yes	
	Fencing:	in pumphouse - so yes	
8. Aquifer	Surficial (type of geology, depth, observed surficial info):	thin overburden unknown type - some gravel	
Characteristics	Bedrock (type, depth, exposed at surface):	no	
	Show the Geology Mapping or borehole,does it match with their understanding?	unknown - operator not familiar with log	
	Unconfined Municipal Aquifer:	unknown - operator not familiar with log	(If yes, go to step II)
	Confined Municipal Aquifer:	unknown - operator not familiar with log	
	Pumping Test Done (Y/N)	unknown - operator not familiar with log	
9. Proximity to sources	when was test done, is the data available?		
of potential surface water contamination	Perennial Stream/Pond (metres away from well):	no	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	Ephemeral Stream (metres away from well):	unknown/ no	Water and bedrock well, go to Step II)
(500 - 5 (	Ditch (metres away from well):	no - not obvious if any are there	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
100m for overburden)	Is there water in the ditch (Y/N):	no	
	When did it last rain? If recent is there water in	36 hours and no evidence of conding / ditch	
	and altern boes the ultern drain quickly?	of hours ago, no chashes of ponding / diten	



	Question	Answer	Comments
	River:	no	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Lake:	no	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Wetlands/Marshes:	seems somewhat marshy around well.	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:	yes, on a slope, well is near the base of it	
	Highway/Road:	is a highway about 50 m away	
	Unused wells found on site:	no	
	Should they be abandoned:	N/A	
	Abandoned weils on site: Abandonment Log Available (Y/N):	110	
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):		
	Artesian wells found on adjacent properties:		
	Are there Well Pits Located on Adjacent Properties:	Not known	
	Other (Specify):		
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	All homes around well on septics (7-10 homes)	
	If on private services, how many septics/wells (based on # of homes):	7 homes on this well	
	Distance of closest septics (approx. to house):	~ 10 m	
	Communal septics used nearby:	no	
	Are domestic wells within municipal aquifer:	not known	Doug Lewis is on domestic well ~ 50 m
	Are there wells found within well pits on surrounding properties:	not known	
	Any historic well interference complaints:	no	
	Historic Contamination Issues Noted at Domestic Wells:	not known	
	Parkland:	no	
	Fertilizer used?	N/A	
	Forestry:	no	
	Agriculture:	no	



	Question	Answer	Comments
	Evidence of Manure Storage (liquid or solid):	N/A	
	Animal Grazing:		
	Animai Grazing.		
	la dustria la		
		no	
	Type of Industrial Use:		
	AST's or UST's at site:		
	Other Risks (large septics etc):		
	Land Uses Specified in NL Reg 63/03 as risks:	No	
	Cesspool receiving raw sewage that is less than or equal to 4 m deep ( >= 30 m away		
	from well):		
	Cesspool or seepage pit that is $>= 4 \text{ m}$ deep upless it prevents seepage has to be $>= 60 \text{ m}$		
	away from a well:		
	Seepage Pit, Filter Bed, Soil Absorption Field,		
	Earth Phys Pit of Similar (>=16 m away from well):		
	Sewer of cast iron with leaded joints or approved mechanical joints, independent		
	clean water drain or cistern (>= 3 m away from		
	well):		
	Sanitary Landfill or Garbage Dump:		
	Is there a pumphouse cast iron floor drain with leaded joints draining to ground surface? (>=1		
	m from well):		
	Septic(s), concrete vault privy, sewer or tightly jointed tile or equivalent material or sewer		
	connected foundation drain (>=16 m away		
	from well):	yes to septics	
	Future Land Use Changes that could impact wells:	N/A to None known	
15 Notos:	Other please specify (i.e. sources of microbial contam.):		
15. NOLES:			

#### Photo Log -Picadilly Slant - Abraham's Cove







Well head



Pumphouse

Pumphouse



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR

Department of Environment and Conservation Water Resources Management Division

### Water Well Record

Well Owner Name: NF & LAB. HOUSING Address: OREGON DRIVE	Lithology Listing: GRVL 2 LMSN 56
Well Location Town: ABRAHAMS COVE GPS Coordinates N ° ' "	Total Depth:         55.20         m         Depth to Bedrock:         m           Water Bearing Zone(s)          Lpm at         m          Lpm at         m            Lpm at         m          Lpm at         m
W Map Number: NAD: UTM Zone:	Casing Type: Casing Length: <u>6.10 m</u> Diameter: mm Casing Thickness: mm Drive Shoe Used:
Northing: Easting: Type of Water Encountered:FR	Well Grouted: fromm tom Grout Type:
Well / Water Use: DO Type of Work Completed: Drilling Method:	Screen Info:
Pump Recommendations         Pump Type:         Intake Setting:       m         Pumping Rate:       Lpm         Estimated Safe Yield of Well:       45.50       Lpm	Pumping Test         Method:         Pumping Rate:       Lpm Duration 150 min         Well Overflowing:       Overflow Rate:       Lpm

**Drillers Comments:** 

Name of Drilling Company Clearwater Drilling Ltd. Licence Number 4 Date Well Completed 27 /07/1995

This Record Modified by: Modified date:



# **Port Aux Port West**





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Wap Document. (P:)602363511000-CADD1050 GIS WIP\MXDs\FieldMapMXDs\60236351WellLocations\_PortAuPortWest1\_SurfGeology.mxd)



	Question	Answer	Comments
1. Project Details:	Project No:	60236351	
	Client:	Newfoundland and Labrador, Department of Environment and Conservation. WRMD	
	Date of Inspection:	29-Nov-11	
	AECOM Inspector:	Amanda Sills	
	Site Contact (Name, Phone #):	Martin Hines	
	Weather:	Cloudy 5°c	
2. Well Designation:	Well ID:	Well #2	
	Well Type/Usage:	Domestic	
	Well Status (Pumping, Backup, Obs.):	Pumping	
3. Location:	Water Supply No.:	WS-G-0574	
	Community:	Port Au Port West	
	Street:	Front Rd	
(Community, Street, GPS	GPS Northing:	372000	
Grid, Well Elevation provided by well operator)	GPS Easting:	5378856	
	Well Elevation (masl):	N/A	
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)	Arsenic exceedance in 2010 - 65-38-00-57 On June 23, 2010. Result 0.017 both well #2 and #3	
(Questions for well operators)	Do Storms Change the Well Chemistry (i.e. increased TSS)	No	(If yes, go to step II) (O.Reg 170/03)
	surface water bodies (take conductivity measurement of nearby surface water if possible):	N/A	(If yes, go to step II) (O.Reg 170/03)
	Is there an observable change in nearby surface water levels when the well is pumping:	N/A	(If yes, go to step II) (MOE GUDI Guidelines, 2001)
	Historic issues with bacteria, TSS, boil water advisories?	NO	(If yes, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or microscopic particulate analysis completed on it? If so when, results, copy of report available?	No	
	Are there increasing/concerning trends of any other parameters at the well not mentioned vet:	Not anything they know of since 2006	
	Additonal Raw Water Chemistry Available that we could have:	yes	
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc	Not that they have seen	
	Does the well water ever taste salty? Is there any evidence of salt water intrusion at the well or in the surrounding area?	No	
	What is the current well treatment:	chlorination	



	Question	Answer	Comments
	Has the well ever needed treatment upgrades		
	or remediation (if so, when, why, records		
	available?):	No (just use chlorine)	
			(If was and a contrary conact was not written
			after August 1, 2000, go to step II) (O.Reg
	Historic Reports Indicating GUDI status (Y/N):	No	170/03)
	Obtain a copy (Y/N):		
	Date of Report:		
	Balo of Hoporta		
	Name of Preparer:		
	Reason for GLIDI Status:		
		12 gpm (11,000 - 12,000 gallons per day) (Well #2) (6,000 gpd - Well	
	Average Annual Pumping Rate:	#3)	
			(If cannot pump at greater than 0.58 L/s and
	Maximum Monthly Pumping Rate:		is within 15 m of surface water or if the well
	······································		can supply water at greater than 0.58 L/s and is in overburden within 100 m of surface
			water or can supply water at greater than
			0.58 L/s and is in bedrock within 500 m of
			surface water, go to step II) (O.Reg 170/03)
	Other (specify):		
E. Considius Cottings	Out with a set	Na	
5. Sensitive Setting:	Spring:	NO	(if yes, go to step ii)
(Source of Water Supply)	Infiltration Gallery:	No	(If yes, go to step II) (O.Reg 170/03)
			<i></i>
		NO	(if yes, go to step ii)
	Karst Aquifer:	No	(If yes, go to step II)
	Exposed Erectured Bodrock:	No	(If you go to stop II)
		NU	(ii yes, go to step ii)
	Thin or absent soil cover over bedrock? How		
	far away from the well?		
	Hiah K Unconfined Aquifer:	unknown	(If yes, go to step II) (O.Reg 170/03)
			, ,, <u>,</u> ,, (e
			(If yes, go to step II) (MOE Guidelines on
	Enhanced Recharge:	No	GUDI, 2001)
			(If not Drilled Well, Go To Stop II) (O Bog
	Dug Well:	No	170/03)
	Drilled Well (in every under an hadreels):	Drilled in bodrock	
6. Well	Well Log Found (Y/N):	no	
Construction	Driller (Name: ID):	po.	
Construction		10	
Details	Construction Date:	before 1973 by government (Well #1)	
	Well Depth:	Well #3: 188 1/2 ft Well #1: 202 ft	
	Casing Type:	Steel casing	





	Question	Answer	Comments
	Firmly seated in bedrock (Y/N)	unknown	
	Water Tight Casing to 6mbgs (Y/N)	unknown	(If No go to Step II) (O.Reg 903)
	Casing Diameter:	6"	
	Casing Length:	unknown	(If < 12 m or 40 ft, go to Step II)
	Has the well ever been disinfected (when, why, most recently):	no	
	When was the well pump last serviced or replaced? Was it disinfected before being placed back in well:	Well #3 - 2011 pump replaced not disinfected before put in	
	Well Yield:	See previous Well #3 - can't sustain 20 gpm	
	Static Water Level:	no	
	Overburden Thickness:	There is some we don't know how much	
	Pump type:	N/A	
	Pump Setting:	Pump at 197 ft in Well #1 in 1996;Pump at 150 ft in Well #3 in 1996 - Pumps replaced	
	Drive Shoe (Y/N):	Unknown	
	Grouted Casing (Y/N):	unknown	
	Thickness of Grout around well:	unknown	
	Water Level Monitoring Pipe in Well (Y/N):	no	
	Raw Water Sampling Tap (Y/N):	yes	
	Other:		
7. Well Condition	Located in a Well House (Y/N):	yes	
Assessment (O.Reg 9	Well Tagged or Identified:	no	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):	Cemented in well house	
	Any Rust or Holes Evident on Casing:	Casing is rusted	
	Above Ground Casing Height (mags) (If stickup, provide details):	12 cm	
	Flush Mount Well (mbgs) (If flush mount, provide details):	N/A	
	Is the Well Located in a Well Pit (mbgs):	No	
	Covered with solid, watertight cover (Y/N):	N/A	
	Casing is above bttm of pit floor:		
	Is the pit equipped to drain (provide details)?		



