

# **An Inventory of Private Water Wells in the 050J Watershed**

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## **i. Abstract**

A well inventory program was conducted by the East Interlake Conservation District for the 05OJ watershed from May to August of 2008. Staff members went door to door collecting water samples from active water wells to test for nitrate and bacteria concentrations. Additional well information such as well depth, size and type was collected in conjunction with the water samples to allow staff at the Province of Manitoba to update provincial well records. Results of this comprehensive well survey showed that approximately 1 in 4 wells sampled failed to meet basic Canadian Drinking Water Quality Guidelines. In total, 524 wells were sampled for bacteria (total coliforms and *E. coli*) and nitrate levels and 134 failed (25.6%). The location of wells that failed due to nitrates appears to correlate to areas of shallow overburden thickness. However, it is beyond the scope of the EICD project to confirm this correlation.

In general, public participation in this project was very high with a 96.3% uptake. It is felt that the participation was at this level due to public awareness of potential health problems associated with poor water quality. The information collected in this survey will be used to focus programming and the development of an Integrated Watershed Management Plan within the Netley-Grassmere (05OJ) watershed. It is recommended that this type of program continue through future partnerships with Manitoba Water Stewardship – Groundwater and Office of Drinking Water sections – and the East Interlake Conservation District.



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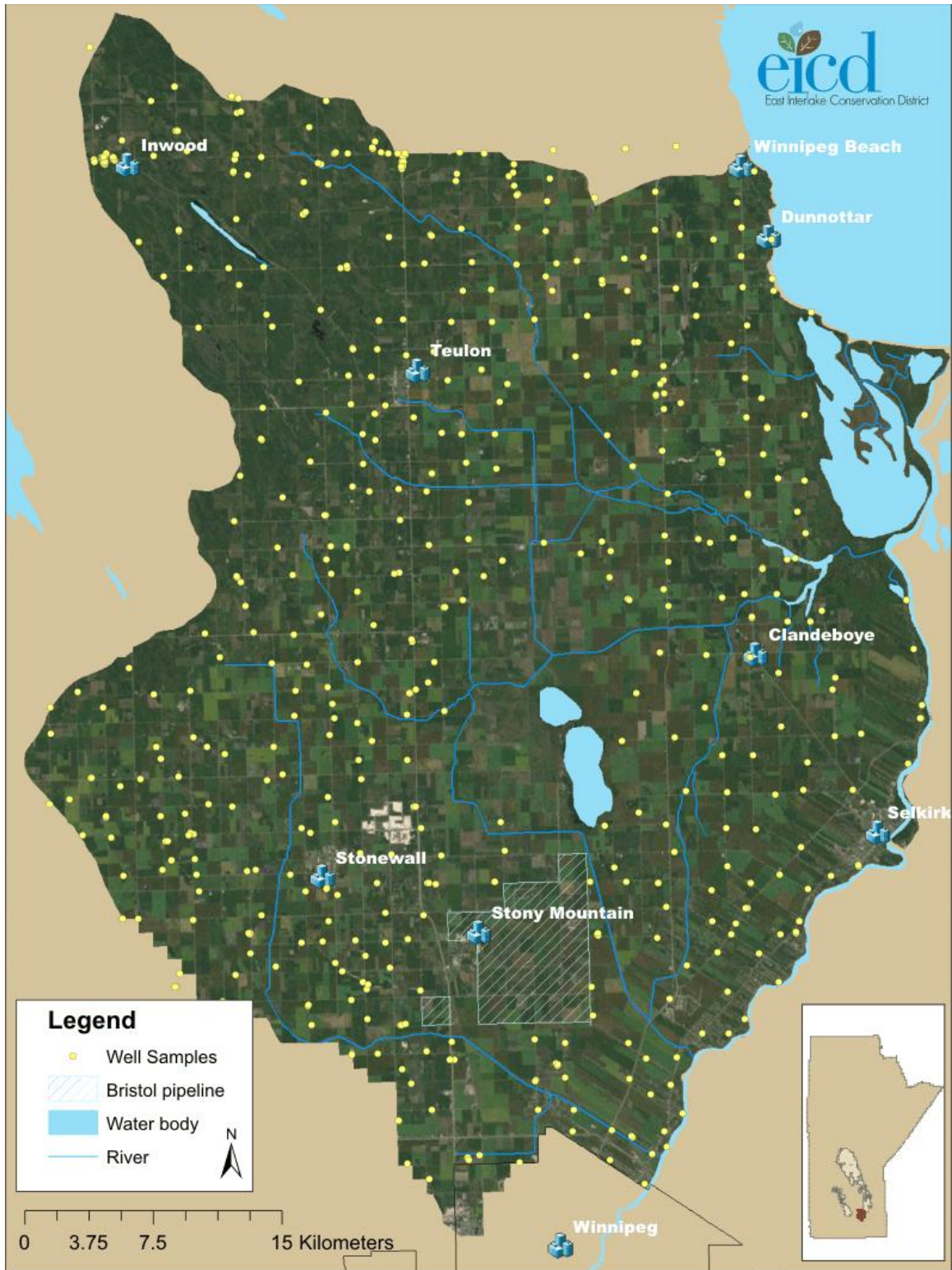
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## **ii. INTRODUCTION**

