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CITY OF GRAND FORKS

MANAGEMENT OF COMMUNITY WATER WELLS

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PROJECT 3181 **FEBRUARY 2013**

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1. INTRODUCTION

1.1 BACKGROUND

The source of municipal water for the City of Grand Forks (the City) is a network of five water wells, all of which are located north of the Kettle River in an area bounded by 19th Street to the east and Northfork Road to the west. The aquifer which hosts the wells is referred to as the Grand Forks Aquifer (the Aquifer). The Aquifer is irregular in shape and covers the entire valley where the Kettle and Granby rivers confluence. The aquifer generally follows the base of the valleys along the two rivers, which are limited in extent by the surrounding bedrock hills. The entire aquifer is a floodplain which is underlain by alluvial and glacial drift units, consisting predominantly of sand, gravel, silt and clay (Wei et al., 1994).

Recharge to the Aquifer is derived from lateral flow contributions from the Granby Valley (from the north) and more predominantly from the Kettle Valley (from the west). Additional recharge is provided via the hydraulic connection between the aquifer and the rivers, as well as via infiltration of precipitation and irrigation return flow.

In addition to the City wells, the Aquifer is heavily used for potable and agricultural water supply by several water utilities including the Sion Improvement District (SID), Grand Forks Irrigation District (GFID), Covert Irrigation District (CID) and several smaller community water supply systems.

The BC Ministry of Forests Lands and Natural Resource Operations (MNRO) have classified the Aquifer as IA, indicating a relatively high degree of development as compared to productivity of the aquifer, along with high demand and potentially high yields being available. The classification also denotes a relatively high vulnerability to contamination.

Elevated nitrate levels in the Aquifer were initially identified in 1989, with most of the higher level areas located to the south of the Kettle River and therefore south of the limits of the City. There is also an area to the north of the City wells where nitrate levels, while lower, are increasing. Nitrate levels in the City wells are relatively stable and well within drinking water quality standards, as shown by a maximum nitrate level of 1.6 mg/L measured in Well 2 in 2005, and lower concentrations that are declining or stable. Regardless of the nitrate levels in the City wells, there is on-going concern regarding nitrate contamination in the Aquifer. Several studies have been completed by the Province to characterize the spatial and temporal water quality in the Aquifer. The Province therefore maintains a program of monitoring water quality in several wells throughout the entire Aquifer. The sources of nitrates have yet to be clearly determined.

The City and the irrigation districts in the area have also been tracking water quality in response to a requirement by the Interior Health Authority (IHA) to do so.

In addition to the water quality monitoring program, the Province has completed several studies to characterize the Aquifer and delineate capture zones for individual wells (Wei, 1982, 1983a, 1983b, 1983c, 1999, 2001). To compliment this work, the City and the local irrigation districts formed an aquifer protection committee in 1995 and commissioned a review of land use in the area. The committee also undertook an inventory of contaminants, within the capture zones established by the Province (Allard et al., 2003), and provided public education on water quality protection initiatives for the Aquifer. A formal aquifer or source water protection plan was never completed and the committee informally disbanded in 2005.

The City completed a groundwater development study in 1999 to look at the supply capacity of existing wells and to identify options for increasing the capacity (Kerr Wood Leidal, 1999). At the time of the 1999 study, there were only four wells in the system, as Well 1 had been decommissioned in the late 1980s after contamination with hydrocarbons. As part of the 1999 study, two test wells were drilled to identify a suitable location for an additional supply well and recommendations were provided to drill a new supply well near Boundary Hospital on 22nd Street, between 77th Avenue and 78th Avenue (Piteau, 1999). In 2000, a new supply well was constructed near the existing Well 3, and henceforth referred to as Well 3a. No supply well has ever been constructed at the 22nd Street location.

More detailed study of the Aquifer has been completed by the Province and Simon Fraser University (SFU), specifically to refine capture zones and assess the vulnerability of the Aquifer to both surface contamination and climate change (Allen, 2005; Wei et al., 2010). The 2010 Report includes a groundwater flow model developed by Dr. Diana Allen at SFU. The model and report represent the most comprehensive information available for the Aquifer and therefore much of the description of the Aquifer contained in this report has been abridged from the work completed by Dr. Allen and Mr. Wei.

The most recent work relating to the Aquifer includes a 2012 review of the water quality monitoring network that the Province maintains in the Grand Forks Aquifer (Allard & Manwell, 2012), and the development of the technical portion of a watershed management plan for the Kettle River (Summit, 2012).

Piteau Associates Engineering Ltd. (Piteau) was retained by the City of Grand Forks to compile and review data on the Grand Forks Aquifer and existing wells, to perform an assessment of aquifer yields, groundwater quality and well capture zones, and to prepare this report. The report provides a review of the hydrogeology in the Grand Forks area and outlines a strategy for the management of community water supply wells for the City, which is the dominant stakeholder of the groundwater resource in the area.

Authorization to proceed with the work was given on behalf of the City by Ms. Sasha Bird, Manager of Technical Services, on August 15, 2012.

This study is the first part of an integrated groundwater management strategy to compliment the rejuvenation of groundwater protection planning by the City. Given the dependence of the community on groundwater as the sole source of domestic water, the implementation of a Groundwater Protection Plan (GWPP) and the development of a strategy for sustained use of the aquifer is important. Implementation of groundwater protection measures will not only help to protect public health, but also protect ecosystems associated with streams and lakes that rely on groundwater as a source of recharge.

1.2 OBJECTIVES AND WORK SCOPE

The immediate objective of this assignment was to re-assess individual well yields as well as the impact of mutual well drawdown interference on total water delivery capacity. This was required to support a larger study completed by Urban Systems, conducted to rationalize investment in standby generators for key wells in the current water supply system (Urban Systems, 2012). The interim report, which was issued in August 2012, also looked at current chemistry and projected water quality trends (Piteau, 2012).

The more global objective of this work was to develop a plan for the management of the groundwater resource in the area using basic risk management principles applied to public health, coupled with life-cycle asset management to:

- minimize operational costs,
- maximize the lifespan of the existing water supply wells, and
- prioritize action items for upgrades, maintenance and replacement.

We have divided the scope of work into seven primary tasks including:

1. Spatial and temporal analysis of water quality data for the aquifer, to identify areas of the Aquifer where water quality concerns exist;
2. Evaluation of physical attributes for each well;
3. Assessment of water quality vulnerability using screening for GARP/ GWUDI;
4. Comparative asset valuation for existing wells and possible new well locations;
5. Groundwater modelling for optimization of well spacing and yield as constrained by existing water quality concerns and mutual well interference;
6. Identification of priorities and development of a management plan with priority action items; and
7. Reporting and project management.

2. HYDROGEOLOGIC SUMMARY

The Grand Forks Aquifer (the Aquifer) has been studied in great detail and the intent of this assignment is not to provide a comprehensive summary of the work completed, nor to expand on the current understanding of hydrogeology in the area. The most comprehensive source of information on the Aquifer is presented in a report entitled "The State of Understanding of the Hydrogeology of the Grand Forks Aquifer (Wei et al., 2010), which describes the physical setting plus climate of the area and summarizes all of the hydrogeologic studies completed on the Aquifer. Much of the information provided in the report by Wei et al. is based on the studies completed by the Province and by Dr. Diana Allen at Simon Fraser University.

Figure 1 presents a plan of the Study Area showing the extent of the Aquifer, the Granby and Kettle rivers and the generalized direction of flow in the Aquifer. Figure 2 shows the locations of the City wells and other select wells that are discussed in this report.

The Kettle River Valley and adjacent portions of the Granby River Valley are underlain by alluvial and glacial drift consisting mainly of sand, gravel, silt and clay. The source aquifer is generally encountered at between 15 to 60m depth and ranges from confined to unconfined in character. Recharge to the Aquifer is predominantly by precipitation; however, the Aquifer is also recharged from the north, near Ward Lake, and from the Kettle River which flows west to east through the middle of the Aquifer and is hydraulically connected. The high permeability of this Aquifer and the shallow depth to water results in the groundwater being susceptible to surface sources of contamination.

2.1 CITY OF GRAND FORKS WELLS

This study is limited to north side of the Kettle River, generally within City limits. The following provides an overview of the available information on each well. The MNRO web-hosted WELLS database contains Well Tag Number (WTN) records for most of the City wells and copies of these records are provided in Appendix A.

A summary of selected characteristics for each well is presented in Table I. The locations of the City wells are shown on Fig. 2.

2.1.1 Well 1

This well, which is also referred to as the Arena Well, was decommissioned sometime during the late 1980s following contamination by long-term gasoline leakage from filling stations located near the junction of Highway 3 and 19th Street. The well was located at approximate coordinates 393186E / 5431550N, at the northeast corner of what is currently a parking lot at the east end of the hockey arena. The well was drilled in 1957 and reportedly completed to 11m depth. The well was deepened in 1981 to 18m depth. The yield of the well was in the order of 19 L/s to 25 L/s. A record for this well exists in the MNRO WELLS database as WTN 14654.

2.1.2 Well 2

This well is also known as either the Henning or Hutton well and is located along 75th Avenue at approximate coordinates 392451E / 5431284N. The well was drilled in 1965 and completed with 200m diameter casing and screens to 30.5m depth. The approximate static water level in the well is at 12m below the top of well casing (mbtoc) and the 2.4m long screened section in the well extends from 28 mbtoc to 30.5 mbtoc. This well is equipped with a submersible pump. Allowing for an 1.5m pump motor length above the K-packer at the top of the screen assembly, the available drawdown in this well is estimated to be 14.5m, and the individual yield assigned to the well is 83 L/s (Piteau, 1988). No report regarding the construction and testing of this well has been found; therefore, the initial specific capacity for the well is unknown. The well has been historically pumped at 25 L/s and the corresponding drawdown at this rate has been approximately 2m. The specific capacity (efficiency) of this well is in the order of 12.5 L/s/m of drawdown, making it the most efficient of all the City wells. The well is located within a below ground concrete bunker and Well Identification Plate (WID) number 316 is affixed to the well casing inside the bunker. The corresponding record for this well in the MNRO WELLS database is WTN 19226.

2.1.3 Well 3a

This well was initially known as the Old Airport Well and also as Well 3, until the new Well 3 was constructed in 2000. The location is approximately 410m southeast of Well 2, along 68th Avenue, at approximate coordinates 392726E / 5430956N. This well was

drilled in 1969 and completed with 500mm diameter casing and a 6.1m long screen. The well completion included an engineered gravel pack surrounding the well screens. The approximate static water level in the well is at 8 mbtoc and the 6.1m long screened section in the well extends from 27.9 mbtoc to 34.0 mbtoc. The well collar is inside a pump house and encased within the concrete floor of the pump house building. The well is equipped with a submersible pump. The available drawdown in this well is 20m and the individual yield assigned to the well is 125 L/s (Piteau, 1988). Due to the close proximity of Well 3, the water level in this well is lowered when Well 3 is being pumped. Due to the interference with Well 3, this well has been historically pumped at 75.7 L/s and very rarely at the same time as Well 3. The specific capacity of this well when it was tested at the time of construction was 10.5 L/s/m. WID Plate number 353 is affixed to the outside of the door entering the pump house. The corresponding record for this well in the MNRO WELLS database is WTN 22427.

This well was rehabilitated in 2008 to recover lost efficiency and increase its specific capacity.

2.1.4 Well 3

This well is located approximately 22m northwest of Well 3a at coordinates 392704E / 5430959N. It was drilled in 2000 by Columbia Water Wells and completed with 400mm diameter casing and screens to 32.3m depth. The approximate static water level in the well is at 9 mbtoc and the 6.1m long screened section in the well extends from 25.0 mbtoc to 31.1 mbtoc. There is a 1.2m long section of solid pipe at the bottom of the well, to provide a sump for any sand accumulations. The well collar is located within a pump house and encased within the concrete floor of the pump house building. The well is equipped with a vertical shaft turbine pump and the available drawdown in this well is 15m. Due to the interference with Well 3a, this well has been historically pumped at 30 L/s and very rarely at the same time as Well 3a. The specific capacity of this well when it was tested at the time of construction was 6.8 L/s/m. WID Plate number 352 is affixed to the outside of the door entering the pump house. A record for this well does not exist in the MNRO WELLS database; however, a copy of a well completion diagram for the well is included in Appendix A.

This well was rehabilitated in 2007 to recover lost efficiency and increase its specific capacity. During rehabilitation, surface subsidence was noted to occur around the well casing.

2.1.5 Well 4

This well was formerly known as the Arena South Well and is located approximately 860m east of Well 2 at the northwest corner of the junction of 19th Street and 70th Avenue. The coordinates for the well are 393313E / 5431319N. This well is 22m southwest of Well 5. It was drilled in 1977 and completed with 200mm diameter casing and screens to 59.1m depth. The approximate static water level in the well is at 11 mbtoc and the 12.2m long screened section in the well extends from 46.9 mbtoc to 59.1 mbtoc. The well collar is located within a small kiosk and the well is serviced with a submersible pump. Available drawdown in this well is 28m and the individual yield assigned to the well is 41.5 L/s (Piteau, 1988). This yield rating exceeds the laminar flow capacity of the installed screen assembly; hence, continuous long-term operation at this rate should be monitored closely for any rapid losses in well efficiency. Due to the close proximity of Well 5, the water level in this well is lowered when Well 5 is being pumped and a recommendation was provided for operation of this well at a reduced rate (Piteau, 1988). The well has been historically pumped at 41.5 L/s and very rarely at the same time as Well 5. The specific capacity of this well when it was tested at the time of construction was 3.5 L/s/m, which is the lowest well efficiency of all the City wells. WID Plate number 354 is affixed to the outside of the kiosk which sits atop this well. The corresponding record for this well in the MNRO WELLS database is WTN 37325.

2.1.6 Well 5

This well is located approximately 22m northeast of Well 4 at coordinates 393327E / 5431337N. It was drilled in 1988 and completed to 59.4m depth. The 400mm diameter casing extends to 44m depth and the 250mm diameter screens from the base of the casing to the full depth of the well. The screen section is 15.4m long and surrounded by gravel pack material. The approximate static water level in the well is at 11 mbtoc. This well is located within a pump house building and is serviced with e vertical shaft turbine pump. The available drawdown in this well is 29m and the individual yield assigned to the

well is 150 L/s (Piteau, 1988). Due to the close proximity of Well 4, the water level in this well is lowered when Well 4 is being pumped and therefore this well has been historically pumped at a reduced rate of 69.4 L/s. Very rarely is the well operated concurrently with Well 4. The specific capacity of this well when it was tested at the time of construction was 5.6 L/s/m, which is the second lowest efficiency well operated by the City. Well Identification Plate (WID) number 355 is affixed to the entry door to the pump house building. There is no record for this well in the MNRO WELLS database. A copy of the well log from the original 1988 construction report by Piteau is included in Appendix A.

This well was rehabilitated in 2007.

2.2 OTHER WELLS OF NOTE IN THE AREA

Other wells in the area that are referred to in this study include:

- TW99-1, which is an unsuccessful test well drilled by the City in 1999 near the junction of 59th Avenue and 17th Street (Piteau, 1999);
- TW99-2, which is a successful test well drilled on 22nd Street (formerly Pine Street), to the north of Boundary Hospital (Piteau, 1999);
- SION#3, located near the junction of Hardy Mountain Road and Plotnikoff Road; and
- Wells monitored by the Province as part of the water quality monitoring network for the Grand Forks Aquifer including Well Tag Number (WTN) B, WTN 7962 and WTN 35526.

3. SOURCE WATER QUALITY ASSESSMENT

The major water quality concern in the Grand Forks Aquifer relates to nitrate-nitrogen (nitrates). There are several localized areas in the Aquifer that exhibit elevated levels and the source of the nitrates has not clearly been differentiated between agriculture (fertilizer application) versus human (effluent disposal via septic systems). This study also addresses spatial and temporal concentrations in the Aquifer for nitrite, chloride, iron, sodium, potassium, sulphate, arsenic and conductivity. Bacteriological test results for the City wells are also addressed, specifically in response to the requirements outlined in the Operational Permit for the water system issued by IHA. The objective of this assessment is to identify areas of the Aquifer where current concentrations and trends in water quality may impact existing wells and also where wells might be constructed in the future.

The data sets used for this analysis include:

- Water quality data from the MNRO (Penticton Regional office) for ongoing water quality monitoring in the Grand Forks Aquifer, commencing in 1989;
- Water quality data from the City of Grand Forks for regular potable water quality testing completed on City Wells; and
- Bacteriological test results from the City of Grand Forks for regular bacteriological testing.

The spatial and temporal analysis of water quality data was completed using EnviroInsite© (Ver.7), a commercially available software package that is ideally suited for the analysis and presentation of hydrogeological data. The software combines easy to use input files (MS Excel, MS Access, text or ascii) which generate a spatial and temporal (time history) database. The software is capable of identifying outliers and trends as effectively as commonly used statistical methods for the analysis of environmental data and the database is easily updated, as more data are available.

Using a blended data set from MNRO and the City, plots of spatial and temporal water quality for nitrates, potassium, sulphate and chloride were prepared for the area north of the Kettle River, where all of the City wells are located. Included in the analysis are Sion Well#3, WTN 35526, and

WTN B, which are wells from the Province's monitoring networks were elevated nitrate levels have been regularly noted. The most important well for the City in relation to water quality trends is Well 2, which has been sampled most frequently and is in closest proximity to agricultural activity (immediately north).

A contoured plot of maximum nitrate values combined with time plots of nitrate for each well is presented on Fig. 3. Similar plots for sulphate, potassium, sodium and chloride, all of which can be associated with fertilizer application, are presented on Figs. 4 through 7. Sodium and chloride can also be associated with effluent disposal and therefore indicative of human waste.

The lowest values for all water quality parameters are in the south where the Aquifer has a strong hydraulic connection with the Kettle River. The highest values for nitrate, sodium and chloride are to the north of the City wells, in MNRO observation well WTN 35526, which is at Boundary Hospital. The highest sulphate values are also to the north at WTN B, which is another MNRO observation well located near the junction of Northfolk Road and 6th Road. Nitrate, sodium and chloride values in both of these wells are increasing with time, whereas sulphate and potassium levels are relatively stable.

Nitrate levels have been increasing in WTN B and WTN 35526 since 2006, with the most recent values in 2010 being 4 mg/L in WTN B and 6 mg/L in WTN 35526. Nitrate levels were also increasing in City Well 2 between 2000 and 2006, reaching a maximum of 1.58 mg/L. Since 2006, the nitrate values in Well 2 have decreased to 1.04 mg/L (last sampled in 2009). The only other City well that has been regularly tested for nitrates is Well 3A, with values of 0.1 mg/L and 0.2 mg/L being consistently noted in this well.

4. WATER QUALITY VULNERABILITY

4.1 COMPLIANCE WITH GROUNDWATER PROTECTION REGULATION

In British Columbia, the Ground Water Protection Regulation (GWPR) has set standards for wellhead protection, well caps and covers, flood proofing and deactivation/closure of water wells (Province of BC, 2005). The GWPR has been in effect since 2005 and therefore all of the City wells were constructed prior to the regulation being enacted.

The GWPR requires that new wells, constructed since 2005, must have a secure cap and that well casing extends at least 0.3m above the surrounding ground surface or above the base of a concrete pit. The top of the well casing must be higher than the local floodplain and a surface annular seal must exist to at least 4.5m depth below ground surface in areas where bedrock does not exist at surface. These well construction requirements are intended to reduce the potential for surface water entering the top of the well, or along the outside of the well casing, and possibly contaminating groundwater in the source aquifer.

A review of the well construction records for the City wells indicates that surface casing is present in Well 3, Well 3a, Well 4 and Well 5. It is not possible to verify if the annulus between the surface casing and production casing has been grouted in Well 3. Surface annular seals were installed during the commissioning of Well 3, Well 4 and Well 5. Well 2 is encased in concrete at surface, but there is no evidence to suggest this well has surface casing, or a surface annular seal. The concrete offers some protection at the wellhead. The geology encountered above 15m is not noted on the driller's logs for Well 2 and it is unknown if any additional protection would be gained from installing a surface annular seal in the well to the required 4.5 m depth.

With regards to flood proofing, none of the City wells lie within the extent of the floodplain associated with the Kettle River (Fig. 8). Well 2 is located within a 3m deep concrete bunker and the elevation of the base of the concrete bunker is marginally above the elevation of the nearest extent of the floodplain.

4.2 GWUDI / GARP SCREENING

The screening followed the protocols of the B.C. Ministry of Health – Guidance Document for Determining Ground Water at Risk of Containing Pathogens (GARP) Including Ground Water Under Direct Influence Of Surface Water (GWUDI) (MOH, 2012). Groundwater at risk of containing pathogens (GARP) is defined herein as any groundwater supply likely to be contaminated from any source of pathogens. Potential sources of pathogens include sewage effluent discharge to land, agricultural waste stockpiles and surface water. Groundwater under direct influence of surface water (GWUDI) is defined herein as groundwater that is hydraulically connected to surface waters and susceptible to contamination from pathogens.

GWUDI wells may not be “at risk of containing pathogens” (GARP) under certain conditions. The approach followed in the guidance document is a staged approach from initial screening of a groundwater source to preliminary and more advanced hydrogeological investigations to assist drinking water officers in determining, where necessary, appropriate treatment requirements for groundwater sources. The guideline’s investigative process consists of four stages:

Stage 1: Screening Tool
Stage 2: Preliminary Hydrogeological Investigation
Stage 3: Advanced Hydrogeological Investigation
Stage 4: Long-term Water Quality Monitoring

A preliminary assessment of GWUDI / GARP potential was completed using the screening tool, which reviews several criteria including the nature of the aquifer, depth of the screens in a well, potential for inundation under high river levels, historical bacteriological water quality results and proximity to surface water. The screening tool assessment was completed for all of the operating wells, plus TW 99-2 and a location proposed as part of this study for a new well (Well 6). The results of the preliminary assessment indicated that none of the wells are considered to be potentially GWUDI / GARP. Copies of individual screening forms for each well are presented in Appendix B, and a summary of results is listed in Table II.

One of the criteria used for the initial GWUDI / GARP screening relates to historical bacteriological data. This data has been reviewed and there were some instances where sampling within the distribution system generated positive results. However, no samples taken

directly from any wells produced a positive result. A table summarizing the historical results of bacteriological testing for wells in the City is presented in Appendix C.

4.3 DELINEATION OF WELL CAPTURE ZONES

During pumping, the lowering of water levels in an aquifer within the immediate area of a well resembles a cone, or funnel, which initially expands as groundwater is removed from storage within the aquifer. In later stages, once the drawdown cone attains sufficient dimensions and/or intersects a water body, groundwater flows radially towards the well and the aquifer is replenished by recharge due to precipitation and/or leakage from streams, rivers, and geologic units bounding the aquifer.

To efficiently manage and protect a groundwater supply, an understanding of the well “capture zone” and the “time of travel” zones are required. A “capture zone” is the area of an aquifer from which all groundwater will eventually arrive at the well. A “time of travel” zone is the area of an aquifer from which groundwater will be derived from a well in a predefined amount of time. For example, if a contaminant is released within the one-year time of travel zone, it can be expected to arrive at the well within one year. Once the capture zone and time of travel zones are estimated, the appropriate monitoring and protective measures can be implemented.

The groundwater flow model developed by Dr. Allen at SFU (Wei at al., 2010 and Allen et al., 2004a /2004b) was used to investigate the extent of one-year time of travel capture zones for the City wells. The model was run using the historical pumping rates provided by the City. The main objective of the modelling was to identify the orientation of capture zones in relation to current land use in order to identify the possible source of impacts to water quality. The secondary objective was to identify potential well locations where the capture zone would not overlap with existing capture zones and hence minimize the potential for mutual well drawdown interference.

A summary of the model inputs, the pumping scenarios investigated and the results is presented in Appendix D. Figure 9 is a plot of the extent of well capture zones.

Capture zones were combined for the pair including Well 3 and Well 3a, plus the pair of Well 4 and Well 5, due to the proximity of these wells. The one-year capture zone for well pair 3/3a extends to the Kettle River, as does the one-year capture zone for Well 2. These capture zones

will therefore not increase in size. The one-year capture zone for well pair 4/5 extends to within 160m of the Kettle River and for longer time periods flow to this well pair is derived from the river.

A capture zone was also delineated for a new well with the ultimate location of this well chosen to minimize mutual well drawdown interference with existing wells. The new well location is referred to as Well 6. No capture zone was established for TW99-2 as the hydraulic properties of the aquifer at this location are uncertain.

4.4 LAND USE AND POTENTIAL CONTAMINANTS OF CONCERN IN CAPTURE ZONE AREAS

Given the dominance of agricultural activity, the shallow depth to groundwater (generally less than 10m deep) and the history of elevated nitrates in the area, the extent of the capture zones associated with each City well was superimposed on a plan of the land use for the Grand Forks area. The objective was to broadly identify environmental concerns across the footprint area of the Aquifer. The land use plan was taken from the Grand Forks Sustainable Community Plan (Urban Systems, 2011). Figure 10 shows the extent of the capture zones and land use in the Grand Forks area.

On a relative basis, land occupied by commercial, industrial and certain types of agricultural land use pose the greatest threat to groundwater. Other agricultural land use poses a moderate threat, while residential land use (generally speaking) poses a relatively low threat to groundwater.

Commercial and industrial-zoned properties in the Study Area are generally located along Highway 3, as well as in the main business area of the City, mostly east of 19th Street. Potential contaminants associated with industrial and commercial zoning are related to the chemicals handled by the respective businesses. Included in this category are service stations, manufacturing, as well as retail and commercial distribution businesses that store and distribute fuel and chemicals. Potential contaminants associated with institutional, residential and agricultural properties include septic effluent and other chemicals entering the septic system, agriculture animal waste run-off, lawn care chemicals, other products associated with equipment and vehicle maintenance, and pesticides and herbicides used in agriculture.

The only well whose capture zone includes commercial land use is Well 2. There are a car dealership, tire sales/installation outlet and car wash along Highway 97 to the west and upgradient of Well 2. A small part of the northern portion of this capture zone is institutional, while the majority of the land use in this capture zone is residential.

The combined capture zone for Well 3 and Well 3a is entirely within agricultural land use areas. The combined capture zone for Well 4 and Well 5 is dominated by residential zoning, with some park to the north and west.

Although no capture zone was delineated for TW99-2, the land use in this area is a mix of agricultural and institutional.

Based on land use and the extent of capture zones, a relative comparison of the vulnerability of the various community wells in the City indicates that Well 2 is the most vulnerable and Wells 4/5 are the least vulnerable to water quality impacts. Due to high nitrate levels in WTN 35526 and the uncertainty in hydraulic parameters for the Aquifer in this area, development of community potable water supply in this area of the Aquifer is not recommended.

5. INDIVIDUAL WELL AND WELL FIELD CAPACITY ASSESSMENT

In British Columbia, individual well yields for community supply wells are typically calculated using the method outlined in the Certificate of Public Convenience and Necessity Guidelines, or CPCN (Allen et al., 1999). The method utilizes a calculation that accounts for available drawdown as determined from the driller's log as well as pumping rate and drawdown information from a formal pumping test. The theoretical long-term capacity (Q) for an individual well is determined using the following formula:

$$Q = 0.7 \times \text{100-day specific capacity} \times \text{available drawdown}$$

Available drawdown is the height of the water column within the well between the depth of the top of the screen assembly and the depth to static water level. In some cases, if the source aquifer is confined, the bottom of the confining layer is used rather than the static water level. The 70% factor applied to the available drawdown is used to account for potential variation in the static water level in the well in response to seasonal changes in recharge to the aquifer, as well as the lowering of water levels in the aquifer resulting from the cumulative effect of several wells pumping. The 100-day specific capacity is estimated by projecting the rate of drawdown observed in the well during the pumping test to 100 days. The 100-day projection period is utilized as it extends the pumping period from when the lowest static water levels typically exist (usually mid-winter in December/January) to May/June, when recharge typically occurs from spring snowmelt/runoff. This is intended to represent the period when the recharge to the aquifer is the lowest and hence worst-case conditions.

Most of the City wells have been subjected to formal pumping tests at the time of construction and have been assigned yields based on the CPCN methodology, with the exception of Well 2 and Well 3. For these two wells, the assigned yields are based on an analysis of historical operational discharge and drawdown data measurements to determine specific capacity. It is critical to note that specific capacity often declines in a well as a result of physical, chemical and biological clogging of the screen assembly, and that regular maintenance (re-development) of the screens is required to maintain the efficiency in a well.

In some instances, the yield for a well is limited by the flow transmitting capacity of the screen assembly in the well, which is calculated based on specifications provided by the screen manufacturer for intake area per foot of screen installed. A summary of the information available for each well and the yield calculations using various methods is presented in Table III.

The yield of a well can also be limited by a reduction in available drawdown caused by nearby wells pumping from the same aquifer. Mutual well interference is critical for the operation of Well 3 and Well 3a since these wells are located within 22m of each other. Well 4 and Well 5 are also located with 22m of each other and are strongly influenced by mutual drawdown interference. Well 2 is not significantly influenced by the other City wells.

A preliminary estimate of drawdown interference between wells during simultaneous operation was included in the interim report for this assignment (Piteau, 2012). The assessment was completed using an analytical solution for drawdown developed by Theis (1935) and modified by Hantush (1951). The calculated drawdown resulting from mutual interference was added to measured drawdown in each well (based on operational data from the City) to determine if total drawdown exceeded available drawdown. The results indicate that total drawdown in Well 3a and in Well 5 marginally exceed the recommended 70% factor of safety applied to available drawdown in the CPCN calculation, and that these wells are the most vulnerable to a decline in water level in the Aquifer. In contrast, the least vulnerable wells are Well 4 and Well 2. The results of the mutual well interference calculations are presented in Table IV.

6. MANAGEMENT OF COMMUNITY WELLS

This section presents a preliminary analysis of priorities for the management of wells used by the City for water supply.

6.1 ASSET VALUATION OF CITY WELLS

Multiple Criteria Analysis (MCA) was used to subjectively rank the asset value, or relative present worth, of each of the wells along with two locations identified as having significant potential (from a hydrogeological perspective) for construction of a new or replacement well.

The MCA analysis and the rationalization for identifying alternative management options are based on Community Based Natural Resource Management (CBRM) principles as discussed in the landmark paper by Hajkowicz et al. (2000). CBRM is a process which facilitates a shift in autonomy from government institutions (in this case the IHA), being responsible for making resource management decisions, to frameworks that empower the community, in this case the City of Grand Forks, with a common interest regarding the minimization of water quality treatment. The same asset valuation methodology has been applied for groundwater based water supply systems in the nearby communities of Salmo (Allard and Sacre, 2005) and Greenwood (Allard and Rhodes, 2012).

The well attributes considered in the analysis account for water quality and quantity issues as well as life-cycle management and operational cost factors including:

- GWUDI / GARP status,
- land use within the capture zone,
- proximity to a major transportation corridor,
- available drawdown,
- specific capacity,
- well yield,
- age of infrastructure,
- water quality,

- improvements required for compliance with the BC Groundwater Protection Regulation (GWPR), and
- ease of connection to the existing water main distribution network in the City.

Each of the attributes was weighted to reflect the relative importance or influence on the present value for each community well. Well yield in relation to total capacity, age, specific capacity, preliminary GWUDI / GARP rating, trend in water quality, and land use within the capture zone were all weighted as equally important, whereas available drawdown, proximity to a major transportation corridor, ease of connection to existing infrastructure, compliance with the GWPR and treatment required were weighted as being less important.

An ordinal ranking was assigned to each attribute characteristic, such that a total scoring for all attributes at each well location was determined. The total scores for all wells were then compared and a ranking order, based on highest value asset (with the highest score) to lowest value asset (with the lowest score) was determined.

Two locations were identified from a hydrogeological perspective, as having potential for construction of a new or replacement well. The potential locations are at TW99-2, which is the location where a test well was drilled for the City in 1999, and at Well 6, which is a location approximately 400m south of well pair 3/3a, where a well is expected to produce limited well interference with the existing City wells.

The results of the MCA assessment for the wells in the City is presented in Table V and a summary of the attributes along with the rationale behind the ordinal ranking for each is presented below:

Preliminary GWUDI / GARP Rating (Quality) – This attribute accounts for the relative vulnerability of a well as determined by the GWUDI / GARP screening tool. Wells that are drawing water from within 15m of surface, located within a floodplain or flood-prone area, with recurrent bacteriological problems or with historical turbidity issues would be assigned an ordinal ranking between 1 and 3. Wells that draw water from greater than 15m depth, completed in a confined aquifer and without turbidity or water quality issues would be assigned a higher ranking, between 6 and 10. Those wells with a marginal GWUDI / GARP rating were given an intermediate

ranking. Alternate well locations were assigned a ranking based on hydrogeological considerations only.

Dominant Land Use within Capture Zone (Quality) – This attribute accounts for the land use within the one-year time of travel zone for each well. Industrial, commercial and agricultural activity, due to the use of chemicals and generation of waste products, were given an ordinal ranking between 1 and 3. Agriculture land use was assigned a value of 3, whereas industrial land use was assigned a value of 1. Light commercial and residential land use was given a ranking between 4 and 6. Park and undeveloped areas were given a higher ranking, between 6 and 10.

Proximity to Major Transportation Corridor (Quality) – Similar to varying levels of exposure to impact based on land use, the proximity of a well to a transportation corridor increases the risk of impact due to the potential for accidental release of chemicals during transportation. To account for increased risk, wells within 25m of a transportation corridor received the lowest ranking, either 1 or 2. Wells located from 25 to 60m distance were assigned a ranking of 3 or 4. Wells from 60m to 100m were assigned a ranking of between 5 and 7, and wells at greater than 100m, a ranking between 8 and 10.

Negative Water Quality Trend in Area (Quality) – where a specific water quality parameter of concern is increasing in concentration, most notably nitrate, a well would be assigned a value between 1 and 3. Wells where the level is stable would be assigned a value between 4 and 7 depending on the concentration of the parameter in relation to the drinking water MAC. Wells with a declining trend would be assigned a value between 8 and 10. Proposed wells would be assigned a median value based on the concentration determined in contoured plots for nitrate.

Available Drawdown (Quantity) – This attribute was previously defined as the height of water between the static water level and the top of the screen assembly in a well, is a general indicator of vulnerability to drought and mining of the aquifer. Wells with less than 5m of available drawdown were assigned a ranking of 1 or 2, those with between 5 and 10m assigned a value of 3 and 4, with ranking values further increasing with more available drawdown. Proposed wells would be assigned a marginally high value of 7 recognizing that maximizing of available drawdown would be a design priority.

Specific Capacity (Quantity) – This attribute is a fundamental characteristic of a well and a general indicator of efficiency. Wells were ranked on a relative basis by comparing specific capacity derived from available pumping test data. Wells with lower specific capacity were assigned a value of 1 or 2, those with a medium efficiency a value between 3 and 6, and the most efficient wells a value between 7 and 10. Proposed well locations were assigned a medium value of 5.

Individual Well Yield as Compared to Total System Capacity (Quantity) – This attribute is related to both aquifer characteristics and well design. Wells were ranked based on the proportion of the total yield of the City water supply system supplied by that well. Wells that supply more than 25% of the total system capacity were assigned a value from 8 to 10, indicative of a dominant source. Wells providing between 15 and 25% of the system capacity were assigned a value between 5 and 7. Wells producing between 5 and 15% were assigned a value between 3 and 4, and those of less than 5% a value of 1 or 2. Proposed well locations were assigned a ranking based on hydrogeology, with a higher value assigned to well locations where the aquifer is expected to be more productive.

Age (Life-Cycle) – Water wells have a finite operational lifespan which, based on a literature search and local experience in BC, averages approximately 35 years. The lifespan is limited by casing and screen deterioration which occurs over time. Well casing and welded joints tend to corrode, primarily due to oxidation which results from cyclic exposure to moisture and oxygen in the splash zone, which is the zone between the pumping and non-pumping water level within the casing. Screen deterioration and degradation of the aquifer within the immediate area of the screen assembly occur due to encrustation of iron and manganese precipitates. Screen corrosion can also occur. Wells greater than 50 years of age were assigned a ranking of 1 to 3 based on the premise that residual asset value is minimal and that a replacement would be required in the near future. Wells between 35 and 50 years old were assigned a value of 5. Newer wells between 5 and 15-years-old were assigned a value between 6 and 8. Proposed well locations were assigned a high value of 10.

Water Quality Treatment Required (Quality) – This attribute is related to the level of treatment required to meet the Guidelines for Canadian Drinking Water Quality and water treatment objectives outlined in IHA's 4-3-2-1-0 policy. In terms of raw water quality, available data indicate

that all parameters with health-based Maximum Allowable Concentrations (MACs) are met in the existing City wells. In terms of the 4-3-2-1-0 policy, true groundwater sources can be expected to require at a minimum primary disinfection with chlorine. GWUDI / GARP sources would require two treatment barriers and therefore, in addition to primary disinfection, GWUDI / GARP wells would require filtration. Given that all of the City wells are not considered to be GWUDI / GARP, secondary chlorination (a residual in the distribution system) is currently being undertaken. The cost versus benefits of primary disinfection should be reviewed with IHA. Regarding the level of treatment required (if any) to address aesthetic concerns, common aesthetic issues with raw groundwater include iron, manganese and hardness. Treatment is not required where parameters exceed their aesthetic objective guidelines, but raw groundwater which does not exceed these parameters is typically preferred by consumers. Given that the City wells meet all aesthetic water quality objectives, there is currently no need for aesthetic treatment. All wells for this assignment, including the proposed well locations, were assigned the same median value of 5.

Improvements Required to Comply with GWPR (Life-Cycle) – This attribute is related to the improvements required to a well in order to comply with the GWPR. PW2 and PW3a are not in compliance with the GWPR, specifically the requirement for surface casing and/or a surface seal. The lowest attribute ranking of between 1 and 3 was assigned where considerable improvements are required. Wells which required only some modification to be compliant were assigned a value of between 5 and 7. The only wells which were assigned a high value were the alternate locations for new wells, which presumably would be constructed with the surface casing or seal.

Connection to Existing Infrastructure (Life Cycle) – In a similar manner to ranking levels of exposure to impact based on the proximity of a well to a transportation corridor, the proximity of a well to an existing water distribution pipeline and the condition of the pipeline influence the cost and desirability of a connection. This is particularly important for new well locations where a new pipeline would be required to connect to the existing system. To account for higher relative cost (and less desirability), wells at further distance from an existing pipeline or wells adjacent to older and smaller diameter pipe received the lowest ranking, either 1 or 2. Wells located at intermediate distances from a water pipeline in poor or fair condition were assigned a ranking of 3 or 4. Wells at intermediate distance to good and/or new pipelines were given a ranking of between 5 and 7, and wells adjacent to a new pipeline were given a ranking between 8 and 10.