	Question	Answer	Comments
	Is the pit equipped with a sump pump (Y/N)?		
	The casing vent is at what height above the pit		
	floor (cm)?		
	Height of Ground Surface for 5 m around well is at		
	least 60 cm above the highest known surface water level (Y/N).	ves (in pumphouse)	
	Is the topography around the well indicative of surface ponding and flow towards the well:	no	
	Is drainage at the well adequate		
	(any standing water or evidence of ponding):	yes ( no evidence of ponding)	
	Protective Cap Found on Well (Acceptable Seal?):	no cap	
	Is the Well Locked (Secure?):	no	
	Pit-less adapter:	no	
	Screened air vent:	N/A (because no lid)	
	Flood protection (has it ever flooded):	no	
	· · · · · · · · · · · · · · · · · · ·		
	Vahiele impost protection:	in numerica	
	Venicle Impact protection:	in pumpnouse	
	Fencing:	in pumphouse	
	Surficial (type of geology, depth, observed surficial		
8. Aquifer	info):	unknown (seems to be a thin layer of overburden)	
Characteristics	Bedrock (type, depth, exposed at surface):	Not exposed at surface	
	Show the Geology Mapping or borehole, does	un la nova	
	it match with their understanding?	UNKNOWN	
	Unconfined Municipal Aquifer:	unknown	(If yes, go to step II)
	Confined Municipal Aquifer:	unknown	
	Pumping Test Done (Y/N)	No - maybe when first drilled to get the 20 gpm at Well #3 but not since	
	When was test done, is the data sublished	N/A	
9. Proximity to sources	when was test durie, is the data dvalidble?	17/75	
of potential surface			(If < 100 m from Surface Water and an
water contamination			overburden well or if < 500 m from Surface
	Perennial Stream/Pond (metres away from well):	Ocean is around 100 m from well	Water and bedrock well, go to Step II)
			/If < 100 m from Surface Water and an
			overburden well or if < 500 m from Surface
	Ephemeral Stream (metres away from well):	no	Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an
	Ditch (metres away from well):	no	Water and bedrock well, go to Step II)
(500 m for bedrock,			, g
100m for overburden)	la those water is the dist. Of the	NI/A	
	is there water in the ditch (Y/N):	IN/A	
	When did it last rain? If recent is there water in		
	the ditch? Does the ditch drain quickly?	N/A rained yesterday but no ditches with water in them	
			(If < 100 m from Surface Water and an
			overburden well or if < 500 m from Surface
	River:	no	Water and bedrock well, go to Step II)



	Question	Answer	Comments
	Lake:	no	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Wetlands/Marchec	ves un above on hill	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well go to Sten II)
	Is drainage towards the well possible:	ves	Water and bearbox wen, go to otep inj
	Highway/Road	ves within 10 m	
	I hused wells found on site:	No	
	Should they be abandoned:	NA	
	Abandoned wells on site:	Νο	
	Abandonment Log Available (Y/N):	N/A	
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):	N/A	
	Artesian wells found on adjacent properties:	N/A	
	Are there Well Pits Located on Adjacent Properties:	Unknown / No	
	Other (Specify):		
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	Yes - Are septics but not around	
	If on private services, how many septics/wells (based on # of homes):	4 within 100 m	
	Distance of closest septics (approx. to house):	75 - 100 m	
	Communal septics used nearby:	No	
	Are domestic wells within municipal aquifer:	No domestic wells bearby	Doug Lewis is on domestic well ~ 50 m
	Are there wells found within well pits on surrounding properties:	No (don't know of any)	
	Any historic well interference complaints:	Only complaints about chlorine taste	
	Historic Contamination Issues Noted at Domestic Wells:	Not that they are aware of	
	Parkland:	Νο	
	Fertilizer used?	N/A	
	Forestry:	Yes (Vacant land)	
	Agriculture:	No	
	Evidence of Manure Storage (liquid or solid):	N/A	



	Question	Answer	Comments
	Animal Grazing:		
	Animai Grazing.		
	Industrial:	None	
	Type of Industrial Use:		
	AST's or UST's at site:		
	Other Risks (large septics etc):		
	Land Uses Specified in NL Reg 63/03 as risks:	No	
	Cesspool receiving raw sewage that is less		
	than or equal to 4 m deep ( >= 30 m away from well):		
	Cesspool or seepage pit that is >= 4 m deep		
	unless it prevents seepage has to be >= 60 m		
	Seepage Pit Filter Bed, Soil Absorption Field		
	Earth Privy Pit or similar (>=16 m away from		
	well): Sewer of cast iron with leaded joints or		
	approved mechanical joints, independent		
	clean water drain or cistern (>= 3 m away from well):		
	Sanitary Landfill or Garbaga Dump:		
	Is there a pumphouse cast iron floor drain with		
	leaded joints draining to ground surface? (>=1		
	m from well):		
	jointed tile or equivalent material or sever		
	connected foundation drain (>=16 m away	Voc	
	non wen).	1 55	
	Future Land Line Observes that evold import	Description of the state of the second	
	Future Land Use Changes that could impact wells:	Proposed subdivision right around well #1 - quite large - all on septics	
15 Notes:	Other please specify (i.e. sources of microbial contam.):		
13. 140185.			

Water in well #2 is within 10 ft of the top of casing when not pumping. The old well (Well #1) drained quickly when it was pumped. Well 2 lowers in water level but does not drain.

Old well (Well #1) was not properly abandonded, a sewer cap was put over the well and then it was covered with gravel. This well is within 5 m of well 2 and is at the same depth. Well logs lost in the flood.

Old Well (Well #1) was found at the same depth as well #2. Both wells were active for a bit at the same time and appear to have a connected response/ interference issue ie. Connected response when pumping

Old well had silting issue when pumped, the new well doesn't (Well #2)

The Government of Environment website has a list of drillers by community and likely has the contact information for Springdale Drillers

They recently thought that well 2 would dry out if they increased pumping. However they increased pumping and the well didn't dry out. It continues to provide a lot of water at the increased pumping rate.



	Question	Answer	Comments
1. Proiect Details:	Proiect No:	60236351	
	Client:	Newfoundland and Labrador, Department of Environment and Conservation, WRMD	
	Date of Inspection:	29 November 2011; 2pm	
	AECOM Inspector:	Amanda Sills	
	Site Contact (Name, Phone #):	Martin Hines	
	Weather:	Cloudy 5°c	
2. Well Designation:	Well ID:	Well #3	
	Well Type/Usage:	Domestic	
	Well Status (Pumping, Backup, Obs.):	Pumping	
3. Location:		WS-G-0574	
	Community:	Port Au Port	
	Street:	Front Rd	
(Community, Street, GPS measured in field. Map	GPS Northing:	370541	
Grid, Well Elevation provided by well operator)	GPS Easting:	5377831	
	Well Elevation (masl):	stickup 10 cm	
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)	Arsenic exceedance on June 23, 2010 Result: 0.017 at Both Well #2 and #3	
(Questions for well operators)	Do Storms Change the Well Chemistry (i.e. increased TSS)	no	(If yes, go to step II) (O.Reg 170/03)
	surface water bodies (take conductivity measurement of nearby surface water if possible):	N/A	(If yes, go to step II) (O.Reg 170/03)
	Is there an observable change in nearby surface water levels when the well is pumping:	N/A	(If yes, go to step II) (MOE GUDI Guidelines, 2001)
	Historic issues with bacteria, TSS, boil water advisories?	NO	(If yes, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or microscopic particulate analysis completed on it? If so when, results, copy of report available?	No	
	Are there increasing/concerning trends of any other parameters at the well not mentioned yet:	Not anything that they are aware of	
	Additonal Raw Water Chemistry Available that we could have:	yes	
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc	No	
	Does the well water ever taste salty? Is there any evidence of salt water intrusion at the well or in the surrounding area?	no	
	What is the current well treatment:	chlorination	



	Question	Answer	Comments
	Has the well ever needed treatment upgrades or remediation (if so, when, why, records available?):	no (they just use chlorination	
			(If yes and a contrary report was not written after August 1, 2000, go to step II) (O.Reg
	Historic Reports Indicating GUDI status (Y/N):	No	170/03)
	Obtain a copy (Y/N):		
	Date of Report:		
	Name of Preparer:		
	Reason for GUDI Status:		
	Average Annual Pumping Rate:	6.000 gpd at Well #3	
	Maximum Monthly Pumping Rate:	Initial pumping test indicated 20 gpm however pumping at this rate	(If <u>cannot</u> pump at greater than 0.58 L/s and is within 15 m of surface water or if the well <u>can</u> supply water at greater than 0.58 L/s and is in overburden within 100 m of surface water or <u>can</u> supply water at greater than 0.58 L/s and is in bedrock within 500 m of
	Other (specify):	wasn't sensible/ sustained	surface water, go to step II) (O.Reg 170/03)
5. Sensitive Setting:	Spring:	NO	(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:	No	(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well:	No	(If yes, go to step II)
	Karst Aquifer:	No	(If yes, go to step II)
	Exposed Fractured Bedrock:	No	(If yes, go to step II)
	Thin or absent soil cover over bedrock? How far away from the well?		
	High K Unconfined Aquifer:	unknown	(If yes, go to step II) (O.Reg 170/03)
	Enhanced Recharge:	No	(If yes, go to step II) (MOE Guidelines on GUDI, 2001)
	Dug Well:	Νο	(If not Drilled Well, Go To Step II) (O.Reg 170/03)
	Drilled Well (in overburden or bedrock):	yes (likely in bedrock)	
6. Well	Well Log Found (Y/N):	no	
Construction	Driller (Name; ID):	no	
Details	Construction Date:	likely before 1978	
	Well Depth:	188 1/2 ft	
	Casing Type:	steel	
	Firmly castad in hadrock (V/A)		
8	cinniy sealed in beurock ( f/N)	UTINIUWII	

Environment





	Question	Answer	Comments
	Water Tight Casing to 6mbgs (Y/N)	unknown	(If No go to Step II) (O.Reg 903)
	Casing Diameter:	6"	
	Casing Length:	unknown	(If < 12 m or 40 ft, go to Step II)
	Has the well ever been disinfected (when, why, most recently):	no	
	When was the well pump last serviced or replaced? Was it disinfected before being placed back in well:	Well #3 - pump replaced 2011 not disinfected before placed in	
	Well Yield:	~6 gpm, couldn't sustain 20 gpm	
	Static Water Level:	no	
	Overburden Thickness:	some overburden above bedrock unsure how much	
	Pump type:	N/A	
	Pump Setting:	Pump set at ~ 150 ft in 1996 - replaced and reset summer 2011	
	Drive Shoe (Y/N):	unknown	
	Grouted Casing (Y/N):	unknown	
	Thickness of Grout around well:	unknown	
	Water Level Monitoring Pipe in Well (Y/N):	unknown	
	Raw Water Sampling Tap (Y/N):	yes	
	Other:		
7. Well Condition	Located in a Well House (Y/N):	yes	
Assessment (O.Reg 9	Well Tagged or Identified:	no	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):	no (half cemented at ground surfa ce half exposed)	
	Any Rust or Holes Evident on Casing:	yes - rusted	
	Above Ground Casing Height (mags) (If stickup, provide details):	10 cm	
	Flush Mount Well (mbgs) (If flush mount, provide details):	No	
	Is the Well Located in a Well Pit (mbgs):	No	
	Covered with solid, watertight cover (Y/N):	N/A	
	Casing is above bttm of pit floor:		
	Is the pit equipped to drain (provide details)?		
	Is the pit equipped with a sump pump (Y/N)?		