The East Interlake Conservation District (EICD) was formed in August 2005 and became the seventeenth conservation district in Manitoba. The purpose of the EICD is to address soil and water management issues using a cooperative, long-term, planned approach within defined watersheds.

The 050J watershed is one of four watersheds within the EICD boundaries. The 050J watershed, located along the west side of the south basin of Lake Winnipeg and the north western part of the Red River, is the most southern sub-watershed in the EICD district (Figure 1). The 050J watershed contains the rural municipalities of Armstrong, Rockwood, St. Andrews, West St. Paul, Rosser, and Woodlands. Rural communities include, Winnipeg Beach, Inwood, Teulon, Stonewall, Selkirk, Stony Mountain, Dunnottar and Clandeboye.



**Figure 1. 050J watershed well water inventory sampling locations**



To continue with the groundwater protection priorities established by the EICD, the well water inventory program was continued in the summer of 2008 encompassing the 050J watershed. The Government of Manitoba, namely Groundwater Management Section and the Office of Drinking Water of Manitoba Water Stewardship, assisted the EICD throughout the project. In Total 524 private rural wells were sampled from May 21 to August 14 of 2008 (Figure 1).

The well water inventory consisted of the collection of active, private, well water samples. All samples were analyzed by ALS Laboratory Group in Winnipeg, Manitoba for *E. coli* and total coliform bacteria and nitrate concentration. The well samples were also analyzed for conductivity and temperature via *in-situ* water analyses. Information about each well was collected from the well owner and recorded through the use of a standardized questionnaire.

A cooperative partnership between Manitoba Water Stewardship and the EICD was developed as a means to engage the public through the education of well owners in preventative and corrective measures for well maintenance; to provide a service to landowners by giving them free access to bacteria and nitrate analyses for their well; and to develop public awareness on how residents can participate with the EICD and governmental agencies to secure their water quality and quantity.

For Manitoba Water Stewardship and the EICD, this program acts to identify “hot spots” of well water contamination within the 050J watershed, this information can then be used to assist in program development and watershed management planning; to collect information on the number and location of private water wells in the 050J watershed; to improve and supplement the Province of Manitoba’s water well database and provide a benchmark of groundwater data from which to gauge any watershed improvement. Successful implementation of this program and the use of data it provides can potentially identify any activities or conditions which may lead to bacterial and/or nitrate contamination of private water wells and prevent contamination of the groundwater aquifer as a whole.