The results of the MCA analysis indicate that the highest value assets are, in decreasing order (with ranking indicated in brackets):

1. New well (Well 6) proposed to the south of Well pair 3/3a (62.5 points) – this location scored high primarily due to a favourable GWUDI / GARP rating, land use within the projected capture zone, lack of improvements to comply with the GWPR, age, high yield in relation to total system capacity and relatively low water quality vulnerability.
2. Existing Well 5 (58 points) – this location scored high as it is one of the newest wells, has high yield in relation to total system capacity and relatively low water quality vulnerability. The specific capacity of this well is relatively low.
3. Existing Well 3 (54 points) – this location scored high for age as it is the newest well in the system, but received moderate to low scores for most of the other criteria. The yield of this well in relation to total system capacity is relatively low and this is primarily due to mutual well interference.
4. Existing Well 3A (53 points) – this location scored relatively high primarily because this is the highest rated well in the system and has a relatively high specific capacity. The well does not strictly comply with the requirements of the GWPR and the well is relatively very old which suggest it will need replacing soon.
5. Existing Well 2 (52 points) – this location scored high for specific capacity as it is the most efficient well in the system, but scored low for age and compliance with the GWPR.
6. Existing Well 4 (51.5 points) – this location scored relatively moderate to low for most criteria. The yield of this well in relation to total system capacity is relatively low and this is primarily due to mutual well interference. The specific capacity is also relatively low.
7. New well at location of TW 99-2 (50.5 points) – this location scored relatively low, primarily based on water quality concerns and hydraulic properties of the aquifer in the area.

In summary, the result of MCA ranking suggests that, on a relative basis, the most valued assets in the system include a new Well 6 plus existing Well 3 and Well 5.

6.2 ASSET LIFE OPTIMIZATION

The City currently monitors pumping rates and water levels in their wells using SCADA and tracks total volume pumped on a monthly basis. Detailed analysis of the data along with additional,

more detailed information, could allow for optimization of operational costs and enhancement of asset life.

It is important to not only collect the required data, but to input the information into spreadsheets and look for visual trends to identify, at an early stage, if either the static water level in the Aquifer is declining, or specific capacity for each well is declining. The identification of declining levels in the Aquifer will alert the City to more closely monitor the wells which are most sensitive to drought and to select the most appropriate wells and discharge rates to meet water demand. As a general rule, it is proposed that a drop in specific capacity exceeding 15%, with no corresponding drop in static water levels in the Aquifer, will trigger more detailed assessment of the well, and likely rehabilitation to recover lost efficiency. Rehabilitation can then be scheduled when convenient, rather than during a peak demand period. Furthermore, regular rehabilitation of wells to maintain optimum specific capacity (efficiency) can significantly improve operation costs, specifically minimization of power consumption. Driscoll (1986) suggests that maintenance for wells completed in sand and gravel aquifers should be done at a minimum of every two to five years, or when a drop of 15% or more occurs in specific capacity. It is also proposed that the City monitor power (electrical) consumption per unit volume of water delivered for each well, as this is another cursory method of tracking well efficiency.

The City has been periodically completing rehabilitation of wells, but it does not appear that the rehabilitation has been triggered by a prescribed drop in specific capacity. Relatively little effort would be required to develop some spreadsheets that could be used to more diligently track specific capacity and power consumption per unit of water delivered.

Figure 11 shows temporal trends for specific capacity in Well 3A and Well 5. Both of these wells were rehabilitated in 2007, at which time neither was returned to the efficiency determined when constructed. The specific capacity values for 2012 are anecdotal values reported by City staff. Well 3A has declined by roughly 10% in five years, whereas Well 5 has not changed. There is insufficient data for the other wells in the system to allow for such a comparison.

6.3 AQUIFER MONITORING

It is considered prudent to monitor the long-term variability in water levels in the Aquifer and this can be accomplished by incorporating information from the BC Observation Well Network into

spreadsheets maintained by the City, specifically from MNRO Observation Well 117, located in the industrial area of Grand Forks, near the junction of Industrial Park Way and 2nd Street.

It is also considered prudent to monitor Aquifer water levels and water quality for nitrates, chloride, sodium, sulphate and potassium in TW99-2 near Boundary Hospital. It may be possible to incorporate TW99-2 into the Observation Well Network and to receive assistance from MNRO with monitoring equipment.

Increased frequency of sampling for these water quality parameters is also recommended for Well 2, Well 3A and Well 5. The recommended frequency for sampling for these parameters is quarterly. It is also recommended to sample Well 2, Well 3A and Well 5 for a more comprehensive list of fertilizers and pesticides every two years.

We understand that the City has posted “Groundwater Protection Area” signs at the limits of the City, along the main transportation routes.

7. INFLUENCE OF CURRENT AND FUTURE PUMPING ON AQUIFER WATER BUDGET

The scope of this study did not include a detailed analysis of the water budget for the Grand Forks Aquifer. The water budget has been examined many times using several methods ranging from a simple flux estimate using analytical equations (Piteau, 1988) to more complex groundwater flow modelling (Wei et al., 2010 and Allen et al., 2004a, 2004b). A clear connection between surface water flow and groundwater levels is present as shown by increased flow and higher groundwater levels during freshet, followed by a decline in flow and aquifer levels throughout the year. A wide range of results for the water budget is indicated; however, water levels in the Aquifer at MNRO Observation Well 217 infer there is no observable trend of Aquifer depletion or replenishment that can be attributed to ether climate change or excessive groundwater extraction.

Perhaps the most pragmatic review of the water budget was completed recently as part of the Kettle River Watershed Management Plan, Phase 1 Technical Assessment (Summit Environmental, 2012). In Section 5.6 of the Summit Report it is suggested that the work completed to date has assumed maximum water usage by the water purveyors who utilize the Aquifer for supply and has not considered recharge to the Aquifer and Kettle River via irrigation return flow or from the discharge of treated wastewater to the river by the City. Furthermore, it can be argued that some wells completed in the Aquifer and located at considerable distance away from the Kettle River do not influence flow in the river.

The Summit Report indicates the average annual groundwater withdrawal by the major water purveyors (SION ID, GFID, the City, Covert ID) is in the order of is 9,132,000 m^3/yr. Based on 2012 records, the City pumped 1,980,000 m^3, which at first glance infers the City was accountable for 21.7% of the total withdrawn. Accounting for returns directly to the river from the City's treatment plant, the net water usage is approximately 560,000 m^3/yr less, or a total of 15.5% of the total withdrawn from the Aquifer. If irrigation return flow to the Aquifer is also considered, the net water usage by SION ID + GFID + the City + Covert ID is effectively reduced by at least 15% over the irrigation period, which translates into a total annual (net) groundwater withdrawal of 8,648,000 m^3/yr.

8. DISCUSSION

A key factor in proceeding with groundwater management in Grand Forks and also a requirement for a Groundwater Protection Plan (GWPP) is stakeholder involvement and public education. Local government, citizens, business owners and community groups all have an interest in protecting the resource. It is therefore recommended to establish a GWPP Committee to educate the public, solicit stakeholder input and ensure that any monitoring and reporting obligations agreed to with IHA are met.

In so far as both short-term and long-term objectives for well management and aquifer protection planning are established have been presented, it is critical that IHA and the City agree on a framework that will give the community the responsibility to manage risk as it relates to their potable water supply. More specifically, it is apparent that the City does not wish to treat their water and is willing to upgrade their community wells and increase the level of monitoring, in order to reduce the risk of exposure.

In this context, it is important to differentiate between risk and uncertainty, where risk implies that both the range of outcomes and probabilities can be predicted, as opposed to uncertainty which implies that parameters (attributes) and the range of outcomes are known, but the probability of occurrence is not known. Again, the objective is for the protection of public health, through the systematic identification of competing issues and the valuation of management alternatives. The objective is not to eliminate risk entirely, but to minimize it.

Ultimately a trade-off must be realized between the total costs of upgrading treatment at existing and proposed wells against the operational costs of increased bacteriological monitoring.

The intended use for the proposed additional City well is for ensuring short-term fire flow demand is achievable and not to permanently augment the annual withdrawals by the City from the Grand Forks Aquifer. The five wells operated by the City are currently capable of meeting potable water demand. Arguably, most of the agricultural potential of the valley and hence water demand for agriculture needs, has already been developed in the area. In turn, on the assumption that 10% of the water demand for agriculture is actually for rural domestic needs, approximately 75% of the annual volume withdrawn from the Grand Forks Aquifer is for crop water (agricultural) demand. Even with the assumption that potable water demand by the City actually increases by 10% in the future, the City would still be using only 17% of the total demands on the Aquifer. Demand side management by the City, SION ID, GFID and Covert ID, specifically for outdoor water use and irrigation, could potentially offset this increased demand for potable water.

A more realistic accounting of water use is warranted to more fully understand the Aquifer such that sustainable management of the water resource is possible.

9. CONCLUSIONS

Based on the available information and the analysis completed, the following conclusions are made:

1. All of the wells operated by the City of Grand Forks are considered to not be potentially GWUDI / GARP and hence not vulnerable to bacteriological impacts
2. All the City wells source groundwater from a portion of the Aquifer that receives recharge predominantly from the Kettle River.
3. The source aquifer for all of the City wells is relatively vulnerable and the capture zones for all City wells extend through areas with residential, commercial, agricultural and industrial land use. Well 2 is the only well that is exposed to water quality impacts from commercial and industrial activities; however the threat is considered low. All other wells are predominantly within agricultural and residential land use areas.
4. Well 2 and Well 3a likely do not comply with all requirements of the GWPR, specifically in regards to surface annular seals; however, modification of the wells with retrofitted seals is not expected to increase the level of protection for these wells.
5. The individual well yields and total supply capacity available from the wells is in the order of 240 L/s. The pumps that are currently installed in the wells are capable of pumping higher rates; however, the assigned rates are based on well construction limitations and the hydrogeology of the Aquifer and should not be exceeded.
6. Some of the wells are old and approaching the end of asset life and will have to be replaced, most likely within ten years. Specific wells in this category are Well 2 and Well 3A.
7. Priority action items for community well management have been determined by assigning a relative value to each well based on a number of criteria. Both existing wells and potential locations for new wells were considered, and the highest ranking asset is a new well (proposed Well 6) to be located south of the well pair 3/3A.
8. Prior to commissioning a new well, the water budget in the Aquifer should be re-visited and the results discussed with stakeholders concerned about in-stream flow needs to the east of the City.
9. The asset value of Well 3 and Well 4 are reduced due to mutual well drawdown interference with the nearby Well 3A and Well 5.

10. While some general recommendations have been provided in sections of this report regarding GWPP, it is important that work be initiated as soon as possible to develop the required plans that typically accompany a GWPP, including: water quality monitoring, contingency supply and emergency response plans.

10. RECOMMENDED ACTION PLAN

A list of priority action items has been prepared based on the asset values determined and these initiatives include options such as new well development, well decommissioning, well rehabilitation, and the implementation of more detailed monitoring. The prioritized list in order of decreasing importance is as follows:

1. Establish a GWPP Committee and develop, in consultation with IHA, an action plan for complying with GWPP and the overall groundwater management plan priorities.
2. Limit investment on wells with low asset value, particularly Well 2 and Well 3A. Commence accumulating funds for replacement of these assets within the next ten years.
3. Improvements required to comply with the requirements of the GWPR and for treatment at source are not recommended for any of the wells.
4. Implement a more comprehensive well monitoring program in all City wells, incorporating static and pumping water level as well as discharge measurement, total flow per month and power consumed per month. Complete regular analysis of the data.
5. Establish a well maintenance program on a rotating basis that allows for the completion of a single well rehabilitation each year, such that when all five wells have been rehabilitated, work would again commence on the first well.
6. The majority of water quality sampling for the system is currently undertaken within the distribution system. Water quality sampling should be more frequently undertaken at each well.
7. Increase the frequency of water quality monitoring in all the City wells to quarterly for selected parameters including: nitrates, chloride, sodium, sulphate and potassium.
8. Sample Well 2, Well 3A and Well 5 for a more comprehensive list of fertilizers and pesticides every two years.
9. Establish an aquifer water level and water quality monitoring program in TW99-2.

11. LIMITATIONS AND USE OF REPORT

This report was prepared for the exclusive use of the City of Grand Forks and Urban Systems Ltd. In completing this assignment, Piteau has relied in good faith on information provided by sources noted in this report. We accept no responsibility for any deficiency, misstatements or inaccuracy contained in this report as a result of omissions, misstatements or fraudulent acts of others.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Piteau Associates Engineering Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

12. CLOSURE

We trust that this report meets your current requirements. Should you have any questions or comments please do not hesitate to call.

Respectfully submitted,

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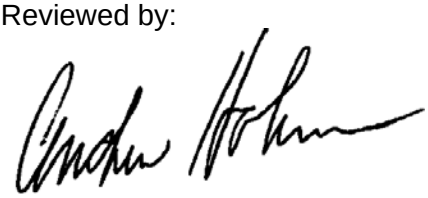

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TABLES

TABLE I
City of Grand Forks Groundwater Management Study
Summary of Selected Characteristics of City Wells

Well	Year Drilled	Well Tag Number	Well ID Plate	Depth (m)	Depth to Top of Screen Packer (m)	Depth to Static Level (m)	Available drawdown (m)	Historical Operation Rate (L/s)
Well 1 [2]	1956	14654	n.a.	18	15	9	6	n.a.
Well 2	1965	19226	316	30.5	28.0	12	15	24.3
Well 3	2000	n.a.	352	32.3	25.0	9	15	30
Well 3a	1969	22427	353	34.0	27.9	7	21	75.7
Well 4	1977	37325	354	59.1	40.2	11	28	41.5
Well 5	1988	n.a.	355	59.4	40.2	11	29	69.4
TW99-2	1999	n.a.	n.a.	46.3	43.3	14	30	n.a.

NOTES:

1) n.a. indicates information not available or not applicable.
2) Well 1 was decommissioned in the late 1980's.

TABLE II

City of Grand Forks Groundwater Management Study

Summary of GWUDI / GARP Assessment for City of Grand Forks Wells

	Well 2	Well 3	Well 3a	Well 4	Well 5	TW99-2	New Well 6
Does routine analysis regularly indicate presence of Total Coliforms and/or *E. Coli*?	**No**. Limited microbiological testing data are available for raw well water. Most of the samples are from locations in the distribution system and at the lift pumps associated with the existing storage reservoir. There are no positive bacteriological results for this well.	**No**. Limited microbiological testing data are available for raw well water. Most of the samples are from locations in the distribution system and at the lift pumps associated with the existing storage reservoir. There are no positive bacteriological results for this well.	**No**. Limited microbiological testing data are available for raw well water. Most of the samples are from locations in the distribution system and at the lift pumps associated with the existing storage reservoir. There are no positive bacteriological results for this well.	**No**. Limited microbiological testing data are available for raw well water. Most of the samples are from locations in the distribution system and at the lift pumps associated with the existing storage reservoir. There are no positive bacteriological results for this well.	**No**. Limited microbiological testing data are available for raw well water. Most of the samples are from locations in the distribution system and at the lift pumps associated with the existing storage reservoir. There are no positive bacteriological results for this well.	**No.** This well has never been activated and has not bee tested for bacteriological parameters.	**No**. This is a potential well location only.
Does the well have a history of turbidity problems?	**No.** There are no reports of turbidity problems or turbidity spikes.	**No.** There are no reports of turbidity problems or turbidity spikes.	**No.** There are no reports of turbidity problems or turbidity spikes.	**No.** There are no reports of turbidity problems or turbidity spikes.	**No.** There are no reports of turbidity problems or turbidity spikes.	**No.** This well has never been activated and has not bee tested for turbidity.	**No.** There are no reports of turbidity problems or turbidity spikes.
Is the well situated inside setback distances of the HHR, from possible source of contamination?	**No.** The well is not located within the setback distance required in the HHR**.**	**No.** The well is not located within the setback distance required in the HHR**.**	**No.** The well is not located within the setback distance required in the HHR**.**	**No.** The well is not located within the setback distance required in the HHR**.**	**No.** The well is not located within the setback distance required in the HHR**.**	**No.** The well is not located within the setback distance required in the HHR**.**	**No.** This potential well location is not located within the setback distance required in the HHR**.**
Does the well have an intake depth <15m below ground and located in floodplain / flood-prone area. OR well <100m outside the high-water mark or natural boundary of surface water feature and intake depth <15m below the high-water level?	**No.** This well is greater than 15m deep and is not within the floodplain of the Kettle River.	**No.** This well is greater than 15m deep and is not within the floodplain of the Kettle River.	**No.** This well is greater than 15m deep and is not within the floodplain of the Kettle River.	**No.** This well is greater than 15m deep and is not within the floodplain of the Kettle River.	**No.** This well is greater than 15m deep and is not within the floodplain of the Kettle River.	**No.** This well is greater than 15m deep and is not within the floodplain of the Kettle River.	**No.** This well is not intended to be less than 15m deep and will not be located within the floodplain of the Kettle River.
Does the well meet GWPR (section 7) for surface sealing.	**No.** This well does not meet the criteria for a surface annular seal. Retrofitting the well with a seal is not expected to increase protection.	**No.** This well does not meet the criteria for a surface annular seal. Retrofitting the well with a seal is not expected to increase protection.	**No.** This well does not meet the criteria for a surface annular seal. Retrofitting the well with a seal is not expected to increase protection.	**No.** This well does not meet the criteria for a surface annular seal. Retrofitting the well with a seal is not expected to increase protection.	**No.** This well does not meet the criteria for a surface annular seal. Retrofitting the well with a seal is not expected to increase protection.	**No.** This well does not meet the criteria for a surface annular seal. Retrofitting the well with a seal is not expected to increase protection.	**Yes.** If and when this well is drilled it will have a surface annular seal.
Does the well meet GWPR (section 10) for well caps and covers.	**Yes.**	**Yes.**	**Yes.**	**Yes.**	**Yes.**	**Yes.**	**Yes.**
Does the well meet GWPR (section 11) for floodproofing.	**Yes.**	**Yes.**	**Yes.**	**Yes.**	**Yes.**	**Yes.**	**Yes.**
Does the well meet GWPR (section 12) for wellhead protection.	**Yes.**	**Yes.**	**Yes.**	**Yes.**	**Yes.**	**Yes.**	**Yes.**
Does the well have an intake depth <15m below ground and situated in a sand and/or gravel unconfined aquifer or fractured bedrock aquifer?	**No.**	**No.**	**No.**	**No.**	**No.**	**No.**	**No.**
Is the well completed in a karst bedrock aquifer?	**No.**	**No.**	**No.**	**No.**	**No.**	**No.**	**No.**
Is the well potentially GWUDI / GARP??	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

TABLE III
City of Grand Forks Groundwater Management Study
Summary of Available Information for Each Well and Estimated Aquifer Properties

Well	Well Characteristics							Test Results at Time of Construction				Individual Yield Estimate			Yield Influenced by Other wells
	Depth (m)	Depth to Top of Screen Packer (m)	Screen length in metres (slot size in brackets)	Pump Type	Depth to Static Level (m)	Available drawdown (m) [5]	0.7 of Available Drawdown (m)	Year when First Tested	Discharge Rate During Testing (L/s)	Projected Drawdown at 100 days (m)	Specific Capacity at 100 days (L/s/m)	Based on CPCN Method (L/s)	Calculated Screen Capacity (L/s)	Historical Operation Rate (L/s)	Well Number (proximity in brackets in m)
Well 1 [2]	18	15	3.1 (n.a.)	n.a.	9	6	4	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	None
Well 2 [3]	30.5	28.0	2.4 (n.a.)	submersible	12	15	11	n.a.	n.a.	n.a.	12.50	n.a.	28.6	24.3	None
Well 3	32.3	25.0	6.1 (50, 150, 250)	turbine shaft	9	15	11	2000	88.1	13.0	6.78	71.2	95.8	30	Well 3a (22 m)
Well 3a	34.0	27.9	20 (100)	submersible	7	21	14	1969	126.0	12.0	10.50	151.8	72.8	75.7	Well 3 (22 m)
Well 4 [4]	59.1	40.2	12.2 (15)	submersible	11	28	20	1977	35.0	10.0	3.50	69.1	29.7	41.5	Well 5 (22 m)
Well 5	59.4	40.2	15.4 (40)	turbine shaft	11	29	20	1988	152.0	27.0	5.63	114.1	99.2	69.4	Well 4 (22 m)
TW99-2	46.3	43.3	3.0 (12)	n.a.	14	30	21	1999	9.3	21.0	0.44	9.2	5.6	n.a.	None

NOTES

1) n.a. indicates information not available or not applicable.
2) Well 1 was decommissioned in the late 1980's.
3) Details regarding screen design and initial pumping test data not available for Well 2. Assume gradational properties of the aquifer at this location similar to ne Well 3 and therefore screen is 100 slot. Specific capacity for Well 2 based on historical pumping data.
4) The screen assembly in Well 4 includes 20 ft of blank (non-slotted) casing.
5) Available drawdown defined as static water level minus depth to top of packer at top of screens. With submersible pump, subtract additional 1.0m for length of pump motor below pump intake. With vertical turbine pump, subtract 0.25m.
6) All available drawdown calculations rounded off to nearest metre.

Table IV
City of Grand Forks Groundwater Management Study
Mutual Well Drawdown Interference Calculations

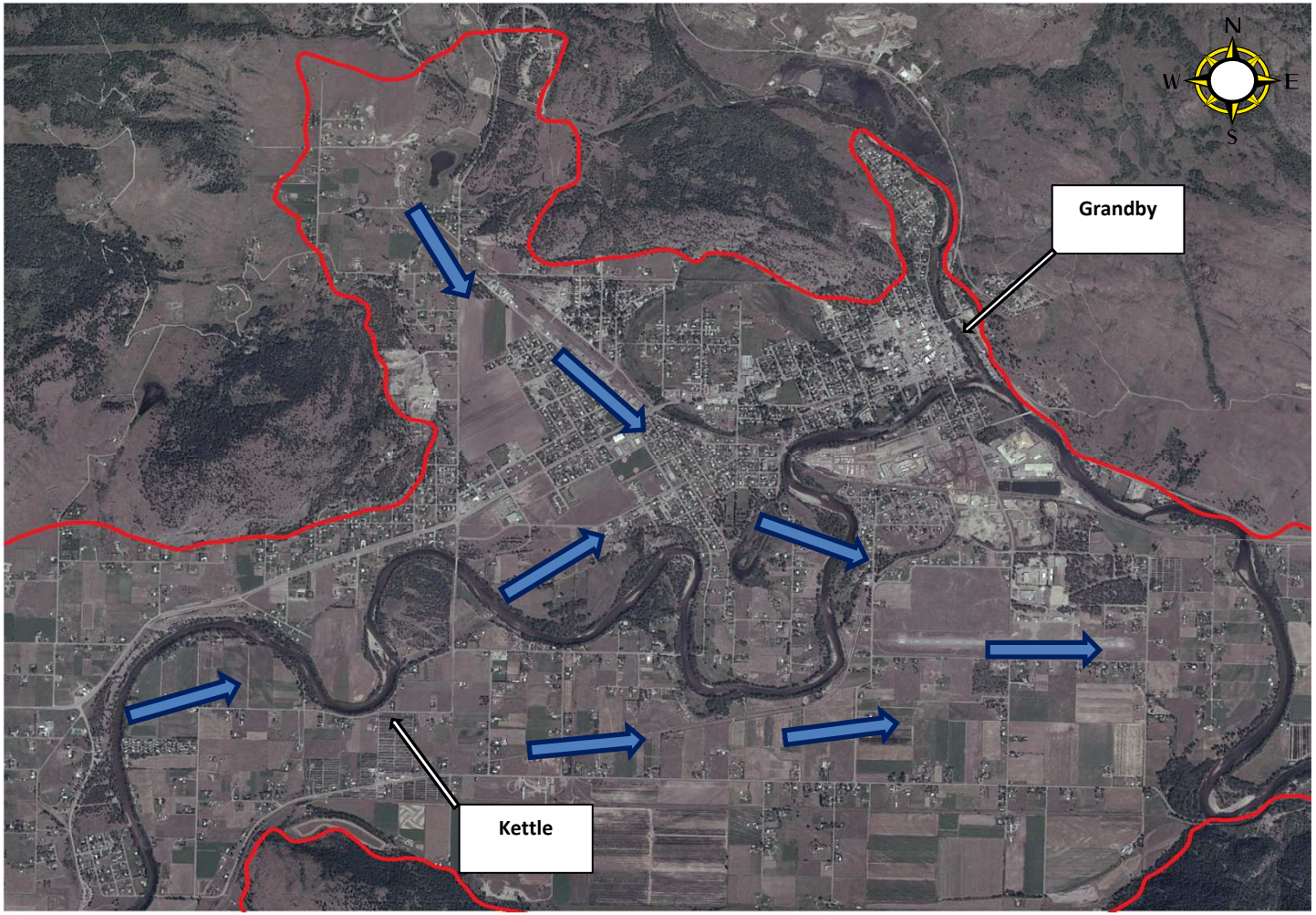
Well	Pumping Rate (m^3/day)	Pumping Rate USgpm	Transmissivity (m^2/day)	Available Drawdown (m)	Casing Radius (m)	PW # 2 Dist.(m)	PW # 2 D'down (m)	PW # 3 Dist.(m)	PW # 3 D'down (m)	PW # 3A Dist.(m)	PW # 3A D'down (m)	PW # 4 Dist.(m)	PW # 4 D'down (m)	PW # 5 Dist.(m)	PW # 5 D'down (m)	TW 99-2 Dist.(m)	TW 99-2 D'down (m)	New Well Dist.(m)	New Well D'down (m)	Cumulative Drawdown (m)	70% of Available Drawdown (m)	Acceptable (Yes/No)
Scenario 1																						
PW #2	**2100**	**385**	1380	15	0.2	0.2	**2.0**	410	**0.2**	430	**0.2**	862	**0.1**	876	**0.1**	700	**n.a.**	665	**n.a.**	2.6	10.5	Yes
PW #3a	**6500**	**1200**	920	21	0.25	410	0.9	0.25	12.4	22	4.2	711	0.4	730	0.4	1000	n.a.	245	n.a.	18.3	14.7	No
PW #3	**2600**	**475**	920	15	0.15	430	0.3	22	1.6	0.15	5.5	690	0.2	710	0.2	1000	n.a.	235	n.a.	7.8	10.5	Yes
PW #4	**3000**	**400**	1500	28	0.1	862	0.1	711	0.1	690	0.1	0.1	2.1	22.5	0.9	950	n.a.	670	n.a.	3.3	19.6	Yes
PW#5	**7100**	**1100**	1200	29	0.2	876	0.3	730	0.3	710	0.4	22.5	3.0	0.2	20.2	950	n.a.	690	n.a.	24.2	20.3	No
TW 99-2	**0**	**0**	575	30	0.1	n.a	n.a	n.a	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.1	n.a.	n.a.	n.a.	0.0	21.0	n.a.
New Well 6	**0**	**0**	1000	25	0.1	n.a	n.a	n.a	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.1	n.a.	0.0	17.5	n.a.
Totals	**21300**	**3560**																				
Scenario 2																						
PW #2	**2100**	**385**	1380	16.8	0.2	0.2	**2.0**	410	**0.2**	430	**0.2**	862	**0.1**	876	**0.1**	695	**0.1**	665	**0.0**	2.7	11.8	Yes
PW #3a	**6500**	**1200**	920	19.8	0.25	410	0.9	0.25	12.4	22	4.2	711	0.4	730	0.4	1000	0.2	245	0.0	18.5	13.9	No
PW #3	**2600**	**475**	920	20.1	0.15	430	0.3	22	1.6	0.15	5.5	690	0.2	710	0.2	1000	0.1	235	0.0	7.9	14.1	Yes
PW #4	**3000**	**400**	1500	35.6	0.1	862	0.1	711	0.1	690	0.1	0.1	2.1	22.5	0.9	940	0.1	670	0.0	3.4	24.9	Yes
PW#5	**7100**	**1100**	1200	33.5	0.2	876	0.3	730	0.3	710	0.4	22.5	3.0	0.2	20.2	945	0.2	690	0.0	24.4	23.5	No
TW 99-2	**4000**	**700**	575	25	0.1	695	0.2	1000	0.1	1000	0.1	940	0.1	945	0.1	0.1	10.0	n.a.	n.a.	10.6	17.5	Yes
New Well 6	**0**	**0**	1000	25	0.1	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.1	n.a.	0	17.5	n.a.
Totals	**25300**	**4260**																	**0.0**			
Scenario 3																						
PW #2	**2100**	**385**	1380	16.8	0.2	0.2	**2.0**	410	**0.2**	430	**0.2**	862	**0.1**	876	**0.1**	695	**n.a.**	665	**0.0**	2.6	11.8	Yes
PW #3a	**6500**	**1200**	920	19.8	0.25	410	0.9	0.25	12.4	22	4.2	711	0.4	730	0.4	1000	n.a.	245	0.0	18.3	13.9	No
PW #3	**2600**	**475**	920	20.1	0.15	430	0.3	22	1.6	0.15	5.5	690	0.2	710	0.2	1000	n.a.	235	0.0	7.8	14.1	Yes
PW #4	**3000**	**400**	1500	35.6	0.1	862	0.1	711	0.1	690	0.1	0.1	2.1	22.5	0.9	940	n.a.	670	0.0	3.3	24.9	Yes
PW#5	**7100**	**1100**	1200	33.5	0.2	876	0.3	730	0.3	710	0.4	22.5	3.0	0.2	20.2	945	n.a.	690	0.0	24.2	23.5	No
TW 99-2	**0**	**0**	575	25	0.1	n.a	n.a	n.a	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.0	17.5	n.a.
New Well 6	**4000**	**700**	1000	25	0.1	665	0.3	245	0.8	235	0.8	670	0.3	690	0.2	n.a.	n.a.	0.1	6.0	8.4	17.5	Yes
Totals	**25300**	**4260**																				

Notes: (1) Pumping rates based on historical data from 2006-2012 provided by City of Grand Forks Public Works Department.
(2) Drawdown in existing pumping wells based on historical operational values. Drawdown in TW99-2 and in proposed new well does not account for well losses and is therefore approximated only.
(3) Scenario 1 based on existing wells operating for 12 hours continuously.
(4) Scenario 2 based on existing wells and TW 99-2.
(5) Scenario 3 based on existing wells and new well at proposed location roughly 250m southeast of well pair 3 / 3A.
(6) Available drawdown defined as height of water from top of screens to static water level, OR, from bottom of confining unit to static water level.
(7) Storage coefficient for all locations 1.5 e-3 .
(8) Transmissivity and aquifer thickness for new well location assumed to be similar to values at well pair 3 / 3A.

TABLE V
City of Grand Forks Groundwater Management Study
Summary of Valuation of City Water Wells as Assets

No.	Attribute	Attribute Weighting Factor	Well Location and Value Assigned							Management Issue	Ranking Criteria
			Well 2	Well 3	Well 3A	Well 4	Well 5	TW 99-2	Proposed Well 6		
1	Preliminary GWUDI / GARP Rating	1	10	10	10	10	10	10	10	Quality	1 = Definitive GWUDI/GARP, 5 = Potentially GWUDI/GARP, 10 = Not GWUDI/GARP
2	Dominant Land Use Within 1-Year Capture Zone	1	6	3	3	4	4	2	4	Quality	1 = Industrial / Commercial / Agricultural, 5 = residential / Light Commercial, 10 = Crown/Undeveloped
3	Proximity to Major Transportation Corridor	0.5	10	10	10	10	10	10	10	Quality	1 = within 25m, 4= from 25 to 60m, 7 = from 60 to 100m, 10 = greater than 100m
4	Negative Water Quality Trends in Area	1	7	5	5	5	5	4	6	Quality	1 to 3 = increasing concentration trend, 4 to 7 = stable depending on parameter, 8 to 10 = declining
5	Available Drawdown (m) susceptibility to drought	0.5	5	5	5	6	7	7	7	Quantity	1 = less than 5m, 3 = from 5 to 10m, 5 = from 10 to 20m, 7 = from 20 to 30m, 9 = greater than 30m
6	Specific Capacity (Efficiency)	1	8	5	7	3	4	1	7	Quantity	1 or 2 = relatively low value, 3 to 6 = median value, 7 to 10 = relatively high value
7	Well Yield in Relation to Total System Capacity	1	4	4	9	5	8	5	8	Quantity	8 to 10 = greater than 25 %, 5 to 7 = between 15 and 25%, 3 or 4 = between 5 and 15%, 1 or 2 = less than 5%
8	Age (years)	1	1	7	3	4	6	10	10	Life Cycle / Cost	1 = greater than 50 years, 3 = from 35 to 50 years, 5 = from 20 to 35 years, 7 = from 5 to 15 years, 10 = less than 5 years or new
9	Water Quality (treatment required?)	0.5	5	5	5	5	5	5	5	Quality / Cost	1 = Needs Treatment, 5 = Treatment for Aesthetic Parameters only , 10 = No Treatment Required
10	Improvement Required to Comply with GWPR	0.5	2	10	2	10	10	10	10	Life Cycle / Cost	relative ranking from 1 = significant improvements required, 5 = some improvements required, 10 = compliant with GWPR or new
11	Existing Infrastructure	0.5	10	10	10	10	10	5	3	New Well Location Consideration	1 = Connection Difficult, 5 = moderately easy to connect, 10 = Easy connection or already connected
	Total		52	54	53	51.5	58	50.5	62.5	**larger number denotes relatively higher asset worth**	

FIGURES



Legend

Direction of Flow

Limits of Aquifer

City of Grand Forks

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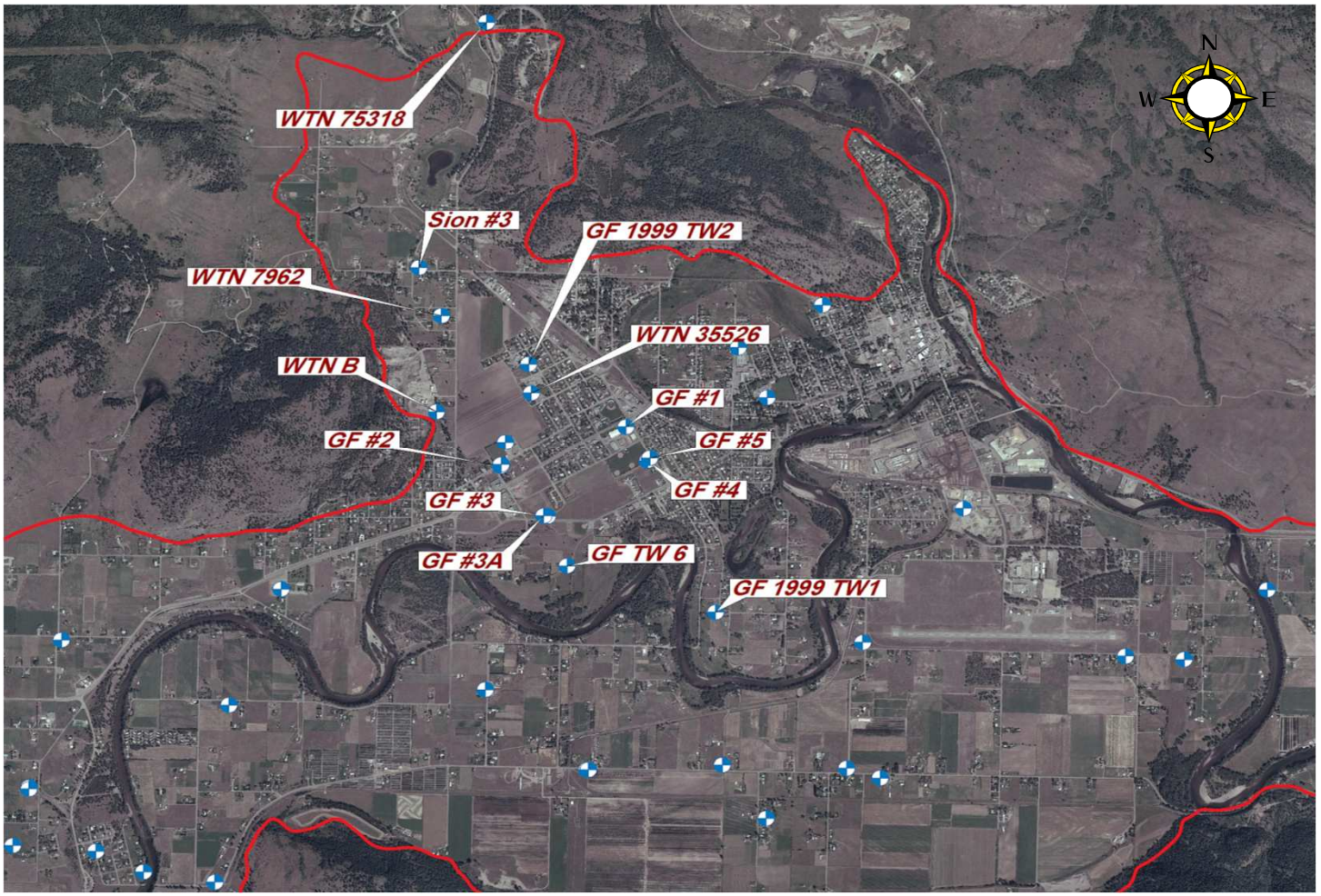
GEOTECHNICAL AND HYDROGEOLOGICAL CONSULTANTS

Management of Community Water Wells Project

Plan of Study Area

BY:	DATE:
RA	FEB 13
APPROVED:	FIG:
RA	1



Legend

Blue dot denotes well location

Red label denotes well name

City of Grand Forks

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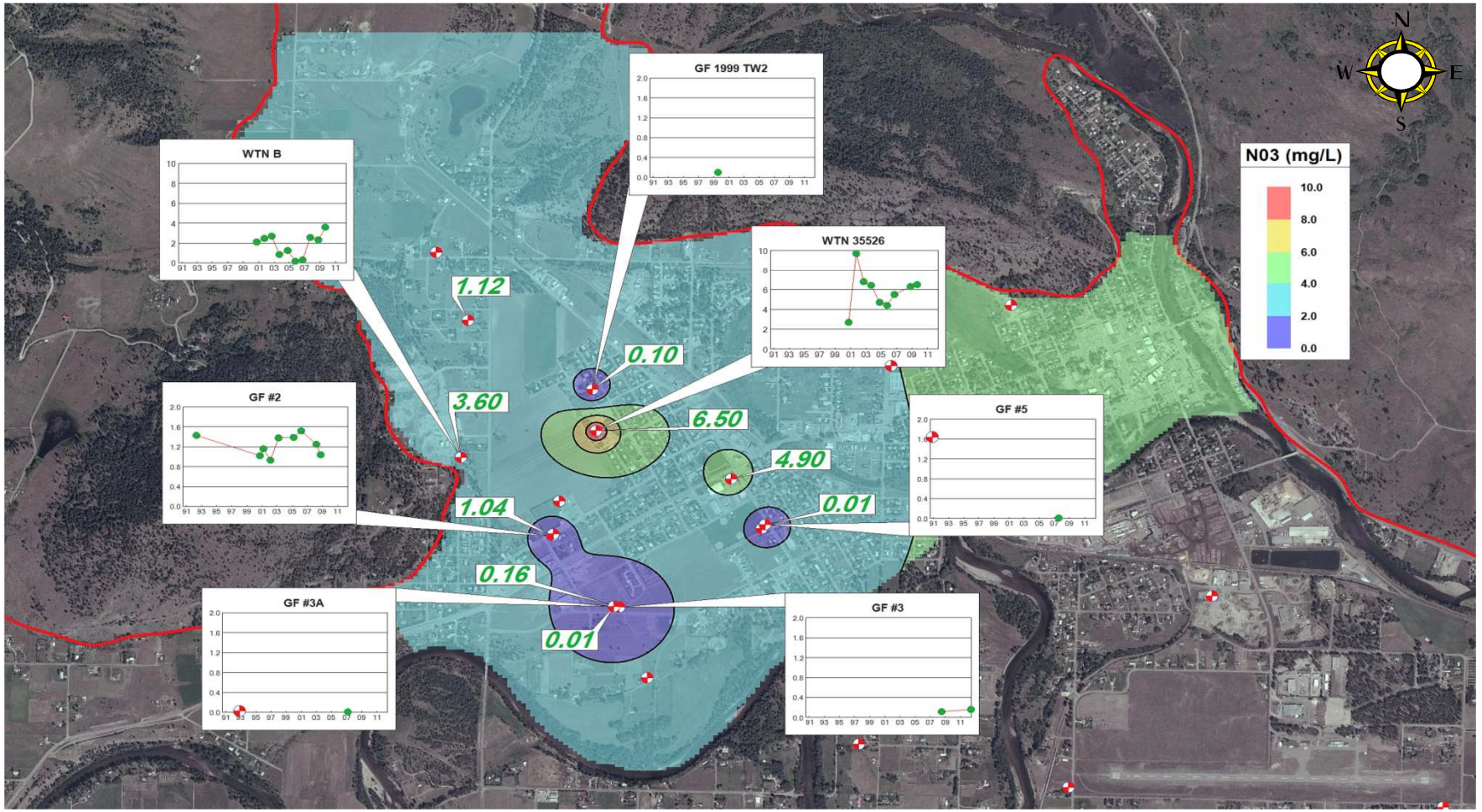
GEOTECHNICAL AND HYDROGEOLOGICAL CONSULTANTS