	Question	Answer	Comments
	The casing vent is at what height above the pit		
	Height of Ground Surface for 5 m around well is at least 60 cm above the highest known surface water level (Y/N):	yes (in pumphouse)	
	Is the topography around the well indicative of surface ponding and flow towards the well:	no	
	Is drainage at the well adequate (any standing water or evidence of ponding):	yes ( no evidence of ponding)	
	Protective Cap Found on Well (Acceptable Seal?):	no cap	
	Is the Well Locked (Secure?):	no	
	Pit-less adapter:	no	
	Screened air vent:	N/A (because no lid)	
	Flood protection (has it ever flooded):	no	
	Vehicle impact protection:	in pumphouse	
8. Aquifer	Pencing: Surficial (type of geology, depth, observed surficial info):	unknown (seems to be a thin layer of overburden)	
Characteristics	Bedrock (type, depth, exposed at surface):	Not exposed at surface	
	Show the Geology Mapping or borehole,does it match with their understanding?	unknown	
	Unconfined Municipal Aquifer:	unknown	(If yes, go to step II)
	Confined Municipal Aquifer:	unknown	
	Pumping Test Done (Y/N)	maybe when first Get the 20 gpm but not since	
	When was test done, is the data available?	N/A	
9. Proximity to sources of potential surface water contamination	December (Rend (metres supplified until))		(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bodeoch well or a to Ster IV
	Perennial Stream/Pond (metres away from well).	10	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	Ephemeral Stream (metres away from well):	no	Water and bedrock well, go to Step II)
(500 m for bedrock,	Ditch (metres away from well):	no	overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
100m for overburden)	Is there water in the ditch (Y/N):	N/A	
	When did it last rain? If recent is there water in the ditch? Does the ditch drain quickly?	N/A rained yesterday but no ditches with water in them	//f = 400 m from Surface Write and
	River:	no	(r < 100 m from Sufface Water and an overburden well or if < 500 m from Sufface Water and bedrock well, go to Step II)
	Lake:	ocean in 150	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well go to Step IN
1			



Environment

	Question	Answer	Comments
	Wetlands/Marshes:	yes, up above on hill	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:	yes	
	Highway/Road:	yes 5 - 10 m	
	Unused wells found on site:	Νο	
	Should they be abandoned:	N/A	
	Abandoned wells on site:	No	
	Abandonment Log Available (Y/N):	N/A	
	Artesian wells found on site (is the well fixed or does it need to be abandoned):	N/A	
	Artesian wells found on adjacent properties:	N/A	
	Are there Well Pits Located on Adjacent Properties:	No	
	Other (Specify):		
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	yes	
	If on private services, how many septics/wells (based on # of homes):	5 homes in 100 m	
	Distance of closest septics (approx. to house):	20 m	
	Communal septics used nearby:	No	
	Are domestic wells within municipal aquifer:	No domestic wells nearby	Doug Lewis is on domestic well ~ 50 m
	Are there wells found within well pits on surrounding properties:	No (don't know of any)	
	Any historic well interference complaints:	only complaints above chlorine	
	Historic Contamination Issues Noted at Domestic Wells:	Not that they are aware of	
	Parkland:	No (Vacant land)	
	Fertilizer used?	N/A	
	Forestry:	Yes (Vacant land)	
	Agriculture:	Νο	
	Evidence of Manure Storage (liquid or solid):	N/A	
	Animal Grazing:		



	Question	Answer	Comments
	Industrial:	None	
	Type of Industrial Use:		
	AST's or UST's at site:		
	Other Risks (large septics etc):		
	Land Uses Specified in NL Reg 63/03 as risks:	No	
	Cesspool receiving raw sewage that is less		
	than or equal to 4 m deep ( >= 30 m away from well):		
	Cesspool or seepage pit that is >= 4 m deep		
	away from a well:		
	Seepage Pit, Filter Bed, Soil Absorption Field,		
	Earth Privy Pit or similar (>=16 m away from well):		
	Sewer of cast iron with leaded joints or approved mechanical joints independent		
	clean water drain or cistern (>= 3 m away from		
	well):		
	Sanitary Landfill or Garbage Dump: Is there a pumphouse cast iron floor drain with		
	leaded joints draining to ground surface? (>=1		
	m from well):		
	jointed tile or equivalent material or sewer		
	connected foundation drain (>=16 m away from well):	Yes - septics	
	Future Land Use Changes that could impact wells:	None that they are aware of	
	Other please specify (i.e. sources of microbial contam.):		
15. Notes:			

Water in well #2 is within 10 ft of the top of casing when not pumping. The old well (Well #1) drained quickly when it was pumped. Well 2 lowers in water level but does not drain.

Old well (Well #1) was not properly abandonded, a sewer cap was put over the well and then it was covered with gravel. This well is within 5 m of well 2 and is at the same depth. Well logs lost in the flood.

Old Well (Well #1) was found at the same depth as well #2. Both wells were active for a bit at the same time and appear to have a connected response/ interference issue ie. Connected response when pumping

Old well had silting issue when pumped, the new well doesn't (Well #2)

The Government of Environment website has a list of drillers by community and likely has the contact information for Springdale Drillers

They recently thought that well 2 would dry out if they increased pumping. However they increased pumping and the well didn't dry out. It continues to provide a lot of water at the increased pumping rate.

#### Photo Log - Port Au Port West







Well and pumphouse - North direction





Well No. 1

Pumphouse looking West

Signage

#### Photo Log - Port Au Port West





Well #1 and infrastrusture





#### Photo Log - Port Au Port West - Well #3







Signage



Well #3



Well #3 close-up view

Pumphouse





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# Recommendations Regarding a Ground Water Supply System

## for Port au Port West, Newfoundland

J.M. Fleming Mineral Resources Division June, 1971

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#### Introduction

Port au Port West is an incorporated community on the eastern end of the Port au Port Peninsula. The community encompasses all the area to the east of "Father Joy's road' along Routes 47 and 48 as far as The Gravels; also included are those houses on the west side of Bellman's Cove valley (see Map 1). The total number of residents is approximately 600. A large church, an elementary school and a high school are located within the community in one complex on the south side of Route 48. A large general store is located at the junction of Routes 47 and 48 at The Gravels. There are no industrial establishments within the community boundaries but the Sea Mining Company plant is located to the west, at Aguathuna. This plant is designed to extract magnesium hydroxide from sea water but is currently inactive.

The residents presently obtain their water supplies from privately owned dug wells and some drilled wells, many of which go dry during the summer.

The possibility of establishing a community water supply system for the community was recently investigated by Gorman-Butler Associates Limited (1971) who proposed a rather elaborate distribution system from a well or wells to be drilled on the east side of Father Joy's road (see Map 1). The total cost of the system proposed to supply water to all residents and including provision for fire protection was estimated at \$550,000, well beyond the financial capabilities of the community.

As a less expensive alternative to the system proposed by Gorman-Butler Associates, the Board of Trustees is considering the drilling of several wells, one to each group of four to six houses. The writer was asked to investigate the feasibility of obtaining sufficient quantities in this way. The investigation consisted of an analysis of available geological reports, topographic maps and aerial photographs, plus a brief field investigated.

#### Present Water Supplies

Most residents now obtain water from shallow dug wells which are privately owned. Those along Route 47, southwest of The Gravels, usually provide adequate quantities of water, but the wells serving residences along Route 48 often go dry during the summer season.

Several of the residences along Route 48 have drilled wells. Many of these are also relatively shallow, ranging from 12 to 30 feet deep. Those on the west side of Bellman's Cove valley apparrently provide adequate quantities all year but those to the east often go dry during the summer. Many residents then obtain water from a spring on the west side of Father Joy's road, near the head of Bellman's Cove Brook.

A few deeper wells have been drilled. The most notable of these is the well at the elementary school which is approximately 85 feet deep and supplies the school and a large indoor skating rink. According to Father Green, the parish priest, the well was drilled to about 80 feet in "grey limestone" but then encountered "a red rock" from which an abundant supply of water was obtained. The well was pumped for 15 hours, according to Father Green's account, 24 to 36 hours according to the driller, Mr. Leonard House, with no noticeable decrease in capacity. The pumping rate is not known.

Other deep wells in the area yield a barely adequate supply, for example, the well at the local medical doctor's residence, on the north side of Route 48 approximately opposite the church. This well is reported to be 130 feet deep and may go dry when demand is increased beyond normal household use. No information was obtained on water quality. Sewage is disposed of through privately constructed spetic tanks or cesspools. Some examples of poorly constructed wells were noted and it is likely that at least some wells are contaminated.

#### General Geology of the Area

A generalized geological map (Map 2) of the area is attached to this report.

Most of the area is underlain by rocks of the Lower Ordovician St. George Group, dolomites and limestones with interbedded shales. The carbonate rocks are buff and gray in color but weather to a reddish brown due to limonitic staining. Limonite also occurs in occasional geodes and veinlets. Dips are generally to the north and northwest at 15° to 20°. Although some flexuring has been detected the overall structural aspect of the St. George Group in this area is minoclinal.

The headlands between the coves on the north shore of the peninsula are composed of limestones of the Table Head Group of Middle Ordovician age. These rocks rest disconformably on the St. George Group.

Rocks of Carboniferous age, limestone conglomerates, shales and sandstones, occur as synclinal wedges in many of the small coves on the north shore of the peninsula. The most notable such occurrences are at Lead Cove and Bellman's Cove.

The whole area is covered by coarse till which is variable in thickness but usually rather thin. Till thicknesses seem to increase somewhat toward the southeastern and southern coasts where dug wells have been sunk to 15 feet without encountering bedrock.

Several northerly-trending, normal faults with small displace-

ments have been noted on the shore to the northeast and southwest of Green Head. Sullivan (1940) regarded the Carboniferous rocks in the coves on East Bay as being fault bounded, the rocks having been deposited in tectonically subsiding basins. Johnson (1954) argued, however, that the Carboniferous rocks are unconformable on the Table Head Group and were deposited in small basins on an Pre-Carboniferous erosion surface. Johnson's interpretation does not rule out the possibility of Pre-Carboniferous tectonic control of basin development. The straight and parallel sides of the coves and inland valleys strongly suggests at least some faulting.