### iii. METHODOLOGY

#### ***a. Sampling***

All well water sampling locations were within or near the 05OJ watershed (Figure 1). The goal of the project was to capture a representative assessment of the groundwater quality in the watershed, therefore sample locations were selected based on landowner availability and with a goal of obtaining approximately two samples for every four square miles. Samples were collected from active wells on private property only and were not collected from crown lands (i.e. wildlife management areas, provincial parks). Participation by the well owner was voluntary and confidential; as such, abandoned properties were not entered to test or locate potential wells.

Areas within the 05OJ that are supplied by a municipal water source or within a major town were not sampled, these areas included the towns of Teulon, Winnipeg Beach, Clandeboye, Stonewall, and Stony Mountain, the City of Selkirk and the rural area near Stony Mountain supplied by the 'Bristol Pipeline' (Figure 1).

Well water samples were collected from taps which provided the most representative water conditions of the well. Consequently, taps connected to water treatment devices such as filtration systems or softeners were bypassed and any devices directly attached to taps, such as aerators, were removed. Prior to sampling, all taps were opened fully and allowed to run for a minimum of 5 minutes to allow for standing water to be removed from household pipes and pressure tanks, the tap or faucet was then disinfected using antibacterial wipes. Two samples were collected in sterilized containers provided by ALS Laboratory Group; one sample for bacteria and another for nitrates. Water samples were analyzed *in-situ* with a calibrated portable water quality metre for conductivity and temperature.<sup>1</sup>

Sample containers were labelled, using waterproof ink, with a sample identification number, the name of the well owner, and the sampling date. The sample containers were filled to the line indicated on the sampling container or filled to the adequate amount requested for analysis. Once filled and labelled, the sample containers were immediately placed in a chilled cooler.

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<sup>1</sup> Oakton Con11



### ***b. Questionnaire***

Information about the well owner, the property, the construction of the well, and the history of the well was requested from the well owner at the time of sampling and recorded on a standardized questionnaire. The information provided by the well owner was based on their current knowledge of their water well. This information was collected to allow Water Stewardship to update provincial records and to collect information that may indicate potential reasons for water well contamination.

### ***c. Sample Shipping and Chain of Custody***

Prior to submitting sample containers to the laboratory, a chain of custody form (CoC) was used to create an accurate and verifiable record which would be used to trace the possession and handling of the samples from the moment of collection until receipt by the laboratory. The CoC included the name of the sample collector, the time the sample was collected, the mailing address of the well owner, the sample matrix, and the type of analysis requested. The CoC was signed and dated by the person shipping the sample containers and packed with the corresponding samples. Prior to shipping the samples, the questionnaire information was compared to respective sample containers to ensure the accuracy of the legal land location, the sample identification number, and the correct spelling of the name of the well owner.

Once all sample containers were properly packaged in the cooler, ice or ice packs were added to the cooler to keep the samples at a temperature of approximately 4°C. The cooler was then sealed securely with tape to prevent the lid from opening. Samples were shipped via bus to Winnipeg and received the following day by ALS Laboratory Group—all within 24 hours of taking the sample from the well owner.

### ***d. Results***

Each homeowner received the results from ALS laboratories either via e-mail or post. As per the Drinking Water Safety Act, ALS Laboratories contacted the homeowner if the results were found to not meet Canadian Drinking Water Guidelines. EICD received the results from ALS laboratories via e-mail. All data was compiled in a Microsoft Office Access database which was shared with Water Stewardship.

#### iv. TEST RESULTS

Of the 524 wells that were sampled for bacteria and nitrate levels, 25.6% (134) of the well water samples exceeded Canadian Drinking Water Guidelines (CDWG) for bacteria and/or nitrate. Of the 25.6% of the wells that failed 52.2% (70) failed due to total coliform counts, 7.5% (10) failed for both *E. coli* and total coliform, 24.6% (33) failed due to nitrate concentrations, 14.2% (19) failed for both nitrate and total coliform, and 1.5% (2) failed for all three parameters (total coliform, *E. coli* and nitrate).