Management of Community Water Wells Project

Well Locations

BY:	DATE:
RA	FEB 13
APPROVED: RA	FIG: 2



Green numbers represent maximum historical nitrate concentration in mg/l

City of Grand Forks

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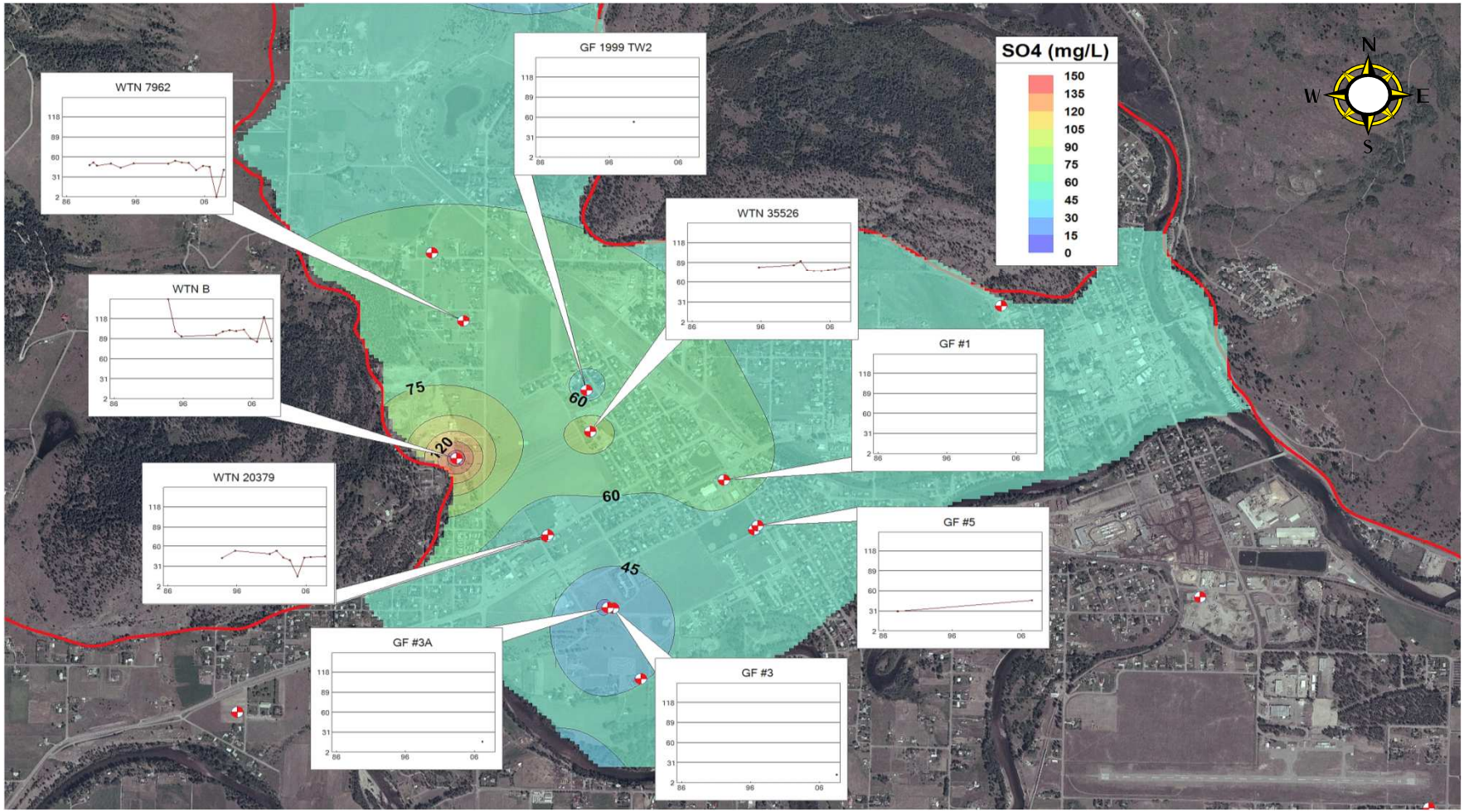
Management of Community Water Wells Project

Spatial and Temporal Plot for Nitrates

BY:	DATE:
RA	FEB 13
APPROVED: RA	FIG: 3



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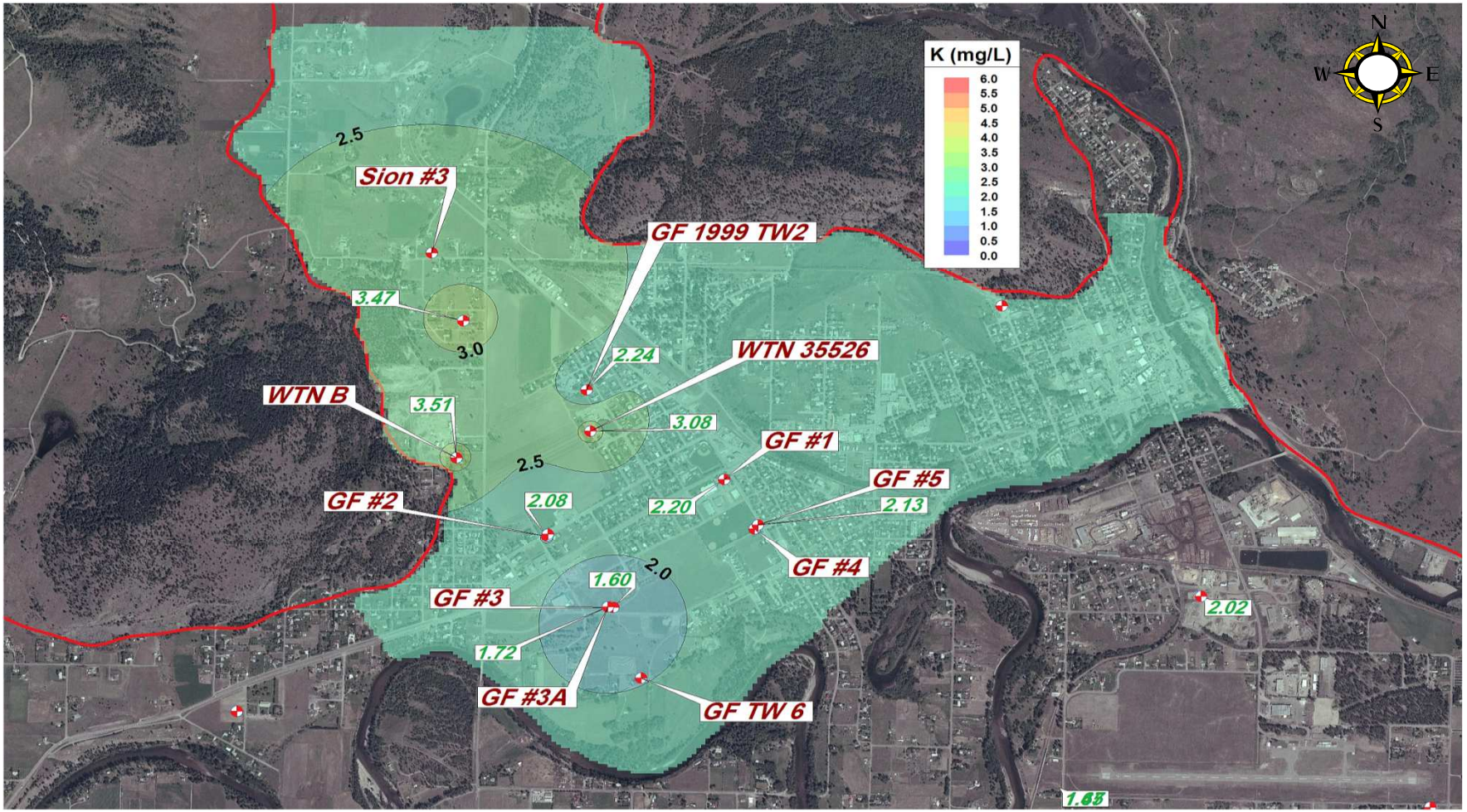
Management of Community Water Wells Project

Spatial and Temporal Plot for Sulphates

BY:	DATE:
RA	FEB13
APPROVED:	FIG:
RA	4



City of Grand Forks

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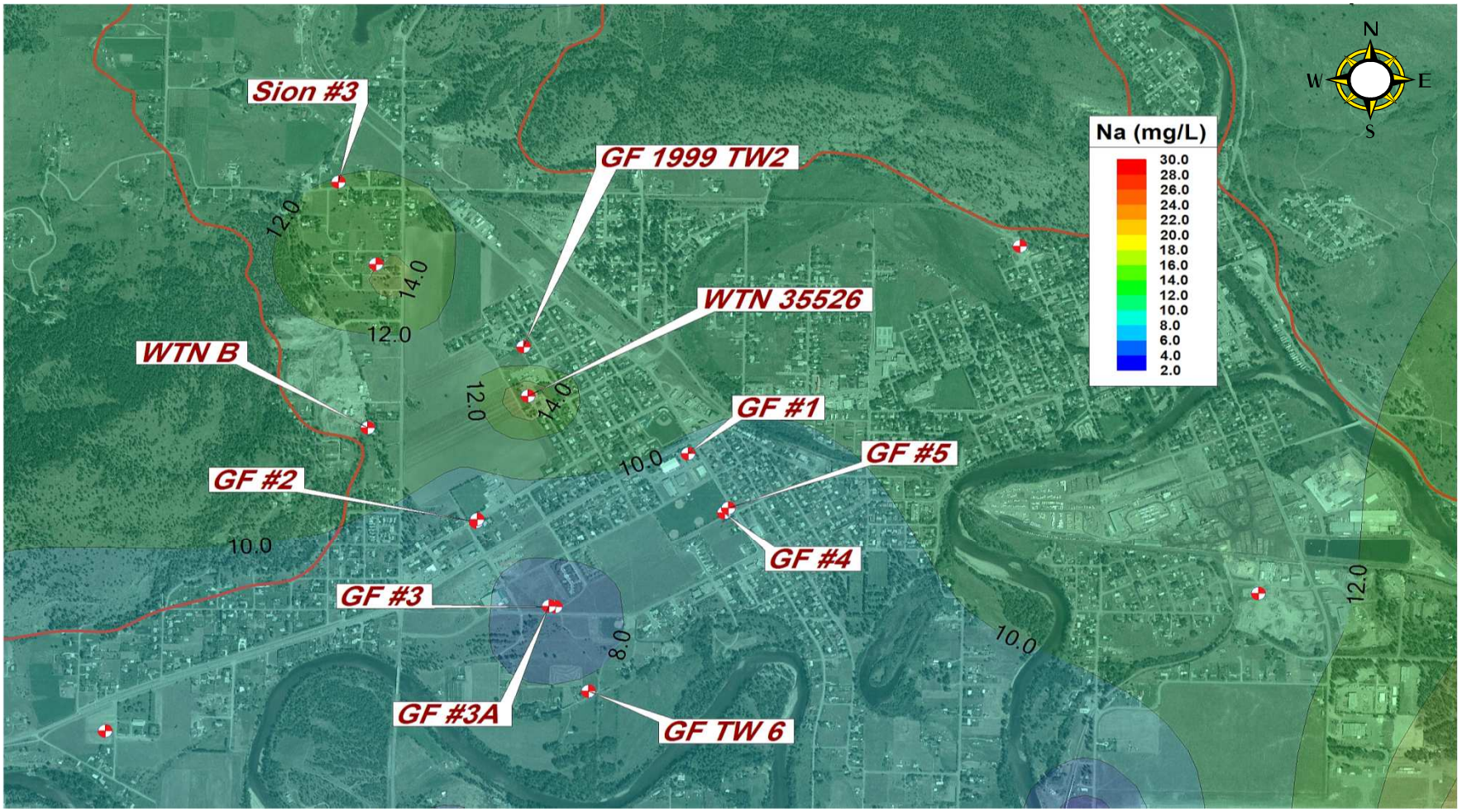
Management of Community Water Wells Project

Spatial and Temporal Plot for Potassium

BY:	DATE:
RA	FEB 13
APPROVED:	FIG:
RA	5



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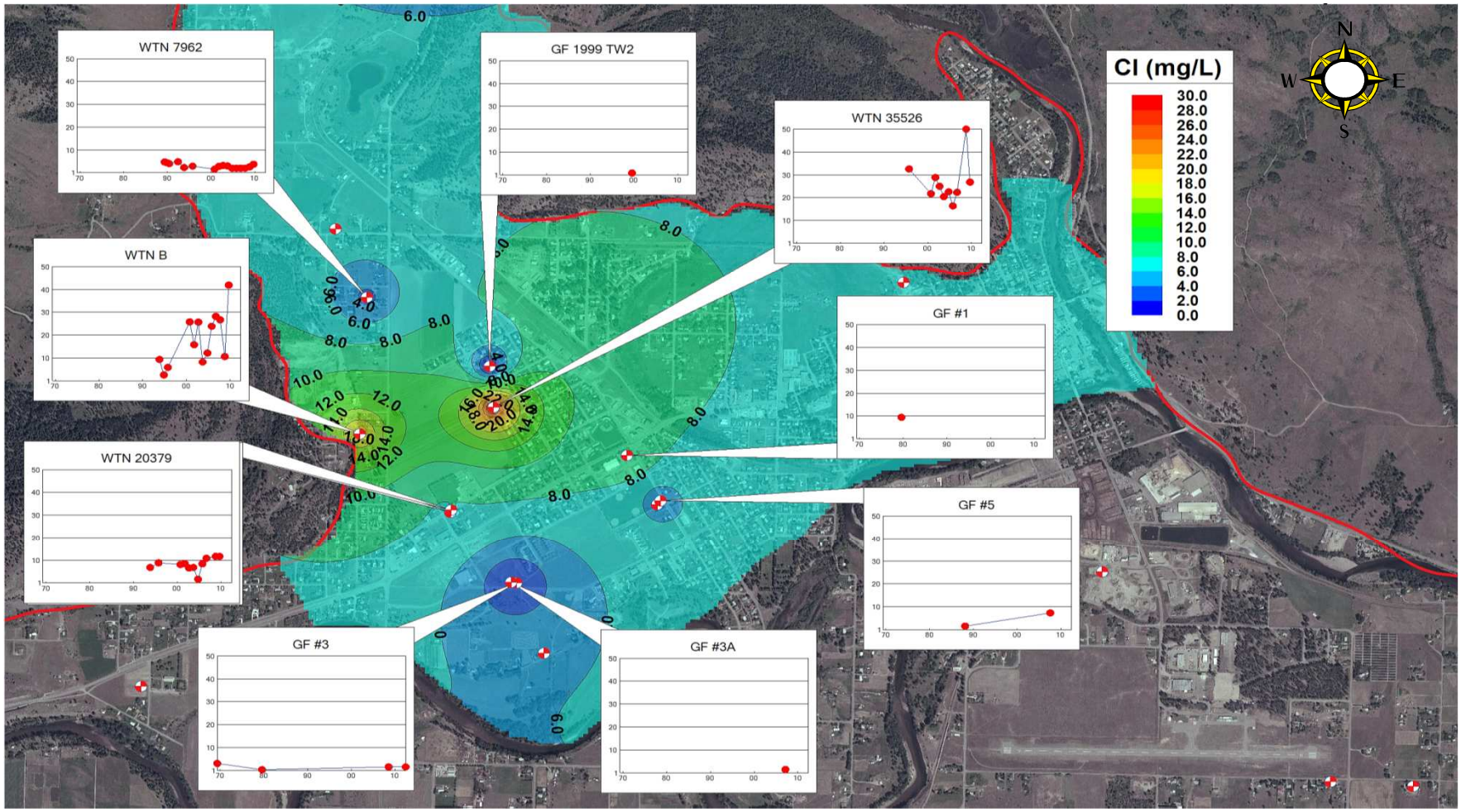
Management of Community Water Wells Project

Spatial and Temporal Plot for Sodium

BY:	DATE:
RA	FEB 13
APPROVED:	FIG:
RA	6



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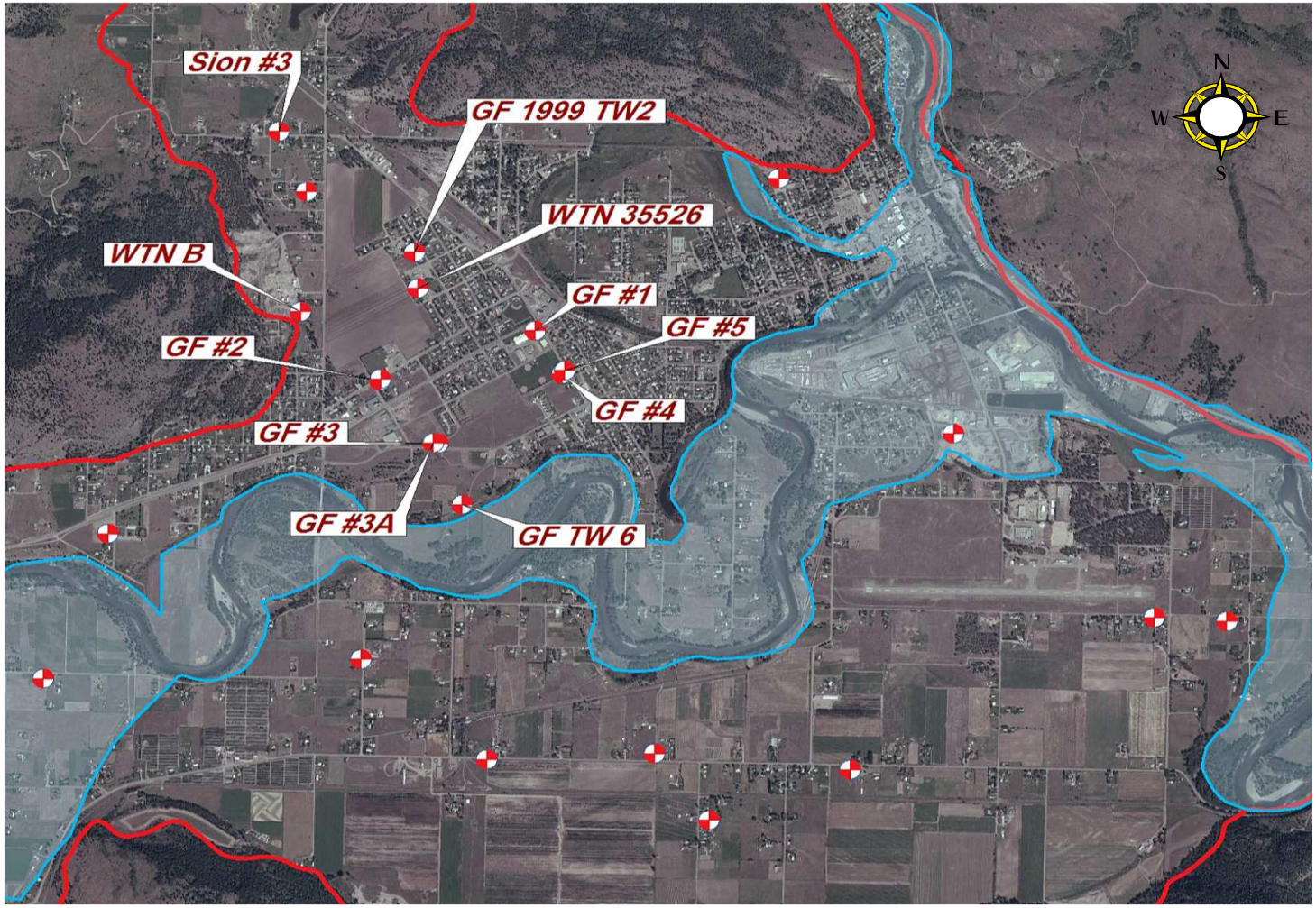
Management of Community Water Wells Project

Spatial and Temporal Plot for Chloride

BY:	DATE:
RA	FEB 13
APPROVED:	FIG:
RA	7



Legend

blue is extent of floodplain

Floodplain limits provided by Urban Systems Ltd.

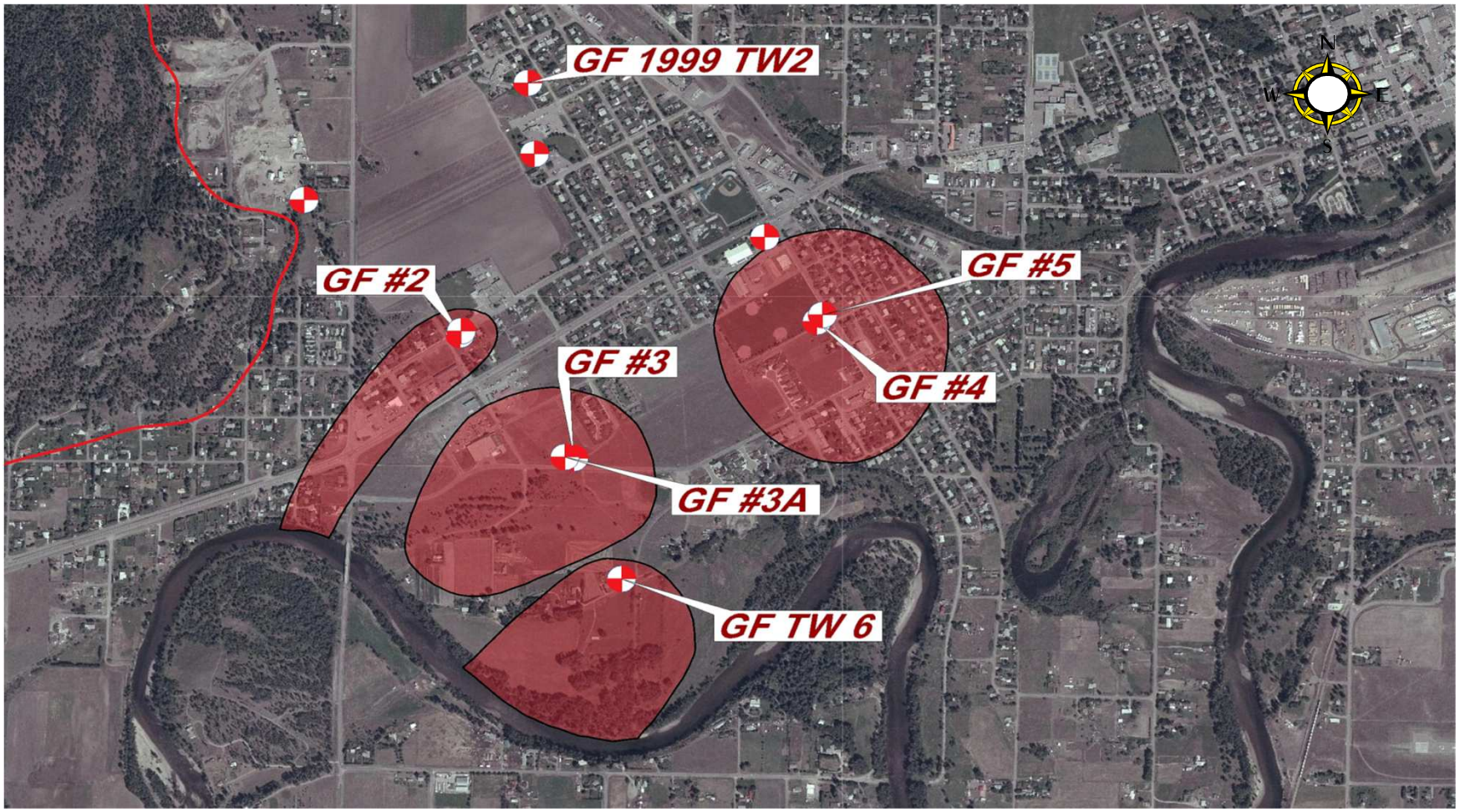
City of Grand Forks

PITEAU ASSOCIATES
GEOTECHNICAL AND HYDROGEOLOGICAL CONSULTANTS

Management of Community Water Wells Project

Well Locations in Relation to Extent of Floodplain

BY:	DATE:
RA	FEB 13
APPROVED:	FIG:
RA	8



Capture Zones determined using Modflow model developed by Dr. D. Allen at Simon Fraser University (Allen, 2004)

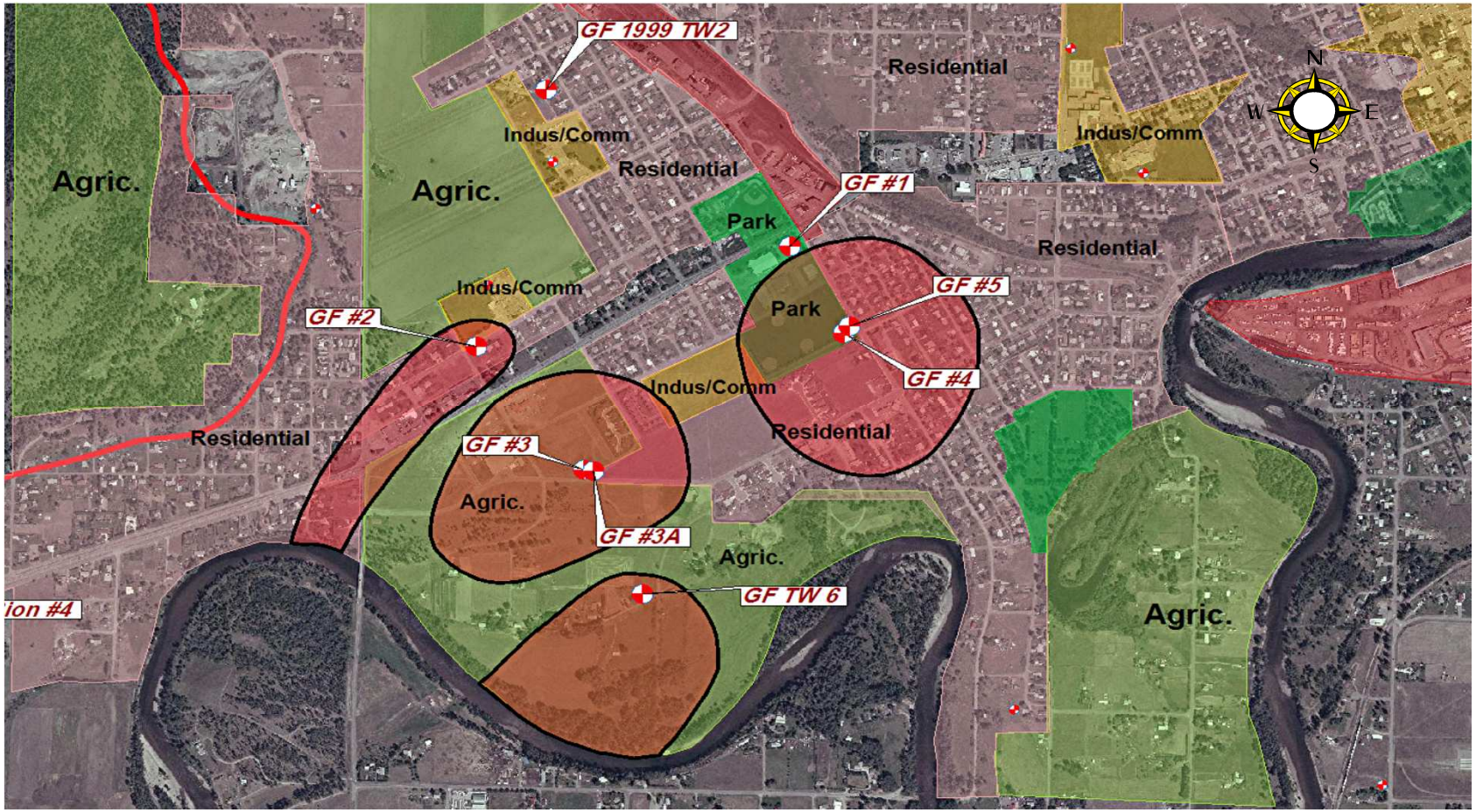
City of Grand Forks

PITEAU ASSOCIATES
GEOTECHNICAL AND HYDROGEOLOGICAL CONSULTANTS

Management of Community Water Wells Project

Capture Zones for City Wells for 1 Year Time of Travel

BY:	DATE:
RA	FEB 13
APPROVED: RA	FIG: 9



Capture zones are for 1 year time of travel. Land use based on 2011 City of Grand Forks Sustainable Community Plan.

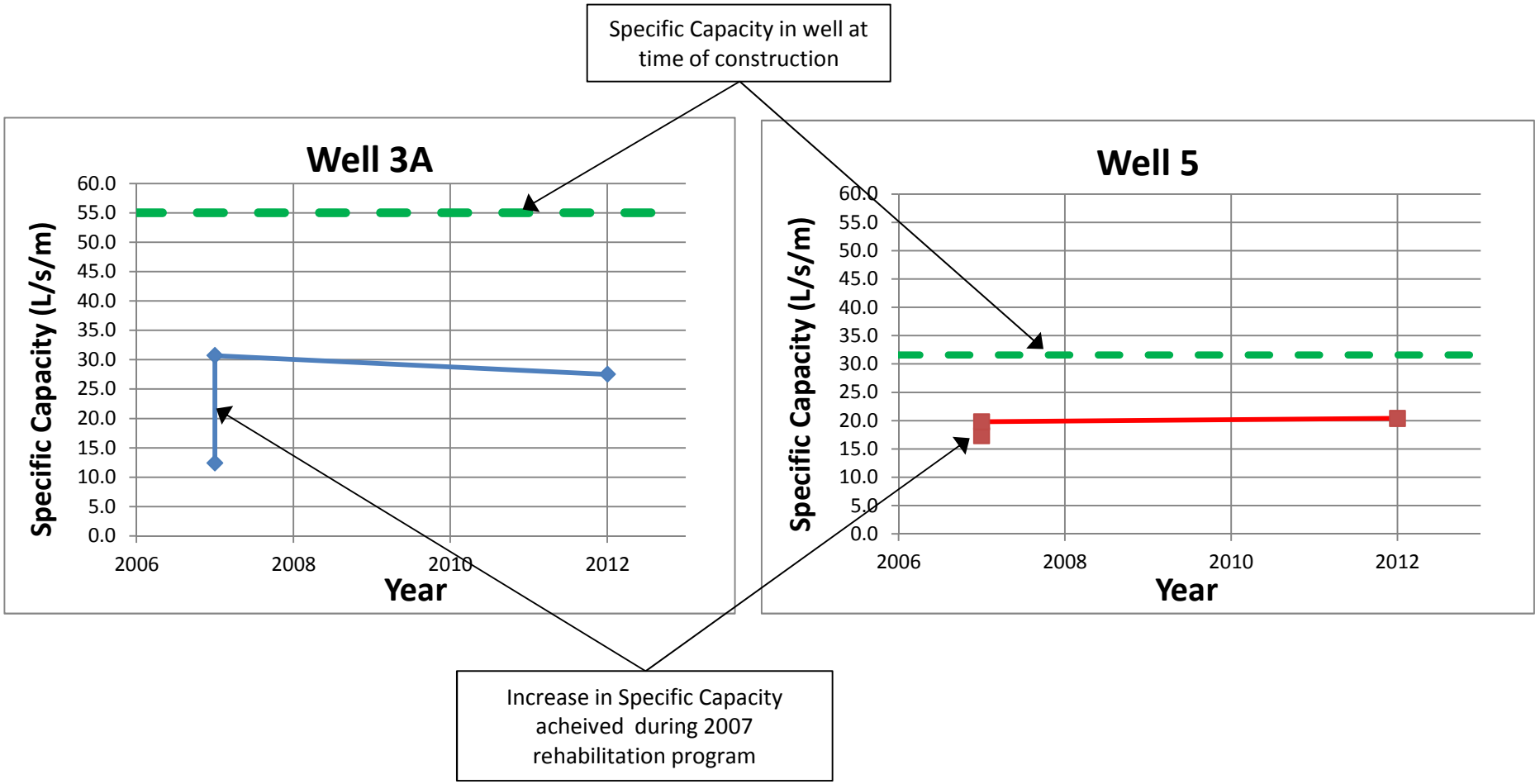
City of Grand Forks

PITEAU ASSOCIATES
GEOTECHNICAL AND HYDROGEOLOGICAL CONSULTANTS

Management of Community Water Wells Project

Land Use in Area of Capture Zones for City Wells

BY:	DATE:
RA	FEB 13
APPROVED: RA	FIG: 10



City of Grand Forks

PITEAU ASSOCIATES
GEOTECHNICAL AND HYDROGEOLOGICAL CONSULTANTS

Management of Community Water Wells Project

Temporal Trend in Specific Capacity in Well 3A and Well 5

BY: RA

DATE: FEB 13

APPROVED: RA

FIG: 11

APPENDIX A

WELL RECORDS FOR CITY WELLS

R. Allard (November 2012)
This is Grand Forks Well 1

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 14654

Owner: CITY OF GRAND FORKS

Address: GRAND FORKS

Area: GRAND FORKS

WELL LOCATION:
SIMILKAMEEN Land District
District Lot: Plan: Lot: 15
Township: Section: Range:
Indian Reserve: Meridian: Block: 21
Quarter:
Island:
BCGS Number (NAD 27): 082E008232 Well: 5

Class of Well: Water supply
Subclass of Well: Domestic
Orientation of Well:
Status of Well: New
Well Use: Water Supply System
Observation Well Number:
Observation Well Status:
Construction Method: Dug
Diameter: 0.0 inches
Casing drive shoe:
Well Depth: 91 feet
Elevation: 1727 feet (ASL)
Final Casing Stick Up: inches
Well Cap Type:
Bedrock Depth: feet
Lithology Info Flag: N
File Info Flag: N
Sieve Info Flag: N
Screen Info Flag: N

Site Info Details:
Other Info Flag:
Other Info Details:

Construction Date: 1956-01-01 00:00:00.0

Driller: Not Applicable
Well Identification Plate Number:
Plate Attached By:
Where Plate Attached:

PRODUCTION DATA AT TIME OF DRILLING:
Well Yield: 750 (Driller's Estimate) U.S. Gallons per Minute
Development Method:
Pump Test Info Flag: N
Artesian Flow:
Artesian Pressure (ft):
Static Level: 17 feet

WATER QUALITY:
Character:
Colour:
Odour:
Well Disinfected: N
EMS ID:
Water Chemistry Info Flag: Y
Field Chemistry Info Flag:
Site Info (SEAM):

Water Utility:
Water Supply System Name:
Water Supply System Well Name:

SURFACE SEAL:
Flag: N
Material:
Method:
Depth (ft):
Thickness (in):

WELL CLOSURE INFORMATION:
Reason For Closure:
Method of Closure:
Closure Sealant Material:
Closure Backfill Material:
Details of Closure:

Screen from	to feet	Type	Slot Size

Casing from	to feet	Diameter	Material	Drive Shoe

GENERAL REMARKS:

LITHOLOGY INFORMATION:

From	0 to	36 Ft.	all gravel?
From	0 to	0 Ft.	
From	0 to	0 Ft.	* Deepened Oct. 1981 by Double J. Well
From	0 to	0 Ft.	Dr. Ltd. Castlegar, BC
From	36 to	49 Ft.	Fn.-cr. gravel, 65 % md.-cr. sand(clean)
From	49 to	55 Ft.	fn.-cr. sand (clean)
From	55 to	60 Ft.	fn.-md. gravel, 30 % fn.-cr. sand
From	60 to	66 Ft.	fn.-md. sand, some silt
From	66 to	78 Ft.	fn., silty, sand
From	78 to	83 Ft.	fn.-md. sand, some silt
From	83 to	87 Ft.	fn.-md. sand, some gravel (clean)
From	87 to	91 Ft.	fn.-md. sand (clean)
From	0 to	0 Ft.	
From	0 to	0 Ft.	Screen location:
From	41.3 to	43.3 Ft.	top of screen assembly - blank
From	0 to	0 Ft.	pipe and packer
From	43.3 to	48.7 Ft.	80 slot screen
From	48.7 to	59 Ft.	20 slot screen
From	0 to	0 Ft.	

From	0 to	0 Ft.	Estimated yield = 750 GPM
From	0 to	0 Ft.	
From	0 to	0 Ft.	Mulit-stage centrifugal pump in well.
From	0 to	0 Ft.	
From	0 to	0 Ft.	Aug. 15/83 - all well log footages mea-
From	0 to	0 Ft.	sured to the top of the dug well which
From	0 to	0 Ft.	is 7.3', below present ground level.
From	0 to	0 Ft.	(M.Wei)
From	0 to	0 Ft.	17/5/94 - Min. of Health, Grand Forks
From	0 to	0 Ft.	well # 1

- Return to Main
- Return to Search Options
- Return to Search Criteria

R. Allard (November 2012)
This is Grand Forks Well 2

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 19226

Owner: CITY OF GRAND FORKS

Address: GRAND FORKS

Area: GRAND FORKS

WELL LOCATION:
SIMILKAMEEN Land District
District Lot: Plan: Lot:
Township: Section: Range:
Indian Reserve: Meridian: Block:
Quarter:
Island:
BCGS Number (NAD 27): 082E008232 Well: 10

Class of Well: Water supply
Subclass of Well: Domestic
Orientation of Well:
Status of Well: New
Well Use: Water Supply System
Observation Well Number:
Observation Well Status:
Construction Method: Drilled
Diameter: 16.0 inches
Casing drive shoe:
Well Depth: 100 feet
Elevation: 0 feet (ASL)
Final Casing Stick Up: inches
Well Cap Type:
Bedrock Depth: feet
Lithology Info Flag: N
File Info Flag: N
Sieve Info Flag: N
Screen Info Flag: N

Site Info Details:
Other Info Flag:
Other Info Details:

Construction Date: 1965-04-16 00:00:00.0

Driller: Budhenning Co.
Well Identification Plate Number:
Plate Attached By:
Where Plate Attached:

PRODUCTION DATA AT TIME OF DRILLING:
Well Yield: 500 (Driller's Estimate) Gallons per Minute (U.S./Imperial)
Development Method:
Pump Test Info Flag: N
Artesian Flow:
Artesian Pressure (ft):
Static Level: 40 feet

WATER QUALITY:
Character:
Colour:
Odour:
Well Disinfected: N
EMS ID: E217469
Water Chemistry Info Flag: Y
Field Chemistry Info Flag:
Site Info (SEAM): Y

Water Utility:
Water Supply System Name:
Water Supply System Well Name:

SURFACE SEAL:
Flag: N
Material:
Method:
Depth (ft):
Thickness (in):

WELL CLOSURE INFORMATION:
Reason For Closure:
Method of Closure:
Closure Sealant Material:
Closure Backfill Material:
Details of Closure:

Screen from	to feet	Type	Slot Size

Casing from	to feet	Diameter	Material	Drive Shoe

GENERAL REMARKS:

LITHOLOGY INFORMATION:

From	0 to	0 Ft.	Well deepened from 43'
From	0 to	0 Ft.	7" test hole.April 16, 1965.
From	0 to	0 Ft.	
From	0 to	48 Ft.	dk
From	48 to	50 Ft.	fine brwn sand
From	50 to	52 Ft.	crse sand (some grvl)
From	52 to	58 Ft.	fine brwn sand
From	58 to	62 Ft.	med. sand (61' - boulder?)
From	62 to	67 Ft.	crse sand
From	67 to	76 Ft.	med. sand
From	76 to	78 Ft.	yellow sandy clay
From	78 to	98 Ft.	sand & grvl (tight, hard)
From	98 to	109 Ft.	grvl (Robin egg size)
From	109 to	114 Ft.	sand -some grvl
From	114 to	135 Ft.	fine gry sand (dirty)

- Return to Main
- Return to Search Options
- Return to Search Criteria

Information Disclaimer
The Province disclaims all responsibility for the accuracy of information provided. Information provided should not be used as a basis for making financial or any other commitments.