No regularly developed jointing has been observed but in the shoreline exposures several widely spaced vertical fracture planes are evident from the aerial photograph.

#### Hydrogeology

Surface drainage in the area is limited to small brooks running into Bellman's Cove, Lead Cove and a small, unnamed cove about midway between these two. A short southward running brook drains into Man O'War Cove on the southern shore. Since these brooks have no surface sources they must be maintained through groundwater seepage and probably approximate the maximum lowest levels reached by the water table. All of the northward running brooks drain areas underlain by Carboniferous rocks. This may indicate that these rocks have a higher capacity for groundwater storage than the underlying carbonates. The Carboniferous rocks contain a higher proportion of clastics than the St. George or Table Head Groups and are often highly brecclated.

In the northern part of the area, the overburden appears to be thin, with a limited capacity for groundwater storage. This is indicated by the lowering of water table levels during the summer to the point where existing wells go dry. In the southern and southeastern parts of the area the overburden is thicker and appears capable of supplying adequate quantities of water, at least for present needs.

In view of the apparent limited capacity of the overburden in the most densely populated part of the community, along Route 48, resort must be made to deep wells in the bedrock. These rocks are mainly limestones and dolomites of the St. George Group which do not usually have a high degree of intergranular porosity. The ability of these rocks, then, to supply water depends on the extent and nature of fracturing within them. The variable capacity of the deep wells indicates that water is concentrated in major fractures, possibly faults. If minor fracturing were extensively developed the deep well at the doctor's residence should supply an amount more than adequate for one household. The deep well at the elementary school is probably deriving most of its supply form a major fracture zone. This is indicated by the greatly increased flow which followed the intersection of the "red rock". This red rock probably does not represent a distinct stratigraphic horizon but is more likely an iron stained fracture or fault zone.

Several linear features are visible on the aerial photographs of the area which probably represent fracture or fault zones. These are probably vertical they should supply adequate quantities of water to supply the needs of the community. The traces of some of these features are shown on Map 1.

## Conclusions and Recommendations

It appears probable that adequate quantities of water can be obtained in the southern end and southeastern parts of the community, along Route 47, by the drilling of shallow wells in the overburden. The proper construction of such wells will require the placement of screens in the most productive zones in each well and the casing and grouting of the upper

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portions of the wells to protect against surface contamination.

In the northern part of the area, along Route 48, deep wells into bedrock will have to be drilled. These will have to be sited in such a way as to attempt to intersect vertical or near vertical fracture zones. Because these zones are difficult to accurately locate away from the coast, it would be a distinct advantage to drill inclined rather than vertical wells. This will maximize the possibilities of intersecting one of these zones of fracturing. However, the drilling of inclined wells would necessitate the use of diamond drill since none of the well drills currently in use in the province is capable of drilling any but vertical holes.

No well sites are suggested here since this will require a more thorough analysis of the geology of the area and will have to take into account the type of drill to be used, the houses to be serviced, the distribution of wastes within the area, and an analysis of present water quality.

In view of the geologic and technical complexities involved, it is recommended that a consultant hydrogeologist be retained to direct the drilling and well development. The drillers operating in the province are not capable of installing well screens, adequately finishing wells to guard against surface contamination, etc.,without supervision.

#### References Cited

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2

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### **Sheaves Cove**





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	Question	Answer	Comments
1 Project Details:	Project No:	60236351	Aggregate site has a few septic systems
n roject Details.	Client:	Newfoundland and Labrador, Department of Environment and Conservation, WRMD	In Summer 2010 well dried out a bit. It hasn'thappedned since. Well Operators; House shook when mine
	Date of Inspection:	30-Nov-11	
	AECOM Inspector:	Amanda Sills	
	Site Contact (Name, Phone #):	Travis Young	
	Weather:	1°C Cloudy	
2. Well Designation:	Well ID:	Drilled Well	
	Well Type/Usage:	Domestic	
	Well Status (Pumping, Backup, Obs.):	Pumping	
3. Location:	Water Supply No.:	WS-G-0643	
	Community:	Sheave Cove	
	Street:	Port au Port Highway	
(Community, Street, GPS	GPS Northing:	349098	
Grid, Well Elevation provided by well operator)	GPS Easting:	5376797	
	Well Elevation (masl):	Not Available	
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)	Some bacteria, Iron, some lead, and one other parameter in the water he can't recall	
(Questions for well operators)	Do Storms Change the Well Chemistry (i.e. increased TSS)	yes, gets cloudy and clears up 2 hours after rain ends	(If yes, go to step II) (O.Reg 170/03)
	surface water bodies (take conductivity measurement of nearby surface water if possible):	None nearby	(If yes, go to step II) (O.Reg 170/03)
	Is there an observable change in nearby surface water levels when the well is pumping:	N/A	(If yes, go to step II) (MOE GUDI Guidelines, 2001)
	Historic issues with bacteria, TSS, boil water advisories?	Total Coli hit / exceedance recently (e-coli since mine started blasting)	(If yes, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or microscopic particulate analysis completed on it? If so when, results, copy of report available?	Νο	
	Are there increasing/concerning trends of any other parameters at the well not mentioned yet:	No	
	Additonal Raw Water Chemistry Available that we could have:	 No	
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc	No (only have issues with the well when it rains)	
	Does the well water ever taste salty? Is there any evidence of salt water intrusion at the well or in the surrounding area?	No	
	What is the current well treatment:	Chlorinated	



	Question	Answer	Comments
	Has the well ever needed treatment upgrades or remediation (if so, when, why, records available?):	Just for chlorinated water due to e-coli	
			(If yes and a contrary report was not written after August 1, 2000, go to step II) (O.Reg
	Historic Reports Indicating GUDI status (Y/N):	No	170/03)
	Obtain a copy (Y/N):		
	Date of Report:		
	Name of Preparer:		
	Reason for GUDI Status:		
	Average Annual Pumping Rate:	Pump is 2 HP (Model #001H07U-4253)	
	Maximum Monthly Pumping Rate:		(If <u>cannot</u> pump at greater than 0.58 L/s and is within 15 m of surface water or if the well <u>can</u> supply water at greater than 0.58 L/s and is in overburden within 100 m of surface water or <u>can</u> supply water at greater than 0.58 L/s and is in bedrock within 500 m of
		30 gpm (Supply ~25 houses)	surface water, go to step II) (O.Reg 170/03)
	Other (specify):		
5. Sensitive Setting:	Spring:	No	(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:	Νο	(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well:	Νο	(If yes, go to step II)
	Karst Aquifer:	Unknown	(If yes, go to step II)
	Exposed Fractured Bedrock:	Thin overburden over fractured bedrock (~ 1 m of overburden)	(If yes, go to step II)
	Thin or absent soil cover over bedrock? How far away from the well?	yes ~ 15m in rock out crop	
	High K Unconfined Aquifer:	N/A (Don't know)	(If yes, go to step II) (O.Reg 170/03)
	Enhanced Recharge:	No	(If yes, go to step II) (MOE Guidelines on GUDI, 2001)
	Dug Well:	No	(If not Drilled Well, Go To Step II) (O.Reg 170/03)
	Drilled Well (in overburden or bedrock):	yes (bedrock)	
6. Well	Well Log Found (Y/N):	No	
Construction	Driller (Name; ID):	Clearwater (Francis Gail)	
Details	Construction Date:	~ 1996	
	Well Depth:	~ 200 ft	
	Casing Type:	Steel	
	Firmly seated in bedrock (Y/N)	Asked for 60 ft of casing but thinks he only got 20-40 ft.	





	Question	Answer	Comments
	Water Tight Casing to 6mbgs (Y/N)	Thinks they grouted up the base but no up the whole well to ground surface. When it rains all of the water around the well soaks in. No puddles and no water in ditches	(If No go to Step II) (O.Reg 903)
	Casing Diameter:	6"	(ii iio go to otep ii) (o.itog ooo)
	Casing Length:	Supposed to be 60 ft but thisks driller put is 20.40 ft	(16 - 12 m or 10 ft, go to Stop II)
	Has the well ever been disinfected (when, why, most	They put chlorine down the well every 2 - 3 months to disinfect well (0.5	
	When was the well pump last serviced or replaced? Was it disinfected before being placed back in well:	April 2011 (bottom of pump fell off) They disinfect it in chlorine barrel before putting in well	
	Well Yield:	Not known	
	Static Water Level:	~ 80 ft from bottom of well up (Summer 2010)	
	Overburden Thickness:	~ 2ft	
	Pump type:	Sumbmersible Pantek pump	
	Pump Setting:	180ft btc	
	Drive Shoe (Y/N):	No/ Not available	
	Grouted Casing (Y/N):	N/A (not known)	
	Thickness of Grout around well:	N/A (not known)	
	Water Level Monitoring Pipe in Well (Y/N):	Maybe or could be for wiring - don't want to remomve lid to check bolts etc.)	
	Raw Water Sampling Tap (Y/N):	yes	
	Other:		
7. Well Condition	Located in a Well House (Y/N):	No	
Assessment (O.Reg 90	Well Tagged or Identified:	No	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):	N/A (not known)	
	Any Rust or Holes Evident on Casing:	Rusted (Cut a hole to run the rope for the pump into the well)	
	Above Ground Casing Height (mags) (If stickup, provide details):	20 cm	
	Flush Mount Well (mbgs) (If flush mount, provide details):	N/A (No)	
	Is the Well Located in a Well Pit (mbgs):	No	
	Covered with solid, watertight cover (Y/N):		
	Casing is above bttm of pit floor:		
	Is the pit equipped to drain (provide details)?		
	Is the pit equipped with a sump pump (Y/N)?		