To eliminate any sampling bias due to some targeting of areas that initially showed higher susceptibility to nitrate or bacteria contamination, a subset of the data was created from randomly selecting two points (i.e. sampled wells) within a 2 x 2 mile grid. This resulted in a subset of 362 wells that should be indicative of aquifer quality. Of the randomly selected wells 24% (87) exceeded Canadian Drinking Water Guidelines. Of the total wells that failed, 52.9% (46) failed due to total coliform counts exceeding CDWG, 10.3% (9) failed because both *E. coli* and total coliform counts exceeded CWDG, 22.9% (20) failed due to nitrate levels exceeding CWDG, 12.6% (11) failed CDWG for both nitrate and total coliform, 1.2% (1) failed for all three parameters.

It was observed that of the 55 wells with nitrate concentrations above the Canadian Drinking Water Quality Guidelines for nitrate ( $\geq 10.00$  mg/L), 81.8% (43) were in parts of the watershed with less than 10 meters of soil overburden. These areas are vulnerable to groundwater contamination due to the speed at which nitrates from anthropogenic sources can reach the aquifer (i.e., application of inorganic fertilizer, land application or storage of manure, and confined livestock pens).<sup>2</sup>

A map was created through the use of inverse distance weighting (IDW) techniques that extrapolate possible nitrate levels between known points using 75% of the nitrate results; the remaining 25% was used to test the interpolation. Although the resultant map was not found to be statistically correct in its prediction of nitrate levels, it does generally show potential areas of nitrate contamination or 'hot-spots'. The locations of the potential 'hot-spots' appeared to correlate with the areas of shallow overburden but verification of this is beyond the scope of this project (Figure 2).

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<sup>2</sup> Betcher, p. 6.