BOREHOLE NO. WELL NO. 3A

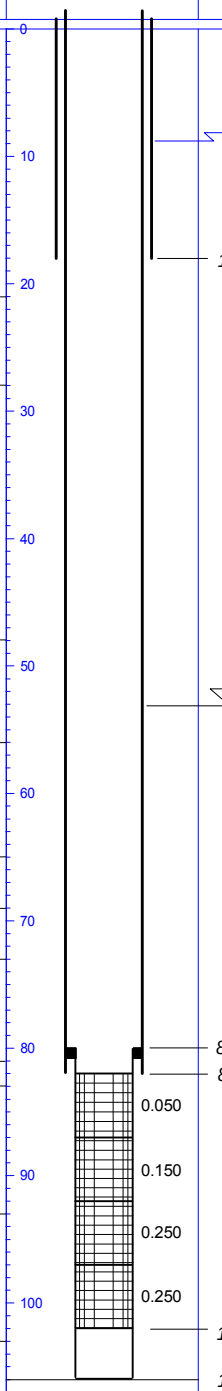
LOCATION WEST SIDE AREA
GRAND FORKS BC

DRILLER COLUMBIA WATER WELLS (1986) LTD.

EQUIPMENT B.E. 22W CABLE TOOL DRILL

DEPTH, FT	DEPTH, M	SYMBOL	SOIL DESCRIPTION
0 – 10	0 – 5		Brown SAND, coarse GRAVEL and COBBLES
20	5		Coarse SAND, fine to medium GRAVEL
30 – 40	10		Brown coarse SAND, fine to coarse GRAVEL and COBBLES. Water bearing from 33 ft.
50	15		Gray interbedded medium to coarse SAND and fine to coarse GRAVEL
60			Coarse SAND
70	20		Medium to coarse SAND
			Fine to coarse SAND. Cemented.
80			Fine to medium SAND, some coarse SAND and STONES
	25		Fine to coarse SAND and GRAVEL
90			Fine to coarse SAND, fine GRAVEL and STONES.
100	30		Coarse SAND, fine to coarse GRAVEL, some COBBLES
			Brown SILTY fine to medium SAND
110			

CONSTRUCTION



REMARKS

Surface casing 20-inch diameter

R. Allard (November 2012)
This is Grand Forks Well 3

Hole drilled and cased 16-inch diameter.

SCREEN ASSEMBLY:
Nominal 16-inch diameter x 20-feet of wire wound stainless steel well screen, slot size as noted in inches.
Total assembly length 26 feet complete with Neoprene packer, riser and bottom sump.

CLIENT
CITY OF GRAND FORKS

COLUMBIA WATER WELLS (1986) LTD.
LANGLEY BRITISH COLUMBIA

PROJECT
PRODUCTION WELL DRILLING

LOG OF WELL
WELL NO. 3A

W.O. NO. 2803
CONSTRUCTION DATE 15 JUL 00
BY HWR
DRAWING NO. 102

R. Allard (November 2012)
This is Grand Forks well 3A drilled in 1969 and formerly known as Well 3

Ground surface

Annular space cement grouted

Bottom of 24-inch culvert pipe — 15'

Static water level — 21'

20-inch casing

See Detail of joint on Diagram : 3

Bottom of 20-inch casing — 90'

20 feet of 10-inch 100/1000 slot stainless steel screen

3/8-inch nominal gravel pack

Bottom of screen 111.5

Bottom of 16-inch hole 116.0

coarse gravel backfill

	Course gravel and silt
24'	
	Clean, course sand and some small gravel. Water-bearing
50'	Very coarse sand, coarse gravel and fine silt
57'	
	Coarse sand and some medium sand
69'	
	Medium sand, thin clay layers and some boulders
75'	
	Medium sand and some coarse sand, fine sand and silt
86'	
87'	Coarse gravel with clay layers
90'	Coarse sand and some gravel
	Medium sand, well graded with pebbles up to 2½ inches
95'	
	Well graded gravel and some sand
102'	
	Very coarse gravel
	Very little sand

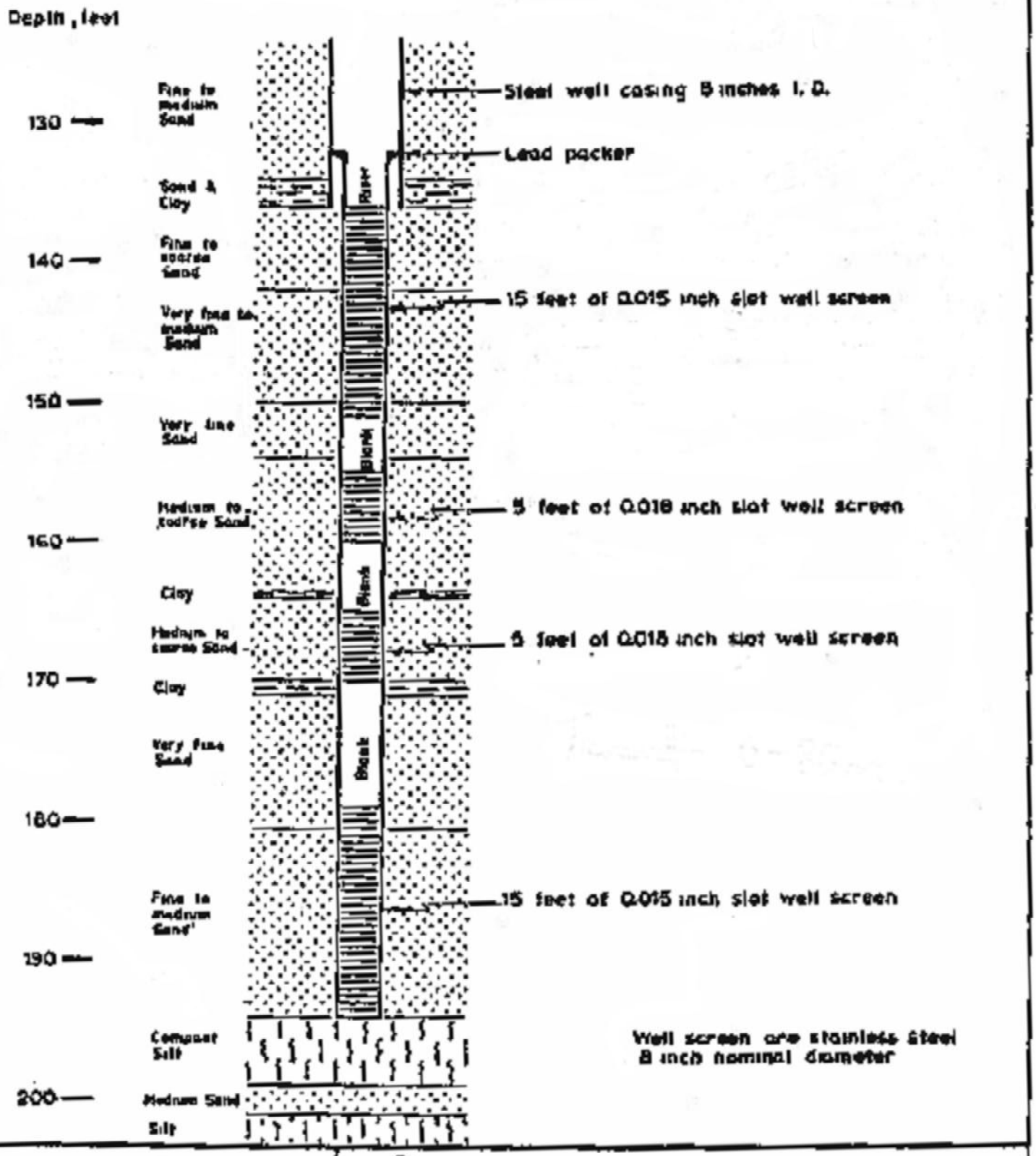
CITY OF GRAND FORKS	Log of Production Well	ROBINSON, ROBERTS & BROWN LTD. CONSULTING GROUNDWATER HYDROLOGISTS NORTH VANCOUVER, CANADA
Grand Forks, B.C.		June, 1969

WELL #4

R. Allard (November 2012)
This is Grand Forks Well 4

GRAND FORKS: T.H. 77-2

Depth Below Ground	Description
0-25	Silty sand and coarse gravel, dry.
25-45	Silty medium sand, small gravel, some silt and clay layers.
45-58	Medium sand and gravel, clean, water-bearing.
58-61	Medium to coarse sand and gravel, clean.
61-71	Fine to medium sand, good draining.
71-73	Fine to medium sand, some pebbles, water iron coloured.
73-85	Very fine sand, some silt. Tight
85-91	Fine sand, clean.
91-103	Very fine sand, silt, good draining.
103-110	Very find silty sand, poor draining. Some clay strips
110-116	Very fine sand, clay strips, poor draining.
116-118	Clay.
118-120	Medium to coarse sand, good draining.
120-134	Fine to medium sand, good draining.
134-136	Clay and silty clay layers in medium sand.
136-142	Fine to coarse sand, good drainage.
142-150	Very fine to medium sand, good drainage.
150-154	Very fine sand, good draining.
154-163.5	Medium to coarse, clean.
163.5-164	Clay layer.



CITY OF GRAND FORKS

INTERNATIONAL GROUNDWATER CONSULTANTS LTD.
NORTH VANCOUVER, BRITISH COLUMBIA

BRITISH COLUMBIA

TEST WELL
SCREEN ASSEMBLY

BY	DATE
HWR	11-8-77
JOB	DWG.
77-036	1

Job No. 87-97/8

HYDROGEOLOGIC LOG

R. Allard (November 2012)
This is Grand Forks Well 5

DRILLHOLE No. PW-5
Sheet 1 of 2

PROJECT City of Grand Forks New Well

Purpose of hole Water Supply
Coordinates:
E ..... Angle from horizontal 0
N ..... Bearing ..... °Azimuth

Type of drilling Cable Tool
Rig Bucyrus Erie
Drilling fluid water

Reference elevation 526.152 m - asl
Elevation type: Surveyed ☒ Altimeter ☐ From map ☐

Casing stick up 0.67 m - above ground

(1)(2)* Lithology	(2)(3) Completed Construction	During Drilling: (2) Depth (m)	During Drilling: (2)(4) Water Level (m)	During Drilling: (5) Water Flow (Lpm)	During Drilling: (6) Other	After Drilling: (2)(7) Water Level (m)	After Drilling: (8) Hydraulic Conductivity: Test Type	After Drilling: (8) Hydraulic Conductivity: Value (m/s)	After Drilling: (2) Depth (m)	Comments
Ground level										Elev: top of 400 mm casing 526.822 m
Silty SAND and coarse GRAVEL	500mm									
4.57 (521.58)										
SAND and coarse GRAVEL	6.1									
6.71 (519.44)										
Grey/brn med. SAND, few pebbles										
8.53 (517.62)	400mm									
						10.68				Feb 25, 1988
Grey/brn med. SAND - coarse GRAVEL, few pebbles up to 2"						10.69 (515.46)				Feb 5, 1988
14.63 (511.52)										
Grey/brn med. course SAND, some Gravel, few pebbles										
		25	10.0							
25.6 (500.55)										
trace med. Gravel										
Grey/brn med. coarse SAND										

Contractor Field Drilling
Date started Dec 3 1987
Date finished Feb 3 1988

Logged by PM
Checked by RAD
Date Mar 1 88

SCALE: Vertical 1: 150 approximate
Horizontal - NIL

*Bracketed numbers refer to notes following the logs

PITEAU & ASSOCIATES
GEOTECHNICAL CONSULTANTS
VANCOUVER CALGARY

HYDROGEOLOGIC LOG (Continued)

DRILLHOLE No. PW 3

Sheet 2 of 2

PROJECT City of Grand Forks New Well

Reference elevation 526.152 m-asl

Job No

(1)(2)* Lithology	(2)(3) Completed Construction	During Drilling: (2) Depth (m)	During Drilling: (2)(4) Water Level (m)	During Drilling: (5) Water Flow (Lps)	During Drilling: (6) Other	After Drilling: (2)(7) Water Level (m)	After Drilling: (8) Hydraulic Conductivity: Test Type	After Drilling: (8) Hydraulic Conductivity: Value (m/s)	After Drilling: (2) Depth (m)	Comments
40.237										
SILT Grey/brn md-crs SAND 0.1 41.5 (484.65)	40.5 41 (485.65) 400mm 250mm									
42.6 (483.35)							h	7.2×10^{-5}	43.0	
	44 (482.65)						h	1.0×10^{-4}	44.8	Water temperature during pump test was approx 9.5°C
Grey/brown fn - med. SAND, trace Silt							h	1.7×10^{-4}	46.6	
47.6 (478.55)							h	1.6×10^{-4}	47.6	
Grey/browned-coarse SAND, trace Silt, occasional gravelly (5-10%) layers	1,ss,1						h	1.2×10^{-4}	48.7	Electrical conductivity during pump test ranged from 490 µmhos/cm after 1 hour to 430 µmhos/cm after 14 hours.
							h	5.3×10^{-4}	50.0	
	F9 Monterey Sand pack						h	1.4×10^{-4}	51.2	
51.2 (474.95)							h	4.2×10^{-5}	51.8	
Grey/brown fn-med. SAND, trace Silt							h	2.1×10^{-4}	53.0	
occasional pebbles 0.10 54.7 Silt (471.45)							h	2.1×10^{-4}	54.3	pH values during pump test ranged from 8.0-8.3
							h	1.6×10^{-4}	54.9	
Grey/brown fn-med. SAND, trace Silt							h	2.3×10^{-4}	56.1	
	Cement Grout Seal						p	------		
0.07 59.7 (466.45)	59.4 (466.75)									

Logged by PMI Checked by RHD

*Bracketed numbers refer to notes following the logs

SCALE: Vertical 1: 150 approximate

Horizontal - N.t.s.

PITEAU & ASSOCIATES GEOTECHNICAL CONSULTANTS

VANCOUVER CALGARY

R. Allard (November 2012)
This is Grand Forks TW99-1

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 75353

Owner: CITY OF GRAND FORKS

Address: SW END OF 18TH STREET

Area: GRAND FORKS

WELL LOCATION:
SIMILKAMEEN Land District
District Lot: 533 Plan: 67 Lot: 21
Township: Section: Range:
Indian Reserve: Meridian: Block: 4
Quarter:
Island:
BCGS Number (NAD 27): 082E008214 Well: 45

Class of Well:
Subclass of Well:
Orientation of Well:
Status of Well: New
Well Use: Abandoned
Observation Well Number:
Observation Well Status:
Construction Method: Drilled
Diameter: 8.0 inches
Casing drive shoe:
Well Depth: 193.6 feet
Elevation: 1696 feet (ASL)
Final Casing Stick Up: inches
Well Cap Type:
Bedrock Depth: feet
Lithology Info Flag:
File Info Flag:
Sieve Info Flag:
Screen Info Flag: N

Site Info Details:
Other Info Flag:
Other Info Details:

Construction Date: 1998-11-17 00:00:00.0

Driller: Columbia Water Wells
Well Identification Plate Number:
Plate Attached By:
Where Plate Attached:

PRODUCTION DATA AT TIME OF DRILLING:
Well Yield: 0 (Driller's Estimate)
Development Method:
Pump Test Info Flag:
Artesian Flow:
Artesian Pressure (ft):
Static Level:

WATER QUALITY:
Character:
Colour:
Odour:
Well Disinfected: N
EMS ID:
Water Chemistry Info Flag:
Field Chemistry Info Flag:
Site Info (SEAM):

Water Utility:
Water Supply System Name:
Water Supply System Well Name:

SURFACE SEAL:
Flag:
Material:
Method:
Depth (ft):
Thickness (in):

WELL CLOSURE INFORMATION:
Reason For Closure:
Method of Closure:
Closure Sealant Material:
Closure Backfill Material:
Details of Closure:

Screen from	to feet	Type	Slot Size

Casing from	to feet	Diameter	Material	Drive Shoe
null	null	null	null	null

GENERAL REMARKS:
UTM LOCATION GIVEN IS NAD 83

LITHOLOGY INFORMATION:

From	0	to	7 Ft.	black topsoil
From	1	to	7 Ft.	brown silty sand
From	7	to	19 Ft.	coarse sand and fine to coarse gravel

From	19	to	25 Ft.	medium to fine sand, some stones
From	25	to	35.1 Ft.	fine sand, odd stones
From	35.1	to	40 Ft.	medium to fine sand
From	40	to	74.8 Ft.	fine sand, some water (<2 gpm)
From	74.8	to	89.9 Ft.	fine sand with seams of gray clay
From	89.9	to	95.1 Ft.	gray silty sand, more gray clay
From	95.1	to	105 Ft.	sand, some clay balls
From	105	to	117.1 Ft.	med. to fine sand, seams of packed silt
From	117.1	to	141 Ft.	fine to medium gray silty sand
From	141	to	161 Ft.	gray medium to fine sand and silt
From	161	to	178.1 Ft.	gray, fine silty sand, with clay seams
From	178.1	to	193.6 Ft.	gray, fine silty sand, tight

- Return to Main
- Return to Search Options
- Return to Search Criteria

R. Allard (November 2012)
This is Grand Forks TW99-2

HYDROGEOLOGIC LOG

Well No. TH99-2

Purpose of Hole: Test Production Well
Type of Rig: Cable Tool
Drill Contractor: Columbia Water Wells (1986) Ltd.
Date Drilled: July 14 - 26, 1999
Supervised by: N/A
Ground Elevation (masl): 531

Casing Stick-up (m): 0.46
Elevation of Top of Steel Casing (m-asl): 531.5
Elev. of Top of PVC Standpipe (m-asl): n/a
Depth to Water (m): 13.71
Elevation of Water (m-asl): 517.3

Depth (m)	Elevation (m-asl)	Description of Lithology Encountered		Well Construction Materials	Well Diagram	Sample depth (m-bgrd)
0.0	531.0	Ground Surface				
	530.4	Brown TOPSOIL	0.6			
2.0						
4.0						
6.0	522.8	Tight coarse SAND and GRAVEL, some cobbles	8.2	203mm steel surface casing		
8.0						
10.0						
	520.0	Brown fine-medium SAND, some small cobbles, s	11.0			
12.0				July 29, 1999; SWL (m) = 13.71		
14.0	517.0	Well-graded SAND and GRAVEL	14.0			
16.0						
18.0	512.4	Well-graded SAND and GRAVEL	18.6			
20.0	510.6	Fine-medium SAND, some silt lenses	20.4			
22.0				152mm steel casing		
	508.1	Fine-medium SAND, some silt lenses	22.9			
24.0						
26.0						
28.0						
30.0						
32.0						
34.0	496.9	Fine-medium SAND, some silt lenses	34.1			
36.0	494.7	Fine-medium SAND	36.3			
38.0	492.9	Tight fine SAND and SILT	38.1			
40.0		hole continued on next page				

KERR WOOD LEIDAL ASSOCIATES

PITEAU ASSOCIATES
GEOTECHNICAL AND HYDROGEOLOGICAL CONSULTANTS
VANCOUVER CALGARY

HYDROGEOLOGICAL ASSESSMENT OF WATER SUPPLY WELL FOR CITY, GRAND FORKS, B.C.

WELL TH99-2

BY: MDP | DATE: AUG 99
APPROVED | FIG: A-2

HYDROGEOLOGIC LOG Well No. TH99-2

Purpose of Hole: Test Production Well
Type of Rig: Cable Tool
Drill Contractor: Columbia Water Wells (1986) Ltd.
Date Drilled:
Supervised by:
Ground Elevation (masl): 531

Casing Stick-up (m): 0.46
Elevation of Top of Steel Casing (m-asl): 531.5
Elev. of Top of PVC Standpipe (m-asl): n/a
Depth to Water (m): 13.7
Elevation of Water (m-asl): 517

Depth (m)	Elevation (m-asl)	Description of Lithology Encountered		Well Construction Materials	Well Diagram	Sample depth (m-bgrd)
40.0	491.0	continued from page 1				
42.0				0.6m riser and K-packer		
44.0				3m of 0.3mm (0.012") telescopic screen (140mm I.D.)		
46.0	484.7	Fine-medium SAND, some silt	46.3	bail bottom		
48.0						
50.0						
52.0						
54.0						
56.0						
58.0	473.7	Silty fine SAND, some tight silt lenses	57.3			
60.0	470.6	Brown, fine-medium SAND, some silt	60.4			
62.0	468.2	Fine-medium silty SAND, some tight silt lenses	62.8	backfill		
64.0						
66.0	463.9	Fine silty SAND, some silt lenses	67.1			
68.0						
70.0						
72.0	457.8	Brown fine SAND, some silt	73.2			
74.0						
76.0						
78.0	453.3	Brown fine SAND, some silt	77.7			
80.0		hole continued on next page				

KERR WOOD LEIDAL ASSOCIATES

PITEAU ASSOCIATES
GEOTECHNICAL AND HYDROGEOLOGICAL CONSULTANTS

HYDROGEOLOGICAL ASSESSMENT OF WATER SUPPLY WELL FOR CITY, GRAND FORKS, B.C.

WELL TH99-2

BY: MDP | DATE: AUG 99
APPROVED: RW | FIG: A-2

APPENDIX B

COPIES OF COMPLETED GWUDI / GARP SCREENING FORMS

City of Grand Forks Groundwater Management Options Assessment
GWUDI GARP Screening Tool

WATER SYSTEM NAME	WELL NAME and/or BCMOE WELL ID PLATE NO.		
City of Grand Forks	Well 2		
SITE LOCATION 392461E, 5431281N (UTM 10)	Well Log Examined (Y/N) Yes Site Survey Conducted (Y/N) Yes		
RISK FACTORS and CRITERIA	**YES: Potentially At Risk**	**NO: Low Risk**	**COMMENTS**
1.Water Quality Results			
1.1: Water system or well bacteriological sampling shows recurring presence of confirmed total coliform, fecal coliform, or *E.coli.*		No	
1.2: Water system has historical turbidity issues associated with the source water.		No	
2.Source Type and Location			
2.1: Well situated inside setback distances of the HHR, from possible source of contamination.		No	
2.2: Well with intake depth <15 m below ground and located in floodplain / flood-prone area. OR well <100 m outside the high-water mark or natural boundary of surface water feature and intake depth <15 m below the high-water level.		No	
3.Well Construction			
3.1: Well does not meet GWPR (section 7) for surface sealing.		No	well constructed in 1965 (prior to 2005). pump house and concrete pad atop well head
3.2: Well does not meet GWPR (section 10) for well caps and covers.		No	
3.3: Well does not meet GWPR (section 11) for floodproofing.		No	
3.4: Well does not meet GWPR (section 12) for wellhead protection.		No	
4.Aquifer Type and Setting			
4.1: Well with intake depth <15 m below ground and situated in a sand and/or gravel unconfined aquifer or fractured bedrock aquifer.		No	
4.2: Well completed in a karst bedrock aquifer.		No	
RISK / VULNERABILITY ASSESSMENT DECISION TAKEN AND REASON(S):			
ACTION RECOMMENDATION:			
CHECKLIST / ASSESSMENT COMPLETED BY: Remi Allard, P. Eng. (Piteau Associates Engineering Ltd.)		**DATE COMPLETED:** 28 September 2012	

City of Grand Forks Groundwater Management Options Assessment
GWUDI GARP Screening Tool

WATER SYSTEM NAME	WELL NAME and/or BCMOE WELL ID PLATE NO.		
City of Grand Forks	Well 3		
SITE LOCATION 392720E, 5430952 N (UTM 10)	Well Log Examined (Y/N) Yes Site Survey Conducted (Y/N) Yes		
RISK FACTORS and CRITERIA	**YES: Potentially At Risk**	**NO: Low Risk**	**COMMENTS**
1.Water Quality Results			
1.1: Water system or well bacteriological sampling shows recurring presence of confirmed total coliform, fecal coliform, or *E.coli.*		No	
1.2: Water system has historical turbidity issues associated with the source water.		No	
2.Source Type and Location			
2.1: Well situated inside setback distances of the HHR, from possible source of contamination.		No	
2.2: Well with intake depth <15 m below ground and located in floodplain / flood-prone area. OR well <100 m outside the high-water mark or natural boundary of surface water feature and intake depth <15 m below the high-water level.		No	
3.Well Construction			
3.1: Well does not meet GWPR (section 7) for surface sealing.		No	well constructed in 2000 (pre 2005). pump house and concrete pad atop well head
3.2: Well does not meet GWPR (section 10) for well caps and covers.		No	
3.3: Well does not meet GWPR (section 11) for floodproofing.		No	
3.4: Well does not meet GWPR (section 12) for wellhead protection.		No	
4.Aquifer Type and Setting			
4.1: Well with intake depth <15 m below ground and situated in a sand and/or gravel unconfined aquifer or fractured bedrock aquifer.		No	
4.2: Well completed in a karst bedrock aquifer.		No	
RISK / VULNERABILITY ASSESSMENT DECISION TAKEN AND REASON(S):			
ACTION RECOMMENDATION:			
CHECKLIST / ASSESSMENT COMPLETED BY: Remi Allard, P. Eng. (Piteau Associates Engineering Ltd.)		**DATE COMPLETED:** 28 September 2012	

City of Grand Forks Groundwater Management Options Assessment
GWUDI GARP Screening Tool

WATER SYSTEM NAME	WELL NAME and/or BCMOE WELL ID PLATE NO.		
City of Grand Forks	Well 3A		
SITE LOCATION 392700E, 5430957N (UTM 10)	Well Log Examined (Y/N) Yes Site Survey Conducted (Y/N) Yes		
RISK FACTORS and CRITERIA	**YES: Potentially At Risk**	**NO: Low Risk**	**COMMENTS**
1.Water Quality Results			
1.1: Water system or well bacteriological sampling shows recurring presence of confirmed total coliform, fecal coliform, or *E.coli.*		No	
1.2: Water system has historical turbidity issues associated with the source water.		No	
2.Source Type and Location			
2.1: Well situated inside setback distances of the HHR, from possible source of contamination.		No	
2.2: Well with intake depth <15 m below ground and located in floodplain / flood-prone area. OR well <100 m outside the high-water mark or natural boundary of surface water feature and intake depth <15 m below the high-water level.		No	
3.Well Construction			
3.1: Well does not meet GWPR (section 7) for surface sealing.		No	well constructed in 1969 (pre 2005). pump house and concrete pad atop well head
3.2: Well does not meet GWPR (section 10) for well caps and covers.		No	
3.3: Well does not meet GWPR (section 11) for floodproofing.		No	
3.4: Well does not meet GWPR (section 12) for wellhead protection.		No	
4.Aquifer Type and Setting			
4.1: Well with intake depth <15 m below ground and situated in a sand and/or gravel unconfined aquifer or fractured bedrock aquifer.		No	
4.2: Well completed in a karst bedrock aquifer.		No	
RISK / VULNERABILITY ASSESSMENT DECISION TAKEN AND REASON(S):			
ACTION RECOMMENDATION:			
CHECKLIST / ASSESSMENT COMPLETED BY: Remi Allard, P. Eng. (Piteau Associates Engineering Ltd.)		**DATE COMPLETED:** 28 September 2012	

City of Grand Forks Groundwater Management Options Assessment
GWUDI GARP Screening Tool

WATER SYSTEM NAME	WELL NAME and/or BCMOE WELL ID PLATE NO.		
City of Grand Forks	Well 4		
SITE LOCATION 393316E, 5431312 (UTM 10)	Well Log Examined (Y/N) Yes Site Survey Conducted (Y/N) Yes		
RISK FACTORS and CRITERIA	**YES: Potentially At Risk**	**NO: Low Risk**	**COMMENTS**
1.Water Quality Results			
1.1: Water system or well bacteriological sampling shows recurring presence of confirmed total coliform, fecal coliform, or *E.coli.*		No	
1.2: Water system has historical turbidity issues associated with the source water.		No	
2.Source Type and Location			
2.1: Well situated inside setback distances of the HHR, from possible source of contamination.		No	
2.2: Well with intake depth <15 m below ground and located in floodplain / flood-prone area. OR well <100 m outside the high-water mark or natural boundary of surface water feature and intake depth <15 m below the high-water level.		No	
3.Well Construction			
3.1: Well does not meet GWPR (section 7) for surface sealing.		No	well constructed in 1977 (pre 2005). pump house and concrete pad atop well head
3.2: Well does not meet GWPR (section 10) for well caps and covers.		No	
3.3: Well does not meet GWPR (section 11) for floodproofing.		No	
3.4: Well does not meet GWPR (section 12) for wellhead protection.		No	
4.Aquifer Type and Setting			
4.1: Well with intake depth <15 m below ground and situated in a sand and/or gravel unconfined aquifer or fractured bedrock aquifer.		No	
4.2: Well completed in a karst bedrock aquifer.		No	
RISK / VULNERABILITY ASSESSMENT DECISION TAKEN AND REASON(S):			
ACTION RECOMMENDATION:			
CHECKLIST / ASSESSMENT COMPLETED BY: Remi Allard, P. Eng. (Piteau Associates Engineering Ltd.)		**DATE COMPLETED:** 28 September 2012	

City of Grand Forks Groundwater Management Options Assessment
GWUDI GARP Screening Tool

WATER SYSTEM NAME	WELL NAME and/or BCMOE WELL ID PLATE NO.		
City of Grand Forks	Well 5		
SITE LOCATION 393329E, 5431332N (UTM 10)	Well Log Examined (Y/N) Yes Site Survey Conducted (Y/N) Yes		
RISK FACTORS and CRITERIA	**YES: Potentially At Risk**	**NO: Low Risk**	**COMMENTS**
1.Water Quality Results			
1.1: Water system or well bacteriological sampling shows recurring presence of confirmed total coliform, fecal coliform, or *E.coli.*		No	
1.2: Water system has historical turbidity issues associated with the source water.		No	
2.Source Type and Location			
2.1: Well situated inside setback distances of the HHR, from possible source of contamination.		No	
2.2: Well with intake depth <15 m below ground and located in floodplain / flood-prone area. OR well <100 m outside the high-water mark or natural boundary of surface water feature and intake depth <15 m below the high-water level.		No	
3.Well Construction			
3.1: Well does not meet GWPR (section 7) for surface sealing.		No	well constructed in 1988 (pre 2005). pump house and concrete pad atop well head
3.2: Well does not meet GWPR (section 10) for well caps and covers.		No	
3.3: Well does not meet GWPR (section 11) for floodproofing.		No	
3.4: Well does not meet GWPR (section 12) for wellhead protection.		No	
4.Aquifer Type and Setting			
4.1: Well with intake depth <15 m below ground and situated in a sand and/or gravel unconfined aquifer or fractured bedrock aquifer.		No	
4.2: Well completed in a karst bedrock aquifer.		No	
RISK / VULNERABILITY ASSESSMENT DECISION TAKEN AND REASON(S):			
ACTION RECOMMENDATION:			
CHECKLIST / ASSESSMENT COMPLETED BY: Remi Allard, P. Eng. (Piteau Associates Engineering Ltd.)		**DATE COMPLETED:** 28 September 2012	

City of Grand Forks Groundwater Management Options Assessment
GWUDI GARP Screening Tool

WATER SYSTEM NAME	WELL NAME and/or BCMOE WELL ID PLATE NO.		
City of Grand Forks	TW 99-2 (Hospital Well)		
SITE LOCATION 392629E, 5431955N (UTM 10)	Well Log Examined (Y/N) Yes Site Survey Conducted (Y/N) Yes		
RISK FACTORS and CRITERIA	**YES: Potentially At Risk**	**NO: Low Risk**	**COMMENTS**
1.Water Quality Results			
1.1: Water system or well bacteriological sampling shows recurring presence of confirmed total coliform, fecal coliform, or *E.coli.*		No	
1.2: Water system has historical turbidity issues associated with the source water.		No	
2.Source Type and Location			
2.1: Well situated inside setback distances of the HHR, from possible source of contamination.		No	
2.2: Well with intake depth <15 m below ground and located in floodplain / flood-prone area. OR well <100 m outside the high-water mark or natural boundary of surface water feature and intake depth <15 m below the high-water level.		No	
3.Well Construction			
3.1: Well does not meet GWPR (section 7) for surface sealing.		No	well constructed in 1999 (pre 2005). pump house and concrete pad atop well head
3.2: Well does not meet GWPR (section 10) for well caps and covers.		No	
3.3: Well does not meet GWPR (section 11) for floodproofing.		No	
3.4: Well does not meet GWPR (section 12) for wellhead protection.		No	
4.Aquifer Type and Setting			
4.1: Well with intake depth <15 m below ground and situated in a sand and/or gravel unconfined aquifer or fractured bedrock aquifer.		No	
4.2: Well completed in a karst bedrock aquifer.		No	
RISK / VULNERABILITY ASSESSMENT DECISION TAKEN AND REASON(S):			
ACTION RECOMMENDATION:			
CHECKLIST / ASSESSMENT COMPLETED BY: Remi Allard, P. Eng. (Piteau Associates Engineering Ltd.)		**DATE COMPLETED:** 28 September 2012	

City of Grand Forks Groundwater Management Options Assessment
GWUDI GARP Screening Tool

WATER SYSTEM NAME	WELL NAME and/or BCMOE WELL ID PLATE NO.		
City of Grand Forks	Proposed well 6		
SITE LOCATION 392841E, 5430633N (UTM 10)	Well Log Examined (Y/N) Yes Site Survey Conducted (Y/N) Yes		
RISK FACTORS and CRITERIA	**YES: Potentially At Risk**	**NO: Low Risk**	**COMMENTS**
1.Water Quality Results			
1.1: Water system or well bacteriological sampling shows recurring presence of confirmed total coliform, fecal coliform, or *E.coli.*		No	Well has not been constructed
1.2: Water system has historical turbidity issues associated with the source water.		No	Well has not been constructed
2.Source Type and Location			
2.1: Well situated inside setback distances of the HHR, from possible source of contamination.		No	
2.2: Well with intake depth <15 m below ground and located in floodplain / flood-prone area. OR well <100 m outside the high-water mark or natural boundary of surface water feature and intake depth <15 m below the high-water level.		No	
3.Well Construction			
3.1: Well does not meet GWPR (section 7) for surface sealing.		No	
3.2: Well does not meet GWPR (section 10) for well caps and covers.		No	
3.3: Well does not meet GWPR (section 11) for floodproofing.		No	
3.4: Well does not meet GWPR (section 12) for wellhead protection.		No	
4.Aquifer Type and Setting			
4.1: Well with intake depth <15 m below ground and situated in a sand and/or gravel unconfined aquifer or fractured bedrock aquifer.		No	
4.2: Well completed in a karst bedrock aquifer.		No	
RISK / VULNERABILITY ASSESSMENT DECISION TAKEN AND REASON(S):			
ACTION RECOMMENDATION:			
CHECKLIST / ASSESSMENT COMPLETED BY: Remi Allard, P. Eng. (Piteau Associates Engineering Ltd.)		**DATE COMPLETED:** 28 September 2012	