	Question	Answer	Comments
	The casing vent is at what height above the pit floor (cm)?		
	Height of Ground Surface for 5 m around well is at least 60 cm above the highest known surface water level (Y/N):	Yes (however, is a ditch that would be slightly higher (~1m) than well)	
	Is the topography around the well indicative of surface ponding and flow towards the well:	On a slope so flow could go to well but would run past	
	Is drainage at the well adequate (any standing water or evidence of ponding):	Yes (no evidence of ponding)	
	Protective Cap Found on Well (Acceptable Seal?):	Yes - is a cap, seal could be tighter	
	Is the Well Locked (Secure?):	No - Lifts right off	
	Pit-less adapter:	No	
	Screened air vent:	No - loose cap	
	Flood protection (has it ever flooded):	No, water soaks in immediately or runs by the well	
	Vehicle impact protection:	No	
	Fencing:	No	
8. Aquifer	Surficial (type of geology, depth, observed surficial info):	Overburden with some nearby rock outcrops	
Characteristics	Bedrock (type, depth, exposed at surface):	Some nearby bedrock outcrops (~ 15m)	
	Show the Geology Mapping or borehole,does it match with their understanding?	Not known by operator	
	Unconfined Municipal Aquifer:	Likely because 2 ft of OB and then fractured bedrock	(If yes, go to step II)
	Confined Municipal Aquifer:	No	
	Pumping Test Done (Y/N)	No	
0. Provinity to courses	When was test done, is the data available?		
of potential surface water contamination	Perennial Stream/Pond (metres away from well):	Νο	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	Ephemeral Stream (metres away from well):	No	Water and bedrock well, go to Step II) (If < 100 m from Surface Water and an
(500 m for bedrock,	Ditch (metres away from well):	Yes ~ 10 m	overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
100m for overburden)	Is there water in the ditch (Y/N):	No	
	When did it last rain? If recent is there water in the ditch? Does the ditch drain quickly?	36 hours ago	
	River:	No	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
I	Lake:	No	Water and bedrock well, go to Step II)



	Question	Answer	Comments
	Wetlands/Marshes:	No	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:	N/A	
	Highway/Road:	yes - 10 - 15 m	
	Unused wells found on site:	No (don't see any)	
	Should they be abandoned:		
	Abandoned wells on site:	Νο	
	Abandonment Log Available (Y/N):	No	
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):	No	
	Artesian wells found on adjacent properties:	No	
	Are there Well Pits Located on Adjacent Properties:	No	
	Other (Specify):		
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	Yes	
	If on private services, how many septics/wells (based on # of homes):	5 homes	
	Distance of closest septics (approx. to house):	~ 30 m	
	Communal septics used nearby:	No	
	Are domestic wells within municipal aquifer:	N/A - Given that there are no provate domestic wells	
	Are there wells found within well pits on surrounding properties:	N/A - Given that there are no provate domestic wells	
	Any historic well interference complaints:	N/A - Given that there are no provate domestic wells	
	Historic Contamination Issues Noted at Domestic Wells:	N/A - Given that there are no provate domestic wells	
	Parkland:	No, just vacant land	
	Fertilizer used?		
	Forestry:	No, just vacant land	
	Agriculture:	No, just vacant land	
	Evidence of Manure Storage (liquid or solid):		
	Animal Grazing:		



	Question	Answer	Comments
	Industrial:	Quarry / Mining	
	n ddon din	quary / mining	
		Ourse (Minim	
		Quarty / Mining	
	AST's or UST's at site:	Yes (Above ground tanks- 2 one on quarry and one near garage	
		Blasting has potentially opened Have their own well and septic on	
	Other Risks (large septics etc):	site at quarry	
	Land Uses Specified in NL Reg 63/03 as risks:		
	Cesspool receiving raw sewage that is less than or equal to 4 m deep ( >= 30 m away		
	from well):	Mine activity	
	Cesspool or seepage pit that is $>= 4 \text{ m}$ deep		
	away from a well:	Washing ponds, wash vehicles up on site. Storage ponds	
	Seepage Pit, Filter Bed, Soil Absorption Field,		
	Earth Privy Pit or similar (>=16 m away from well):		
	Sewer of cast iron with leaded joints or		
	clean water drain or cistern (>= 3 m away from		
	well):	No	
		Dump - old and abandoned. On other side of the road from mine, in	
	Sanitary Landfill or Garbage Dump:	Quarry land	
	Is there a pumphouse cast iron floor drain with		
	m from well):	No	
	Septic(s), concrete vault privy, sewer or tightly		
	jointed tile or equivalent material or sewer connected foundation drain (>=16 m away		
	from well):	No (closest septic is ~30m)	
	Future Land Use Changes that could impact wells:	Mining is continually expanding	
		Raw sewage for wastewater treatment is 1km away from well 2 at a lake which leads to the river, running by the wells. Flow is towards the	
	Other please specify (i.e. sources of microbial contam.):	municipal wells.	
15. Notes:	300 ft around well is protected from	No sources of potential containation on other hill. A lot of crown	
	development; Preter to have a new well drilled on opposite hill which is at a	land up there, so it is protected.	
	distance from the mine and higher		
	elevation with no threats		

#### Photo Log - Sheaves Cove - WS-g-0643







Signage



Rear view of pumphouse





Well head



Well head - unsanitary well seal

#### Photo Log - Sheaves Cove - WS-g-0643

### AECOM



Interior of pumphouse



Interior of pumphouse



Interior of pumphouse



Metal debris near pumphouse



Fractured rock outcrop near well site



## Ship Cove-Lower Cove Jerry's Nose







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	Question	Answer	Comments
1 Project Details:	Project No:	60236351	Aggregate site has a few septic systems
n roject Details.	Client:	Newfoundland and Labrador, Department of Environment and Conservation, WRMD	In Summer 2010 well dried out a bit. It hasn'thappedned since. Well Operators; House shook when mine
	Date of Inspection:	30-Nov-11	
	AECOM Inspector:	Amanda Sills	
	Site Contact (Name, Phone #):	Travis Young	
	Weather:	1°C Cloudy	
2. Well Designation:	Well ID:	Drilled Well	
	Well Type/Usage:	Domestic	
	Well Status (Pumping, Backup, Obs.):	Pumping	
3. Location:	Water Supply No.:	WS-G-0643	
	Community:	Sheave Cove	
	Street:	Port au Port Highway	
(Community, Street, GPS	GPS Northing:	349098	
Grid, Well Elevation provided by well operator)	GPS Easting:	5376797	
	Well Elevation (masl):	Not Available	
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)	Some bacteria, Iron, some lead, and one other parameter in the water he can't recall	
(Questions for well operators)	Do Storms Change the Well Chemistry (i.e. increased TSS)	yes, gets cloudy and clears up 2 hours after rain ends	(If yes, go to step II) (O.Reg 170/03)
	surface water bodies (take conductivity measurement of nearby surface water if possible):	None nearby	(If yes, go to step II) (O.Reg 170/03)
	Is there an observable change in nearby surface water levels when the well is pumping:	N/A	(If yes, go to step II) (MOE GUDI Guidelines, 2001)
	Historic issues with bacteria, TSS, boil water advisories?	Total Coli hit / exceedance recently (e-coli since mine started blasting)	(If yes, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or microscopic particulate analysis completed on it? If so when, results, copy of report available?	Νο	
	Are there increasing/concerning trends of any other parameters at the well not mentioned yet:	No	
	Additonal Raw Water Chemistry Available that we could have:	 No	
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc	No (only have issues with the well when it rains)	
	Does the well water ever taste salty? Is there any evidence of salt water intrusion at the well or in the surrounding area?	No	
	What is the current well treatment:	Chlorinated	



	Question	Answer	Comments
	Has the well ever needed treatment upgrades or remediation (if so, when, why, records available?):	Just for chlorinated water due to e-coli	
			(If yes and a contrary report was not written after August 1, 2000, go to step II) (O.Reg
	Historic Reports Indicating GUDI status (Y/N):	No	170/03)
	Obtain a copy (Y/N):		
	Date of Report:		
	Name of Preparer:		
	Reason for GUDI Status:		
	Average Annual Pumping Rate:	Pump is 2 HP (Model #001H07U-4253)	
	Maximum Monthly Pumping Rate:		(If <u>cannot</u> pump at greater than 0.58 L/s and is within 15 m of surface water or if the well <u>can</u> supply water at greater than 0.58 L/s and is in overburden within 100 m of surface water or <u>can</u> supply water at greater than 0.58 L/s and is in bedrock within 500 m of
		30 gpm (Supply ~25 houses)	surface water, go to step II) (O.Reg 170/03)
	Other (specify):		
5. Sensitive Setting:	Spring:	No	(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:	Νο	(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well:	Νο	(If yes, go to step II)
	Karst Aquifer:	Unknown	(If yes, go to step II)
	Exposed Fractured Bedrock:	Thin overburden over fractured bedrock (~ 1 m of overburden)	(If yes, go to step II)
	Thin or absent soil cover over bedrock? How far away from the well?	yes ~ 15m in rock out crop	
	High K Unconfined Aquifer:	N/A (Don't know)	(If yes, go to step II) (O.Reg 170/03)
	Enhanced Recharge:	No	(If yes, go to step II) (MOE Guidelines on GUDI, 2001)
	Dug Well:	No	(If not Drilled Well, Go To Step II) (O.Reg 170/03)
	Drilled Well (in overburden or bedrock):	yes (bedrock)	
6. Well	Well Log Found (Y/N):	No	
Construction	Driller (Name; ID):	Clearwater (Francis Gail)	
Details	Construction Date:	~ 1996	
	Well Depth:	~ 200 ft	
	Casing Type:	Steel	
	Firmly seated in bedrock (Y/N)	Asked for 60 ft of casing but thinks he only got 20-40 ft.	





	Question	Answer	Comments
	Water Tight Casing to 6mbgs (Y/N)	Thinks they grouted up the base but no up the whole well to ground surface. When it rains all of the water around the well soaks in. No puddles and no water in ditches	(If No go to Step II) (O.Reg 903)
	Casing Diameter:	6"	(ii iio go to otep ii) (o.itog ooo)
	Casing Length:	Supposed to be 60 ft but thisks driller put is 20.40 ft	(16 - 12 m or 10 ft, go to Stop II)
	Has the well ever been disinfected (when, why, most	They put chlorine down the well every 2 - 3 months to disinfect well (0.5	
	When was the well pump last serviced or replaced? Was it disinfected before being placed back in well:	April 2011 (bottom of pump fell off) They disinfect it in chlorine barrel before putting in well	
	Well Yield:	Not known	
	Static Water Level:	~ 80 ft from bottom of well up (Summer 2010)	
	Overburden Thickness:	~ 2ft	
	Pump type:	Sumbmersible Pantek pump	
	Pump Setting:	180ft btc	
	Drive Shoe (Y/N):	No/ Not available	
	Grouted Casing (Y/N):	N/A (not known)	
	Thickness of Grout around well:	N/A (not known)	
	Water Level Monitoring Pipe in Well (Y/N):	Maybe or could be for wiring - don't want to remomve lid to check bolts etc.)	
	Raw Water Sampling Tap (Y/N):	yes	
	Other:		
7. Well Condition	Located in a Well House (Y/N):	No	
Assessment (O.Reg 90	Well Tagged or Identified:	No	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):	N/A (not known)	
	Any Rust or Holes Evident on Casing:	Rusted (Cut a hole to run the rope for the pump into the well)	
	Above Ground Casing Height (mags) (If stickup, provide details):	20 cm	
	Flush Mount Well (mbgs) (If flush mount, provide details):	N/A (No)	
	Is the Well Located in a Well Pit (mbgs):	No	
	Covered with solid, watertight cover (Y/N):		
	Casing is above bttm of pit floor:		
	Is the pit equipped to drain (provide details)?		
	Is the pit equipped with a sump pump (Y/N)?		