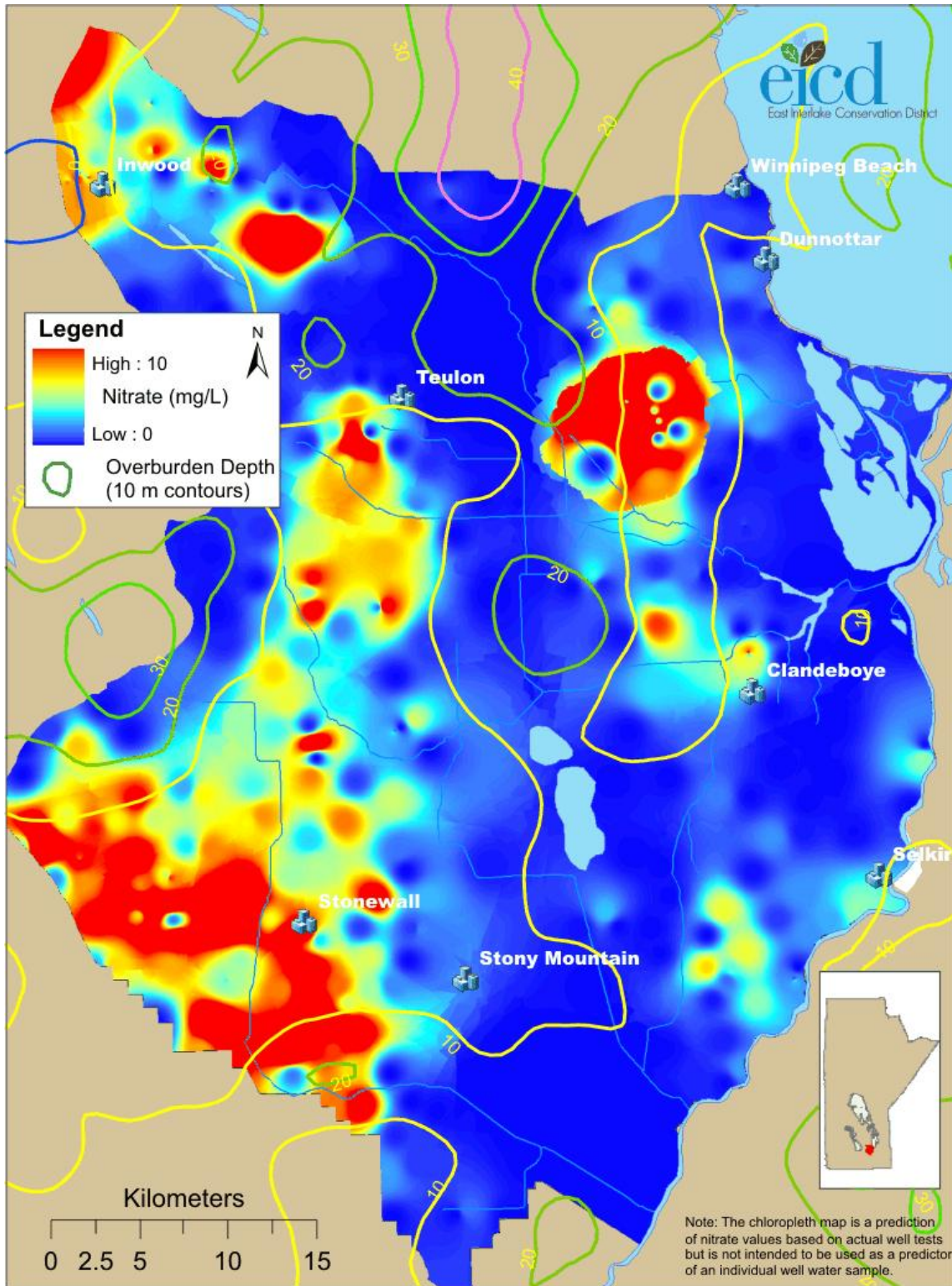


Figure 2. Predicted nitrate levels and depth of overburden



## **v. PUBLIC PARTICIPATION**

Public participation was well received; out of 544 homeowners approached only 20 homeowners were not interested in participating in the program. One of the major concerns about the program came from residents within the R.M. of St. Andrews, the R.M. of West St. Paul. The well owners in these areas were concerned that the information gathered would be used to implement a new drinking water pipeline that would result in additional costs to the taxpayer or home-owner.

Other public concerns mentioned were the Stonewall quarry mine and its potential impact on the water table, the contaminated ground water site by Bristol Aerospace, and surface and ground water quality near hog plants.

Approximately 470 pamphlets were left at homes where no personal contact was made. Of those 470 homes, approximately 25 homeowners contacted the EICD office to request sampling of their well.

## **vi. CONCLUSION**

Prior to implementation of this program, detailed information regarding the health of the aquifer directly under watershed 05OJ was not available. A key finding as a result of this program was that 1 in 4 rural water wells failed to meet basic Canadian Drinking Water Quality guidelines. This has highlighted the need to increase programming targeted at rural audiences regarding proper maintenance and well installation. This program acted as an initial education campaign and hopefully raised the public's awareness of drinking water quality in watershed 05OJ.

The data gathered through the partnership between the EICD and Water Stewardship will be crucial to the successful development of a watershed management plan for the region. It is recommended that a continued partnership exist in the future to allow the two remaining watersheds, 05SB and 05SD, to be surveyed in 2009 and 2010 respectively.



## **vii. REFERENCES**

Betcher, Robert. "Washow Bay/Icelandic River Watersheds State of the Watersheds Report – Groundwater." Report provided to the East Interlake Conservation District, April 2, 2007.

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Health Canada. "Guidelines for Canadian Drinking Water Quality – Summary Table." Health Canada website. [http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/doc\\_sup-appui/sum\\_guide-res\\_recom/index\\_e.html](http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/doc_sup-appui/sum_guide-res_recom/index_e.html).

Manitoba Intergovernmental Affairs. Water Facts – Farm Water Analysis. (Brandon, MB: Manitoba Water Services Board, 2000).