APPENDIX C

SPREADSHEET SUMMARY OF HISTORICAL BACTERIOLOGICAL TEST RESULTS FROM SAMPLING WITHIN THE CITY OF GRAND FORKS WATER SYSTEM

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
3-Jan-06	Valley Heights Booster	0	0		Tested at Caro Lab
3-Jan-06	Boundary Hospital	0	0		Tested at Caro Lab
3-Jan-06	Aquatic Center	X		NEG	Tested in House
9-Jan-06	Valley Heights Booster	X		NEG	Tested in House
9-Jan-06	Treatment Plant	X		NEG	Tested in House
10-Jan-06	Valley Heights Booster	0	0		Tested at Caro Lab
10-Jan-06	Boundary Hospital	0	0		Tested at Caro Lab
16-Jan-06	Valley Heights Booster	X		NEG	Tested in House
16-Jan-06	Fire Hall	X		NEG	Tested in House
16-Jan-06	Aquatic Center	X		NEG	Tested in House
17-Jan-06	Valley Heights Booster	0	0		Tested at Caro Lab
17-Jan-06	Boundary Hospital	0	0		Tested at Caro Lab
23-Jan-06	Valley Heights Booster	X		NEG	Tested in House
23-Jan-06	Boundary Electric	X		NEG	Tested in House
24-Jan-06	Valley Heights Booster	0	0		Tested at Caro Lab
24-Jan-06	Jan 31 2006	0	0		Tested at Caro Lab
30-Jan-06	Valley Heights Booster	X		NEG/ back ground	Tested in House
30-Jan-06	Hutton School	X		NEG	Tested in House
31-Jan-06	Valley Heights Booster	0	0		Tested at Caro Lab
31-Jan-06	Boundary Hospital	0	0		Tested at Caro Lab
6-Feb-06	Works Yard	X		NEG	Tested in House
6-Feb-06	Valley Heights Booster	X		NEG	Tested in House
6-Feb-06	Boundary Hospital	X		NEG	Tested in House
8-Feb-06	Valley Heights Booster	0	0		Tested at Caro Lab
8-Feb-06	Boundary Hospital	0	0		Tested at Caro Lab
13-Feb-06	Valley Heights Booster	X		NEG	Tested in House
13-Feb-06	1524 77th Ave.	X		NEG	Tested in House
14-Feb-06	Valley Heights Booster	0	0		Tested at Caro Lab
14-Feb-06	Boundary Hospital	0	0		Tested at Caro Lab
20-Feb-06	Valley Heights Booster	X		NEG/ back ground	Tested in House
20-Feb-06	Selkirk College	X		NEG	Tested in House
20-Feb-06	B & F Sales	X		NEG	Tested in House
21-Feb-06	Valley Heights Booster	0	0		Tested at Caro Lab
21-Feb-06	Boundary Hospital	0	0		Tested at Caro Lab
27-Feb-06	Valley Heights Booster	X		NEG	Tested in House
27-Feb-06	Black Knight Market	X		NEG	Tested in House
28-Feb-06	Valley Heights Booster	0	0		Tested at Caro Lab
28-Feb-06	Boundary Hospital	0	0		Tested at Caro Lab
7-Mar-06	Valley Heights Booster	0	0		Tested at Caro Lab
7-Mar-06	Valley Heights Booster	X		NEG	Tested in House
7-Mar-06	Petro Canada	X		NEG	Tested in House
7-Mar-06	Boundary Hospital	0	0		Tested at Caro Lab
13-Mar-06	Valley Heights Booster	X		NEG	Tested in House
13-Mar-06	Aquatic Center	X		NEG	Tested in House
14-Mar-06	Valley Heights Booster	0	0		Tested at Caro Lab
14-Mar-06	Boundary Hospital	0	0		Tested at Caro Lab
20-Mar-06	Valley Heights Booster	X		NEG/ back ground	Tested in House
20-Mar-06	Boundary Hospital	X		NEG	Tested in House
21-Mar-06	Valley Heights Booster	0	0		Tested at Caro Lab
21-Mar-06	Boundary Hospital	0	0		Tested at Caro Lab
27-Mar-06	WWTF	X		NEG	Tested in House
27-Mar-06	Valley Heights Booster	X		NEG	Tested in House
28-Mar-06	Valley Heights Booster	0	0		Tested at Caro Lab
28-Mar-06	Boundary Hospital	0	0		Tested at Caro Lab
3-Apr-06	Valley Heights Booster	X		NEG/ back ground	Tested in House
3-Apr-06	Fire Hall	X		NEG	Tested in House
3-Apr-06	Aquatic Center	X		NEG	Tested in House
4-Apr-06	Valley Heights Booster	0	0		Tested at Caro Lab
4-Apr-06	Boundary Hospital	0	0		Tested at Caro Lab
10-Apr-06	Valley Heights Booster	X		NEG/ back ground	Tested in House
10-Apr-06	Hutton School	X		NEG	Tested in House
11-Apr-06	Valley Heights Booster	0	0		Tested at Caro Lab
11-Apr-06	Boundary Hospital	0	0		Tested at Caro Lab
18-Apr-06	WWTF	X		NEG	Tested in House
18-Apr-06	Valley Heights Booster	X		NEG	Tested in House
18-Apr-06	Valley Heights Booster	0	0		Tested at Caro Lab
18-Apr-06	Boundary Hospital	0	0		Tested at Caro Lab
25-Apr-06	Valley Heights Booster	0	0		Tested at Caro Lab
25-Apr-06	Boundary Hospital	0	0		Tested at Caro Lab
1-May-06	Valley Heights Booster	X		NEG	Tested in House
1-May-06	Boundary Hospital	X		NEG	Tested in House
3-May-06	Valley Heights Booster	0	0		Tested at Caro Lab
3-May-06	Boundary Hospital	0	0		Tested at Caro Lab
8-May-06	Valley Heights Booster	X		NEG/ back ground	Tested in House
8-May-06	Aquatic Center	X		NEG	Tested in House
9-May-06	Valley Heights Booster	0	0		Tested at Caro Lab
9-May-06	City Hall	0	0		Tested at Caro Lab
15-May-06	Valley Heights Booster	X		NEG	Tested in House
15-May-06	Hutton School	X		NEG	Tested in House
16-May-06	Tested in House	0	0		Tested at Caro Lab
16-May-06	Boundary Hospital	0	0		Tested at Caro Lab
22-May-06	Valley Heights Booster	0	0	background	Tested at Caro Lab
22-May-06	Jake Raven's 2nd st.	X		NEG	Tested in House

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
22-May-06	Jake Raven's 2nd st.	0	0		Tested at Caro Lab
22-May-06	Cemetery	X		NEG	Tested in House
22-May-06	Cemetery	0	0		Tested at Caro Lab
22-May-06	Boundary Hospital	0	0		Tested at Caro Lab
22-May-06	7645 Granby rd.	X		NEG/ back ground	Tested in House
22-May-06	7645 Granby rd.	0	0		Tested at Caro Lab
25-May-06	Granby Rd.	**2**	< 1		Audit by I.H.A.
25-May-06	7649 22nd st.	< 1	< 1		Audit by I.H.A.
25-May-06	7130 9th st.	< 1	< 1		Audit by I.H.A.
25-May-06	7007 27th st.	< 1	< 1		Audit by I.H.A.
25-May-06	236 Market st.	< 1	< 1		Audit by I.H.A.
29-May-06	Valley Heights Booster	X		NEG	Tested in House
29-May-06	Donaldson Fountain	X		NEG	Tested in House
29-May-06	Bartlett Park Fountain	X		NEG	Tested in House
31-May-06	Valley Heights Booster	11	0	background	Tested at Caro Lab
31-May-06	Boundary Hospital	0	0		Tested at Caro Lab
31-May-06	#4 7625 Granby Rd.	X		NEG/ back ground	Tested in House
31-May-06	#4 7625 Granby Rd.	0	0		Tested at Caro Lab
31-May-06	#2 7625 Granby Rd.	X		NEG	Tested in House
31-May-06	#14 7625 Granby Rd.	X		NEG	Tested in House
2-Jun-06	7434 Valley Heights	4	0		Tested at Caro Lab
2-Jun-06	7389 Valley Heights	3	0		Tested at Caro Lab
5-Jun-06	Valley Heights Booster	X	X	NEG	Tested in House
5-Jun-06	Skate Park	X	X	NEG	Tested in House
5-Jun-06	Boundary Hospital	X	X	NEG	Tested in House
5-Jun-06	243 Winnipeg Ave.	X	X	NEG/ back ground	Tested in House
5-Jun-06	128 Victoria Way	X	X	NEG	Tested in House
6-Jun-06	Valley Heights Booster	1	0		Tested at Caro Lab
6-Jun-06	129 Victoria Way	5	0		Tested at Caro Lab
6-Jun-06	Boundary Hospital	0	0		Tested at Caro Lab
6-Jun-06	7389 Valley Heights	0	0		Tested at Caro Lab
12-Jun-06	7389 Valley Heights	1	0	background	Tested at Caro Lab
12-Jun-06	Valley Heights Booster	0	0	background	Tested at Caro Lab
13-Jun-06	Valley Heights Booster	**0**	0		Tested at Caro Lab
13-Jun-06	Boundary Hospital	0	0		Tested at Caro Lab
19-Jun-06	Valley Heights Booster	X	X	**Pos**/ pumps off	Tested in House
19-Jun-06	Boundary Hospital	X	X	Neg	Tested in House
19-Jun-06	Bartlett Park Fountain	X	X		Tested in House
20-Jun-06	Valley Heights Booster	X	X	**Pos**/ pumps off	Tested in House
20-Jun-06	Valley Heights Booster	3	0	background	Tested at Caro Lab
20-Jun-06	Valley Heights Booster	0	0	background	Tested at Caro Lab
20-Jun-06	Boundary Hospital	0	0		Tested at Caro Lab
20-Jun-06	#2 Valley Heights	X	X	**NEG**/ pumps on	Tested in House
20-Jun-06	#1 Valley Heights	X	X	**NEG**/ pumps on	Tested in House
21-Jun-06	#1 Valley Heights	X	X	**Pos**/ pumps off	Tested in House
21-Jun-06	#2 Valley Heights	X	X	**Pos**/ pumps off	Tested in House
21-Jun-06	#2 Valley Heights	X	X	**NEG**/ pumps on	Tested in House
21-Jun-06	#1 Valley Heights	X	X	**NEG**/ pumps on	Tested in House
22-Jun-06	#2 Valley Heights	0	0	pumps on	Tested at Caro Lab
22-Jun-06	#1 Valley Heights	0	0	pumps on	Tested at Caro Lab
26-Jun-06	Main Res standpipe	X	X	**Pos**/ pumps off	Tested in House
26-Jun-06	Valley Heights Booster	X	X	**NEG**/ pumps on	Tested in House
26-Jun-06	Market st Fountain	X	X	NEG	Tested in House
26-Jun-06	Main Res standpipe	X	X	**NEG**/ pumps on	Tested in House
26-Jun-06	Bartlett Park Fountain	X	X	NEG	Tested in House
27-Jun-06	Valley Heights Booster	0	0		Tested at Caro Lab
27-Jun-06	Boundary Hospital	0	0		Tested at Caro Lab
27-Jun-06	7389 Valley Heights	0	0		Tested at Caro Lab
4-Jul-06	Valley Heights Booster	0	0		Tested at Caro Lab
4-Jul-06	Market st Fountain	X	X	NEG	Tested in House
4-Jul-06	Jim Fields V.H.	X	X	NEG	Tested in House
4-Jul-06	Fire Hall	X	X	NEG	Tested in House
4-Jul-06	Boundary Hospital	0	0		Tested at Caro Lab
4-Jul-06	Bartlett Park Fountain	X	X	NEG	Tested in House
4-Jul-06	7389 Valley Heights	0	0		Tested at Caro Lab
11-Jul-06	City Hall	0	0		Tested at Caro Lab
11-Jul-06	Boundary Hospital	0	0		Tested at Caro Lab
17-Jul-06	Market st Fountain	X	X	**POS**	Tested in House
17-Jul-06	Donaldson Fountain	X	X	NEG	Tested in House
17-Jul-06	128 Victoria Way	X	X	NEG	Tested in House
18-Jul-06	Valley Heights Booster	0	0		Tested at Caro Lab
18-Jul-06	Market st Fountain	X	X	**NEG**	Tested in House
18-Jul-06	City Hall	0	0		Tested at Caro Lab
18-Jul-06	Boundary Hospital	0	0		Tested at Caro Lab
24-Jul-06	Valley Heights Booster	X	X	NEG	Tested in House
24-Jul-06	Market st Fountain	X	X	NEG	Tested in House
24-Jul-06	#46 7225 Boundary Dr.	X	X	NEG	Tested in House
26-Jul-06	Valley Heights Booster	0	0		Tested at Caro Lab
26-Jul-06	Firehall	0	0		Tested at Caro Lab
26-Jul-06	Boundary Hospital	0	0		Tested at Caro Lab
31-Jul-06	Skate Park	X	X	NEG	Tested in House
31-Jul-06	Market st Fountain	X	X	NEG	Tested in House

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
31-Jul-06	1349 67th Ave.	X	X	NEG	Tested in House
31-Jul-06	128 Victoria Way	X	X	NEG	Tested in House
1-Aug-06	Valley Heights Booster	0	0		Tested at Caro Lab
1-Aug-06	Boundary Hospital	0	0		Tested at Caro Lab
1-Aug-06	1349 67th ave	0	0		Tested at Caro Lab
8-Aug-06	Victoria Way	X	X	NEG	Tested in House
8-Aug-06	Market st Fountain	X	X	NEG	Tested in House
8-Aug-06	Donaldson Fountain	X	X	NEG	Tested in House
9-Aug-06	Valley Heights Booster	0	0		Tested at Caro Lab
9-Aug-06	Boundary Hospital	0	0		Tested at Caro Lab
14-Aug-06	Valley Heights Booster	X	X	NEG	Tested in House
14-Aug-06	Market st Fountain	X	X	NEG	Tested in House
15-Aug-06	Valley Heights Booster	0	0		Tested at Caro Lab
15-Aug-06	Boundary Hospital	0	0		Tested at Caro Lab
21-Aug-06	Valley Heights Booster	X	X	NEG	Tested in House
21-Aug-06	Market st Fountain	X	X	NEG	Tested in House
22-Aug-06	Valley Heights Booster	0	0		Tested at Caro Lab
22-Aug-06	Boundary Hospital	0	0		Tested at Caro Lab
29-Aug-06	Valley Heights Booster	0	0		Tested at Caro Lab
29-Aug-06	Market st Fountain	X	X	NEG	Tested in House
29-Aug-06	Donaldson Fountain	X	X	NEG	Tested in House
29-Aug-06	Boundary Hospital	0	0		Tested at Caro Lab
5-Sep-06	Valley Heights Booster	0	0		Tested at Caro Lab
5-Sep-06	Skate Park	X	X	NEG	Tested in House
5-Sep-06	Market st Fountain	X	X	NEG	Tested in House
5-Sep-06	Boundary Hospital	0	0		Tested at Caro Lab
11-Sep-06	Skate Park	X	X	NEG	Tested in House
11-Sep-06	Market st Fountain	X	X	NEG	Tested in House
12-Sep-06	Valley Heights Booster	0	0		Tested at Caro Lab
12-Sep-06	Boundary Hospital	0	0		Tested at Caro Lab
18-Sep-06	Skate Park	X	X	NEG	Tested in House
18-Sep-06	Market st Fountain	X	X	NEG	Tested in House
18-Sep-06	Firehall	X	X	NEG	Tested in House
19-Sep-06	Valley Heights Booster	0	0		Tested at Caro Lab
19-Sep-06	Boundary Hospital	0	0		Tested at Caro Lab
25-Sep-06	Skate Park	X	X	NEG	Tested in House
25-Sep-06	Market st Fountain	X	X	NEG	Tested in House
27-Sep-06	Valley Heights Booster	0	0		Tested at Caro Lab
27-Sep-06	Boundary Hospital	0	0		Tested at Caro Lab
2-Oct-06	City Hall	X	X	NEG	Tested in House
2-Oct-06	128 Victoria Way	X	X	NEG	Tested in House
3-Oct-06	Valley Heights Booster	< 1	< 1		Tested at Caro Lab
3-Oct-06	Boundary Hospital	< 1	< 1		Tested at Caro Lab
10-Oct-06	Valley Heights Booster	X	X	NEG	Tested in House
10-Oct-06	Valley Heights Booster	< 1	< 1		Tested at Caro Lab
10-Oct-06	City Hall	X	X	NEG	Tested in House
10-Oct-06	Boundary Hospital	< 1	< 1		Tested at Caro Lab
16-Oct-06	Valley Heights Booster	X	X	NEG	Tested in House
16-Oct-06	Firehall	X	X	POS/ NEG E COLI	Tested in House
18-Oct-06	Valley Heights Booster	< 1	< 1		Tested at Caro Lab
18-Oct-06	Firehall	X	X	POS/ NEG E COLI	Tested in House
18-Oct-06	Boundary Hospital	< 1	< 1		Tested at Caro Lab
19-Oct-06	City Hall	X	X	NEG	Tested in House
21-Oct-06	Firehall	X	X	NEG	Tested in House
23-Oct-06	Firehall	X	X	NEG	Tested in House
23-Oct-06	City Cemetery	X	X	NEG	Tested in House
24-Oct-06	Valley Heights Booster	< 1	< 1		Tested at Caro Lab
24-Oct-06	Boundary Hospital	< 1	< 1		Tested at Caro Lab
30-Oct-06	Valley Heights Booster	X	X	NEG	Tested in House
30-Oct-06	Firehall	X	X	NEG	Tested in House
31-Oct-06	Valley Heights Booster	< 1	< 1		Tested at Caro Lab
31-Oct-06	Boundary Hospital	< 1	< 1		Tested at Caro Lab
6-Nov-06	Valley Heights Booster	X	X	NEG	Tested in House
6-Nov-06	Valley Heights Booster	< 1	< 1		Tested at Caro Lab
6-Nov-06	City Hall	X	X	NEG	Tested in House
6-Nov-06	Boundary Hospital	< 1	< 1		Tested at Caro Lab
15-Nov-06	Valley Heights Booster	< 1	< 1		Tested at Caro Lab
15-Nov-06	East Zone Reservior	X	X	NEG	Tested in House
15-Nov-06	East Zone Reservior	< 1	< 1		Tested at Caro Lab
15-Nov-06	Boundary Hospital	< 1	< 1		Tested at Caro Lab
17-Nov-06	East Zone Reservior	X	X	NEG	Tested in House
20-Nov-06	Valley Heights Booster	X	X	NEG	Tested in House
20-Nov-06	City Hall	X	X	NEG	Tested in House
21-Nov-06	Valley Heights Booster	< 1	< 1		Tested at Caro Lab
21-Nov-06	Boundary Hospital	< 1	< 1		Tested at Caro Lab
23-Nov-06	East Zone Reservior	X	X	**POS / no e coli**	Tested in House
26-Nov-06	East Zone Reservior	X	X	**NEG**	Tested in House
27-Nov-06	Valley Heights Booster	X	X	NEG	Tested in House
27-Nov-06	Firehall	X	X	NEG	Tested in House
28-Nov-06	Valley Heights Booster	< 1	< 1		Tested at Caro Lab
28-Nov-06	Boundary Hospital	< 1	< 1		Tested at Caro Lab
11-Dec-06	Firehall	X	X	NEG	Tested in House
12-Dec-06	Valley Heights Booster	< 1	< 1		Tested at Caro Lab

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
12-Dec-06	Boundary Hospital	< 1	< 1		Tested at Caro Lab
18-Dec-06	Valley Heights Booster	X	X	NEG	Tested in House
18-Dec-06	Hutton School	X	X	NEG	Tested in House
19-Dec-06	Valley Heights Booster	< 1	< 1		Tested at Caro Lab
19-Dec-06	Boundary Hospital	< 1	< 1		Tested at Caro Lab
27-Dec-06	Valley Heights Booster	< 1	< 1		Tested at Caro Lab
27-Dec-06	Boundary Hospital	< 1	< 1		Tested at Caro Lab
2-Jan-07	Valley Heights booster	<1	<1		Tested at Caro Lab
2-Jan-07	Fire Hall	X	X	NEG	Tested in House
2-Jan-07	Cemetary Office	X	X	NEG	Tested in House
2-Jan-07	Boundary Hospital	<1	<1		Tested at Caro Lab
8-Jan-07	Valley Heights booster	X	X	NEG	Tested in House
8-Jan-07	Hutton School	X	X	NEG	Tested in House
9-Jan-07	Valley Heights booster	<1	<1		Tested at Caro Lab
9-Jan-07	Boundary Hospital	<1	<1		Tested at Caro Lab
15-Jan-07	Valley Heights booster	X	X	NEG	Tested in House
15-Jan-07	Hutton School	X	X	NEG	Tested in House
16-Jan-07	Valley Heights booster	<1	<1		Tested at Caro Lab
16-Jan-07	Boundary Hospital	<1	<1		Tested at Caro Lab
22-Jan-07	Valley Heights booster	X	X	NEG	Tested in House
22-Jan-07	Aquatic Center	X	X	NEG	Tested in House
23-Jan-07	Valley Heights booster	<1	<1		Tested at Caro Lab
23-Jan-07	Boundary Hospital	<1	<1		Tested at Caro Lab
29-Jan-07	Valley Heights booster	X	X	NEG	Tested in House
29-Jan-07	Hutton School	X	X	NEG	Tested in House
30-Jan-07	Valley Heights booster	<1	<1		Tested at Caro Lab
30-Jan-07	Boundary Hospital	<1	<1		Tested at Caro Lab
5-Feb-07	Valley Heights booster	X	X	NEG	Tested in House
5-Feb-07	Cemetary Office	X	X	NEG	Tested in House
6-Feb-07	Valley Heights booster	<1	<1		Tested at Caro Lab
6-Feb-07	Boundary Hospital	<1	<1		Tested at Caro Lab
12-Feb-07	Valley Heights booster	X	X	NEG	Tested in House
12-Feb-07	Aquatic Center	X	X	NEG	Tested in House
14-Feb-07	Valley Heights booster	<1	<1		Tested at Caro Lab
14-Feb-07	Boundary Hospital	<1	<1		Tested at Caro Lab
19-Feb-07	Valley Heights booster	X	X	NEG	Tested in House
19-Feb-07	Aquatic Center	X	X	NEG	Tested in House
20-Feb-07	Valley Heights booster	<1	<1		Tested at Caro Lab
20-Feb-07	Boundary Hospital	<1	<1		Tested at Caro Lab
26-Feb-07	Valley Heights booster	X	X	NEG	Tested in House
26-Feb-07	Hutton School	X	X	NEG	Tested in House
27-Feb-07	Valley Heights booster	<1	<1		Tested at Caro Lab
27-Feb-07	Boundary Hospital	<1	<1		Tested at Caro Lab
5-Mar-07	Valley Heights booster	X	X	NEG	Tested in House
5-Mar-07	Aquatic Center	X	X	NEG	Tested in House
6-Mar-07	Valley Heights booster	<1	<1		Tested at Caro Lab
6-Mar-07	Boundary Hospital	<1	<1		Tested at Caro Lab
12-Mar-07	Hutton School	X	X	NEG	Tested in House
12-Mar-07	Valley Heights booster	<1	<1		Tested at Caro Lab
12-Mar-07	Boundary Hospital	<1	<1		Tested at Caro Lab
19-Mar-07	Valley Heights booster	X	X	NEG	Tested in House
19-Mar-07	Cemetary Office	X	X	NEG	Tested in House
20-Mar-07	Valley Heights booster	<1	<1		Tested at Caro Lab
20-Mar-07	Boundary Hospital	<1	<1		Tested at Caro Lab
29-Mar-07	Valley Heights booster	<1	<1		Tested at Caro Lab
29-Mar-07	Boundary Hospital	<1	<1		Tested at Caro Lab
2-Apr-07	Valley Heights booster	X	X	NEG	Tested in House
2-Apr-07	Hutton School	X	X	NEG	Tested in House
3-Apr-07	Valley Heights booster	<1	<1		Tested at Caro Lab
3-Apr-07	Boundary Hospital	<1	<1		Tested at Caro Lab
10-Apr-07	Valley Heights booster	X	X	NEG	Tested in House
10-Apr-07	Skate Park Fountain	X	X	NEG	Tested in House
12-Apr-07	Valley Heights booster	<1	<1		Tested at Caro Lab
12-Apr-07	Boundary Hospital	<1	<1		Tested at Caro Lab
16-Apr-07	Valley Heights booster	X	X	NEG	Tested in House
16-Apr-07	Skate Park Fountain	X	X	NEG	Tested in House
17-Apr-07	Valley Heights booster	<1	<1		Tested at Caro Lab
17-Apr-07	Boundary Hospital	<1	<1		Tested at Caro Lab
23-Apr-07	Valley Heights booster	POS	NEG	POS	Tested in House
24-Apr-07	Valley Heights booster	<1	<1		Tested at Caro Lab
24-Apr-07	Skate Park Fountain	X	X	NEG	Tested in House
24-Apr-07	Boundary Hospital	<1	<1		Tested at Caro Lab
25-Apr-07	Valley Heights booster	X	X	NEG	Tested in House
25-Apr-07	Fire Hall	X	X	NEG	Tested in House
30-Apr-07	Valley Heights booster	POS	NEG	POS	Tested in House
30-Apr-07	Skate Park Fountain	X	X	NEG	Tested in House
1-May-07	Valley Heights booster	POS	NEG		Tested in House
1-May-07	128 Victoria Way	POS	NEG		Tested in House
1-May-07	Valley Heights booster	<1	<1		Tested at Caro Lab
1-May-07	Boundary Hospital	<1	<1		Tested at Caro Lab
2-May-07	Victoria Way	POS	NEG		Tested in House
2-May-07	Fire Hall	POS	NEG		Tested in House
2-May-07	East Zone Reservoir	POS	NEG		Tested in House

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
2-May-07	Valley Heights booster	X	X	NEG	Tested in House
2-May-07	High Zone Reservoir	X	X		Tested in House
3-May-07	Victoria Way	POS	NEG		Tested in House
3-May-07	East Zone Reservoir	POS	NEG		Tested in House
3-May-07	East Zone Reservoir	POS	NEG		Tested in House
3-May-07	Well 3A	X	X	NEG	Tested in House
3-May-07	Well 2	X	X	NEG	Tested in House
3-May-07	Valley Heights booster	X	X	NEG	Tested in House
3-May-07	Skate Park Fountain	X	X	NEG	Tested in House
3-May-07	High Zone Reservoir	X	X	NEG	Tested in House
3-May-07	Fire Hall	X	X	NEG	Tested in House
3-May-07	East Zone Reservoir	< 3.0	<3.0		Tested at Caro Lab
4-May-07	East Zone Reservoir	POS	NEG		Tested in House
4-May-07	Valley Heights booster	X	X	NEG	Tested in House
4-May-07	Fire Hall	X	X	NEG	Tested in House
7-May-07	Well 3	X	X	NEG	Tested in House
7-May-07	Victoria Way	X	X	NEG	Tested in House
7-May-07	Valley Heights booster	X	X	NEG	Tested in House
7-May-07	City Hall	X	X	NEG	Tested in House
9-May-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
10-May-07	Victoria Way	X	X	NEG	Tested in House
10-May-07	Valley Heights booster	<1	<1		Tested at Caro Lab
10-May-07	Valley Heights booster	X	X	NEG	Tested in House
10-May-07	Skate Park Fountain	X	X	NEG	Tested in House
10-May-07	Hutton School	X	X	NEG	Tested in House
10-May-07	East Zone Reservoir	X	X	NEG	Tested in House
10-May-07	City Hall	X	X	NEG	Tested in House
10-May-07	Cemetary Office	X	X	NEG	Tested in House
10-May-07	Boundary Hospital	<1	<1		Tested at Caro Lab
13-May-07	East Zone Reservoir	25	<1		Tested at Caro Lab
14-May-07	Valley Heights booster	X	X	NEG	Tested in House
14-May-07	Fire Hall	X	X	NEG	Tested in House
14-May-07	City Hall	X	X	NEG	Tested in House
14-May-07	Cemetary Office	X	X	NEG	Tested in House
14-May-07	1524 77th ave	X	X	NEG	Tested in House
15-May-07	Valley Heights booster	<1	<1		Tested at Caro Lab
15-May-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
15-May-07	Boundary Hospital	<1	<1		Tested at Caro Lab
22-May-07	Valley Heights booster	X	X	NEG	Tested in House
22-May-07	Valley Heights booster	<1	<1		Tested at Caro Lab
22-May-07	Fire Hall	X	X	NEG	Tested in House
22-May-07	Fire Hall	<1	<1		Tested at Caro Lab
22-May-07	Cemetary Office	X	X	NEG	Tested in House
22-May-07	Boundary Hospital	<1	<1		Tested at Caro Lab
22-May-07	1524 77th ave	X	X	NEG	Tested in House
24-May-07	East Zone Reservoir	POS	NEG		Tested in House
27-May-07	East Zone Reservoir	POS	NEG		Tested in House
27-May-07	East Zone Reservoir	<1	<1	background >200	Tested at Caro Lab
27-May-07	East Zone Reservoir	<1	<1	background >200	Tested at Caro Lab
28-May-07	Works Yard	<1	<1		Tested at Caro Lab
28-May-07	Valley Heights booster	X	X	NEG	Tested in House
28-May-07	Skate Park Fountain	X	X	NEG	Tested in House
28-May-07	Highschool	<1	<1		Tested at Caro Lab
28-May-07	Fire Hall	<1	<1		Tested at Caro Lab
28-May-07	City Hall	X	X	NEG	Tested in House
28-May-07	Cemetary Office	<1	<1		Tested at Caro Lab
28-May-07	243 winnipeg ave.	X	X	NEG	Tested in House
29-May-07	Valley Heights booster	<1	<1		Tested at Caro Lab
29-May-07	Boundary Hospital	<1	<1		Tested at Caro Lab
30-May-07	Well 5	<1	<1		Tested at Caro Lab
30-May-07	Well 3A	<1	<1		Tested at Caro Lab
30-May-07	Well 3	<1	<1		Tested at Caro Lab
30-May-07	Well 2	<1	<1		Tested at Caro Lab
30-May-07	Valley Heights booster 2	<1	<1		Tested at Caro Lab
30-May-07	Valley Heights booster 1	<1	<1		Tested at Caro Lab
30-May-07	Reservoir Hatch 2	X	X	NEG	Tested in House
30-May-07	Reservoir Hatch 2	<1	<1		Tested at Caro Lab
30-May-07	Reservoir Hatch 1	X	X	NEG	Tested in House
30-May-07	Reservoir Hatch 1	<1	<1		Tested at Caro Lab
30-May-07	Reservoir Drain 2	<1	<1		Tested at Caro Lab
30-May-07	Reservoir Drain 1	<1	<1		Tested at Caro Lab
31-May-07	Reservoir Hatch 1	<1	<1		Tested at Caro Lab
31-May-07	Reservoir Drain 1	<1	<1		Tested at Caro Lab
31-May-07	Airport Terminal	<1	<1		Tested at Caro Lab
31-May-07	8515 Riverside	<1	<1		Tested at Caro Lab
31-May-07	7816 Donaldson	<1	<1		Tested at Caro Lab
31-May-07	761 76th Ave.	<1	<1		Tested at Caro Lab
31-May-07	6435 9th St.	<1	<1		Tested at Caro Lab
31-May-07	6045 19th St.	<1	<1		Tested at Caro Lab
4-Jun-07	Flames Restaurant	X	X	NEG	Tested in House
4-Jun-07	Fire Hall	X	X	NEG	Tested in House
4-Jun-07	East Zone Reservoir	X	X	NEG	Tested in House
4-Jun-07	City park tot lot	X	X	NEG	Tested in House

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
6-Jun-07	Valley Heights booster	<1	<1		Tested at Caro Lab
6-Jun-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
6-Jun-07	East Zone Reservoir	X	X	NEG	Tested in House
6-Jun-07	Boundary Hospital	<1	<1		Tested at Caro Lab
8-Jun-07	East Zone Reservoir	X	X	NEG	Tested in House
12-Jun-07	East Zone Reservoir	POS	NEG		Tested in House
12-Jun-07	Well 3A	X	X	NEG	Tested in House
12-Jun-07	Valley Heights booster	X	X	NEG	Tested in House
12-Jun-07	Valley Heights booster	<1	<1		Tested at Caro Lab
12-Jun-07	Skate Park Fountain	X	X	NEG	Tested in House
12-Jun-07	East Zone Reservoir	<1	<1	background >200	Tested at Caro Lab
12-Jun-07	Boundary Hospital	<1	<1		Tested at Caro Lab
13-Jun-07	Reservoir standpipe	POS	NEG		Tested in House
13-Jun-07	East Zone Reservoir	POS	NEG		Tested in House
14-Jun-07	East Zone Reservoir	POS	NEG		Tested in House
14-Jun-07	East Zone Reservoir 2	<1	<1	background >200	Tested at Caro Lab
14-Jun-07	East Zone Reservoir 1	<1	<1	background >200	Tested at Caro Lab
17-Jun-07	East Zone Reservoir 2	<1	<1		Tested at Caro Lab
17-Jun-07	East Zone Reservoir 1	<1	<1		Tested at Caro Lab
17-Jun-07	East Zone Reservoir	X	X	NEG	Tested in House
18-Jun-07	Perley School	X	X	NEG	Tested in House
18-Jun-07	Fire Hall	X	X	NEG	Tested in House
18-Jun-07	East Zone Reservoir	X	X	NEG	Tested in House
19-Jun-07	Valley Heights booster	<1	<1		Tested at Caro Lab
19-Jun-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
19-Jun-07	Boundary Hospital	<1	<1		Tested at Caro Lab
21-Jun-07	Valley Heights booster	X	X	NEG	Tested in House
21-Jun-07	East Zone Reservoir	X	X	NEG	Tested in House
25-Jun-07	East Zone Reservoir	POS	NEG		Tested in House
25-Jun-07	Hutton School	X	X	NEG	Tested in House
25-Jun-07	City Hall	X	X	NEG	Tested in House
26-Jun-07	East Zone Reservoir	POS	NEG		Tested in House
26-Jun-07	Valley Heights booster	<1	<1	background >200	Tested at Caro Lab
26-Jun-07	East Zone Reservoir	<1	<1	background >200	Tested at Caro Lab
26-Jun-07	Boundary Hospital	<1	<1		Tested at Caro Lab
27-Jun-07	Reservoir standpipe2	POS	NEG		Tested in House
27-Jun-07	East Zone Reservoir	POS	NEG		Tested in House
27-Jun-07	Well 3A	X	X	NEG	Tested in House
27-Jun-07	Well 3	X	X	NEG	Tested in House
27-Jun-07	Well 2	X	X	NEG	Tested in House
27-Jun-07	Skate Park Fountain	X	X	NEG	Tested in House
27-Jun-07	Reservoir standpipe1	X	X	NEG	Tested in House
27-Jun-07	Omega Restaurant	X	X	NEG	Tested in House
27-Jun-07	Fire Hall	X	X	NEG	Tested in House
27-Jun-07	Cemetary Office	X	X	NEG	Tested in House
28-Jun-07	East Zone Reservoir 2	X	X	NEG	Tested in House
28-Jun-07	East Zone Reservoir 1	X	X	NEG	Tested in House
29-Jun-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
29-Jun-07	East Zone Reservoir	X	X	NEG	Tested in House
30-Jun-07	East Zone Reservoir 2	X	X	NEG	Tested in House
30-Jun-07	East Zone Reservoir 1	X	X	NEG	Tested in House
1-Jul-07	East Zone Reservoir 2	X	X	NEG	Tested in House
1-Jul-07	East Zone Reservoir 1	X	X	NEG	Tested in House
2-Jul-07	East Zone Reservoir 2	X	X	NEG	Tested in House
2-Jul-07	East Zone Reservoir 1	X	X	NEG	Tested in House
3-Jul-07	Valley Heights booster	X	X	NEG	Tested in House
3-Jul-07	Skate Park Fountain	X	X	NEG	Tested in House
3-Jul-07	Fire Hall	X	X	NEG	Tested in House
3-Jul-07	East Zone Reservoir	X	X	NEG	Tested in House
4-Jul-07	East Zone Reservoir	X	X	NEG	Tested in House
5-Jul-07	East Zone Reservoir	X	X	NEG	Tested in House
6-Jul-07	East Zone Reservoir	POS	NEG		Tested in House
6-Jul-07	East Zone Reservoir 1	POS	NEG		Tested in House
7-Jul-07	East Zone Reservoir 2	POS	NEG		Tested in House
7-Jul-07	East Zone Reservoir 2	POS	NEG		Tested in House
8-Jul-07	East Zone Reservoir 1	X	X	NEG	Tested in House
9-Jul-07	Valley Heights booster	<1	<1		Tested at Caro Lab
9-Jul-07	Skate Park Fountain	X	X	NEG	Tested in House
9-Jul-07	Reservoir standpipe1	<1	<1		Tested at Caro Lab
9-Jul-07	Fire Hall	X	X	NEG	Tested in House
9-Jul-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
9-Jul-07	East Zone Reservoir	X	X	NEG	Tested in House
9-Jul-07	Boundary Hospital	<1	<1		Tested at Caro Lab
10-Jul-07	East Zone Reservoir	X	X	NEG	Tested in House
11-Jul-07	East Zone Reservoir	X	X	NEG	Tested in House
16-Jul-07	Fire Hall	POS	NEG		Tested in House
16-Jul-07	East Zone Reservoir	POS	NEG		Tested in House
16-Jul-07	Skate Park Fountain	X	X	NEG	Tested in House
17-Jul-07	Reservoir standpipe1	POS	NEG		Tested in House
17-Jul-07	East Zone Reservoir	POS	NEG		Tested in House
17-Jul-07	Valley Heights booster	<1	<1		Tested at Caro Lab
17-Jul-07	Reservoir standpipe1	<1	<1		Tested at Caro Lab
17-Jul-07	East Zone Reservoir	<1	<1		Tested at Caro Lab

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
17-Jul-07	Boundary Hospital	<1	<1		Tested at Caro Lab
18-Jul-07	Valley Heights booster	POS	NEG		Tested in House
18-Jul-07	Reservoir standpipe	POS	NEG		Tested in House
18-Jul-07	Fire Hall	X	X	NEG	Tested in House
18-Jul-07	East Zone Reservoir	X	X	NEG	Tested in House
19-Jul-07	East Zone Reservoir	POS	NEG		Tested in House
19-Jul-07	Valley Heights booster	X	X	NEG	Tested in House
19-Jul-07	Reservoir standpipe	X	X	NEG	Tested in House
19-Jul-07	High Zone Reservoir	X	X	NEG	Tested in House
23-Jul-07	High Zone Reservoir	POS	NEG		Tested in House
23-Jul-07	East Zone Reservoir	POS	POS		Tested in House
23-Jul-07	East Zone Reservoir	6	5		Tested at Caro Lab
23-Jul-07	Skate Park Fountain	X	X	NEG	Tested in House
23-Jul-07	Fire Hall	X	X	NEG	Tested in House
24-Jul-07	East Zone Reservoir	3	1		Tested at Caro Lab
24-Jul-07	Well 5	<1	<1		Tested at Caro Lab
24-Jul-07	Well 3A	<1	<1		Tested at Caro Lab
24-Jul-07	Valley Heights booster	<1	<1		Tested at Caro Lab
24-Jul-07	Fire Hall	<1	<1		Tested at Caro Lab
24-Jul-07	Boundary Hospital	<1	<1		Tested at Caro Lab
25-Jul-07	Well 5	<1	<1		Tested at Caro Lab
25-Jul-07	Well 2	<1	<1		Tested at Caro Lab
25-Jul-07	High Zone Reservoir	<1	<1		Tested at Caro Lab
25-Jul-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
26-Jul-07	Works Yard	<1	<1		Tested at Caro Lab
26-Jul-07	well 4	X	X	NEG	Tested in House
26-Jul-07	Well 4	X	X	NEG	Tested in House
26-Jul-07	Well 3	<1	<1		Tested at Caro Lab
26-Jul-07	Valmar Liftstation	<1	<1		Tested at Caro Lab
26-Jul-07	Valley Heights booster	X	X	NEG	Tested in House
26-Jul-07	Valley Heights booster	<1	<1		Tested at Caro Lab
26-Jul-07	Skate Park Fountain	<1	<1		Tested at Caro Lab
26-Jul-07	Pressure Relief	<1	<1		Tested at Caro Lab
26-Jul-07	Perley School Annex	<1	<1		Tested at Caro Lab
26-Jul-07	Overwaitea Foods	<1	<1		Tested at Caro Lab
26-Jul-07	High Zone Reservoir	X	X	NEG	Tested in House
26-Jul-07	High Zone Reservoir	<1	<1		Tested at Caro Lab
26-Jul-07	Granby Liftstation	X	X	NEG	Tested in House
26-Jul-07	Firehall	<1	<1		Tested at Caro Lab
26-Jul-07	Extra Foods	<1	<1		Tested at Caro Lab
26-Jul-07	East Zone Reservoir	X	X	NEG	Tested in House
26-Jul-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
26-Jul-07	City Hall	<1	<1		Tested at Caro Lab
26-Jul-07	Cemetery	<1	<1		Tested at Caro Lab
26-Jul-07	Buy Low Foods	<1	<1		Tested at Caro Lab
26-Jul-07	Airport Terminal	<1	<1		Tested at Caro Lab
26-Jul-07	8515 Riverside Dr.	<1	<1		Tested at Caro Lab
26-Jul-07	1524 77th Ave.	<1	<1		Tested at Caro Lab
27-Jul-07	Valley Heights booster	X	X	NEG	Tested in House
27-Jul-07	P & T Office	X	X	NEG	Tested in House
27-Jul-07	High Zone Reservoir	X	X	NEG	Tested in House
27-Jul-07	East Zone Reservoir	X	X	NEG	Tested in House
27-Jul-07	Boundary Lodge	X	X	NEG	Tested in House
27-Jul-07	7715 22nd St.	X	X	NEG	Tested in House
27-Jul-07	6435 9th St.	X	X	NEG	Tested in House
27-Jul-07	6144 12th St.	X	X	NEG	Tested in House
27-Jul-07	2240 Selkirk Pl.	X	X	NEG	Tested in House
28-Jul-07	High Zone Reservoir	X	X	NEG	Tested in House
28-Jul-07	East Zone Reservoir	X	X	NEG	Tested in House
29-Jul-07	Valley Heights booster	X	X	NEG	Tested in House
29-Jul-07	Fire Hall	X	X	NEG	Tested in House
29-Jul-07	East Zone Reservoir	X	X	NEG	Tested in House
29-Jul-07	Donaldson Park	X	X	NEG	Tested in House
29-Jul-07	Burroughs Residence	X	X	NEG	Tested in House
30-Jul-07	Valley Heights booster	<1	<1		Tested at Caro Lab
30-Jul-07	V H Booster	X	X	NEG	Tested in House
30-Jul-07	Sands Condos	X	X	NEG	Tested in House
30-Jul-07	Roxul	X	X	NEG	Tested in House
30-Jul-07	High Zone Reservoir	<1	<1		Tested at Caro Lab
30-Jul-07	High Zone Reservoir	X	X	NEG	Tested in House
30-Jul-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
30-Jul-07	East Zone Reservoir	X	X	NEG	Tested in House
30-Jul-07	7549 11th St.	X	X	NEG	Tested in House
30-Jul-07	6369 12th St.	X	X	NEG	Tested in House
30-Jul-07	6008 18th St.	X	X	NEG	Tested in House
31-Jul-07	Well 5	<1	<1		Tested at Caro Lab
31-Jul-07	Well 3A	<1	<1		Tested at Caro Lab
31-Jul-07	Well 3	<1	<1		Tested at Caro Lab
31-Jul-07	Well 2	<1	<1		Tested at Caro Lab
31-Jul-07	V H Booster	<1	<1		Tested at Caro Lab
31-Jul-07	Super Save Gas	X	X	NEG	Tested in House
31-Jul-07	Fire Hall	X	X	NEG	Tested in House
31-Jul-07	East Zone Reservoir	<1	<1		Tested at Caro Lab

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
31-Jul-07	Burroughs Residence	<1	<1		Tested at Caro Lab
31-Jul-07	Boundary Lodge	X	X	NEG	Tested in House
31-Jul-07	Boundary Hospital	<1	<1		Tested at Caro Lab
1-Aug-07	V H Booster	X	X	NEG	Tested in House
1-Aug-07	Riverside (Noseworthy's)	X	X	NEG	Tested in House
1-Aug-07	High Zone Reservoir	X	X	NEG	Tested in House
1-Aug-07	East Zone Reservoir	X	X	NEG	Tested in House
1-Aug-07	Can Par Lunch Room	X	X	NEG	Tested in House
1-Aug-07	780 65th Ave.	X	X	NEG	Tested in House
1-Aug-07	7295 Sunshine Way	X	X	NEG	Tested in House
2-Aug-07	V H Booster	X	X	NEG	Tested in House
2-Aug-07	East Zone Reservoir	X	X	NEG	Tested in House
2-Aug-07	7253 7th St.	X	X	NEG	Tested in House
2-Aug-07	6854 1st St.	X	X	NEG	Tested in House
2-Aug-07	6773 14th St.	X	X	NEG	Tested in House
2-Aug-07	1381 71st Ave.	X	X	NEG	Tested in House
3-Aug-07	FireHall	X	X	NEG	Tested in House
3-Aug-07	East Zone Reservoir	X	X	NEG	Tested in House
3-Aug-07	Boundary Hospital	X	X	NEG	Tested in House
3-Aug-07	7498 Valley Heights Dr.	X	X	NEG	Tested in House
4-Aug-07	V H Booster	X	X	NEG	Tested in House
4-Aug-07	Petro Canada	X	X	NEG	Tested in House
4-Aug-07	East Zone Reservoir	X	X	NEG	Tested in House
5-Aug-07	V H Booster	X	X	NEG	Tested in House
5-Aug-07	High Zone Reservoir	X	X	NEG	Tested in House
5-Aug-07	East Zone Reservoir	X	X	NEG	Tested in House
5-Aug-07	Black Knight Market	X	X	NEG	Tested in House
6-Aug-07	V H Booster	<1	<1		Tested at Caro Lab
6-Aug-07	V H Booster	X	X	NEG	Tested in House
6-Aug-07	Shell Station	X	X	NEG	Tested in House
6-Aug-07	Public Works	X	X	NEG	Tested in House
6-Aug-07	Petro Canada	<1	<1		Tested at Caro Lab
6-Aug-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
6-Aug-07	East Zone Reservoir	X	X	NEG	Tested in House
6-Aug-07	Cemetery	<1	<1		Tested at Caro Lab
7-Aug-07	B C Liquor Store	POS	NEG		Tested in House
7-Aug-07	Well 5	X	X	NEG	Tested in House
7-Aug-07	Well 3A	<1	<1		Tested at Caro Lab
7-Aug-07	Well 3	<1	<1		Tested at Caro Lab
7-Aug-07	Well 2	X	X	NEG	Tested in House
7-Aug-07	V H Booster	<1	<1		Tested at Caro Lab
7-Aug-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
7-Aug-07	East Zone Reservoir	X	X	NEG	Tested in House
7-Aug-07	Cemetery	X	X	NEG	Tested in House
7-Aug-07	Boundary Hospital	<1	<1		Tested at Caro Lab
7-Aug-07	7971 19th (Valmar)	X	X	NEG	Tested in House
7-Aug-07	740 65th Ave.	X	X	NEG	Tested in House
8-Aug-07	V H Booster	<1	<1		Tested at Caro Lab
8-Aug-07	V H Booster	X	X	NEG	Tested in House
8-Aug-07	Overwaitea Foods	X	X	NEG	Tested in House
8-Aug-07	G F Optical	X	X	NEG	Tested in House
8-Aug-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
8-Aug-07	East Zone Reservoir	X	X	NEG	Tested in House
8-Aug-07	Curves	X	X	NEG	Tested in House
8-Aug-07	Cemetery	<1	<1		Tested at Caro Lab
8-Aug-07	B C Liquor Store	<1	<1		Tested at Caro Lab
8-Aug-07	B C Liquor Store	X	X	NEG	Tested in House
8-Aug-07	1659 Lansdown Cr.	X	X	NEG	Tested in House
9-Aug-07	V H Booster	X	X	NEG	Tested in House
9-Aug-07	East Zone Reservoir	X	X	NEG	Tested in House
9-Aug-07	City Hall	X	X	NEG	Tested in House
9-Aug-07	B C Liquor Store	X	X	NEG	Tested in House
10-Aug-07	West End Store	X	X	NEG	Tested in House
10-Aug-07	Water Cooler GF C Union	X	X	NEG	Tested in House
10-Aug-07	V H Booster	X	X	NEG	Tested in House
10-Aug-07	G F Funeral Home	X	X	NEG	Tested in House
10-Aug-07	G F Credit Union	X	X	NEG	Tested in House
10-Aug-07	East Zone Reservoir	X	X	NEG	Tested in House
10-Aug-07	Abbyfield House	X	X	NEG	Tested in House
11-Aug-07	V H Booster	X	X	NEG	Tested in House
11-Aug-07	East Zone Reservoir	X	X	NEG	Tested in House
12-Aug-07	V H Booster	<1	<1		Tested at Caro Lab
12-Aug-07	V H Booster	X	X	NEG	Tested in House
12-Aug-07	Shell Station	<1	<1		Tested at Caro Lab
12-Aug-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
12-Aug-07	East Zone Reservoir	X	X	NEG	Tested in House
12-Aug-07	Cemetery	<1	<1		Tested at Caro Lab
12-Aug-07	7434 Valley Heights	<1	<1		Tested at Caro Lab
13-Aug-07	V H Booster	<1	<1		Tested at Caro Lab
13-Aug-07	V H Booster	X	X	NEG	Tested in House
13-Aug-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
13-Aug-07	East Zone Reservoir	X	X	NEG	Tested in House
13-Aug-07	7524 77th Ave.	<1	<1		Tested at Caro Lab

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
13-Aug-07	7320 9th St.	<1	<1		Tested at Caro Lab
14-Aug-07	Well 3A	X	X	NEG	Tested in House
14-Aug-07	Well 3	X	X	NEG	Tested in House
14-Aug-07	V H Booster	X	X	NEG	Tested in House
14-Aug-07	East Zone Reservoir	X	X	NEG	Tested in House
14-Aug-07	6026 12th St.	X	X	NEG	Tested in House
14-Aug-07	1724 66th Ave.	X	X	NEG	Tested in House
15-Aug-07	Water Cooler GF C Union	X	X	NEG	Tested in House
15-Aug-07	V H Booster	<1	<1		Tested at Caro Lab
15-Aug-07	V H Booster	X	X	NEG	Tested in House
15-Aug-07	Fire Hall	<1	<1		Tested at Caro Lab
15-Aug-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
15-Aug-07	East Zone Reservoir	X	X	NEG	Tested in House
15-Aug-07	Credit Union	<1	<1		Tested at Caro Lab
15-Aug-07	City Hall	X	X	NEG	Tested in House
16-Aug-07	V H Booster	X	X	NEG	Tested in House
16-Aug-07	V H Booster	<1	<1		Tested at Caro Lab
16-Aug-07	Lenny's 16th St.	<1	<1		Tested at Caro Lab
16-Aug-07	East Zone Reservoir	X	X	NEG	Tested in House
16-Aug-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
16-Aug-07	Curling Rink	X	X	NEG	Tested in House
16-Aug-07	Barbra Anne Park	X	X	NEG	Tested in House
16-Aug-07	B&F Sales	<1	<1		Tested at Caro Lab
17-Aug-07	Works Yard	X	X	NEG	Tested in House
17-Aug-07	V H Booster	X	X	NEG	Tested in House
17-Aug-07	Super save Gas	X	X	NEG	Tested in House
17-Aug-07	East Zone Reservoir	X	X	NEG	Tested in House
18-Aug-07	V H Booster	X	X	NEG	Tested in House
18-Aug-07	SPCA	X	X	NEG	Tested in House
18-Aug-07	Petro Canada	X	X	NEG	Tested in House
18-Aug-07	East Zone Reservoir	X	X	NEG	Tested in House
19-Aug-07	V H Booster	<1	<1		Tested at Caro Lab
19-Aug-07	V H Booster	X	X	NEG	Tested in House
19-Aug-07	Shell Station	<1	<1		Tested at Caro Lab
19-Aug-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
19-Aug-07	East Zone Reservoir	X	X	NEG	Tested in House
19-Aug-07	Cemetery	<1	<1		Tested at Caro Lab
20-Aug-07	V H Booster	X	X	NEG	Tested in House
20-Aug-07	V H Booster	<1	<1		Tested at Caro Lab
20-Aug-07	Omega II	<1	<1		Tested at Caro Lab
20-Aug-07	FireHall	X	X	NEG	Tested in House
20-Aug-07	East Zone Reservoir	X	X	NEG	Tested in House
20-Aug-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
20-Aug-07	7320 9th St.	X	X	NEG	Tested in House
20-Aug-07	6908 17th St	<1	<1		Tested at Caro Lab
21-Aug-07	V H Booster	X	X	NEG	Tested in House
21-Aug-07	V H Booster	<1	<1		Tested at Caro Lab
21-Aug-07	Kal Tire	<1	<1		Tested at Caro Lab
21-Aug-07	HighZone Reservoir	X	X	NEG	Tested in House
21-Aug-07	East Zone Reservoir	X	X	NEG	Tested in House
21-Aug-07	Boundary Hospital	<1	<1		Tested at Caro Lab
22-Aug-07	Well 2	POS	NEG	POS	Tested in House
22-Aug-07	Wildlife Hall	X	X	NEG	Tested in House
22-Aug-07	Well 5	X	X	NEG	Tested in House
22-Aug-07	V H Booster	X	X	NEG	Tested in House
22-Aug-07	East Zone Reservoir	X	X	NEG	Tested in House
23-Aug-07	Well 2	NEG	NEG	NEG	Tested in House
23-Aug-07	V H Booster	NEG	NEG	NEG	Tested in House
23-Aug-07	V H Booster	<1	<1		Tested at Caro Lab
23-Aug-07	Lordco	NEG	NEG	NEG	Tested in House
23-Aug-07	Lordco	<1	<1		Tested at Caro Lab
23-Aug-07	East Zone Reservoir	NEG	NEG	NEG	Tested in House
23-Aug-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
23-Aug-07	Dick Bartlett Park	NEG	NEG	NEG	Tested in House
23-Aug-07	Dick Bartlett Park	<1	<1		Tested at Caro Lab
27-Aug-07	V H Booster	<1	<1		Tested at Caro Lab
27-Aug-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
27-Aug-07	BMX Concession	<1	<1		Tested at Caro Lab
27-Aug-07	Arena	<1	<1		Tested at Caro Lab
28-Aug-07	Well5	<1	<1		Tested at Caro Lab
28-Aug-07	Well 3A	NEG	NEG	NEG	Tested in House
28-Aug-07	Well 3	NEG	NEG	NEG	Tested in House
28-Aug-07	Well 2	<1	<1		Tested at Caro Lab
28-Aug-07	V H Booster	NEG	NEG	NEG	Tested in House
28-Aug-07	V H Booster	<1	<1		Tested at Caro Lab
28-Aug-07	East Zone Reservoir	NEG	NEG	NEG	Tested in House
28-Aug-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
28-Aug-07	Boundary Lodge	NEG	NEG	NEG	Tested in House
28-Aug-07	Boundary Hospital	<1	<1		Tested at Caro Lab
29-Aug-07	V H Booster	NEG	NEG	NEG	Tested in House
29-Aug-07	Liquor Store	NEG	NEG	NEG	Tested in House
29-Aug-07	East Zone Reservoir	NEG	NEG	NEG	Tested in House
29-Aug-07	6947 17th St.	NEG	NEG	NEG	Tested in House

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
30-Aug-07	Well 2	NEG	NEG	NEG	Tested in House
30-Aug-07	V H Booster	<1	<1		Tested at Caro Lab
30-Aug-07	V H Booster	NEG	NEG	NEG	Tested in House
30-Aug-07	PRV Station	NEG	NEG	NEG	Tested in House
30-Aug-07	FireHall	<1	<1		Tested at Caro Lab
30-Aug-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
30-Aug-07	East Zone Reservoir	NEG	NEG	NEG	Tested in House
31-Aug-07	V H Booster	NEG	NEG	NEG	Tested in House
31-Aug-07	East Zone Reservoir	NEG	NEG	NEG	Tested in House
31-Aug-07	City Hall	NEG	NEG	NEG	Tested in House
31-Aug-07	ABH Car Sales	NEG	NEG	NEG	Tested in House
31-Aug-07	ABH Car Sales	NEG	NEG	NEG	Tested in House
31-Aug-07	7466 Valley Heights	NEG	NEG	NEG	Tested in House
1-Sep-07	V H Booster	NEG	NEG	NEG	Tested in House
1-Sep-07	East Zone Reservoir	NEG	NEG	NEG	Tested in House
2-Sep-07	V H Booster	NEG	NEG	NEG	Tested in House
2-Sep-07	East Zone Reservoir	NEG	NEG	NEG	Tested in House
2-Sep-07	125 Victoria Way	NEG	NEG	NEG	Tested in House
3-Sep-07	V H Booster	<1	<1		Tested at Caro Lab
3-Sep-07	V H Booster	NEG	NEG	NEG	Tested in House
3-Sep-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
3-Sep-07	East Zone Reservoir	NEG	NEG	NEG	Tested in House
3-Sep-07	Cemetery	<1	<1		Tested at Caro Lab
3-Sep-07	Cemetery	NEG	NEG	NEG	Tested in House
4-Sep-07	Well 5	X	X	NEG	Tested in House
4-Sep-07	Well 3A	<1	<1		Tested at Caro Lab
4-Sep-07	Well 3	<1	<1		Tested at Caro Lab
4-Sep-07	Well 2	X	X	NEG	Tested in House
4-Sep-07	V H Booster	<1	<1		Tested at Caro Lab
4-Sep-07	V H Booster	X	X	NEG	Tested in House
4-Sep-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
4-Sep-07	East Zone Reservoir	X	X	NEG	Tested in House
4-Sep-07	Boundary Hospital	<1	<1		Tested at Caro Lab
4-Sep-07	Boundary Hospital	X	X	NEG	Tested in House
5-Sep-07	V H Booster	<1	<1		Tested at Caro Lab
5-Sep-07	V H Booster	X	X	NEG	Tested in House
5-Sep-07	RCMP Station	<1	<1		Tested at Caro Lab
5-Sep-07	RCMP Station	X	X	NEG	Tested in House
5-Sep-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
5-Sep-07	East Zone Reservoir	X	X	NEG	Tested in House
5-Sep-07	696 64th Ave.	<1	<1		Tested at Caro Lab
5-Sep-07	696 64th Ave.	X	X	NEG	Tested in House
6-Sep-07	Well4	<1	<1		Tested at Caro Lab
6-Sep-07	Well4	X	X	NEG	Tested in House
6-Sep-07	Well 5	<1	<1		Tested at Caro Lab
6-Sep-07	Well 5	X	X	NEG	Tested in House
6-Sep-07	V H Booster	<1	<1		Tested at Caro Lab
6-Sep-07	V H Booster	X	X	NEG	Tested in House
6-Sep-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
6-Sep-07	East Zone Reservoir	X	X	NEG	Tested in House
7-Sep-07	V H Booster	X	X	NEG	Tested in House
7-Sep-07	East Zone Reservoir	X	X	NEG	Tested in House
8-Sep-07	V H Booster	X	X	NEG	Tested in House
8-Sep-07	Fire Hall	X	X	NEG	Tested in House
8-Sep-07	East Zone Reservoir	X	X	NEG	Tested in House
8-Sep-07	Cemetery	X	X	NEG	Tested in House
9-Sep-07	V H Booster	<1	<1		Tested at Caro Lab
9-Sep-07	V H Booster	X	X	NEG	Tested in House
9-Sep-07	Super Save Gas	<1	<1		Tested at Caro Lab
9-Sep-07	Super Save Gas	X	X	NEG	Tested in House
9-Sep-07	Petro Canada	<1	<1		Tested at Caro Lab
9-Sep-07	Petro Canada	X	X	NEG	Tested in House
9-Sep-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
9-Sep-07	East Zone Reservoir	X	X	NEG	Tested in House
10-Sep-07	V H Booster	<1	<1		Tested at Caro Lab
10-Sep-07	V H Booster	X	X	NEG	Tested in House
10-Sep-07	Joga's Coffee Market St.	X	X	NEG	Tested in House
10-Sep-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
10-Sep-07	East Zone Reservoir	X	X	NEG	Tested in House
10-Sep-07	Angus McDonald Park	X	X	NEG	Tested in House
11-Sep-07	Well 5	<1	<1		Tested at Caro Lab
11-Sep-07	Well 3A	X	X	NEG	Tested in House
11-Sep-07	Well 3	X	X	NEG	Tested in House
11-Sep-07	V H Booster	<1	<1		Tested at Caro Lab
11-Sep-07	V H Booster	X	X	NEG	Tested in House
11-Sep-07	Pope & Talbot	X	X	NEG	Tested in House
11-Sep-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
11-Sep-07	East Zone Reservoir	X	X	NEG	Tested in House
11-Sep-07	Can Par	X	X	NEG	Tested in House
11-Sep-07	Boundary Hospital	<1	<1		Tested at Caro Lab
11-Sep-07	129 Victoria Way (VH)	X	X	NEG	Tested in House
13-Sep-07	V H Booster	X	X	NEG	Tested in House
13-Sep-07	Overwaitea	X	X	NEG	Tested in House

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
13-Sep-07	East Zone Reservoir	X	X	NEG	Tested in House
13-Sep-07	Boundary Lodge	X	X	NEG	Tested in House
13-Sep-07	1270 59th Ave.	X	X	NEG	Tested in House
14-Sep-07	V H Booster	X	X	NEG	Tested in House
14-Sep-07	Hardy View Lodge	X	X	NEG	Tested in House
14-Sep-07	East Zone Reservoir	X	X	NEG	Tested in House
14-Sep-07	7320 9th St.	X	X	NEG	Tested in House
15-Sep-07	V H Booster	X	X	NEG	Tested in House
15-Sep-07	East Zone Reservoir	X	X	NEG	Tested in House
16-Sep-07	Works Yard	<1	<1		Tested at Caro Lab
16-Sep-07	V H Booster	<1	<1		Tested at Caro Lab
16-Sep-07	V H Booster	X	X	NEG	Tested in House
16-Sep-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
16-Sep-07	East Zone Reservoir	X	X	NEG	Tested in House
16-Sep-07	Black Knight Market	<1	<1		Tested at Caro Lab
17-Sep-07	V H Booster	<1	<1		Tested at Caro Lab
17-Sep-07	V H Booster	X	X	NEG	Tested in House
17-Sep-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
17-Sep-07	East Zone Reservoir	X	X	NEG	Tested in House
17-Sep-07	City Hall	X	X	NEG	Tested in House
17-Sep-07	7496 Valley Heights	<1	<1		Tested at Caro Lab
18-Sep-07	Well 5	X	X	NEG	Tested in House
18-Sep-07	Well 3A	<1	<1		Tested at Caro Lab
18-Sep-07	Well 3	<1	<1		Tested at Caro Lab
18-Sep-07	V H Booster	X	X	NEG	Tested in House
18-Sep-07	V H Booster	<1	<1		Tested at Caro Lab
18-Sep-07	East Zone Reservoir	X	X	NEG	Tested in House
18-Sep-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
18-Sep-07	Boundary Hospital	<1	<1		Tested at Caro Lab
19-Sep-07	V H Booster	<1	<1		Tested at Caro Lab
19-Sep-07	Hutton School	X	X	NEG	Tested in House
19-Sep-07	Glanville Center	X	X	NEG	Tested in House
19-Sep-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
19-Sep-07	Bon Air Motel	<1	<1		Tested at Caro Lab
19-Sep-07	Bon Air Motel	X	X	NEG	Tested in House
20-Sep-07	V H Booster	X	X	NEG	Tested in House
20-Sep-07	East Zone Reservoir	X	X	NEG	Tested in House
21-Sep-07	V H Booster	<1	<1		Tested at Caro Lab
21-Sep-07	V H Booster	X	X	NEG	Tested in House
21-Sep-07	GF Arena	X	X	NEG	Tested in House
21-Sep-07	Fire Hall	X	X	NEG	Tested in House
21-Sep-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
21-Sep-07	East Zone Reservoir	X	X	NEG	Tested in House
21-Sep-07	V H Booster	X	X	NEG	Tested in House
21-Sep-07	Fire Hall	X	X	NEG	Tested in House
21-Sep-07	East Zone Reservoir	X	X	NEG	Tested in House
21-Sep-07	6435 9th St.	X	X	NEG	Tested in House
22-Sep-07	V H Booster	X	X	NEG	Tested in House
22-Sep-07	Subway	X	X	NEG	Tested in House
22-Sep-07	East Zone Reservoir	X	X	NEG	Tested in House
23-Sep-07	Well 3	<1	<1		Tested at Caro Lab
23-Sep-07	V H Booster	<1	<1		Tested at Caro Lab
23-Sep-07	V H Booster	X	X	NEG	Tested in House
23-Sep-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
23-Sep-07	East Zone Reservoir	X	X	NEG	Tested in House
24-Sep-07	V H Booster	<1	<1		Tested at Caro Lab
24-Sep-07	V H Booster	X	X	NEG	Tested in House
24-Sep-07	Roxul	X	X	NEG	Tested in House
24-Sep-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
24-Sep-07	East Zone Reservoir	X	X	NEG	Tested in House
24-Sep-07	225 Wellington Cres.	<1	<1		Tested at Caro Lab
25-Sep-07	Well 5	<1	<1		Tested at Caro Lab
25-Sep-07	V H Booster	<1	<1		Tested at Caro Lab
25-Sep-07	V H Booster	X	X	NEG	Tested in House
25-Sep-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
25-Sep-07	East Zone Reservoir	X	X	NEG	Tested in House
25-Sep-07	Boundary Hospital	<1	<1		Tested at Caro Lab
26-Sep-07	Well 4	X	X	NEG	Tested in House
26-Sep-07	Well 3A	X	X	NEG	Tested in House
26-Sep-07	Well 3	X	X	NEG	Tested in House
26-Sep-07	V H Booster	<1	<1		Tested at Caro Lab
26-Sep-07	V H Booster	X	X	NEG	Tested in House
26-Sep-07	Fire Hall	<1	<1		Tested at Caro Lab
26-Sep-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
26-Sep-07	East Zone Reservoir	X	X	NEG	Tested in House
27-Sep-07	V H Booster	X	X	NEG	Tested in House
27-Sep-07	East Zone Reservoir	X	X	NEG	Tested in House
27-Sep-07	Boundary Lodge	X	X	NEG	Tested in House
28-Sep-07	V H Booster	X	X	NEG	Tested in House
28-Sep-07	Hardy View Lodge	X	X	NEG	Tested in House
28-Sep-07	East Zone Reservoir	X	X	NEG	Tested in House
29-Sep-07	Well 5	X	X	NEG	Tested in House
29-Sep-07	V H Booster	X	X	NEG	Tested in House

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
29-Sep-07	Omega II	X	X	NEG	Tested in House
29-Sep-07	East Zone Reservoir	X	X	NEG	Tested in House
30-Sep-07	Well 3A	<1	<1		Tested at Caro Lab
30-Sep-07	V H Booster	<1	<1		Tested at Caro Lab
30-Sep-07	V H Booster	X	X	NEG	Tested in House
30-Sep-07	Petro Canada	X	X	NEG	Tested in House
30-Sep-07	East Zone Reservoir	<1	<1		Tested at Caro Lab
30-Sep-07	East Zone Reservoir	X	X	NEG	Tested in House
1-Oct-07	Valley Heights Booster	<1	<1		Tested at Caro
1-Oct-07	Valley Heights Booster			Neg	In House
1-Oct-07	Treatment Plant			Neg	In House
1-Oct-07	FireHall	<1	<1		Tested at Caro
1-Oct-07	East Zone Reservoir	<1	<1		Tested at Caro
1-Oct-07	East Zone Reservoir			Neg	In House
2-Oct-07	Well 5			Neg	In House
2-Oct-07	Well 3A	<1	<1		Tested at Caro
2-Oct-07	Well 3A	<1	<1		Tested at Caro
2-Oct-07	Valley Heights Booster	<1	<1		Tested at Caro
2-Oct-07	Valley Heights Booster			Neg	In House
2-Oct-07	East Zone Reservoir	<1	<1		Tested at Caro
2-Oct-07	East Zone Reservoir			Neg	In House
2-Oct-07	Boundary Hospital	<1	<1		Tested at Caro
3-Oct-07	Valley Heights Booster	<1	<1		Tested at Caro
3-Oct-07	Valley Heights Booster			Neg	In House
3-Oct-07	East Zone Reservoir	<1	<1		Tested at Caro
3-Oct-07	East Zone Reservoir			Neg	In House
3-Oct-07	City Hall			Neg	In House
3-Oct-07	Aquatic Center	<1	<1		Tested at Caro
4-Oct-07	Valley Heights Booster			Neg	In House
4-Oct-07	East Zone Reservoir			Neg	In House
4-Oct-07	Black Knight			Neg	In House
5-Oct-07	Valley Heights Booster			Neg	In House
5-Oct-07	FireHall			Neg	In House
5-Oct-07	East Zone Reservoir			Neg	In House
5-Oct-07	7463 Valley Heights			Neg	In House
6-Oct-07	Valley Heights Booster			Neg	In House
6-Oct-07	East Zone Reservoir			Neg	In House
7-Oct-07	Valley Heights Booster			Neg	In House
7-Oct-07	East Zone Reservoir			Neg	In House
8-Oct-07	Valley Heights Booster			Neg	In House
8-Oct-07	East Zone Reservoir			Neg	In House
9-Oct-07	Well3			Neg	In House
9-Oct-07	Well 3A			Neg	In House
9-Oct-07	Valley Heights Booster			Neg	In House
9-Oct-07	East Zone Reservoir			Neg	In House
10-Oct-07	Well 5	<1	<1		Tested at Caro
10-Oct-07	Valley Heights Booster	<1	<1		Tested at Caro
10-Oct-07	Valley Heights Booster			Neg	In House
10-Oct-07	FireHall	<1	<1		Tested at Caro
10-Oct-07	East Zone Reservoir	<1	<1		Tested at Caro
10-Oct-07	East Zone Reservoir			Neg	In House
10-Oct-07	Boundary Hospital	<1	<1		Tested at Caro
10-Oct-07	7976 Riverside Dr.			Neg	In House
12-Oct-07	Valley Heights Booster			Neg	In House
12-Oct-07	Sunshine Special Care			Neg	In House
12-Oct-07	East Zone Reservoir			Neg	In House
12-Oct-07	Boundary Lodge			Neg	In House
13-Oct-07	Valley Heights Booster			Neg	In House
13-Oct-07	East Zone Reservoir			Neg	In House
14-Oct-07	Valley Heights Booster	<1	<1		Tested at Caro
14-Oct-07	Valley Heights Booster			Neg	In House
14-Oct-07	East Zone Reservoir	<1	<1		Tested at Caro
14-Oct-07	East Zone Reservoir			Neg	In House
15-Oct-07	Works Yard	<1	<1		Tested at Caro
15-Oct-07	Valley Heights Booster	<1	<1		Tested at Caro
15-Oct-07	Valley Heights Booster			Neg	In House
15-Oct-07	FireHall			Neg	In House
15-Oct-07	East Zone Reservoir	<1	<1		Tested at Caro
15-Oct-07	East Zone Reservoir			Neg	In House
16-Oct-07	Well 5			Neg	In House
16-Oct-07	Well 3A	<1	<1		Tested at Caro
16-Oct-07	Well 3	<1	<1		Tested at Caro
16-Oct-07	Valley Heights Booster	<1	<1		Tested at Caro
16-Oct-07	Valley Heights Booster			Neg	In House
16-Oct-07	FireHall	<1	<1		Tested at Caro
16-Oct-07	East Zone Reservoir	<1	<1		Tested at Caro
16-Oct-07	East Zone Reservoir			Neg	In House
16-Oct-07	Boundary Hospital	<1	<1		Tested at Caro
17-Oct-07	Well 2			Neg	In House
17-Oct-07	Valley Heights Booster	<1	<1		Tested at Caro
17-Oct-07	Valley Heights Booster			Neg	In House
17-Oct-07	Petro Canada	<1	<1		Tested at Caro
17-Oct-07	Petro Canada			Neg	In House

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
17-Oct-07	East Zone Reservoir	<1	<1		Tested at Caro
17-Oct-07	East Zone Reservoir			Neg	In House
18-Oct-07	Valley Heights Booster			Neg	In House
18-Oct-07	Perley School			Neg	In House
18-Oct-07	Hutton School			Neg	In House
18-Oct-07	High School			Neg	In House
18-Oct-07	East Zone Reservoir			POS	In House
19-Oct-07	Valley Heights Booster			Neg	In House
19-Oct-07	PRV Station			Neg	In House
19-Oct-07	East Zone Reservoir			NEG	In House
20-Oct-07	Valley Heights Booster			Neg	In House
20-Oct-07	East Zone Reservoir			Neg	In House
21-Oct-07	Valley Heights Booster	<1	<1		Tested at Caro
21-Oct-07	Valley Heights Booster			Neg	In House
21-Oct-07	Omega II Restaurant	<1	<1		Tested at Caro
21-Oct-07	East Zone Reservoir	<1	<1		Tested at Caro
21-Oct-07	East Zone Reservoir			Neg	In House
22-Oct-07	Valley Heights Booster	<1	<1		Tested at Caro
22-Oct-07	Valley Heights Booster			Neg	In House
22-Oct-07	G F Arena			Neg	In House
22-Oct-07	East Zone Reservoir	<1	<1		Tested at Caro
22-Oct-07	East Zone Reservoir			Neg	In House
22-Oct-07	City Hall	<1	<1		Tested at Caro
23-Oct-07	Well 5	<1	<1	Back Ground	Tested at Caro
23-Oct-07	Valley Heights Booster	<1	<1		Tested at Caro
23-Oct-07	East Zone Reservoir	<1	<1		Tested at Caro
23-Oct-07	Boundary Hospital	<1	<1		Tested at Caro
24-Oct-07	Valley Heights Booster	<1	<1		Tested at Caro
24-Oct-07	Valley Heights Booster			Neg	In House
24-Oct-07	FireHall	<1	<1		Tested at Caro
24-Oct-07	East Zone Reservoir	<1	<1		Tested at Caro
24-Oct-07	East Zone Reservoir			Neg	In House
24-Oct-07	2660 75th Ave.			POS	In House
25-Oct-07	Valley Heights Booster			Neg	In House
25-Oct-07	High School			Neg	In House
25-Oct-07	East Zone Reservoir			Neg	In House
25-Oct-07	2660 75th Ave.			NEG	In House
26-Oct-07	Well 5			Neg	In House
26-Oct-07	Valley Heights Booster			Neg	In House
26-Oct-07	East Zone Reservoir			Neg	In House
26-Oct-07	6933 16th Street			Neg	In House
27-Oct-07	Valley Heights Booster			Neg	In House
27-Oct-07	East Zone Reservoir			Neg	In House
28-Oct-07	Well 5	<1	<1		Tested at Caro
28-Oct-07	Valley Heights Booster	<1	<1		Tested at Caro
28-Oct-07	Valley Heights Booster			Neg	In House
28-Oct-07	East Zone Reservoir	<1	<1		Tested at Caro
28-Oct-07	East Zone Reservoir			Neg	In House
29-Oct-07	Valley Heights Booster	<1	<1		Tested at Caro
29-Oct-07	Valley Heights Booster			Neg	In House
29-Oct-07	Perley School			Neg	In House
29-Oct-07	FireHall	<1	<1		Tested at Caro
29-Oct-07	East Zone Reservoir	<1	<1		Tested at Caro
29-Oct-07	East Zone Reservoir			Neg	In House
30-Oct-07	Well 5			Neg	In House
30-Oct-07	Well 3A	<1	<1		Tested at Caro
30-Oct-07	Well 3	<1	<1		Tested at Caro
30-Oct-07	Valley Heights Booster	<1	<1		Tested at Caro
30-Oct-07	Valley Heights Booster			Neg	In House
30-Oct-07	East Zone Reservoir	<1	<1		Tested at Caro
30-Oct-07	East Zone Reservoir			Neg	In House
30-Oct-07	Boundary Hospital	<1	<1		Tested at Caro
31-Oct-07	Well 2			Neg	In House
31-Oct-07	Valley Heights Booster	<1	<1		Tested at Caro
31-Oct-07	Valley Heights Booster			Neg	In House
31-Oct-07	Hutton School			Neg	In House
31-Oct-07	East Zone Reservoir	<1	<1		Tested at Caro
31-Oct-07	East Zone Reservoir			Neg	In House
31-Oct-07	City Hall	<1	<1		Tested at Caro
1-Nov-07	Valley Heights Booster			NEG	Tested in House
1-Nov-07	GFSS			NEG	Tested in House
1-Nov-07	East Zone Reservoir			NEG	Tested in House
2-Nov-07	Valley Heights Booster			NEG	Tested in House
2-Nov-07	Hardy View Lodge			NEG	Tested in House
2-Nov-07	East Zone Reservoir			NEG	Tested in House
3-Nov-07	Valley Heights Booster			NEG	Tested in House
3-Nov-07	East Zone Reservoir			NEG	Tested in House
4-Nov-07	Valley Heights Booster			NEG	Tested in House
4-Nov-07	East Zone Reservoir			NEG	Tested in House
5-Nov-07	Valley Heights Booster			NEG	Tested in House
5-Nov-07	East Zone Reservoir	<1	<1		Tested at Caro
5-Nov-07	East Zone Reservoir			NEG	Tested in House
5-Nov-07	Cemetery			NEG	Tested in House

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
6-Nov-07	Well 5	<1	<1		Tested at Caro
6-Nov-07	Well 3A			NEG	Tested in House
6-Nov-07	Well 3			NEG	Tested in House
6-Nov-07	Valley Heights Booster	<1	<1		Tested at Caro
6-Nov-07	Valley Heights Booster			NEG	Tested in House
6-Nov-07	East Zone Reservoir	<1	<1		Tested at Caro
6-Nov-07	East Zone Reservoir			NEG	Tested in House
6-Nov-07	Boundary Hospital	<1	<1		Tested at Caro
7-Nov-07	Valley Heights Booster			NEG	Tested in House
7-Nov-07	Hutton School			NEG	Tested in House
7-Nov-07	East Zone Reservoir	<1	<1		Tested at Caro
7-Nov-07	East Zone Reservoir			NEG	Tested in House
7-Nov-07	Boundary Lodge	<1	<1		Tested at Caro
8-Nov-07	Valley Heights Booster			NEG	Tested in House
8-Nov-07	Perley School			NEG	Tested in House
8-Nov-07	East Zone Reservoir			NEG	Tested in House
9-Nov-07	Valley Heights Booster			NEG	Tested in House
9-Nov-07	Hardy View Lodge			NEG	Tested in House
9-Nov-07	East Zone Reservoir			NEG	Tested in House
10-Nov-07	Valley Heights Booster			NEG	Tested in House
10-Nov-07	East Zone Reservoir			NEG	Tested in House
11-Nov-07	Valley Heights Booster			NEG	Tested in House
11-Nov-07	East Zone Reservoir			NEG	Tested in House
12-Nov-07	Valley Heights Booster	<1	<1		Tested at Caro
12-Nov-07	Valley Heights Booster			NEG	Tested in House
12-Nov-07	East Zone Reservoir	<1	<1		Tested at Caro
12-Nov-07	East Zone Reservoir			NEG	Tested in House
13-Nov-07	Well 5			NEG	Tested in House
13-Nov-07	Well 3A	<1	<1		Tested at Caro
13-Nov-07	Well 3	<1	<1		Tested at Caro
13-Nov-07	Well 2			NEG	Tested in House
13-Nov-07	Valley Heights Booster	<1	<1		Tested at Caro
13-Nov-07	East Zone Reservoir			NEG	Tested in House
13-Nov-07	Boundary Hospital	<1	<1		Tested at Caro
14-Nov-07	Valley Heights Booster			NEG	Tested in House
14-Nov-07	Perley School	<1	<1		Tested at Caro
14-Nov-07	Hutton School			NEG	Tested in House
14-Nov-07	East Zone Reservoir	<1	<1		Tested at Caro
14-Nov-07	East Zone Reservoir			NEG	Tested in House
15-Nov-07	Valley Heights Booster			NEG	Tested in House
15-Nov-07	Super Save Gas			NEG	Tested in House
15-Nov-07	East Zone Reservoir			NEG	Tested in House
16-Nov-07	Valley Heights Booster			NEG	Tested in House
16-Nov-07	East Zone Reservoir			NEG	Tested in House
16-Nov-07	Boundary Lodge			NEG	Tested in House
17-Nov-07	Valley Heights Booster			NEG	Tested in House
17-Nov-07	East Zone Reservoir			NEG	Tested in House
18-Nov-07	Valley Heights Booster			NEG	Tested in House
18-Nov-07	East Zone Reservoir			NEG	Tested in House
19-Nov-07	Valley Heights Booster			NEG	Tested in House
19-Nov-07	GFSS	<1	<1		Tested at Caro
19-Nov-07	East Zone Reservoir	<1	<1		Tested at Caro
19-Nov-07	East Zone Reservoir			NEG	Tested in House
20-Nov-07	Well 5	<1	<1		Tested at Caro
20-Nov-07	Well 3A			NEG	Tested in House
20-Nov-07	Well 3			NEG	Tested in House
20-Nov-07	Well 2	<1	<1		Tested at Caro
20-Nov-07	Valley Heights Booster	<1	<1		Tested at Caro
20-Nov-07	East Zone Reservoir			NEG	Tested in House
20-Nov-07	Boundary Hospital	<1	<1		Tested at Caro
21-Nov-07	Valley Heights Booster			NEG	Tested in House
21-Nov-07	Perley School			NEG	Tested in House
21-Nov-07	Hutton School	<1	<1		Tested at Caro
21-Nov-07	East Zone Reservoir	<1	<1		Tested at Caro
22-Nov-07	Valley Heights Booster			NEG	Tested in House
22-Nov-07	East Zone Reservoir			NEG	Tested in House
23-Nov-07	Valley Heights Booster			NEG	Tested in House
23-Nov-07	Hardy View Lodge			NEG	Tested in House
23-Nov-07	East Zone Reservoir			NEG	Tested in House
24-Nov-07	Valley Heights Booster			NEG	Tested in House
24-Nov-07	East Zone Reservoir			NEG	Tested in House
25-Nov-07	Valley Heights Booster			NEG	Tested in House
25-Nov-07	East Zone Reservoir			NEG	Tested in House
26-Nov-07	Valley Heights Booster			NEG	Tested in House
26-Nov-07	East Zone Reservoir			NEG	Tested in House
26-Nov-07	City Hall			NEG	Tested in House
27-Nov-07	Well 5			NEG	Tested in House
27-Nov-07	Well 3A	<1	<1		Tested at Caro
27-Nov-07	Well 3	<1	<1		Tested at Caro
27-Nov-07	Well 2			NEG	Tested in House
27-Nov-07	Valley Heights Booster	<1	<1		Tested at Caro
27-Nov-07	East Zone Reservoir	<1	<1		Tested at Caro
27-Nov-07	East Zone Reservoir			NEG	Tested in House

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
27-Nov-07	Boundary Hospital	<1	<1		Tested at Caro
28-Nov-07	Valley Heights Booster			NEG	Tested in House
28-Nov-07	Perley School				Tested at Caro
28-Nov-07	Hutton School			NEG	Tested in House
28-Nov-07	East Zone Reservoir				Tested at Caro
29-Nov-07	Valley Heights Booster			NEG	Tested in House
29-Nov-07	East Zone Reservoir			NEG	Tested in House
29-Nov-07	6311 12th Street			NEG	Tested in House
30-Nov-07	Valley Heights Booster			NEG	Tested in House
30-Nov-07	Firehall			NEG	Tested in House
30-Nov-07	East Zone Reservoir			NEG	Tested in House
3-Dec-07	East Zone Reservoir	POS	NEG	POS	Tested in House
3-Dec-07	Valley Heights Booster			NEG	Tested in House
3-Dec-07	Valley Heights Booster	<1	<1		Tested at Caro
3-Dec-07	Hutton School			NEG	Tested in House
3-Dec-07	East Zone Reservoir	<1	<1		Tested at Caro
4-Dec-07	East Zone Reservoir	POS	NEG	POS	Tested in House
4-Dec-07	Well 5	<1	<1		Tested at Caro
4-Dec-07	Well 3			NEG	Tested in House
4-Dec-07	Well 2	<1	<1		Tested at Caro
4-Dec-07	Valley Heights Booster	<1	<1		Tested at Caro
4-Dec-07	Valley Heights Booster			NEG	Tested in House
4-Dec-07	Perley School	<1	<1		Tested at Caro
4-Dec-07	East Zone Reservoir	<1	<1		Tested at Caro
4-Dec-07	Boundary Hospital	<1	<1		Tested at Caro
5-Dec-07	Well 3A			NEG	Tested in House
5-Dec-07	Valley Heights Booster			NEG	Tested in House
5-Dec-07	East Zone Reservoir			NEG	Tested in House
5-Dec-07	East Zone Reservoir			NEG	Tested in House
5-Dec-07	East Zone Reservoir	<1	<1		Tested at Caro
5-Dec-07	Abbyfield			NEG	Tested in House
6-Dec-07	Valley Heights Booster			NEG	Tested in House
6-Dec-07	Pope & Talbot	<1	<1		Tested at Caro
6-Dec-07	Highschool	<1	<1		Tested at Caro
6-Dec-07	EZ DRAIN			NEG	Tested in House
6-Dec-07	East Zone Reservoir	<1	<1		Tested at Caro
6-Dec-07	East Zone Reservoir			NEG	Tested in House
6-Dec-07	Can Par	<1	<1		Tested at Caro
6-Dec-07	Boundary Lodge	<1	<1		Tested at Caro
7-Dec-07	Valley Heights Booster			NEG	Tested in House
7-Dec-07	Omega II			NEG	Tested in House
7-Dec-07	East Zone Reservoir			NEG	Tested in House
7-Dec-07	128 Victoria Way			NEG	Tested in House
8-Dec-07	Valley Heights Booster			NEG	Tested in House
8-Dec-07	East Zone Reservoir			NEG	Tested in House
8-Dec-07	7619 Granby Rd.			NEG	Tested in House
9-Dec-07	Valley Heights Booster			NEG	Tested in House
9-Dec-07	East Zone Reservoir			NEG	Tested in House
9-Dec-07	Chevron			NEG	Tested in House
10-Dec-07	East Zone Reservoir	POS	NEG	POS	Tested in House
10-Dec-07	Valley Heights Booster			NEG	Tested in House
10-Dec-07	6435 9th St.			NEG	Tested in House
10-Dec-07	6144 12th St.			NEG	Tested in House
11-Dec-07	Well 5			NEG	Tested in House
11-Dec-07	Well 3A	<1	<1		Tested at Caro
11-Dec-07	Well 3	<1	<1		Tested at Caro
11-Dec-07	Well 2			NEG	Tested in House
11-Dec-07	Valley Heights Booster	<1	<1		Tested at Caro
11-Dec-07	Valley Heights Booster			NEG	Tested in House
11-Dec-07	N 19th dead end			NEG	Tested in House
11-Dec-07	East Zone Reservoir	<1	<1		Tested at Caro
11-Dec-07	East Zone Reservoir			NEG	Tested in House
11-Dec-07	Boundary Hospital	<1	<1		Tested at Caro
12-Dec-07	Valley Heights Booster	<1	<1		Tested at Caro
12-Dec-07	Valley Heights Booster			NEG	Tested in House
12-Dec-07	Hutton School			NEG	Tested in House
12-Dec-07	Firehall	<1	<1		Tested at Caro
12-Dec-07	East Zone Reservoir	<1	<1		Tested at Caro
12-Dec-07	East Zone Reservoir			NEG	Tested in House
13-Dec-07	Valley Heights Booster	<1	<1		Tested at Caro
13-Dec-07	Valley Heights Booster			NEG	Tested in House
13-Dec-07	Super Save			NEG	Tested in House
13-Dec-07	East Zone Reservoir	<1	<1		Tested at Caro
13-Dec-07	East Zone Reservoir			NEG	Tested in House
13-Dec-07	7487 2nd St.			NEG	Tested in House
13-Dec-07	6933 16th St.	<1	<1		Tested at Caro
14-Dec-07	Valley Heights Booster			NEG	Tested in House
14-Dec-07	Mix's House			NEG	Tested in House
14-Dec-07	East Zone Reservoir			NEG	Tested in House
15-Dec-07	Went End Store			NEG	Tested in House
15-Dec-07	East Zone Reservoir			NEG	Tested in House
16-Dec-07	Valley Heights Booster			NEG	Tested in House
16-Dec-07	Valley Heights Booster	<1	<1		Tested at Caro

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
16-Dec-07	East Zone Reservoir	<1	<1		Tested at Caro
16-Dec-07	East Zone Reservoir			NEG	Tested in House
17-Dec-07	Valley Heights Booster			NEG	Tested in House
17-Dec-07	Valley Heights Booster			NEG	Tested in House
17-Dec-07	PRV Station			NEG	Tested in House
17-Dec-07	Perley Annex			NEG	Tested in House
17-Dec-07	East Zone Reservoir			NEG	Tested in House
17-Dec-07	Cemetery			NEG	Tested in House
18-Dec-07	Valley Heights Booster	<1	<1		Tested at Caro
18-Dec-07	Valley Heights Booster			NEG	Tested in House
18-Dec-07	Hutton School			NEG	Tested in House
18-Dec-07	East Zone Reservoir	<1	<1		Tested at Caro
18-Dec-07	East Zone Reservoir			NEG	Tested in House
18-Dec-07	Boundary Lodge			NEG	Tested in House
18-Dec-07	Boundary Hospital	<1	<1		Tested at Caro
19-Dec-07	Valley Heights Booster			NEG	Tested in House
19-Dec-07	Super Save			NEG	Tested in House
19-Dec-07	East Zone Reservoir			NEG	Tested in House
20-Dec-07	Valley Heights Booster			NEG	Tested in House
20-Dec-07	Petro Canada			NEG	Tested in House
20-Dec-07	East Zone Reservoir			NEG	Tested in House
20-Dec-07	Aquatic Center			NEG	Tested in House
27-Dec-07	Valley Heights Booster			NEG	Tested in House
27-Dec-07	East Zone Reservoir			NEG	Tested in House
27-Dec-07	Curves			NEG	Tested in House
27-Dec-07	Boundary Hospital			NEG	Tested in House
28-Dec-07	Valley Heights Booster			NEG	Tested in House
28-Dec-07	G F Arena			NEG	Tested in House
28-Dec-07	East Zone Reservoir			NEG	Tested in House
28-Dec-07	City Hall			NEG	Tested in House
31-Dec-07	Valley Heights Booster			NEG	Tested in House
31-Dec-07	Hardyview Lodge			NEG	Tested in House
31-Dec-07	Emcon Services			NEG	Tested in House
31-Dec-07	East Zone Reservoir			NEG	Tested in House
31-Dec-07	Boundary Lodge			NEG	Tested in House
2-Jan-08	Valley Heights Booster			NEG	Tested in House
2-Jan-08	East Zone Reservoir			NEG	Tested in House
2-Jan-08	Boundary Hospital			NEG	Tested in House
3-Jan-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
3-Jan-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
3-Jan-08	Boundary Hospital	<1	<1		Tested at Caro Lab
7-Jan-08	Valley Heights Booster			NEG	Tested in House
7-Jan-08	Super Save Gas			NEG	Tested in House
7-Jan-08	East Zone Reservoir			NEG	Tested in House
8-Jan-08	Well 5	<1	<1		Tested at Caro Lab
8-Jan-08	Well 3A	<1	<1		Tested at Caro Lab
8-Jan-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
8-Jan-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
8-Jan-08	Boundary Hospital	<1	<1		Tested at Caro Lab
9-Jan-08	Well 3			NEG	Tested in House
9-Jan-08	Well 2			NEG	Tested in House
9-Jan-08	East Zone Reservoir			NEG	Tested in House
14-Jan-08	Valley Heights Booster			NEG	Tested in House
14-Jan-08	East Zone Reservoir			NEG	Tested in House
15-Jan-08	Well 3	<1	<1		Tested at Caro Lab
15-Jan-08	Well 2	<1	<1		Tested at Caro Lab
15-Jan-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
15-Jan-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
15-Jan-08	Boundary Hospital	<1	<1		Tested at Caro Lab
16-Jan-08	Well 5			NEG	Tested in House
16-Jan-08	Well 3A			NEG	Tested in House
16-Jan-08	East Zone Reservoir			NEG	Tested in House
21-Jan-08	East Zone Reservoir			NEG	Tested in House
22-Jan-08	Well 5	<1	<1		Tested at Caro Lab
22-Jan-08	Well 3A	<1	<1		Tested at Caro Lab
22-Jan-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
22-Jan-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
22-Jan-08	Boundary Hospital	<1	<1		Tested at Caro Lab
24-Jan-08	East Zone Reservoir			NEG	Tested in House
29-Jan-08	Well 5	<1	<1		Tested at Caro Lab
29-Jan-08	Well 3A	<1	<1		Tested at Caro Lab
29-Jan-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
29-Jan-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
29-Jan-08	Boundary Hospital	<1	<1		Tested at Caro Lab
4-Feb-08	East Zone Reservoir			NEG	Tested in House
5-Feb-08	Well 3	<1	<1		Tested at Caro Lab
5-Feb-08	Well 2	<1	<1		Tested at Caro Lab
5-Feb-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
5-Feb-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
5-Feb-08	Boundary Hospital	<1	<1		Tested at Caro Lab
6-Feb-08	East Zone Reservoir			NEG	Tested in House
12-Feb-08	Well 5	<1	<1		Tested at Caro Lab
12-Feb-08	Well 3A	<1	<1		Tested at Caro Lab

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
12-Feb-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
12-Feb-08	Valley Heights Booster			NEG	Tested in House
12-Feb-08	High School			NEG	Tested in House
12-Feb-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
12-Feb-08	East Zone Reservoir			NEG	Tested in House
12-Feb-08	Boundary Hospital	<1	<1		Tested at Caro Lab
14-Feb-08	East Zone Reservoir			NEG	Tested in House
18-Feb-08	Hutton School			NEG	Tested in House
18-Feb-08	East Zone Reservoir			NEG	Tested in House
19-Feb-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
19-Feb-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
19-Feb-08	Boundary Hospital	<1	<1		Tested at Caro Lab
20-Feb-08	East Zone Reservoir			NEG	Tested in House
25-Feb-08	East Zone Reservoir			NEG	Tested in House
26-Feb-08	Well 5	<1	<1		Tested at Caro Lab
26-Feb-08	Well 3	<1	<1		Tested at Caro Lab
26-Feb-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
26-Feb-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
26-Feb-08	Boundary Hospital	<1	<1		Tested at Caro Lab
4-Mar-08	Well 3A	<1	<1		Tested at Caro Lab
4-Mar-08	Well 2	<1	<1		Tested at Caro Lab
4-Mar-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
4-Mar-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
4-Mar-08	Boundary Hospital	<1	<1		Tested at Caro Lab
5-Mar-08	Well 5			NEG	Tested in House
5-Mar-08	Well 3			NEG	Tested in House
6-Mar-08	East Zone Reservoir			NEG	Tested in House
11-Mar-08	Well 5	<1	<1		Tested at Caro Lab
11-Mar-08	Well 3	<1	<1		Tested at Caro Lab
11-Mar-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
11-Mar-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
11-Mar-08	Boundary Hospital	<1	<1		Tested at Caro Lab
12-Mar-08	Valley Heights booster	X	X	NEG	Tested in House
13-Mar-08	East Zone Reservoir			NEG	Tested in House
18-Mar-08	Well 3A	<1	<1		Tested at Caro Lab
18-Mar-08	Well 2	<1	<1		Tested at Caro Lab
18-Mar-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
18-Mar-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
18-Mar-08	Boundary Hospital	<1	<1		Tested at Caro Lab
25-Mar-08	Well 5	<1	<1		Tested at Caro Lab
25-Mar-08	Well 3	<1	<1		Tested at Caro Lab
25-Mar-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
25-Mar-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
25-Mar-08	Boundary Hospital	<1	<1		Tested at Caro Lab
27-Mar-08	East Zone Reservoir			NEG	Tested in House
1-Apr-08	Well 3A	<1	<1		Tested at Caro Lab
1-Apr-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
1-Apr-08	Hutton School	<1	<1		Tested at Caro Lab
1-Apr-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
1-Apr-08	Boundary Hospital	<1	<1		Tested at Caro Lab
2-Apr-08	City Park Campground			NEG	Tested in House
2-Apr-08	5th St. and 71st Ave.			NEG	Tested in House
9-Apr-08	Well 5	<1	<1		Tested at Caro Lab
9-Apr-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
9-Apr-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
9-Apr-08	Boundary Lodge	<1	<1		Tested at Caro Lab
9-Apr-08	Boundary Hospital	<1	<1		Tested at Caro Lab
15-Apr-08	Well 3A	<1	<1		Tested at Caro Lab
15-Apr-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
15-Apr-08	Perley School	<1	<1		Tested at Caro Lab
15-Apr-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
15-Apr-08	Boundary Hospital	<1	<1		Tested at Caro Lab
17-Apr-08	East Zone Reservoir			NEG	Tested in House
22-Apr-08	Well 5	<1	<1		Tested at Caro Lab
22-Apr-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
22-Apr-08	Hutton School	<1	<1		Tested at Caro Lab
22-Apr-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
22-Apr-08	Boundary Hospital	<1	<1		Tested at Caro Lab
24-Apr-08	East Zone Reservoir			NEG	Tested in House
28-Apr-08	Well 3A	<1	<1		Tested at Caro Lab
28-Apr-08	Well 3	<1	<1		Tested at Caro Lab
28-Apr-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
28-Apr-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
28-Apr-08	Boundary Hospital	<1	<1		Tested at Caro Lab
1-May-08	East Zone Reservoir			NEG	Tested in House
6-May-08	Well 5	<1	<1		Tested at Caro Lab
6-May-08	Well 2	<1	<1		Tested at Caro Lab
6-May-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
6-May-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
6-May-08	Boundary Hospital	<1	<1		Tested at Caro Lab
13-May-08	Well 3	<1	<1		Tested at Caro Lab
13-May-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
13-May-08	East Zone Reservoir	<1	<1		Tested at Caro Lab

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
13-May-08	Boundary Lodge	<1	<1		Tested at Caro Lab
13-May-08	Boundary Hospital	<1	<1		Tested at Caro Lab
22-May-08	Well 3	<1	<1		Tested at Caro Lab
22-May-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
22-May-08	Perley School	<1	<1		Tested at Caro Lab
22-May-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
22-May-08	Boundary Hospital	<1	<1		Tested at Caro Lab
28-May-08	Well 3	<1	<1		Tested at Caro Lab
28-May-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
28-May-08	Hutton School	<1	<1		Tested at Caro Lab
28-May-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
28-May-08	Boundary Hospital	<1	<1		Tested at Caro Lab
3-Jun-08	Well 5	<1	<1		Tested at Caro Lab
3-Jun-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
3-Jun-08	Perley School	<1	<1		Tested at Caro Lab
3-Jun-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
3-Jun-08	Boundary Hospital	<1	<1		Tested at Caro Lab
10-Jun-08	Well 2	<1	<1		Tested at Caro Lab
10-Jun-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
10-Jun-08	Highschool	<1	<1		Tested at Caro Lab
10-Jun-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
10-Jun-08	Boundary Hospital	<1	<1		Tested at Caro Lab
17-Jun-08	Well 3A	<1	<1		Tested at Caro Lab
17-Jun-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
17-Jun-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
17-Jun-08	Boundary Hospital	<1	<1		Tested at Caro Lab
24-Jun-08	Well 5	<1	<1		Tested at Caro Lab
24-Jun-08	Well 3A	<1	<1		Tested at Caro Lab
24-Jun-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
24-Jun-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
24-Jun-08	Boundary Hospital	<1	<1		Tested at Caro Lab
2-Jul-08	Well 3	<1	<1		Tested at Caro Lab
2-Jul-08	Well 2	<1	<1		Tested at Caro Lab
2-Jul-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
2-Jul-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
2-Jul-08	Boundary Hospital	<1	<1		Tested at Caro Lab
8-Jul-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
8-Jul-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
8-Jul-08	City Hall	<1	<1		Tested at Caro Lab
8-Jul-08	Boundary Hospital	<1	<1		Tested at Caro Lab
9-Jul-08	2181 72nd Ave.			NEG	Tested in House
15-Jul-08	Works Yard	<1	<1		Tested at Caro Lab
15-Jul-08	Well 2	<1	<1		Tested at Caro Lab
15-Jul-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
15-Jul-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
15-Jul-08	Boundary Hospital	<1	<1		Tested at Caro Lab
22-Jul-08	Well 3A	<1	<1		Tested at Caro Lab
22-Jul-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
22-Jul-08	Lordco Autoparts	<1	<1		Tested at Caro Lab
22-Jul-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
22-Jul-08	Boundary Hospital	<1	<1		Tested at Caro Lab
29-Jul-08	Well 3	<1	<1		Tested at Caro Lab
5-Aug-08	Well 2	<1	<1		Tested at Caro Lab
5-Aug-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
5-Aug-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
5-Aug-08	Boundary Lodge	<1	<1		Tested at Caro Lab
5-Aug-08	Boundary Hospital	<1	<1		Tested at Caro Lab
13-Aug-08	Shell on Central Ave.			NEG	Tested in House
13-Aug-08	CL2 Contact Chamber			NEG	Tested in House
15-Aug-08	Valley Heights Booster			NEG	Tested in House
15-Aug-08	East Zone Reservoir			NEG	Tested in House
15-Aug-08	Boundary Hospital			NEG	Tested in House
19-Aug-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
19-Aug-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
19-Aug-08	Donaldson Park	<1	<1		Tested at Caro Lab
19-Aug-08	Boundary Hospital	<1	<1		Tested at Caro Lab
26-Aug-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
26-Aug-08	Highschool	<1	<1		Tested at Caro Lab
26-Aug-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
26-Aug-08	Boundary Hospital	<1	<1		Tested at Caro Lab
2-Sep-08	Well 3A	<1	<1		Tested at Caro Lab
2-Sep-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
2-Sep-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
2-Sep-08	Boundary Hospital	<1	<1		Tested at Caro Lab
8-Sep-08	Well 5	<1	<1		Tested at Caro Lab
8-Sep-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
8-Sep-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
8-Sep-08	Boundary Hospital	<1	<1		Tested at Caro Lab
8-Sep-08	Alf's subdivision	<1	<1		Tested at Caro Lab
16-Sep-08	Well 3	<1	<1		Tested at Caro Lab
16-Sep-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
16-Sep-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
16-Sep-08	Boundary Hospital	<1	<1		Tested at Caro Lab

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
16-Sep-08	Alf's subdivision	<1	<1		Tested at Caro Lab
23-Sep-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
23-Sep-08	Perley School	<1	<1		Tested at Caro Lab
23-Sep-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
23-Sep-08	Boundary Hospital	<1	<1		Tested at Caro Lab
30-Sep-08	Well 2	<1	<1		Tested at Caro Lab
30-Sep-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
30-Sep-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
30-Sep-08	Boundary Hospital	<1	<1		Tested at Caro Lab
7-Oct-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
7-Oct-08	G.F. High school	<1	<1		Tested at Caro Lab
7-Oct-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
7-Oct-08	Boundary Hospital	<1	<1		Tested at Caro Lab
14-Oct-08	Well 5	<1	<1		Tested at Caro Lab
14-Oct-08	Well 2	<1	<1		Tested at Caro Lab
14-Oct-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
14-Oct-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
14-Oct-08	Boundary Hospital	<1	<1		Tested at Caro Lab
21-Oct-08	Well 3	<1	<1		Tested at Caro Lab
21-Oct-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
21-Oct-08	Hutton School	<1	<1		Tested at Caro Lab
21-Oct-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
21-Oct-08	Boundary Hospital	<1	<1		Tested at Caro Lab
12-Nov-08	Well 4	<1	<1		Tested at Caro Lab
12-Nov-08	Well 2	<1	<1		Tested at Caro Lab
12-Nov-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
12-Nov-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
12-Nov-08	City Hall	<1	<1		Tested at Caro Lab
12-Nov-08	Boundary Hospital	<1	<1		Tested at Caro Lab
18-Nov-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
18-Nov-08	Super Save Gas	<1	<1		Tested at Caro Lab
18-Nov-08	G.F. Fire Hall	<1	<1		Tested at Caro Lab
18-Nov-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
18-Nov-08	Boundary Hospital	<1	<1		Tested at Caro Lab
19-Nov-08	Well 4	<1	<1		Tested at Caro Lab
25-Nov-08	Well 5	<1	<1		Tested at Caro Lab
25-Nov-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
25-Nov-08	Hutton School	<1	<1		Tested at Caro Lab
25-Nov-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
25-Nov-08	Boundary Hospital	<1	<1		Tested at Caro Lab
2-Dec-08	Well 2	<1	<1		Tested at Caro Lab
2-Dec-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
2-Dec-08	Perley School	<1	<1		Tested at Caro Lab
2-Dec-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
2-Dec-08	Boundary Hospital	<1	<1		Tested at Caro Lab
9-Dec-08	Well 3A	<1	<1		Tested at Caro Lab
9-Dec-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
9-Dec-08	Hutton School	<1	<1		Tested at Caro Lab
9-Dec-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
9-Dec-08	Boundary Hospital	<1	<1		Tested at Caro Lab
16-Dec-08	Well 3	<1	<1		Tested at Caro Lab
16-Dec-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
16-Dec-08	Perley School	<1	<1		Tested at Caro Lab
16-Dec-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
16-Dec-08	Boundary Hospital	<1	<1		Tested at Caro Lab
22-Dec-08	Well 5	<1	<1		Tested at Caro Lab
22-Dec-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
22-Dec-08	Super Save Gas	<1	<1		Tested at Caro Lab
22-Dec-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
22-Dec-08	Boundary Hospital	<1	<1		Tested at Caro Lab
29-Dec-08	Valley Heights Booster	<1	<1		Tested at Caro Lab
29-Dec-08	Petro Can Gas	<1	<1		Tested at Caro Lab
29-Dec-08	East Zone Reservoir	<1	<1		Tested at Caro Lab
29-Dec-08	Buy Low Foods	<1	<1		Tested at Caro Lab
29-Dec-08	Boundary Hospital	<1	<1		Tested at Caro Lab
6-Jan-09	Well 3A	<1	<1		Tested at Caro Lab
6-Jan-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
6-Jan-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
6-Jan-09	Boundary Hospital	<1	<1		Tested at Caro Lab
13-Jan-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
13-Jan-09	Hutton School	<1	<1		Tested at Caro Lab
13-Jan-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
13-Jan-09	Curves	<1	<1		Tested at Caro Lab
13-Jan-09	Boundary Hospital	<1	<1		Tested at Caro Lab
20-Jan-09	Well 5	<1	<1		Tested at Caro Lab
20-Jan-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
20-Jan-09	Firehall	<1	<1		Tested at Caro Lab
20-Jan-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
20-Jan-09	Boundary Hospital	<1	<1		Tested at Caro Lab
27-Jan-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
27-Jan-09	Perley School	<1	<1		Tested at Caro Lab
27-Jan-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
27-Jan-09	Boundary Hospital	<1	<1		Tested at Caro Lab

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
3-Feb-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
3-Feb-09	GF Aquatic Center	<1	<1		Tested at Caro Lab
3-Feb-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
3-Feb-09	Boundary Hospital	<1	<1		Tested at Caro Lab
10-Feb-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
10-Feb-09	Super Save Gas	<1	<1		Tested at Caro Lab
10-Feb-09	Pressure reducing station	<1	<1		Tested at Caro Lab
10-Feb-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
10-Feb-09	Boundary Hospital	<1	<1		Tested at Caro Lab
17-Feb-09	Well 5	<1	<1		Tested at Caro Lab
17-Feb-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
17-Feb-09	Perley School	<1	<1		Tested at Caro Lab
17-Feb-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
17-Feb-09	Boundary Hospital	<1	<1		Tested at Caro Lab
24-Feb-09	Well 3	<1	<1		Tested at Caro Lab
24-Feb-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
24-Feb-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
24-Feb-09	Curves			NEG	Tested in House
24-Feb-09	City Hall	<1	<1		Tested at Caro Lab
24-Feb-09	Buy Low Foods			NEG	Tested in House
24-Feb-09	Boundary Hospital	<1	<1		Tested at Caro Lab
24-Feb-09	Aquatic Center			NEG	Tested in House
3-Mar-09	Well 2	<1	<1		Tested at Caro Lab
3-Mar-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
3-Mar-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
3-Mar-09	Boundary Hospital	<1	<1		Tested at Caro Lab
10-Mar-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
10-Mar-09	Perley School	<1	<1		Tested at Caro Lab
10-Mar-09	Hutton School	<1	<1		Tested at Caro Lab
10-Mar-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
10-Mar-09	City Hall	<1	<1		Tested at Caro Lab
10-Mar-09	Boundary Hospital	<1	<1		Tested at Caro Lab
12-Mar-09	Well 3	<1	<1		Tested at Caro Lab
12-Mar-09	GF Pool			NEG	Tested in house
12-Mar-09	8015 McCallum			NEG	Tested in house
16-Mar-09	Super Save Gas			NEG	Tested in house
16-Mar-09	Lordco			NEG	Tested in house
16-Mar-09	GF Firehall			NEG	Tested in house
16-Mar-09	GF Construction			NEG	Tested in house
16-Mar-09	Boundary Hospital	<1	<1		Tested at Caro Lab
17-Mar-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
17-Mar-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
17-Mar-09	ABH Car Sales	<1	<1		Tested at Caro Lab
23-Mar-09	Station Pub			NEG	Tested in house
23-Mar-09	PRV Station	<1	<1		Tested at Caro Lab
23-Mar-09	Old Court House (washrm)			NEG	Tested in house
23-Mar-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
23-Mar-09	Boundary Hospital	<1	<1		Tested at Caro Lab
24-Mar-09	Well 5	<1	<1		Tested at Caro Lab
24-Mar-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
24-Mar-09	8167 Donaldson Dr.			NEG	Tested in house
31-Mar-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
31-Mar-09	Liquor Store			NEG	Tested in house
31-Mar-09	Evergreen Cemetary	<1	<1		Tested at Caro Lab
31-Mar-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
31-Mar-09	Boundary Hospital	<1	<1		Tested at Caro Lab
31-Mar-09	Airport	<1	<1		Tested at Caro Lab
31-Mar-09	7426 Valley Heights			NEG	Tested in house
1-Apr-09	Val-Mar Hydrant	<1	<1		Tested at Caro Lab
7-Apr-09	Well 3A	<1	<1		Tested at Caro Lab
7-Apr-09	Super Save Gas	<1	<1		Tested at Caro Lab
7-Apr-09	Shell Gas			NEG	Tested in house
7-Apr-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
7-Apr-09	Curves	<1	<1		Tested at Caro Lab
7-Apr-09	City Hall			NEG	Tested in house
7-Apr-09	2735 - 75th Street			NEG	Tested in house
14-Apr-09	VH Booster Pump	<1	<1		Tested at Caro Lab
14-Apr-09	VH Booster Pump	<1	<1		Tested at Caro Lab
14-Apr-09	Hospital	<1	<1		Tested at Caro Lab
14-Apr-09	Evergreen Cemetary	<1	<1		Tested at Caro Lab
14-Apr-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
21-Apr-09	Well 2	<1	<1		Tested at Caro Lab
21-Apr-09	VH Booster Pump	<1	<1		Tested at Caro Lab
21-Apr-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
21-Apr-09	City Hall	<1	<1		Tested at Caro Lab
21-Apr-09	Boundary Hospital	<1	<1		Tested at Caro Lab
28-Apr-09	VH Booster Pump	<1	<1		Tested at Caro Lab
28-Apr-09	Perley Elementary	<1	<1		Tested at Caro Lab
28-Apr-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
28-Apr-09	Boundary Hospital	<1	<1		Tested at Caro Lab
28-Apr-09	Airport	<1	<1		Tested at Caro Lab
5-May-09	Well 2	<1	<1		Tested at Caro Lab
5-May-09	Valley Heights Booster	<1	<1		Tested at Caro Lab

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
5-May-09	Hutton School	<1	<1		Tested at Caro Lab
5-May-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
5-May-09	Boundary Hospital	<1	<1		Tested at Caro Lab
12-May-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
12-May-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
12-May-09	Del's Bistro	<1	<1		Tested at Caro Lab
12-May-09	Boundary Hospital	<1	<1		Tested at Caro Lab
19-May-09	Well 5	<1	<1		Tested at Caro Lab
19-May-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
19-May-09	GF Arena	<1	<1		Tested at Caro Lab
19-May-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
19-May-09	Boundary Hospital	<1	<1		Tested at Caro Lab
26-May-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
26-May-09	Firehall	<1	<1		Tested at Caro Lab
26-May-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
26-May-09	Boundary Hospital	<1	<1		Tested at Caro Lab
2-Jun-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
2-Jun-09	Hutton School	<1	<1		Tested at Caro Lab
2-Jun-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
2-Jun-09	Boundary Hospital	<1	<1		Tested at Caro Lab
9-Jun-09	Works Yard	<1	<1		Tested at Caro Lab
9-Jun-09	Super Save			NEG	Tested in house
9-Jun-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
9-Jun-09	Cemetery			NEG	Tested in house
9-Jun-09	Boundary Hospital	<1	<1		Tested at Caro Lab
9-Jun-09	Booster Station	<1	<1		Tested at Caro Lab
10-Jun-09	Blow Out @ Subdivision			NEG	Tested in house
16-Jun-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
16-Jun-09	Hydrant #74			NEG	Tested in house
16-Jun-09	Grand Forks City Hall			NEG	Tested in house
16-Jun-09	Grand Forks Airport			NEG	Tested in house
16-Jun-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
23-Jun-09	Well #2			NEG	Tested in house
23-Jun-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
23-Jun-09	Evergreen Cemetary			NEG	Tested in house
23-Jun-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
23-Jun-09	Boundary Hospital	<1	<1		Tested at Caro Lab
2-Jul-09	Well #3			NEG	Tested in house
2-Jul-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
2-Jul-09	Lordco			NEG	Tested in house
2-Jul-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
2-Jul-09	Boundary Hospital	<1	<1		Tested at Caro Lab
7-Jul-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
7-Jul-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
7-Jul-09	Boundary Hospital	<1	<1		Tested at Caro Lab
14-Jul-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
14-Jul-09	Market St Fountain			NEG	Tested in house
14-Jul-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
14-Jul-09	Dick Bartlett Pk Fountain			NEG	Tested in house
14-Jul-09	Boundary Hospital	<1	<1		Tested at Caro Lab
23-Jul-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
23-Jul-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
23-Jul-09	Boundary Hospital	<1	<1		Tested at Caro Lab
29-Jul-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
29-Jul-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
29-Jul-09	Boundary Hospital	<1	<1		Tested at Caro Lab
5-Aug-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
5-Aug-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
5-Aug-09	Boundary Hospital	<1	<1		Tested at Caro Lab
6-Aug-09	CL2 Contact Bldg			NEG	Tested in house
6-Aug-09	Boundary Hospital	<1	<1		Tested at Caro Lab
11-Aug-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
11-Aug-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
11-Aug-09	Campers Washroom			NEG	Tested in house
13-Aug-09	Lordco-mens washroom			NEG	Tested in house
13-Aug-09	Boundary Hospital	<1	<1		Tested at Caro Lab
18-Aug-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
18-Aug-09	Pool-first aid room			NEG	Tested in house
18-Aug-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
20-Aug-09	Boundary Hospital	<1	<1		Tested at Caro Lab
20-Aug-09	334 C Market (Hookers)			NEG	Tested in house
24-Aug-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
24-Aug-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
24-Aug-09	Cal Lamontanges			NEG	Tested in house
27-Aug-09	JD Park			NEG	Tested in house
27-Aug-09	Boundary Hospital	<1	<1		Tested at Caro Lab
31-Aug-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
31-Aug-09	Rod Fofonoff residence			NEG	Tested in house
31-Aug-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
2-Sep-09	Lordco			NEG	Tested in house
2-Sep-09	Boundary Hospital	<1	<1		Tested at Caro Lab
8-Sep-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
8-Sep-09	Super Save Gas			NEG	Tested in house

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
8-Sep-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
9-Sep-09	Boundary Hospital	<1	<1		Tested at Caro Lab
9-Sep-09	Anex			NEG	Tested in house
14-Sep-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
14-Sep-09	PetroCan			NEG	Tested in house
14-Sep-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
16-Sep-09	Hutton Elementary			NEG	Tested in house
16-Sep-09	Boundary Hospital	<1	<1		Tested at Caro Lab
21-Sep-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
21-Sep-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
21-Sep-09	7425 - 2nd St.			NEG	Tested in house
22-Sep-09	Cemetary			NEG	Tested in house
22-Sep-09	Boundary Hospital	<1	<1		Tested at Caro Lab
28-Sep-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
28-Sep-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
28-Sep-09	Airport			NEG	Tested in house
6-Oct-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
6-Oct-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
6-Oct-09	Boundary Hospital	<1	<1		Tested at Caro Lab
13-Oct-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
13-Oct-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
13-Oct-09	Boundary Hospital	<1	<1		Tested at Caro Lab
15-Oct-09	WWTP			NEG	Tested in house
15-Oct-09	Boundary Hospital	<1	<1		Tested at Caro Lab
20-Oct-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
20-Oct-09	Scout Hall			NEG	Tested in house
20-Oct-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
22-Oct-09	Perley School			NEG	Tested in house
22-Oct-09	Hutton School			NEG	Tested in house
22-Oct-09	Boundary Hospital	<1	<1		Tested at Caro Lab
26-Oct-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
26-Oct-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
26-Oct-09	Curves			NEG	Tested in house
2-Nov-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
2-Nov-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
2-Nov-09	Boundary Hospital	<1	<1		Tested at Caro Lab
9-Nov-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
9-Nov-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
9-Nov-09	Boundary Hospital	<1	<1		Tested at Caro Lab
16-Nov-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
16-Nov-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
16-Nov-09	Boundary Hospital	<1	<1		Tested at Caro Lab
19-Nov-09	Liquor Store & More			NEG	Tested in House
19-Nov-09	Boundary Hospital	<1	<1		Tested at Caro Lab
23-Nov-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
23-Nov-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
23-Nov-09	Buy Low Foods			NEG	Tested in House
30-Nov-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
30-Nov-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
30-Nov-09	Boundary Hospital	<1	<1		Tested at Caro Lab
3-Dec-09	Super Save Gas			NEG	Tested in House
3-Dec-09	City Hall			NEG	Tested in House
3-Dec-09	Boundary Hospital	<1	<1		Tested at Caro Lab
7-Dec-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
7-Dec-09	Petro Can			NEG	Tested in House
7-Dec-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
8-Dec-09	Boundary Hospital	<1	<1		Tested at Caro Lab
8-Dec-09	Aquatic Centre			NEG	Tested in House
14-Dec-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
14-Dec-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
14-Dec-09	7425-2nd Street			NEG	Tested in House
17-Dec-09	Hutton School			NEG	Tested in House
17-Dec-09	Boundary Hospital	<1	<1		Tested at Caro Lab
21-Dec-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
21-Dec-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
21-Dec-09	Clyde's Pub			NEG	Tested in House
23-Dec-09	GF Construction			NEG	Tested in House
23-Dec-09	Boundary Hospital	<1	<1		Tested at Caro Lab
23-Dec-09	Apt7 7560 - 21st St			NEG	Tested in House
29-Dec-09	Valley Heights Booster	<1	<1		Tested at Caro Lab
29-Dec-09	Home Hardware			NEG	Tested in House
29-Dec-09	East Zone Reservoir	<1	<1		Tested at Caro Lab
4-Jan-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
4-Jan-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
4-Jan-10	Boundary Hospital	<1	<1		Tested at Caro Lab
11-Jan-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
11-Jan-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
11-Jan-10	Boundary Hospital	<1	<1		Tested at Caro Lab
14-Jan-10	Super Save Gas			NEG	Tested In-House
14-Jan-10	Boundary Hospital	<1	<1		Tested at Caro Lab
25-Jan-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
25-Jan-10	Fire Hall			NEG	Tested In-House
25-Jan-10	East Zone Reservoir	<1	<1		Tested at Caro Lab

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
1-Feb-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
1-Feb-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
1-Feb-10	Boundary Hospital	<1	<1		Tested at Caro Lab
8-Feb-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
8-Feb-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
8-Feb-10	Boundary Hospital	<1	<1		Tested at Caro Lab
11-Feb-10	Boundary Hospital	<1	<1		Tested at Caro Lab
11-Feb-10	Airport Terminal			NEG	Tested In-House
15-Feb-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
15-Feb-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
15-Feb-10	Cemetery Shack			NEG	Tested In-House
22-Feb-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
22-Feb-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
22-Feb-10	Boundary Hospital	<1	<1		Tested at Caro Lab
24-Feb-10	Super Save Gas			NEG	Tested In-House
24-Feb-10	Boundary Hospital	<1	<1		Tested at Caro Lab
1-Mar-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
1-Mar-10	Sears			NEG	Tested In-House
1-Mar-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
3-Mar-10	Boundary Hospital	<1	<1		Tested at Caro Lab
3-Mar-10	Aquatic Centre			NEG	Tested in-House
8-Mar-10	Contact Chamber			NEG	Tested in-House
10-Mar-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
10-Mar-10	GF Construction			NEG	Tested in-House
10-Mar-10	Boundary Hospital	<1	<1		Tested at Caro Lab
10-Mar-10	Bill Durham			NEG	Tested in-House
15-Mar-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
15-Mar-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
15-Mar-10	Buy Low Foods			NEG	Tested in-House
16-Mar-10	Boundary Hospital	<1	<1		Tested at Caro Lab
24-Mar-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
24-Mar-10	SPCA			NEG	Tested in-House
24-Mar-10	Firehall			NEG	Tested in-House
24-Mar-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
24-Mar-10	Boundary Hospital	<1	<1		Tested at Caro Lab
29-Mar-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
29-Mar-10	Lordco			NEG	Tested in-House
29-Mar-10	Flexus			NEG	Tested in-House
29-Mar-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
29-Mar-10	6908-17th Street			NEG	Tested in-House
6-Apr-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
6-Apr-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
6-Apr-10	Boundary Hospital	<1	<1		Tested at Caro Lab
7-Apr-10	Super Save Gas			NEG	Tested in-House
7-Apr-10	Boundary Hospital	<1	<1		Tested at Caro Lab
12-Apr-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
12-Apr-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
12-Apr-10	Curves			NEG	Tested in-House
13-Apr-10	Boundary Hospital	<1	<1		Tested at Caro Lab
13-Apr-10	BC Liquor Store			NEG	Tested in-House
19-Apr-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
19-Apr-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
19-Apr-10	Clydes Brew & Cue			NEG	Tested in-House
22-Apr-10	WWTP			NEG	Tested in-House
22-Apr-10	Boundary Hospital	<1	<1		Tested at Caro Lab
26-Apr-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
26-Apr-10	Petro Canada Gas			NEG	Tested in-House
26-Apr-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
3-May-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
3-May-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
3-May-10	Boundary Hospital	<1	<1		Tested at Caro Lab
4-May-10	Boundary Hospital	<1	<1		Tested at Caro Lab
5-May-10	City Park			NEG	Tested in-House
12-May-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
12-May-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
12-May-10	City Park			NEG	Tested in-House
19-May-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
19-May-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
19-May-10	Boundary Hospital	<1	<1		Tested at Caro Lab
26-May-10	Super Save Gas			NEG	Tested in-House
26-May-10	Boundary Hospital	<1	<1		Tested at Caro Lab
27-May-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
27-May-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
27-May-10	6144-12th St.			NEG	Tested in-House
1-Jun-10	Petro Canada			NEG	Tested in-House
1-Jun-10	Boundary Hospital	<1	<1		Tested at Caro Lab
9-Jun-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
9-Jun-10	Rec Centre			NEG	Tested in-House
9-Jun-10	Fire Hall			NEG	Tested in-House
9-Jun-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
9-Jun-10	Boundary Hospital	<1	<1		Tested at Caro Lab
14-Jun-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
14-Jun-10	East Zone Reservoir	<1	<1		Tested at Caro Lab

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
14-Jun-10	Curves			NEG	Tested in-House
15-Jun-10	Grand Forks Airport			NEG	Tested in-House
15-Jun-10	Boundary Hospital	<1	<1		Tested at Caro Lab
21-Jun-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
21-Jun-10	Supersave Gas			NEG	Tested in-House
21-Jun-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
23-Jun-10	Selkirk College			NEG	Tested in-House
23-Jun-10	Boundary Hospital	<1	<1		Tested at Caro Lab
28-Jun-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
28-Jun-10	Petro Canada			NEG	Tested in-House
28-Jun-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
29-Jun-10	Boundary Hospital	<1	<1		Tested at Caro Lab
29-Jun-10	7223-5th St.			NEG	Tested in-House
5-Jul-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
5-Jul-10	Liquor Store & More			NEG	Tested in-House
5-Jul-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
6-Jul-10	Super Save Gas			NEG	Tested in-House
6-Jul-10	Boundary Hospital	<1	<1		Tested at Caro Lab
12-Jul-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
12-Jul-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
12-Jul-10	6885-3rd St.			NEG	Tested in-House
13-Jul-10	Boundary Hospital	<1	<1		Tested at Caro Lab
13-Jul-10	129 Victoria Way			NEG	Tested in-House
19-Jul-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
19-Jul-10	Kal Tire			NEG	Tested in-House
19-Jul-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
20-Jul-10	Boundary Hospital	<1	<1		Tested at Caro Lab
20-Jul-10	6311-12th St.			NEG	Tested in-House
26-Jul-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
26-Jul-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
26-Jul-10	City Hall			NEG	Tested in-House
28-Jul-10	Boundary Hospital	<1	<1		Tested at Caro Lab
28-Jul-10	8780 Riverside Dr.			NEG	Tested in-House
3-Aug-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
3-Aug-10	McLaren Sub. N. Hydrant			NEG	Tested in-House
3-Aug-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
4-Aug-10	Boundary Hospital	<1	<1		Tested at Caro Lab
4-Aug-10	Airport			NEG	Tested in-House
8-Aug-10	Redi Electric			NEG	Tested in-House
8-Aug-10	Barbarann Park Washroom			NEG	Tested in-House
9-Aug-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
9-Aug-10	Ok Tire Car Wash			NEG	Tested in-House
9-Aug-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
16-Aug-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
16-Aug-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
16-Aug-10	Boundary Hospital	<1	<1		Tested at Caro Lab
17-Aug-10	Flexus			NEG	Tested in-House
17-Aug-10	Boundary Hospital	<1	<1		Tested at Caro Lab
23-Aug-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
23-Aug-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
23-Aug-10	City Hall			NEG	Tested in-House
30-Aug-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
30-Aug-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
30-Aug-10	Boundary Hospital	<1	<1		Tested at Caro Lab
31-Aug-10	Petro Canada			NEG	Tested in-House
31-Aug-10	Boundary Hospital	<1	<1		Tested at Caro Lab
7-Sep-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
7-Sep-10	Riverside Washroom			NEG	Tested in-House
7-Sep-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
7-Sep-10	Boundary Hospital	<1	<1		Tested at Caro Lab
7-Sep-10	6432-8th St.			NEG	Tested in-House
13-Sep-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
13-Sep-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
13-Sep-10	Cemetery			NEG	Tested in-House
13-Sep-10	7307-22nd St.			NEG	Tested in-House
13-Sep-10	7269-22nd St.			NEG	Tested in-House
20-Sep-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
20-Sep-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
20-Sep-10	Boundary Hospital	<1	<1		Tested at Caro Lab
27-Sep-10	Lordco			NEG	Tested in-House
27-Sep-10	Boundary Hospital	<1	<1		Tested at Caro Lab
28-Sep-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
28-Sep-10	Super Save Gas			NEG	Tested in-House
28-Sep-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
6-Oct-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
6-Oct-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
6-Oct-10	Boundary Hospital	<1	<1		Tested at Caro Lab
12-Oct-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
12-Oct-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
12-Oct-10	Boundary Hospital	<1	<1		Tested at Caro Lab
13-Oct-10	Petro Canada Gas			NEG	Tested in-House
13-Oct-10	Boundary Hospital	<1	<1		Tested at Caro Lab
18-Oct-10	Valley Heights Booster	<1	<1		Tested at Caro Lab

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
18-Oct-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
18-Oct-10	B.C. Liquor Store			NEG	Tested in-House
21-Oct-10	Super Save Gas			NEG	Tested in-House
21-Oct-10	Boundary Hospital	<1	<1		Tested at Caro Lab
25-Oct-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
25-Oct-10	Selkirk College			NEG	Tested in-House
25-Oct-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
8-Nov-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
8-Nov-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
8-Nov-10	Boundary Hospital	<1	<1		Tested at Caro Lab
15-Nov-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
15-Nov-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
15-Nov-10	Boundary Hospital	<1	<1		Tested at Caro Lab
17-Nov-10	Super Save			NEG	Tested in-House
17-Nov-10	Boundary Hospital	<1	<1		Tested at Caro Lab
22-Nov-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
22-Nov-10	Petro Canada			NEG	Tested in-House
22-Nov-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
29-Nov-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
29-Nov-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
29-Nov-10	Boundary Hospital	<1	<1		Tested at Caro Lab
8-Dec-10	Boundary Hospital	<1	<1		Tested at Caro Lab
8-Dec-10	Airport			NEG	Tested in-House
13-Dec-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
13-Dec-10	O.K. Tire Car Wash			NEG	Tested in-House
13-Dec-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
15-Dec-10	Cemetery			NEG	Tested in-House
15-Dec-10	Boundary Hospital	<1	<1		Tested at Caro Lab
20-Dec-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
20-Dec-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
20-Dec-10	City Hall			NEG	Tested in-House
22-Dec-10	Super Save Gas			NEG	Tested in-House
22-Dec-10	Boundary Hospital	<1	<1		Tested at Caro Lab
29-Dec-10	Valley Heights Booster	<1	<1		Tested at Caro Lab
29-Dec-10	SPCA			NEG	Tested in-House
29-Dec-10	Omega Restaurant			NEG	Tested in-House
29-Dec-10	East Zone Reservoir	<1	<1		Tested at Caro Lab
29-Dec-10	Curves			NEG	Tested in-House
10-Jan-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
10-Jan-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
10-Jan-11	Boundary Hospital	<1	<1		Tested at Caro Lab
13-Jan-11	Hutton Elementary School			NEG	Tested in-House
13-Jan-11	Boundary Hospital	<1	<1		Tested at Caro Lab
17-Jan-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
17-Jan-11	Perley Elementary School			NEG	Tested in-House
17-Jan-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
18-Jan-11	Flexus			NEG	Tested in-House
18-Jan-11	Boundary Hospital	<1	<1		Tested at Caro Lab
24-Jan-11	Video Express			NEG	Tested in-House
24-Jan-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
24-Jan-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
24-Jan-11	Curves			NEG	Tested in-House
24-Jan-11	Boundary Hospital	<1	<1		Tested at Caro Lab
31-Jan-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
31-Jan-11	Super Save Gas			NEG	Tested in-House
31-Jan-11	Petro			NEG	Tested in-House
31-Jan-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
31-Jan-11	City Hall			NEG	Tested in-House
7-Feb-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
7-Feb-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
7-Feb-11	Boundary Hospital	<1	<1		Tested at Caro Lab
9-Feb-11	Public Works Yard			NEG	Tested in-House
9-Feb-11	Boundary Hospital	<1	<1		Tested at Caro Lab
14-Feb-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
14-Feb-11	Fire Hall			NEG	Tested in-House
14-Feb-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
17-Feb-11	Community Futures			NEG	Tested in-House
17-Feb-11	Boundary Hospital	<1	<1		Tested at Caro Lab
28-Feb-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
28-Feb-11	Sears			NEG	Tested in-House
28-Feb-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
2-Mar-11	Super Save Gas			NEG	Tested in-House
2-Mar-11	Boundary Hospital	<1	<1		Tested at Caro Lab
7-Mar-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
7-Mar-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
7-Mar-11	6311-12th St.			NEG	Tested in-House
8-Mar-11	Petro Canada			NEG	Tested in-House
8-Mar-11	Boundary Hospital	<1	<1		Tested at Caro Lab
14-Mar-11	Works Yard			NEG	Tested in-House
14-Mar-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
14-Mar-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
14-Mar-11	Boundary Hospital	<1	<1		Tested at Caro Lab
14-Mar-11	6337-Como St.			NEG	Tested in-House

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
21-Mar-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
21-Mar-11	Liquor Store N More			NEG	Tested in-House
21-Mar-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
23-Mar-11	Boundary Hospital	<1	<1		Tested at Caro Lab
23-Mar-11	Airport			NEG	Tested in-House
28-Mar-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
28-Mar-11	Sun Valley Car Wash			NEG	Tested in-House
28-Mar-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
30-Mar-11	Petro Canada			NEG	Tested in-House
30-Mar-11	Boundary Hospital	<1	<1		Tested at Caro Lab
4-Apr-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
4-Apr-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
4-Apr-11	City Hall			NEG	Tested in-House
11-Apr-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
11-Apr-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
11-Apr-11	Boundary Hospital	<1	<1		Tested at Caro Lab
18-Apr-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
18-Apr-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
18-Apr-11	Boundary Hospital	<1	<1		Tested at Caro Lab
27-Apr-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
27-Apr-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
27-Apr-11	Boundary Hospital	<1	<1		Tested at Caro Lab
3-May-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
3-May-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
3-May-11	Boundary Hospital	<1	<1		Tested at Caro Lab
9-May-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
9-May-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
9-May-11	Boundary Hospital	<1	<1		Tested at Caro Lab
11-May-11	Petro Canada			NEG	Tested in-House
11-May-11	Boundary Hospital	<1	<1		Tested at Caro Lab
16-May-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
16-May-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
16-May-11	Curves			NEG	Tested in-House
18-May-11	Super Save Gas			NEG	Tested in-House
18-May-11	Boundary Hospital	<1	<1		Tested at Caro Lab
24-May-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
24-May-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
24-May-11	Boundary Hospital	<1	<1		Tested at Caro Lab
24-May-11	BC Liquor Store			NEG	Tested in-House
29-May-11	Cemetery			NEG	Tested in-House
29-May-11	6660-10th St.			NEG	Tested in-House
29-May-11	6155-12th St.			NEG	Tested in-House
29-May-11	131-Central			NEG	Tested in-House
30-May-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
30-May-11	Super Save Gas			NEG	Tested in-House
30-May-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
30-May-11	Boundary Hospital	<1	<1		Tested at Caro Lab
30-May-11	6337-Como Street	<1	<1		Tested at Caro Lab
31-May-11	Sun Valley Car Wash			NEG	Tested in-House
31-May-11	Petro Canada			NEG	Tested in-House
31-May-11	Airport			NEG	Tested in-House
31-May-11	6144 Johnson Flats	<1	<1		Tested at Caro Lab
1-Jun-11	Barbarann Park Washroom			NEG	Tested in-House
1-Jun-11	Angus McDonald Washroom			NEG	Tested in-House
6-Jun-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
6-Jun-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
6-Jun-11	8120 Donaldson Drive			NEG	Tested in-House
8-Jun-11	Kal Tire			NEG	Tested in-House
8-Jun-11	Boundary Hospital	<1	<1		Tested at Caro Lab
13-Jun-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
13-Jun-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
13-Jun-11	Cemetary			NEG	Tested in-House
14-Jun-11	Flexus			NEG	Tested in-House
14-Jun-11	Boundary Hospital	<1	<1		Tested at Caro Lab
16-Jun-11	East Zone Reservoir #2			NEG	Tested in-House
16-Jun-11	East Zone Reservoir #1			NEG	Tested in-House
16-Jun-11	East Zone Reservoir #1	<1	<1		Tested at Caro Lab
16-Jun-11	6144-12th St.			NEG	Tested in-House
20-Jun-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
20-Jun-11	East Zone Reservoir #2	<1	<1		Tested at Caro Lab
20-Jun-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
23-Jun-11	East Zone Reservoir #1	<1	<1		Tested at Caro Lab
23-Jun-11	Boundary Hospital	<1	<1		Tested at Caro Lab
27-Jun-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
27-Jun-11	Petro Canada			NEG	Tested in-House
27-Jun-11	East Zone Reservoir #2	<1	<1		Tested at Caro Lab
27-Jun-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
4-Jul-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
4-Jul-11	Roxul			NEG	Tested in-House
4-Jul-11	Interfor Office			NEG	Tested in-House
4-Jul-11	Interfor J-Bar			NEG	Tested in-House
4-Jul-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
4-Jul-11	Boundary Hospital	<1	<1		Tested at Caro Lab

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
4-Jul-11	Boundary Hospital	<1	<1		Tested at Caro Lab
11-Jul-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
11-Jul-11	Interfor	<1	<1		Tested at Caro Lab
11-Jul-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
13-Jul-11	Super Save Gas			NEG	Tested in-House
13-Jul-11	Boundary Hospital	<1	<1		Tested at Caro Lab
18-Jul-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
18-Jul-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
18-Jul-11	City Hall			NEG	Tested in-House
20-Jul-11	Curves			NEG	Tested in-House
20-Jul-11	Boundary Hospital	<1	<1		Tested at Caro Lab
25-Jul-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
25-Jul-11	Petro Canada			NEG	Tested in-House
25-Jul-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
26-Jul-11	Super Save Gas			NEG	Tested in-House
26-Jul-11	Boundary Hospital	<1	<1		Tested at Caro Lab
2-Aug-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
2-Aug-11	GF Fire Hall			NEG	Tested in-House
2-Aug-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
3-Aug-11	Petro Canada			NEG	Tested in-House
3-Aug-11	Boundary Hospital	<1	<1		Tested at Caro Lab
8-Aug-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
8-Aug-11	Lordco			NEG	Tested in-House
8-Aug-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
11-Aug-11	City Works Yard			NEG	Tested in-House
11-Aug-11	Boundary Hospital	<1	<1		Tested at Caro Lab
15-Aug-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
15-Aug-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
15-Aug-11	2348 - Central			NEG	Tested in-House
22-Aug-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
22-Aug-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
22-Aug-11	Boundary Hospital	<1	<1		Tested at Caro Lab
29-Aug-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
29-Aug-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
29-Aug-11	Boundary Hospital	<1	<1		Tested at Caro Lab
30-Aug-11	City Works Yard			NEG	Tested in-House
30-Aug-11	Boundary Hospital	<1	<1		Tested at Caro Lab
2-Sep-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
2-Sep-11	Super Save Gas			NEG	Tested in-House
2-Sep-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
8-Sep-11	Hutton School			NEG	Tested in-House
8-Sep-11	Boundary Hospital	<1	<1		Tested at Caro Lab
8-Sep-11	Omega II	<1	<1		Tested at Caro Lab
8-Sep-11	Hutton School	<1	<1		Tested at Caro Lab
8-Sep-11	Boundary Hospital	<1	<1		Tested at Caro Lab
12-Sep-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
12-Sep-11	Super Save Gas			NEG	Tested in-House
12-Sep-11	Perley Change Room			NEG	Tested in-House
12-Sep-11	Evergreen Cemetery			NEG	Tested in-House
12-Sep-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
19-Sep-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
19-Sep-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
19-Sep-11	Boundary Hospital	<1	<1		Tested at Caro Lab
26-Sep-11	Works Yard			NEG	Tested in-House
26-Sep-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
26-Sep-11	Boundary Hospital	<1	<1		Tested at Caro Lab
26-Sep-11	Boundary Hospital	<1	<1		Tested at Caro Lab
3-Oct-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
3-Oct-11	Petro Canada			NEG	Tested in-House
3-Oct-11	Perley School			NEG	Tested in-House
3-Oct-11	Hutton School			NEG	Tested in-House
3-Oct-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
11-Oct-11	Contact Chamber			NEG	Tested in-House
11-Oct-11	Boundary Hospital	<1	<1		Tested at Caro Lab
17-Oct-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
17-Oct-11	Super Save Gas			NEG	Tested in-House
17-Oct-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
24-Oct-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
24-Oct-11	Hutton School			NEG	Tested in-House
24-Oct-11	G.F.S.S. (High School)			NEG	Tested in-House
24-Oct-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
24-Oct-11	Boundary Hospital	<1	<1		Tested at Caro Lab
31-Oct-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
31-Oct-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
31-Oct-11	Boundary Hospital	<1	<1		Tested at Caro Lab
7-Nov-11	Grand Forks Construction			NEG	Tested in-House
7-Nov-11	Boundary Hospital	<1	<1		Tested at Caro Lab
7-Nov-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
7-Nov-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
7-Nov-11	City Hall			NEG	Tested in-House
14-Nov-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
14-Nov-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
14-Nov-11	Boundary Hospital	<1	<1		Tested at Caro Lab

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
17-Nov-11	City Hall			NEG	Tested in-House
17-Nov-11	Boundary Hospital	<1	<1		Tested at Caro Lab
21-Nov-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
21-Nov-11	Super Save Gas			NEG	Tested in-House
21-Nov-11	Sears			NEG	Tested in-House
21-Nov-11	Hutton School			NEG	Tested in-House
21-Nov-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
28-Nov-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
28-Nov-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
28-Nov-11	Boundary Hospital	<1	<1		Tested at Caro Lab
30-Nov-11	Boundary Hospital	<1	<1		Tested at Caro Lab
30-Nov-11	BC Liquor Store			NEG	Tested in-House
5-Dec-11	Petro Canada			NEG	Tested in-House
5-Dec-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
5-Dec-11	Boundary Hospital	<1	<1		Tested at Caro Lab
7-Dec-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
7-Dec-11	Hutton School			NEG	Tested in-House
12-Dec-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
12-Dec-11	Petro Canada			NEG	Tested in-House
12-Dec-11	Fire Hall			NEG	Tested in-House
12-Dec-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
12-Dec-11	Aquatic Centre			NEG	Tested in-House
19-Dec-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
19-Dec-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
19-Dec-11	Boundary Hospital	<1	<1		Tested at Caro Lab
20-Dec-11	Boundary Hospital	<1	<1		Tested at Caro Lab
28-Dec-11	Valley Heights Booster	<1	<1		Tested at Caro Lab
28-Dec-11	East Zone Reservoir	<1	<1		Tested at Caro Lab
28-Dec-11	Boundary Hospital	<1	<1		Tested at Caro Lab
29-Dec-11	Super Save Gas			NEG	Tested in-House
29-Dec-11	G.F. Public Library			NEG	Tested in-House
3-Jan-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
3-Jan-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
3-Jan-12	BC Liquor Store			NEG	Tested in-House
5-Jan-12	Hutton School			NEG	Tested in-House
5-Jan-12	Boundary Hospital	<1	<1		Tested at Caro Lab
9-Jan-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
9-Jan-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
9-Jan-12	Cemetery			NEG	Tested in-House
10-Jan-12	Super Save Gas			NEG	Tested in-House
10-Jan-12	Boundary Hospital	<1	<1		Tested at Caro Lab
16-Jan-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
16-Jan-12	Fire Hall			NEG	Tested in-House
16-Jan-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
17-Jan-12	Petro Canada			NEG	Tested in-House
17-Jan-12	Boundary Hospital	<1	<1		Tested at Caro Lab
26-Jan-12	Super Save Gas			NEG	Tested in-House
26-Jan-12	Lordco Auto Parts			NEG	Tested in-House
30-Jan-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
30-Jan-12	Public Works Yard			NEG	Tested in-House
30-Jan-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
31-Jan-12	Boundary Hospital	<1	<1		Tested at Caro Lab
31-Jan-12	Aquatic Centre			NEG	Tested in-House
6-Feb-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
6-Feb-12	Super Save Gas			NEG	Tested in-House
6-Feb-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
6-Feb-12	City Hall			NEG	Tested in-House
6-Feb-12	6311-12th Street			NEG	Tested in-House
13-Feb-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
13-Feb-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
13-Feb-12	Boundary Hospital	<1	<1		Tested at Caro Lab
15-Feb-12	Hutton School			NEG	Tested in-House
15-Feb-12	Boundary Hospital	<1	<1		Tested at Caro Lab
20-Feb-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
20-Feb-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
20-Feb-12	City Hall			NEG	Tested in-House
21-Feb-12	Works Yard			NEG	Tested in-House
21-Feb-12	Boundary Hospital	<1	<1		Tested at Caro Lab
27-Feb-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
27-Feb-12	Petro Canada			NEG	Tested
27-Feb-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
5-Mar-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
5-Mar-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
5-Mar-12	Boundary Hospital	<1	<1		Tested at Caro Lab
14-Mar-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
14-Mar-12	Super Save Gas			NEG	Tested in-House
14-Mar-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
14-Mar-12	Boundary Hospital	<1	<1		Tested at Caro Lab
14-Mar-12	Boundary Hospital	<1	<1		Tested at Caro Lab
19-Mar-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
19-Mar-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
19-Mar-12	City Hall			NEG	Tested in-House
26-Mar-12	Works Yard			NEG	Tested in-House

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
26-Mar-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
26-Mar-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
26-Mar-12	Boundary Hospital	<1	<1		Tested at Caro Lab
26-Mar-12	Boundary Hospital	<1	<1		Tested at Caro Lab
2-Apr-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
2-Apr-12	Hutton School			NEG	Tested in-House
2-Apr-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
2-Apr-12	City Hall			NEG	Tested in-House
2-Apr-12	Cemetery			NEG	Tested in-House
10-Apr-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
10-Apr-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
10-Apr-12	Boundary Hospital	<1	<1		Tested at Caro Lab
11-Apr-12	Petro Canada			NEG	Tested in-House
11-Apr-12	Boundary Hospital	<1	<1		Tested at Caro Lab
16-Apr-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
16-Apr-12	Tom Kat			NEG	Tested in-House
16-Apr-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
23-Apr-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
23-Apr-12	Super Save Gas			NEG	Tested in-House
23-Apr-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
23-Apr-12	Boundary Hospital	<1	<1		Tested at Caro Lab
23-Apr-12	Boundary Hospital	<1	<1		Tested at Caro Lab
26-Apr-12	City Hall			NEG	Tested in-House
30-Apr-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
30-Apr-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
30-Apr-12	Boundary Hospital	<1	<1		Tested at Caro Lab
1-May-12	Cemetery			NEG	Tested in-House
1-May-12	Boundary Hospital	<1	<1		Tested at Caro Lab
7-May-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
7-May-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
7-May-12	Aquatic Centre			NEG	Tested in-House
22-May-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
22-May-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
22-May-12	Boundary Hospital	<1	<1		Tested at Caro Lab
28-May-12	Well #3	<1	<1		Tested at Caro Lab
28-May-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
28-May-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
28-May-12	Boundary Hospital	<1	<1		Tested at Caro Lab
28-May-12	Boundary Hospital	<1	<1		Tested at Caro Lab
29-May-12	Super Save Gas			NEG	Tested in-House
29-May-12	Boundary Hospital	<1	<1		Tested at Caro Lab
4-Jun-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
4-Jun-12	Petro Canada			NEG	Tested in-House
4-Jun-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
5-Jun-12	Works Yard			NEG	Tested in-House
5-Jun-12	Boundary Hospital	<1	<1		Tested at Caro Lab
11-Jun-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
11-Jun-12	East Zone Reservoir			NEG	Tested in-House
11-Jun-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
11-Jun-12	Aquatic Centre			NEG	Tested in-House
18-Jun-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
18-Jun-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
18-Jun-12	Boundary Hospital	<1	<1		Tested at Caro Lab
19-Jun-12	Boundary Hospital	<1	<1		Tested at Caro Lab
19-Jun-12	Aquatic Centre			NEG	Tested in-House
25-Jun-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
25-Jun-12	Super Save Gas			NEG	Tested in-House
25-Jun-12	Fire Hall			NEG	Tested in-House
25-Jun-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
25-Jun-12	City Hall			NEG	Tested in-House
28-Jun-12	Boundary Hospital	<1	<1		Tested at Caro Lab
3-Jul-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
3-Jul-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
3-Jul-12	7619 Granby Rd.			NEG	Tested in-House
4-Jul-12	Boundary Hospital	<1	<1		Tested at Caro Lab
9-Jul-12	Video Store			NEG	Tested in-House
9-Jul-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
9-Jul-12	Selkirk College			NEG	Tested in-House
9-Jul-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
9-Jul-12	Barbra Ann Washroom	<1	<1		Tested at Caro Lab
16-Jul-12	Valley Heights Booster			NEG	Tested in-House
16-Jul-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
16-Jul-12	Super Save Gas			NEG	Tested in-House
16-Jul-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
16-Jul-12	City Hall			NEG	Tested in-House
16-Jul-12	Boundary Hospital	<1	<1		Tested at Caro Lab
23-Jul-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
23-Jul-12	Fire Hall			NEG	Tested in-House
23-Jul-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
23-Jul-12	Boundary Hospital	<1	<1		Tested at Caro Lab
23-Jul-12	Boundary Hospital	<1	<1		Tested at Caro Lab
30-Jul-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
30-Jul-12	Super Save Gas			NEG	Tested in-House

City of Grand Forks Water System
Summary of Bacteriological Results

Date of Sample	Sample Site	Total Coliform	E. COLI	Presence / Absence	Comments
30-Jul-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
1-Aug-12	Super Save Gas			NEG	Tested in-House
1-Aug-12	Boundary Hospital	<1	<1		Tested at Caro Lab
1-Aug-12	Aquatic Centre			NEG	Tested in-House
7-Aug-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
7-Aug-12	Fire Hall			NEG	Tested in-House
7-Aug-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
8-Aug-12	Super Save Gas				Tested in-House
8-Aug-12	Boundary Hospital	<1	<1		Tested at Caro Lab
14-Aug-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
14-Aug-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
14-Aug-12	Barbra Ann Park			NEG	Tested in-House
20-Aug-12	Valley Heights Booster	<1	<1		Tested at Caro Lab
20-Aug-12	East Zone Reservoir	<1	<1		Tested at Caro Lab
20-Aug-12	Boundary Hospital	<1	<1		Tested at Caro Lab
July 29 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
July 29 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
July 29 2008	City Hall	<1	<1		Tested at Caro Lab
July 29 2008	Boundary Hospital	<1	<1		Tested at Caro Lab

APPENDIX D

SUMMARY OF GROUNDWATER MODEL INPUTS AND RESULTS

PITEAU ASSOCIATES
GEOTECHNICAL AND
HYDROGEOLOGICAL CONSULTANTS

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www.piteau.com

MEMORANDUM

TO: Remi Allard, P. Eng., Piteau Associates

Our file: 3181 (3181-M002)
Date: October 26, 2012

FROM: Matthew Cleary, P.Geo.
Email: mcleary@piteau.com

RE: Assessment of Well Capture Zones using Numerical Modeling Techniques
Grand Forks Aquifer, B.C.

As part of the current assessment of groundwater management options being completed by Piteau Associates Engineering Ltd. (Piteau) for the City of Grand Forks (the City), we are providing this technical memorandum summarizing the updated capture zone estimates for various existing and proposed City wells using numerical modeling techniques. The primary objectives of this component of the groundwater assessments are as follows:

- to refine the capture zone estimates for existing City wells;
- to estimate the capture zone of a new well placed adjacent to well TW99-2;
- to estimate the capture zones for various configurations and flow rates for a new well constructed between well pairing GF #3 / #3a and Kettle River; and
- to assess the results of the numerical analyses to determine the best configuration of new well(s) to minimize well interference effects.

Special thanks are given to Dr. Diana Allen, a professor in hydrogeology at Simon Fraser University (SFU) for her assistance with portions of the numerical analyses.

NUMERICAL MODELING SUMMARY FOR THE GRAND FORKS AQUIFER

Numerical modeling efforts focused on the Grand Forks aquifer were initially conducted by Dr. Diana Allen, SFU (Allen, D.M., 2000). The numerical model was developed as a three-dimensional finite-difference groundwater flow model using the MODFLOW-96 code (McDonald, M.G., et al., 1988), and utilized the MODPATH (Pollock, D.W., 1994) post-processing package for particle tracking.

Additional efforts to refine the numerical model were conducted in 2001 (Allen, D.M., 2001) and 2004 (Scibek, J. and Allen, D.M., 2004), which incorporated additional complexity including more refined definition of stratigraphic and bedrock contacts, and spatially-distributed recharge as determined using the HELP model developed by the U.S. Environmental Protection Agency (Schroeder, P. R. et al., 1994).

The Visual MODFLOW software package (v. 3.1.0.84), developed by Waterloo Hydrogeologic Inc. (WHI, 2000), was used for this study, and provides a graphical interface to the MODFLOW-96 modeling code.

MODEL DESCIPTION

The objective for the numerical modeling exercise was to utilize the aforementioned groundwater numerical model in conjunction with MODPATH to define groundwater capture zones for wells operated by the City, as well as possible well locations adjacent to TW99-2 and between well pairing GF #3 / #3a and the Kettle River (GF #6).

The model was constructed over a region measuring 7.0 km from north to south by 16.0 km from east to west. The finite-difference mesh was divided into 312 columns, 206 rows, and six layers. Portions of the model were left as inactive, corresponding with bedrock, as groundwater flow within bedrock is not considered to be significant in comparison to flow within unconsolidated sediments.

Boundary conditions utilized in the model consist of surface recharge, specified head boundaries, drain boundaries, and no flow boundaries. As previously mentioned, surface recharge was determined using the HELP model, and defined 64 different recharge zones. Specified head boundary conditions were applied along the reaches of the Kettle and Granby Rivers, with values representative of January stage height, which is considered equivalent to base flow conditions (Allen, D.M., 2012). Drain boundary conditions were applied to areas representing less significant surface water features, including small lakes. The edges of the active model area, both in the horizontal plane and beneath the unconsolidated sediments, represent the bedrock contact, and were modeled as no flow boundaries.

Hydraulic parameters for unconsolidated sediments were discretized into four layers, representing two upper aquifer layers and two lower aquitard layers, as presented below:

Model Layer	Description	K_x (m/s)	K_y (m/s)	K_z (m/s)
1	Gravel (aquifer)	1.0×10^{-3}	1.0×10^{-3}	1.0×10^{-4}
2	Sand (aquifer)	1.5×10^{-4}	1.5×10^{-4}	1.5×10^{-5}
3	Silt (aquitard)	7.0×10^{-7}	7.0×10^{-7}	7.0×10^{-8}
4	Clay (aquitard)	1.0×10^{-7}	1.0×10^{-8}	1.0×10^{-8}
5	Bedrock (inactive)	-	-	-
6		-	-	-

Simulations detailed below were conducted in steady-state, and while a transient model was available for use, it was indicated to be quite cumbersome and often times had difficulty finding a stable solution due to the complexity of some of the transient boundary conditions (i.e. recharge and variable specified head boundaries).

CAPTURE ZONE ESTIMATION

Capture zone estimation was conducted using the aforementioned MODPATH post-processing package. A circle of twenty backward tracking particles were placed around each well at a radius of 50m, within each of layers 1 through 4. The backward tracking particles outline capture zones for each of the wells for a specified flow rate. Tick marks along the particle path lines represent a

time spacing of 30 days, while the ultimate length of the path lines define the 365 days (one-year) capture zone for each well. Capture zones displayed on Figs. 2 through 9 represent the projection of backward tracking particles within layer 2 of the numerical model.

Eight different scenarios were simulated using various combinations of active pumping at wells, and multiple locations and flow rates for the proposed well GF #6. These scenarios are described herein as well as in Table 1.

Scenario 1

Scenario 1 includes pumping at the five existing wells (GF #2, #3, #3a, #4, and #5) at pumping rates of 24.3, 75.7, 30.0, 25.3, and 69.4 L/s, respectively. The one-year capture zones for the well pairing GF #4 / #5 extends radially outward due to the lesser hydraulic gradient in the vicinity of the wells. The one-year capture zones for well pairing GF #3 / #3a and well GF #2 extend from the well heads towards the Kettle River to the southwest; however they do not intersect the Kettle River within this timeframe. The one-year capture zones for well pairings GF #3 / #3a and GF #4 / #5, and well GF #2 do not overlap when operated concurrently; therefore, it is anticipated that well interference between the two well pairings and well GF #2 is minimal.

Scenario 2

Scenario 2 includes pumping at the five existing wells at the rates specified in Scenario 1, as well as the operation of a well adjacent to TW99-2 at 44.2 L/s. As with the wells operated in Scenario 1, the one-year capture zone for TW99-2 does not intersect the capture zones for well pairings GF #3 / #3a and GF #4 / #5, or well GF #2. The one-year capture zone for a well adjacent to TW99-2 extends radially outward due to the minimal hydraulic gradient in the vicinity of the well.

Scenario 3

Scenario 3 includes pumping at the five existing wells at the rates specified in Scenario 1, as well as the operation of a proposed well GF #6 at 44.2 L/s. The proposed location for GF #6 for this scenario is west of the intersection of 65th Avenue and 24th Street. The one-year capture zone for proposed well GF #6 extends from the well head towards the Kettle River to the southwest, and like well pairing GF #3 / #3a does not intersect the Kettle River within this timeframe. The one-year capture zones for well pairing GF #3 / #3a and proposed well GF #6 do intersect, and therefore it is anticipated that there will be some measureable reduction in available drawdown in the wells after longer sustained concurrent pumping. As it is not anticipated that wells GF #3 and GF #3a will be operated concurrently at full capacity, the reduction in available drawdown will likely be lesser than that of this scenario.

Scenario 4

Scenario 4 includes pumping at the five existing wells at the rates specified in Scenario 1, as well as the operation of well GF #6 and a well adjacent to TW99-2 at rates of 44.2 L/s each. No significant change in the one-year capture zones can be observed as a result of active pumping at the aforementioned seven well locations when compared to the results of Scenarios 2 and 3.

Scenario 5

Scenario 5 includes pumping at the five existing wells at the rates specified in Scenario 1, as well as the operation of proposed well GF #6 at 44.2 L/s. The proposed location for GF #6 for this scenario is east of the intersection of 65th Avenue and 24th Street, along Kettle River Drive. The one-year capture zone for proposed well GF #6 extends from the well head towards the Kettle River to the south. The capture zone does not intersect that of the well pairing GF #3 / #3a nor the Kettle River within this timeframe. Well interference effects observed at the other wells are therefore not anticipated associated with this well configuration and pumping rate for well GF #6.

Scenario 6

Scenario 6 includes pumping at the five existing wells at the rates specified in Scenario 1, as well as the operation of proposed well GF #6 at 44.2 L/s. The proposed location for GF #6 for this scenario is south of well pairing GF #3 / #3a on 25th Street. The one-year capture zone for proposed well GF #6 extends from the well head towards the Kettle River to the south. The capture zone does not intersect that of the well pairing GF #3 / #3a nor the Kettle River in this timeframe. Therefore, well interference effects are not anticipated associated with this well configuration and pumping rate for well GF #6.

Scenario 7

Scenario 7 includes the same well configuration as Scenario 5, with an increased pumping rate for GF #6 (63.1 L/s). The one-year capture zone for proposed well GF #6 extends from the well head and intersects the Kettle River to the south. The capture zone does not intersect that of the well pairing GF #3 / #3a, therefore well interference effects are not anticipated for this well configuration and increased pumping rate at well GF #6.

Scenario 8

Scenario 8 includes the same well configuration as Scenario 6, with an increased pumping rate for GF #6 (63.1 L/s). The one-year capture zone for proposed well GF #6 extends from the well head and intersects the Kettle River to the south and southwest. The capture zone does not intersect that of the well pairing GF #3 / #3a, therefore well interference effects are not anticipated to be significant for this well configuration and increased pumping rate at well GF #6.

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