	Question	Answer	Comments
	The casing vent is at what height above the pit floor (cm)?		
	Height of Ground Surface for 5 m around well is at least 60 cm above the highest known surface water level (Y/N):	Yes (however, is a ditch that would be slightly higher (~1m) than well)	
	Is the topography around the well indicative of surface ponding and flow towards the well:	On a slope so flow could go to well but would run past	
	Is drainage at the well adequate (any standing water or evidence of ponding):	Yes (no evidence of ponding)	
	Protective Cap Found on Well (Acceptable Seal?):	Yes - is a cap, seal could be tighter	
	Is the Well Locked (Secure?):	No - Lifts right off	
	Pit-less adapter:	No	
	Screened air vent:	No - loose cap	
	Flood protection (has it ever flooded):	No, water soaks in immediately or runs by the well	
	Vehicle impact protection:	No	
	Fencing:	No	
8. Aquifer	Surficial (type of geology, depth, observed surficial info):	Overburden with some nearby rock outcrops	
Characteristics	Bedrock (type, depth, exposed at surface):	Some nearby bedrock outcrops (~ 15m)	
	Show the Geology Mapping or borehole,does it match with their understanding?	Not known by operator	
	Unconfined Municipal Aquifer:	Likely because 2 ft of OB and then fractured bedrock	(If yes, go to step II)
	Confined Municipal Aquifer:	No	
	Pumping Test Done (Y/N)	No	
0. Provinity to courses	When was test done, is the data available?		
of potential surface water contamination	Perennial Stream/Pond (metres away from well):	Νο	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
	Ephemeral Stream (metres away from well):	No	Water and bedrock well, go to Step II) (If < 100 m from Surface Water and an
(500 m for bedrock,	Ditch (metres away from well):	Yes ~ 10 m	overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
100m for overburden)	Is there water in the ditch (Y/N):	No	
	When did it last rain? If recent is there water in the ditch? Does the ditch drain quickly?	36 hours ago	
	River:	No	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface
I	Lake:	No	Water and bedrock well, go to Step II)



	Question	Answer	Comments
	Wetlands/Marshes:	No	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:	N/A	
	Highway/Road:	yes - 10 - 15 m	
	Unused wells found on site:	No (don't see any)	
	Should they be abandoned:		
	Abandoned wells on site:	Νο	
	Abandonment Log Available (Y/N):	No	
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):	No	
	Artesian wells found on adjacent properties:	No	
	Are there Well Pits Located on Adjacent Properties:	No	
	Other (Specify):		
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	Yes	
	If on private services, how many septics/wells (based on # of homes):	5 homes	
	Distance of closest septics (approx. to house):	~ 30 m	
	Communal septics used nearby:	No	
	Are domestic wells within municipal aquifer:	N/A - Given that there are no provate domestic wells	
	Are there wells found within well pits on surrounding properties:	N/A - Given that there are no provate domestic wells	
	Any historic well interference complaints:	N/A - Given that there are no provate domestic wells	
	Historic Contamination Issues Noted at Domestic Wells:	N/A - Given that there are no provate domestic wells	
	Parkland:	No, just vacant land	
	Fertilizer used?		
	Forestry:	No, just vacant land	
	Agriculture:	No, just vacant land	
	Evidence of Manure Storage (liquid or solid):		
	Animal Grazing:		



	Question	Answer	Comments
	Industrial:	Quarry / Mining	
	n ddon din	quary / mining	
		Ourse (Minim	
		Quarty / Mining	
	AST's or UST's at site:	Yes (Above ground tanks- 2 one on quarry and one near garage	
		Blasting has potentially opened Have their own well and septic on	
	Other Risks (large septics etc):	site at quarry	
	Land Uses Specified in NL Reg 63/03 as risks:		
	Cesspool receiving raw sewage that is less than or equal to 4 m deep ( >= 30 m away		
	from well):	Mine activity	
	Cesspool or seepage pit that is $>= 4 \text{ m}$ deep		
	away from a well:	Washing ponds, wash vehicles up on site. Storage ponds	
	Seepage Pit, Filter Bed, Soil Absorption Field,		
	Earth Privy Pit or similar (>=16 m away from well):		
	Sewer of cast iron with leaded joints or		
	clean water drain or cistern (>= 3 m away from		
	well):	No	
		Dump - old and abandoned. On other side of the road from mine, in	
	Sanitary Landfill or Garbage Dump:	Quarry land	
	Is there a pumphouse cast iron floor drain with		
	m from well):	No	
	Septic(s), concrete vault privy, sewer or tightly		
	jointed tile or equivalent material or sewer connected foundation drain (>=16 m away		
	from well):	No (closest septic is ~30m)	
	Future Land Use Changes that could impact wells:	Mining is continually expanding	
		Raw sewage for wastewater treatment is 1km away from well 2 at a lake which leads to the river, running by the wells. Flow is towards the	
	Other please specify (i.e. sources of microbial contam.):	municipal wells.	
15. Notes:	300 ft around well is protected from	No sources of potential containation on other hill. A lot of crown	
	development; Preter to have a new well drilled on opposite hill which is at a	land up there, so it is protected.	
	distance from the mine and higher		
	elevation with no threats		







Signage

Signage



Pumphouse



Well head

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Photo Log - Ship Cove - Lower Cove - Jerry's Nose - WS-g-0839
Source Well #4 Nancy Rave Well
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Well head



Well head relative to road



## St. Andrews





Map Document. (P: 90236351000-CADD/050 GIS WIP/MXDs/FieldMapMXDs/60236351WellLocations\_StAndrews.mxd) 11/24/2011 -- 303304 PM



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	Question	Answer	Comments
1. Proiect Details:	Proiect No:	60236351	
	Client:	Newfoundland and Labrador, Department of Environment and Conservation, WRMD	
	Date of Inspection:	2-Dec-11	
	AECOM Inspector	Amanda Sills	
	Site Contact (Name, Phone #):	Donny Tufts	
	Weather:	1°C Cloudy	
2. Well Designation:	Well ID:	St. Andrews #2 Well	
	Well Type/Usage:	Domestic (~16 homes)	
	Well Status (Pumping, Backup, Obs.):	Pumping	
3. Location:	Water Supply No.:	WS-G-0680	
	Community:	St. Andrews	
	Street:	Rains Rd. (Local name for road)	
(Community, Street, GPS	GPS Northing:	329642	
measured in field. Map Grid, Well Elevation provided by well operator)	GPS Easting:	5294034	
	Well Elevation (masl):	Not Available	
4. Historic Water Quality	What is the historic raw water quality of the well (general chem, bacteria etc)	Good	
(Questions for well operators)	Do Storms Change the Well Chemistry (i.e. increased TSS)	No	(If yes, go to step II) (O.Reg 170/03)
	is the well water chemistry similar to nearby surface water bodies (take conductivity measurement of nearby surface water if nossible):	Is a ditch < 5m other than that not relevant	(If yes, go to step II) (O Reg 170/03)
	Is there an observable change in nearby surface water levels when the well is pumping:	No	(If yes, go to step II) (MOE GUDI Guidelines, 2001)
	Historic issues with bacteria, TSS, boil water advisories?	Boil water advisory until chlorine residuals gets checked	(If yes, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or microscopic particulate analysis completed on it? If so when, results, copy of report available?	No	
	Are there increasing/concerning trends of any other parameters at the well not mentioned yet:	Iron, in past pump was too low and had cloudy/dirty water running into well. Raised pump and issue cleaned up.	
	Additonal Raw Water Chemistry Available that we could have:	No	
	Does the well produce dirty water on start up? What is the nature of the dirty water i.e. sandy, iron (red) etc	No	
	Does the well water ever taste salty? Is there any evidence of salt water intrusion at the well or in the surrounding area?	No	
	What is the current well treatment:	Chlorination and UV (UV is often turned off)	



	Question	Answer	Comments
	Has the well ever needed treatment upgrades or remediation (if so, when, why, records available?):	Not known when UV added/ occurred because can't afford to replace bulb. Bulbs should last 1 year but are lasting less. Around 15 years ago chlorine added.	
			(If yes and a contrary report was not written after August 1, 2000, co to step II) (O.Reg
	Historic Reports Indicating GUDI status (Y/N):	No No	170/03)
	Obtain a copy (Y/N):	Not applicable	
	Name of Bransform		
	Reason for GUDI Status:		
	Average Annual Pumping Rate:	1.5 HP, submersible pump.	
	Maximum Monthly Pumping Rate:	Don't know flow numbers	(If <u>cannot</u> pump at greater than 0.58 L/s and is within 15 m of surface water or if the well <u>can</u> supply water at greater than 0.58 L/s and is in overburden within 100 m of surface water or <u>can</u> supply water at greater than 0.58 L/s and is in bedrock within 500 m of surface water. go to step II) (O.Reg 170/03)
	Other (specify):		,,,,,,
5. Sensitive Setting:	Spring:	No	(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:	No	(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well:	No	(If yes, go to step II)
	Karst Aquifer:	No	(If yes, go to step II)
	Exposed Fractured Bedrock:	No	(If yes, go to step II)
	Thin or absent soil cover over bedrock? How far away from the well?	Νο	
	High K Unconfined Aquifer:	Νο	(If yes, go to step II) (O.Reg 170/03)
	Enhanced Recharge:	Νο	(If yes, go to step II) (MOE Guidelines on GUDI, 2001)
	Dug Well:	No	(If not Drilled Well, Go To Step II) (O.Reg 170/03)
	Drilled Well (in overburden or bedrock):	Yes (think it is in bedrock)	
6. Well	Well Log Found (Y/N):	No (Municipal Affairs has it)	
Construction	Driller (Name; ID):	Clearwater (Frainsic Gail)	
Details	Construction Date:	1989 or 1990 (Kevin Gail (son) drilled it)	
	Well Depth:	> 100 ft	
	Casing Type:	Steel	



	Question	Answer	Comments
	Firmly seated in bedrock (Y/N)	Not known	
	Water Tight Casing to 6mbgs (Y/N)	Not known	(If No go to Step II) (O.Reg 903)
	Casing Diameter	6"	
	Casing Learth	Nationum	
	Has the well ever been disinfected (when, why, most	NULKIOWI	(ir < 12 m or 40 π, go to Step ii)
	recently): When was the well pump last serviced or replaced? Was it disinfected before being placed back in well:	No (Never had bacteria issues) A variety of issues with the pump take it out to fix it often (last winter Feb. 2011 last time pump was removed)	
	Well Yield:	Not known	
	Static Water Level:	No	
	Overburden Thickness:	Not known	
	Pump type:	Submersible Pump	
	Pump Setting:	~ 80 ft	
	Drive Shoe (Y/N):	Not known	
	Grouted Casing (Y/N):	Not known	
	Thickness of Grout around well:	Not known	
	Water Level Monitoring Pipe in Well (Y/N):	No	
	Raw Water Sampling Tap (Y/N):	Yes but only if we drain one of the chlorine tanks and run raw water through it	
	Other:		
7. Well Condition	Located in a Well House (Y/N):	No	
Assessment (O.Reg 90	Well Tagged or Identified:	Yes	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):	Not known	
	Any Rust or Holes Evident on Casing:	Rusted, no holes	
	Above Ground Casing Height (mags) (If stickup, provide details):	91 cm	
	Flush Mount Well (mbgs) (If flush mount, provide details):	No	
	Is the Well Located in a Well Pit (mbgs):	No	
	Covered with solid, watertight cover (Y/N):	Not Applicable	
	Casing is above bttm of pit floor:	Not Applicable	
	Is the pit equipped to drain (provide details)?	Not Applicable	



	Question	Answer	Comments
	Is the pit equipped with a sump pump (Y/N)?	Not Applicable	
	The casing yent is at what height above the nit		
	floor (cm)?	Not Applicable	
	Height of Ground Surface for 5 m around well is at		
	least 60 cm above the highest known surface water		
	level (Y/N):	Yes	
	Is the topography around the well indicative of		
	surface ponding and flow towards the well:	No	
	Is drainage at the well adequate	Vee	
	(any standing water or evidence of ponding):	Yes	
	Protective Cap Found on Well (Acceptable Seal?):	Yes	
	Is the Well Locked (Secure?):	Boltod in place - no lock	
		Bolled in place - no lock	
	Pit-less adapter:	No	
	Screened air vent:	Yes	
		100	
	Flood protection (has it ever flooded):	No	
	Vehicle impact protection:	No	
		NO	
	Fencing:	No	
	Surficial (type of geology, depth, observed surficial		
8. Aquifer	info):	Not known	
Characteristics	Bedrock (type, depth, exposed at surface):	Not known	
	Show the Geology Manning or horehole does		
	it match with their understanding?	Not known	
	l la seu fin e di Marci sin e li Annuife n		
	Unconfined Municipal Aquifer:	N/A (NOT KNOWN)	(If yes, go to step II)
	Confined Municipal Aquifer:	N/A (Not known)	
	Pumping Tost Dono (X/N)	Ack the Municipality for data	
		ASK the Municipality for data	
	When was test done, is the data available?	Not Applicable	
9. Proximity to sources			
water contamination			(If < 100 m from Surface Water and an
	Perennial Stream/Pond (metres away from well):	No	overburden well or if < 500 m from Surface Water and bedrock well go to Step II)
	r oronniar oreanin ond (metres away nom weil).	140	Water and bedrook well, go to step II)
			(If < 100 m from Surface Water and an
			overburden well or if < 500 m from Surface
	Ephemeral Stream (metres away from well):	No	Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an
		Voc. all around site one is zEm away other is 10, 15 m away	overburden well or if < 500 m from Surface
(500 m for bedrock, 100m for overburden)	Ditch (metres away from well):	res, ail around site, one is <oni -="" 10="" 15="" away,="" away<="" is="" m="" other="" td=""><td>water and bedrock well, go to Step II)</td></oni>	water and bedrock well, go to Step II)
	Is there water in the ditch (Y/N):	yes	
	When did it last rain? If recent is there water in the ditch? Does the ditch drain guidely?	36 hours ano - still water running in ditchoo	
	the ditch? Does the ditch drain quickly?	SU HOUIS AND - SUIL WALEH FUTTITING IT UICHES	
			(If < 100 m from Surface Water and an
			overburden well or if < 500 m from Surface
1	River:	No	Water and bedrock well, go to Step II)



	Question	Answer	Comments
	Lake:	No	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Wetlands/Marshes:	Yes	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Is drainage towards the well possible:	~ 40m - 50 m, relatively flat terrain	
	Highway/Road:	yes, 5 - 10m	
	Unused wells found on site:	No (Just dissconnected pump at community centre across road, ~ 20m - cloudy water when start pump and sulphur smell at community centre	
	Should they be abandoned:	Not yet - newly disconnected	
	Abandoned wells on site:	No	
	Abandonment Log Available (Y/N):	No	
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):	No	
	Artesian wells found on adjacent properties:	No	
	Are there Well Pits Located on Adjacent Properties:	Not known	
	Other (Specify):		
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	yes	
	If on private services, how many septics/wells (based on # of homes):	16 homes around site - individual septics	
	Distance of closest septics (approx. to house):	approximately 15 - 20 m	
	Communal septics used nearby:	No	
	Are domestic wells within municipal aquifer:	A lot of homes have their own domestic well	
	Are there wells found within well pits on surrounding properties:	Not known but possible	
	Any historic well interference complaints:	No	
	Historic Contamination Issues Noted at Domestic Wells:	No	
	Parkland:	No	
	Fertilizer used?	No	
	Forestry:	No	
	Agriculture:	Yes, but ~4km away	
	Evidence of Manure Storage (liquid or solid):	unknown	



	Question	Answer	Comments
	Animal Crazing	unknown	
	Animai Grazing.	UINIOWI	
	Industrial:	No	
	Type of Industrial Use:		
	AST's or UST's at site:		
	Other Risks (large sentics etc.):		
	Land Uses Specified in NL Reg 63/03 as risks:	No	
	than or equal to 4 m deep ( >= 30 m away		
	from well):		
	Cesspool or seepage pit that is >= 4 m deep		
	away from a well:		
	Seepage Pit, Filter Bed, Soil Absorption Field,		
	Earth Privy Pit or similar (>=16 m away from well):		
	Sewer of cast iron with leaded joints or		
	approved mechanical joints, independent clean water drain or cistern (>= 3 m away from		
	well):		
	Sanitary Landfill or Garbage Dump:		
	Is there a pumphouse cast iron floor drain with		
	leaded joints draining to ground surface? (>=1		
	m from well): Sentic(s) concrete yault prive, sewer or tightly		
	jointed tile or equivalent material or sewer		
	connected foundation drain (>=16 m away	Voc (15 - 20m away)	
	nom wen).	165 (13 * 2011 away)	
		Area of 300 ft around pumphouse protected from development - no new	
	Future Land Use Changes that could impact wells:	development other than 1 or 2 new homes, nothing specific however Raw sewage for wastewater treatment is 1km away from well 2 at a lake	
	Other please specify (i.e. sources of microbial	which leads to the river, running by the wells. Flow is towards the	
	contam.):	municipal wells.	
15. Notes:	Door on pumphouse is often not locked	Well Operator falsifying chlorine residual . D	isconnected UV system because bulb
	was too much of a pain		

#### Photo Log -St. Andrews







Well and pumphouse - North direction



Proximity of well to road



Ditch in close proximity to road

Signage

#### Photo Log -St. Andrews





Well head



Vent in well cap



Well tagging information



Interior of pumphouse



Interior of pumphouse



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR

Department of Environment and Conservation Water Resources Management Division

### Water Well Record

Well Owner Name: LOCAL SERVICE DISTRICT Address:	Lithology Listing: RED CLAY/GRVL 006 RED/GREY SHLE 050		
Well Location Town: ST. ANDREW'S GPS Coordinates N ° ' "	Total Depth:         50.00         m         Depth to Bedrock:         m           Water Bearing Zone(s)          Lpm at         m          Lpm at         m            Lpm at         m          Lpm at         m		
W ° ' " Map Number: 12B/8 NAD: UTM Zone: 21	Casing Type:         Casing Length:       9.70 m       Diameter: mm         Casing Thickness:       mm         Drive Shoe Used:       mm		
Northing: 5293795 Easting: 329578 Type of Water Encountered:FR	Well Grouted:         from       m         from       m         Grout Type:		
Well / Water Use: PS Type of Work Completed: Drilling Method:	Screen Info:		
Pump Recommendations         Pump Type:         Intake Setting:       m         Pumping Rate:       Lpm         Estimated Safe Yield of Well:       63.00       Lpm	Pumping Test         Method:         Pumping Rate:       Lpm Duration 120 min         Well Overflowing:       Overflow Rate:       Lpm		

**Drillers Comments:** 

Name of Drilling Company Clearwater Drilling Ltd. Licence Number 4 Date Well Completed 27 /03/1989

This Record Modified by: Modified date:



# Tompkins






Map Document. (P:160236361000-CADD1050 GIS WIP\MXDs\FieldMapMXDs\60236351WellLocations\_Tompkins\_SurfGeology.mxd) 11/25/2011 -- 12:13:50 PM



Environment

	Question	Answer	Comments
1 Broject Details:	Project No:	60236351	
1. Floject Details.		00230331	
		Newfoundland and Labrador, Department of Environment and	
	Client:	Conservation, WRMD	
	Date of Inspection:	2-Dec-11	
	AECOM Inspector:	Amanda Sills	
	Site Contact (Name, Phone #);	Tod Wall (709 955 2267)	
	Sile Contact (Name, Fhone #).	Teu Waii (709.933.2207)	
		1% Claudu	
	Weather:	I C Cloudy	
2. Well Designation:	Well ID:	Gregg Wall Well	
	Well Type/Usage:	Domestic (~30-32 homes)	
	Well Status (Pumping, Backup, Obs.):	Pumping	
3. Location:	Water Supply No.:	WS-G-0738	
	Community:	Tompkins	
	oominanty.	ronpano	
	Christian	Templing Deed (Deute 400)	
	Street.	Tompkins Road (Route 460)	
(Community, Street, GPS measured in field Map	GPS Northing:	332953	
Grid, Well Elevation			
provided by well operator)	GPS Easting:	5296260	
	Well Elevation (masl):	Not available	
	What is the historic raw water quality of the well		
4. Historic Water Quality	(general chem, bacteria etc)	Good	
(Questions for well	Do Storms Change the Well Chemistry (i.e.		
operators)	increased TSS)	No	(If yes, go to step II) (O.Reg 170/03)
	Is the well water chemistry similar to nearby		
	measurement of nearby surface water if		
	possible):	Not Applicable - No surface water bodies	(If yes, go to step II) (O.Reg 170/03)
	is there an observable change in pearby		(If yes, go to step II) (MOF GUDI Guidelines
	surface water levels when the well is pumping:	Not Applicable	2001)
	Historic issues with bostoria TSS hail water		
	advisories?	Yes because not chlorinated, permanent boil water advisory	(If yes, go to step II) (O.Reg 170/03)
	Has the well ever had particle counting or		
	microscopic particulate analysis completed on it? If so when results, conv of report		
	available?	No	
	Are there increasing/concerning trends of any		
	other parameters at the well not mentioned yet:	No	
	Additonal Raw Water Chemistry Available that we could have:	No	
	Does the well produce dirty water on start up?		
	What is the nature of the dirty water i.e.	No	
	sandy, iron (180) etc	140	
	Does the well water ever taste salty? Is there		
	any evidence of salt water intrusion at the well or in the surrounding area?	No	
		Nation 2	
l	what is the current well treatment:	Nothing	



	Question	Answer	Comments
	Has the well ever needed treatment upgrades or remediation (if so, when, why, records available?):	Used to have chlorination but removed. Chlorine used to plug up the home filter so the operator took it off. A lot of public fear regarding health effects of chlorine. UV turned off because it interfered with neighbour satellite.	
	Historic Reports Indicating GUDI status (Y/N):	No	(If yes and a contrary report was not written after August 1, 2000, go to step II) (O.Reg 170/03)
	Obtain a copy (Y/N):		
	Date of Report:		
	Name of Preparer:		
	Reason for GUDI Status:		
	Average Annual Pumping Rate:	1.5 HP Pump, ~ 27 gpm	
	Maximum Monthly Pumping Rate:		(If <u>cannot</u> pump at greater than 0.58 L/s and is within 15 m of surface water or if the well <u>can</u> supply water at greater than 0.58 L/s and is in overburden within 100 m of surface water or <u>can</u> supply water at greater than 0.58 L/s and is in bedrock within 500 m of
	Other (specify):	Not available	surface water, go to step II) (O.Reg 170/03)
5. Sensitive Setting:	Spring:	No	(If yes, go to step II)
(Source of Water Supply)	Infiltration Gallery:	No	(If yes, go to step II) (O.Reg 170/03)
	Horizontal Collection Well:	No	(If yes, go to step II)
	Karst Aquifer:	No	(If yes, go to step II)
	Exposed Fractured Bedrock: Thin or absent soil cover over bedrock? How	No	(If yes, go to step II)
	High K Unconfined Aquifer:	No	(If yes, go to step II) (O.Reg 170/03)
	Enhanced Recharge:	No	(If yes, go to step II) (MOE Guidelines on GUDI, 2001)
	Dug Well:	No	(If not Drilled Well, Go To Step II) (O.Reg 170/03)
	Drilled Well (in overburden or bedrock):	Yes (bedrock - shale)	
6. Well	Well Log Found (Y/N):	Yes	
Construction	Driller (Name; ID):	Clearwater (Francis Gail)	
Details	Construction Date:	Feb. 20, 1989	
	Well Depth:	25.61m	
1	Casing Type:	Steel	



	Question	Answer	Comments
	Firstly a state of in the data of (AAA)	Contrasti a consta di construitta tata i dagi a ka danghi	
	Firmly seated in bedrock (Y/N)	Casing is sealed approximately im in bedrock	
	Water Tight Casing to 6mbgs (Y/N)	Yes (assuming bentonite is in place - casing is in place)	(If No go to Step II) (O.Reg 903)
	Casing Diameter:	6"	rated 45 L/min; Static 2.44m; Well depth 25.6m
	Casing Length:	Unknown	(If < 12 m or 40 ft, go to Step II)
	Has the well ever been disinfected (when, why, most recently):	Νο	
	When was the well pump last serviced or replaced? Was it disinfected before being placed back in well:	~ 3 years ago put in a new pump, likely not disinfected	
	Well Yield:	45 L/min when installed	
	Static Water Level:	2.44m in 1989	-
	Overburden Thickness:	13.42m	
	Pump type:	Submersible pump	
	Pump Setting:	Not available	
	Drive Shoe (Y/N):	Unknown	
	Grouted Casing (Y/N):	Unknown	
	Thickness of Grout around well:	Unknown	
	Water Level Monitoring Pipe in Well (Y/N):	Νο	
	Raw Water Sampling Tap (Y/N):	All raw water, so yes	
	Other:		
7. Well Condition	Located in a Well House (Y/N):	No	
Assessment (O.Reg 90	Well Tagged or Identified:	Yes	
and NL Reg 63/03)	Condition of Annular Seal (Meets Reg. or Does Not):	Unknown	
	Any Rust or Holes Evident on Casing:	Rusted, no holes evident	
	Above Ground Casing Height (mags) (If stickup, provide details):	40 cm	
	Flush Mount Well (mbgs) (If flush mount, provide details):	No	
	Is the Well Located in a Well Pit (mbgs):	 No	
	Covered with solid, watertight cover (Y/N):	No	
	Casing is above bttm of pit floor:	No	
	Is the pit equipped to drain (provide details)?	No	



	Question	Answer	Comments
	Is the pit equipped with a sump pump (Y/N)?	No	
	I he casing vent is at what height above the pit floor (cm)?	No	
	Height of Ground Surface for 5 m around well is at	No	
	least 60 cm above the highest known surface water		
	level (Y/N):	Yes	
	Is the topography around the well indicative of surface ponding and flow towards the well:	Flow as it is on a slope but not ponding	
	Surface performing and new towards the weil.	now do into on a slope but not politiling	
	Is drainage at the well adequate		
	(any standing water or evidence of ponding):	No evidence of ponding	
	Protective Cap Found on Well (Acceptable Seal?):	Ok cap	
		Un dup	
	Is the Well Locked (Secure?):	Not locked or secured with bolts	
	Pit-less adapter:	Νο	
	Screened air vent:	No	
		Fleads in ditabas in anning ( 20m away, ditabas at bass of a bill	
	Flood protection (bas it ever flooded):	Floods in ditches in spring (~ 30m away, ditches at base of a hill, downbill from the well)	
	Vehicle impact protection:	No	
	Fencina:	No	
	r orionig.	·	
8. Aquifer	Surficial (type of geology, depth, observed surficial info)	Gravel to 13.42m	
Characteristics	Bedrock (type, depth, exposed at surface):	Bedrock 13.42 - 17.69m sandstone; 17.69 - 25.61 shale	
	Show the Geology Mapping or borehole, does		
	it match with their understanding?		
	Unconfined Municipal Aquifer:	No	(If yes, go to step II)
	Confined Municipal Aquifor:	Vac	
		Tes	
	Pumping Test Done (Y/N)	Yes	
	When was test done, is the data available?	Look at records provided by well operators	
9. Proximity to sources			
of potential surface			(If < 100 m from Surface Water and an
water contamination			overburden well or if < 500 m from Surface
	Perennial Stream/Pond (metres away from well):	No	Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an
	Ephemeral Stream (metres away from well)	No (Just ditches flooding)	Water and bedrock well, go to Step II)
			(If < 100 m from Surface Water and an
			overburden well or if < 500 m from Surface
	Ditch (metres away from well):	Yes ~ 30 - 35m	Water and bedrock well, go to Step II)
(500 m for bedrock,			
nuum for overburden)	le thoro water in the ditch (V/N).	Voe	
	is there water in the ditch (Y/N):	1 ೮১	
	When did it last rain? If recent is there water in		
	the ditch? Does the ditch drain quickly?	36 hours ago	
			(If < 100 m from Surface Water and an
	River:	No	Water and bedrock well, go to Step II)



	Question	Answer	Comments
	Lake:	Νο	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well, go to Step II)
	Watlands/Marshes	Ves ~ 5m	(If < 100 m from Surface Water and an overburden well or if < 500 m from Surface Water and bedrock well go to Step II)
	Is drainage towards the well possible:	No (at a slightly lower grade ~ 5m lower so not likely)	
	Highway/Road:	Yes (Hwy 460 - ~ 40m away	
	Unused wells found on site:	No	
	Should they be abandoned:	No	
	Abandoned wells on site:	No	
	Abandonment Log Available (Y/N):	Νο	
	Artesian wells found on site (Is the well fixed or does it need to be abandoned):	No	
	Artesian wells found on adjacent properties:	No	
	Are there Well Pits Located on Adjacent Properties:	Not likely - the ones he has seen are drilled with above ground casing	
	Other (Specify):		
10. Land uses within		Significant Risk (Y/N) / Distance from Municipal Well	
500 m of Well Head	Residential (density, on private services?):	Yes	
	If on private services, how many septics/wells (based on # of homes):	All on septics, 2 homes in immediate vicinty, some private wells, some private communal wells (4 homes) nearby (unsure of distance)	
	Distance of closest septics (approx. to house):	~ 5-10	
	Communal septics used nearby:	No	
	Are domestic wells within municipal aquifer:	Not known	
	Are there wells found within well pits on surrounding properties:	Not likely - the domestic wells he has seen are drilled with above ground casing	
	Any historic well interference complaints:	Νο	
	Historic Contamination Issues Noted at Domestic Wells:	The domestic well were turned down to be municipal wells because they had too much salt and/or iron in them. People are still using them however for domestic use	
	Parkland:	Νο	
	Fertilizer used?	No	
	Forestry:	Yes, above well on hill - private wood lot	
	Agriculture:	No	
	Evidence of Manure Storage (liquid or solid):	No	



	Question	Answer	Comments
	Animal Grazing:	No	
	Allinai Grazing.	110	
	Industrial:	No, is a gold course but >1.5km away from well	
	Type of Industrial Use:		
	AST's or UST's at site:		
	Other Picks (large ceptics etc.):	No	
	Other Risks (large septics etc).	NO	
	Land Uses Specified in NL Reg 63/03 as risks:		
	Cesspool receiving raw sewage that is less than or equal to 4 m deep ( >= 30 m away		
	from well):		
	Cesspool or seepage pit that is >= 4 m deep		
	away from a well:		
	Seepage Pit, Filter Bed, Soil Absorption Field,		
	Earth Privy Pit or similar (>=16 m away from		
	Sewer of cast iron with leaded joints or		
	approved mechanical joints, independent		
	clean water drain or cistern (>= 3 m away from well):		
	,		
	Sonitary Londfill or Corbago Dump:		
	Is there a pumphouse cast iron floor drain with		
	leaded joints draining to ground surface? (>=1		
	m from well):		
	Septic(s), concrete vault privy, sewer or tightly iointed tile or equivalent material or sewer		
	connected foundation drain (>=16 m away		
	from well):	Yes, 1 septic	
	Future Land Use Changes that could impact wells:		
	Other places specify (i.e. sources of microbial	Raw sewage tor wastewater treatment is 1km away from well 2 at a lake which leads to the river, running by the wells. Flow is towards the	
	contam.):	municipal wells.	
15. Notes:			

## Photo Log -Tompkins - WS-G-0738 Greg Wall Well







Well



Pumphouse

Signage



Well in relation to pumphouse



Pumphouse in relation to road

## Photo Log -Tompkins - WS-G-0738 Greg Wall Well







Interior of pumphouse

Interior of pumphouse



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR

Department of Environment and Conservation Water Resources Management Division

# Water Well Record

Well Owner Name: LOCAL SERVICE DISTRICT Address:	Lithology Listing: BRWN TILL 026
Well Location Town: TOMPKINS GPS Coordinates N ° ' "	Total Depth:   25.30   m   Depth to Bedrock:   m     Water Bearing Zone(s)    Lpm at   m    Lpm at   m     Lpm at   m    Lpm at   m
W ° ' " Map Number: NAD: UTM Zone:	Casing Type:   Casing Length: 24.30 m   Diameter: mm   Casing Thickness: mm   Drive Shoe Used: mm
Northing: Easting: Type of Water Encountered:FR	Well Grouted:   from m   Grout Type:
Well / Water Use:PSType of Work Completed:Drilling Method:	Screen Info:
Pump Recommendations   Pump Type:   Intake Setting: m   Pumping Rate: Lpm   Estimated Safe Yield of Well: 137.00 Lpm	Pumping Test   Method:   Pumping Rate: Lpm Duration 1,440 min   Well Overflowing: Overflow Rate: Lpm

**Drillers Comments:** 

Name of Drilling Company Clearwater Drilling Ltd. Licence Number 4 Date Well Completed 18 /08/1988

This Record Modified by: Modified date: