

**THE CORPORATION OF THE CITY OF GRAND FORKS
AGENDA – PRIMARY COMMITTEE MEETING**

**Monday November 19th, 2012
Council Chambers City Hall**

<u>ITEM</u>	<u>SUBJECT MATTER</u>	<u>RECOMMENDATION</u>
1. <u>CALL TO ORDER</u>		Call Meeting to order after the Regular Meeting has been recessed
2. <u>PRIMARY COMMITTEE MEETING AGENDA</u> -	Agenda for November 19 th , 2012	Adoption of Agenda
3. <u>DELEGATIONS:</u>		
a) Manager of Technical Services – Presentation by Remi Allard, P. Eng of Piteau Associates	Presentation regarding the draft report on the Management of Community Water Wells	The Primary Committee recommends to Council to receive the presentation regarding the draft report on the Management of Community Water Wells as presented by Remi Allard, P. Eng. of Piteau Associates
b) Corporate Officer's Report – Presentation by the Grand Forks Community Trails Society	Presentation regarding the Grand Forks-Cascade Kettle River Heritage Trail Project	The Primary Committee recommends to Council to receive the presentation made by representatives of the Grand Forks Community Trails Society
c) Corporate Officer's Report – Presentation by Sandy McKelir of the Kootenay Boundary Pet Dog Association	Presentation regarding responsible dog management in the community	The Primary Committee recommends to Council to receive the presentation made by Sandy McKelir of the Kootenay Boundary Pet Dog Association
4. <u>UNFINISHED BUSINESS:</u> None		
5. <u>RECOMMENDATIONS FOR CONSIDERATION:</u>		
a) Chief Administrative Officer's Report – Proposed Closure of City Hall during Christmas Week 2012	City Staff requesting Council's consideration to close City Hall from December 24 th to 28 th , 2012 inclusive.	The Primary Committee recommends to Council, to receive the CAO's report and authorizes City staff to close City Hall from December 24 th to December 28 th , 2012, inclusive, for the Christmas holiday. Be it further resolved that City Hall Staff will utilize their allotted vacation days to supplement the days that are not required statutory holidays, being December 24 th , 27 th and 28 th , 2012.
6. <u>OPERATIONAL DISCUSSIONS FROM</u>		

STAFF:

None

7. **INFORMATION ITEMS:**

None

8. **PROPOSED BYLAWS FOR
DISCUSSION:**

None

9. **LATE ITEMS:**

10. **REPORTS, QUESTIONS AND
INQUIRIES FROM MEMBERS OF
COUNCIL (VERBAL**

11. **QUESTION PERIOD FROM THE
PUBLIC**

Attendees in the gallery may ask
Council questions at this time.

Hear Presentations and refer any
issues for further discussion.
Hear from the Public

12. **ADJOURNMENT**

Adjournment

**THE CITY OF GRAND FORKS
REQUEST FOR PRIMARY COMMITTEE RECOMMENDATION
DELEGATION**

DATE : November 14th, 2012

TOPIC : Management of Community Water Wells Study

PROPOSAL : Presentation and Draft Report Prepared by Piteau Associates

PROPOSED BY: Remi Allard, P. Eng. Of Piteau Associates

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SUMMARY:

Remi Allard, P. Eng of Piteau Associates will make a presentation to Council with regard to the management of the Grand Forks Community Water Wells.

STAFF RECOMMENDATIONS:

1. That the Primary Committee recommends to Council to receive the presentation.

OPTIONS AND ALTERNATIVES:

1. Receive the presentation: Under this option, Council is provided with the information regarding the management of the community water wells.
2. Receive the presentation and refer any issues for further discussion: The advantage to this option is the same as Option 1.

BENEFITS DISADVANTAGES AND NEGATIVE IMPACTS:

Option 1: The main advantage of this option is that information is provided to the City and the Community.

Option 2: The main advantage is same as Option 1.

COSTS AND BUDGET IMPACT - REVENUE GENERATION:

There is no cost of making the presentation.

LEGISLATIVE IMPACTS, PRECEDENTS, POLICIES:

Council procedures bylaw makes provisions for making presentations to Council.



Department Head or
CAO



Reviewed by CAO



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CITY OF GRAND FORKS

MANAGEMENT OF COMMUNITY WATER WELLS

Prepared by

PITEAU ASSOCIATES ENGINEERING LTD.

PROJECT 3181

NOVEMBER 2012



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DRAFT



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FIGURES

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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 is irregular in shape and covers the entire valley where the Kettle and Grandby 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 Grandby 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 Pine Street (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 Pine 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 Grandby 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 selected characteristics of 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 200mm 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 392704E / 5430959N. 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 southeast of Well 3a at coordinates 392726E / 5430956N. 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 a 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 EnviroInsight® (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 and Well 5. It is not possible to verify if the annulus between the surface casing and production casing has been grouted as these wells are encased in concrete at surface in their respective pump house buildings. Well 2 and Well 4 are also encased in concrete at surface, but there is no evidence to suggest these wells have surface casing or a surface annular seal. The concrete offers some protection at the wellhead. The geology noted on the driller's logs indicates the shallowest depth to encountering a confining unit in any of the wells is 7.6m at Well 4. The additional protection gained from installing a surface annular seal in all of the wells to 4.5 m depth is therefore questionable.

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). Ground water at risk of containing pathogens (GARP) is defined herein as any ground water 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. Ground water under direct influence of surface water (GWUDI) is defined herein as ground water 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 ground water source to preliminary and more advanced hydrogeological investigations to assist drinking water officers in determining, where necessary, appropriate treatment requirements for ground water 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 et 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 up gradient 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 Well 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 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:

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

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 considered appropriate for the time being. The cost versus benefits of primary disinfection should be reviewed with Interior Health. 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. For all of the City wells, the major well design feature which is not in compliance with the GWPR, is 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 favorable 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 (55.5 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 well does not strictly comply with the requirements of the GWPR and therefore was downgraded slightly. The specific capacity of this well is relatively low.
3. Existing Well 3A (54.5 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 and will need replacing soon.
4. 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.
5. Existing Well 3 (51.5 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.
6. 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.
7. Existing Well 4 (49 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.

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 and the existing Well 3A 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.

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 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.

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7. 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.

8. 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 of 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 and the threat is considered low. All other wells are predominantly within agricultural and residential land use areas.
4. All of the City wells do not comply with all requirements of the GWPR, specifically in regards to surface annular seals. Modification of the wells with retrofitted seals is not expected to increase the level of protection for the 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. 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.
9. 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.

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9. 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 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.

10. 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.



11. 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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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	T0090-2	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 analyzed and has not been rated 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. The well has never been analyzed and has not been rated 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 features 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 GWPH (section 7) for surface seepage.	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 the well is drilled it will have a surface annular seal.
Does the well meet GWPH (section 10) for well caps and covers.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.
Does the well meet GWPH (section 11) for floodproofing.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.
Does the well meet GWPH (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 hard bedrock aquifer?	No.	No.	No.	No.	No.	No.	No.
Is the well potentially 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	1988	129.0	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	75.0	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 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

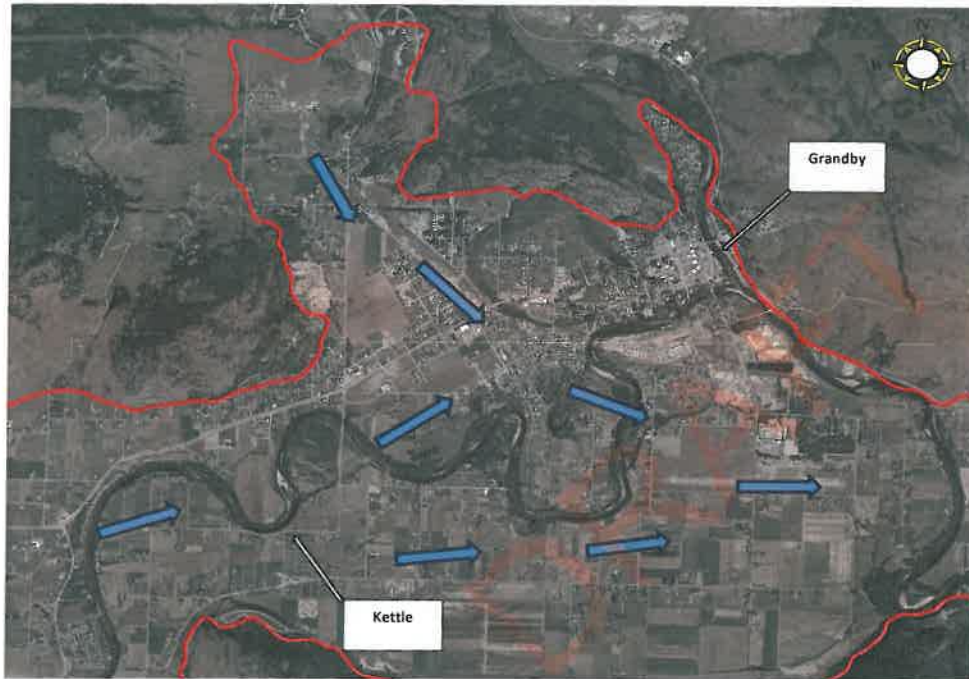
Well	Pumping Rate (m ³ /day)		Transmissivity (m ² /day)	Available Drawdown (m)	Casing Radius (m)	PW # 2		PW # 3		PW # 3A		PW # 4		PW # 5		TW 99-2		New Well		Cumulative Drawdown (m)	75% of Available Drawdown (m)	Acceptable (Yes/No)	
		USgpm				Dist.(m)	D'Down (m)	Dist.(m)	D'Down (m)	Dist.(m)	D'Down (m)	Dist.(m)	D'Down (m)	Dist.(m)	D'Down (m)	Dist.(m)	D'Down (m)	Dist.(m)	D'Down (m)				
Scenario 1																							
PW #2	2100	385	1500	15	0.2	0.2	2.0	410	0.2	430	0.2	862	0.1	876	0.1	700	n.a.	865	n.a.	2.6	10.5	Yes	
PW #3a	8500	1200	920	21	0.25	410	0.9	0.15	12.4	22	4.2	711	0.4	730	0.4	1000	n.a.	245	n.a.	15.3	14.7	No	
PW #3	2600	475	920	16	0.16	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	18.6	Yes	
PW #5	7100	1100	1200	29	0.2	875	0.3	730	0.3	710	0.4	22.5	3.0	0.2	20.2	945	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.	0.1	n.a.	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.	0.1	n.a.	n.a.	0.1	n.a.	0.0	17.5	n.a.	
Totals	21300	3150																					
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	895	0.1	805	0.0	2.7	11.8	Yes	
PW #3a	8500	1200	920	19.0	0.25	410	0.9	0.15	12.4	22	4.2	711	0.4	730	0.4	1000	0.2	245	0.0	15.5	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	25.5	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	24.0	Yes	
PW #5	7100	1100	1200	33.5	0.2	875	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	0	0	575	25	0.1	995	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.	0.1	n.a.	n.a.	0.1	n.a.	0	17.5	n.a.
Totals	25300	4280																0.1	n.a.				
Scenario 3																							
PW #2	2100	385	1350	16.0	0.2	0.2	2.0	410	0.2	430	0.2	862	0.1	876	0.1	895	n.a.	805	0.0	2.6	11.8	Yes	
PW #3a	8500	1200	920	19.5	0.25	410	0.9	0.15	12.4	22	4.2	711	0.4	730	0.4	1000	n.a.	245	0.0	15.3	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	25.6	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	24.0	Yes	
PW #5	7100	1100	1200	33.5	0.2	875	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	0	0	1000	25	0.1	995	0.2	1000	0.1	1000	0.1	940	0.1	945	0.1	0.1	10.0	n.a.	n.a.	0.0	17.5	Yes	
Totals	25300	4280																0.1	6.0	8.4	17.5		

- Notes: (1) Pumping rates based on historical data from 2000-2012 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 screen 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	Ty# 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 25 m, 4 = from 25 to 60 m, 7 = from 60 to 100 m, 10 = greater than 100 m
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 5 m, 3 = from 5 to 10 m, 5 = from 10 to 20 m, 7 = from 20 to 30 m, 9 = greater than 30 m
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	6	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	5	5	5	5	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	51.5	54.5	49	55.5	50.5	62.5	larger number denotes relatively higher asset worth	

FIGURES



Legend

-  Direction of Flow
-  Limits of Aquifer

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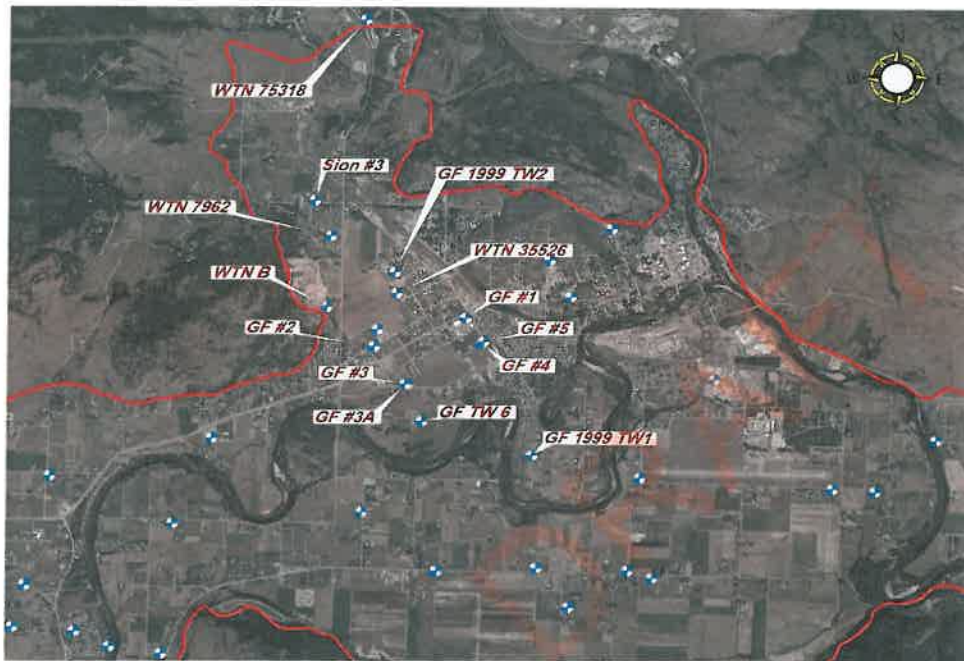


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GEOTECHNICAL AND HYDROGEOLOGICAL CONSULTANTS

Management of Community
Water Wells Project

Plan of Study Area

BY:	RA	DATE:	OCT 12
APPROVED:	RA	FIG:	1



Legend

Blue dot denotes well location

Red label denotes well name

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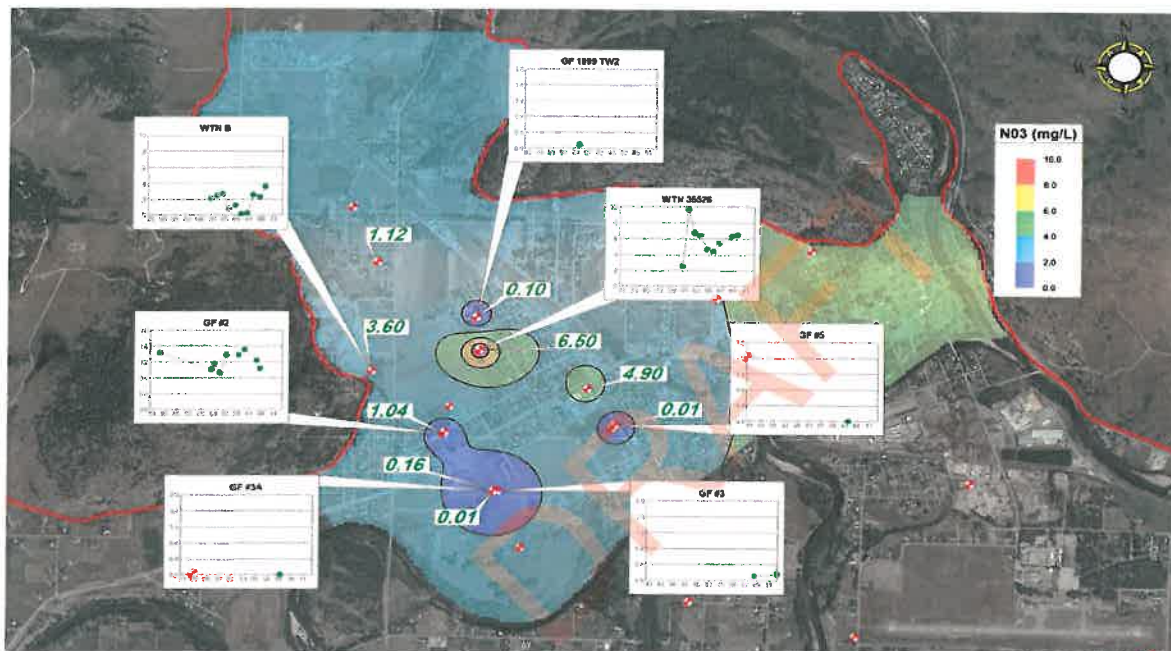
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Management of Community
Water Wells Project

Well Locations

BY: RA DATE: OCT 12

APPROVED: RA FIG: 2



Green numbers represent maximum historical nitrate concentration in mg/l

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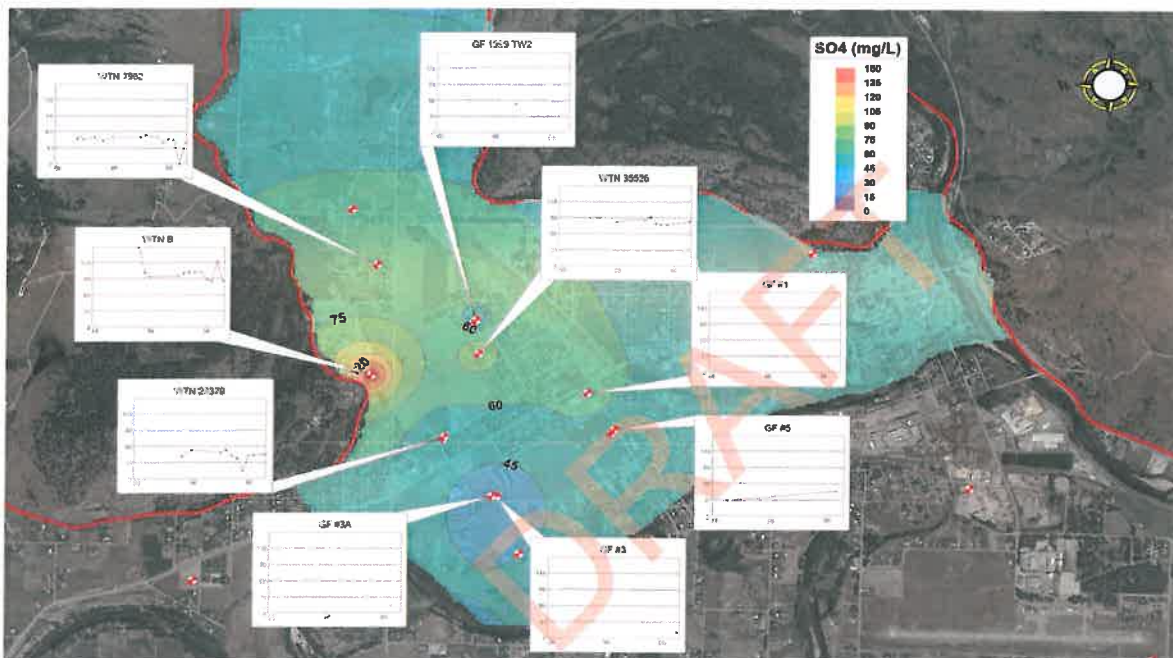


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Management of Community
Water Wells Project

Spatial and Temporal
Plot for Nitrates

BY:	RA	DATE:	OCT 12
APPROVED:	RA	FIG.	3



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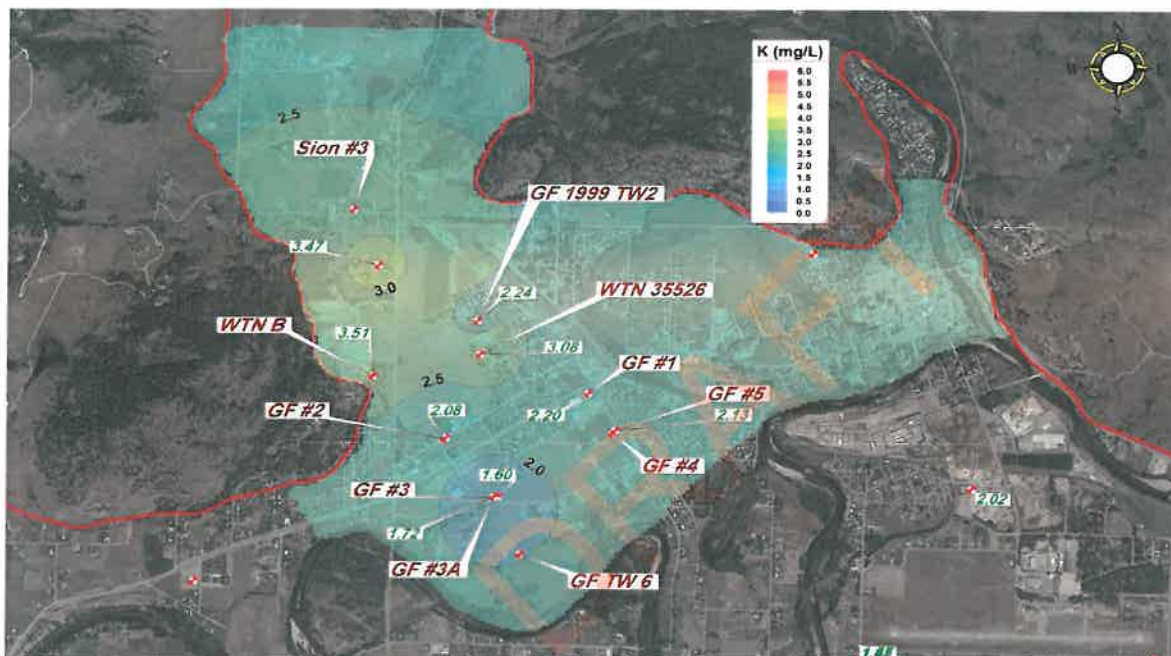


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Management of Community
Water Wells Project

Spatial and Temporal
Plot for Sulphates

BY:	RA	DATE:	OCT 12
APPROVED:	RA	FIG:	4



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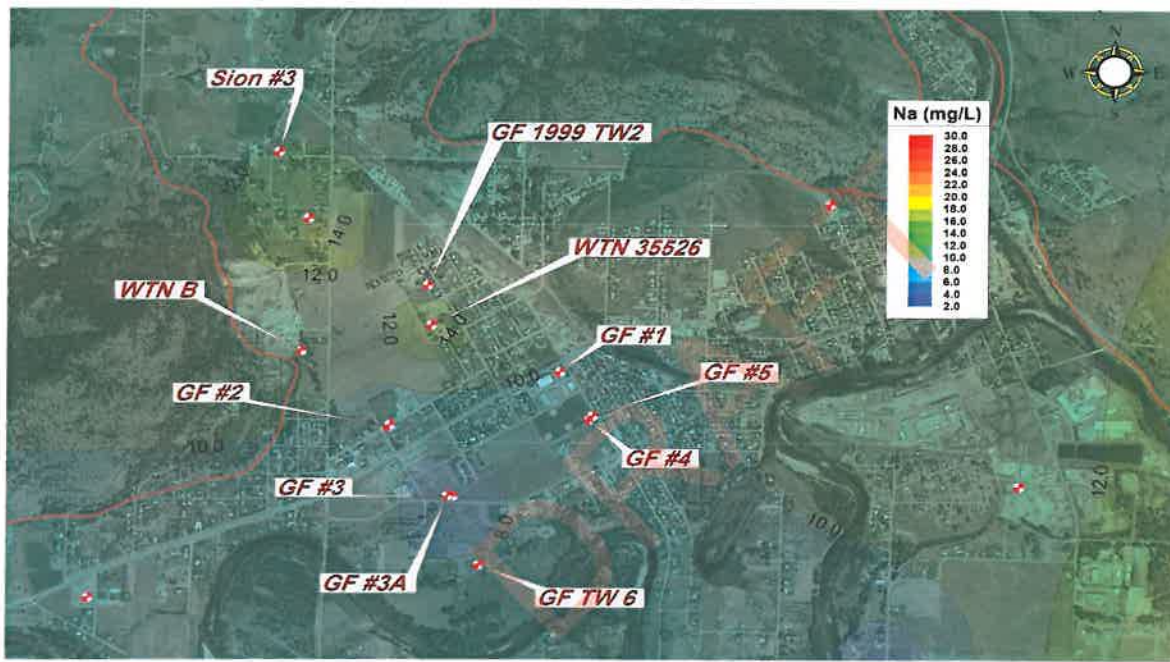


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GEOTECHNICAL AND HYDROGEOLOGICAL CONSULTANTS

Management of Community
Water Wells Project

Spatial and Temporal
Plot for Potassium

BY:	RA	DATE:	OCT 12
APPROVED:	RA	FIG:	5



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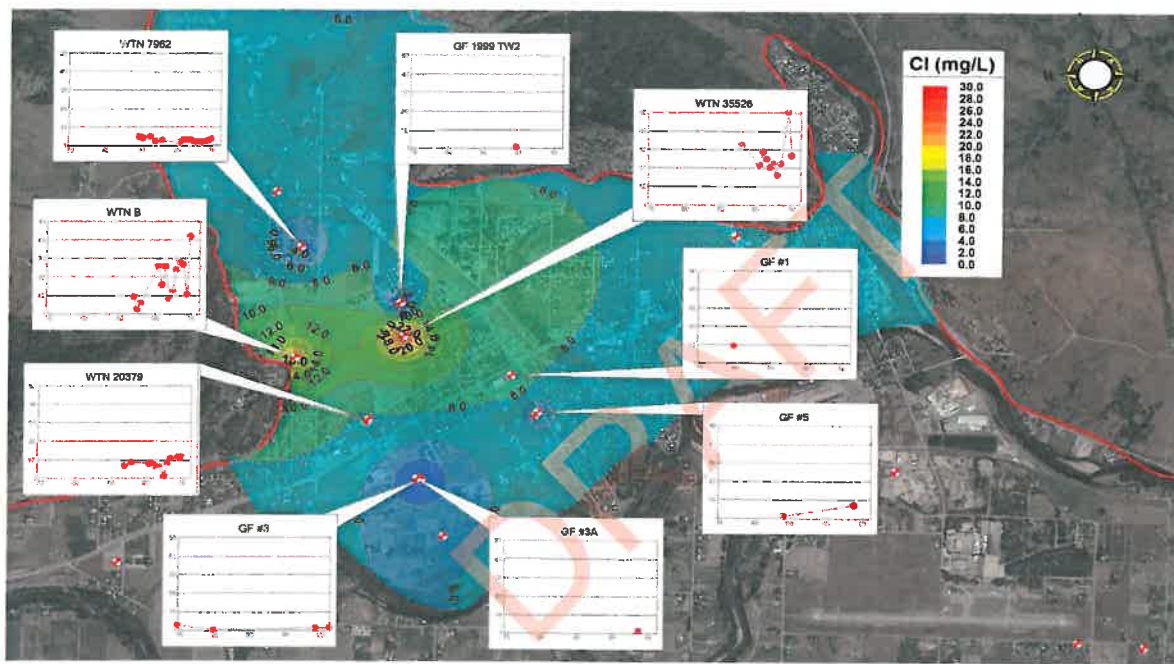
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Management of Community
 Water Wells Project

Spatial and Temporal
 Plot for Sodium

BY: RA DATE: OCT 12

APPROVED: RA FIG: 6



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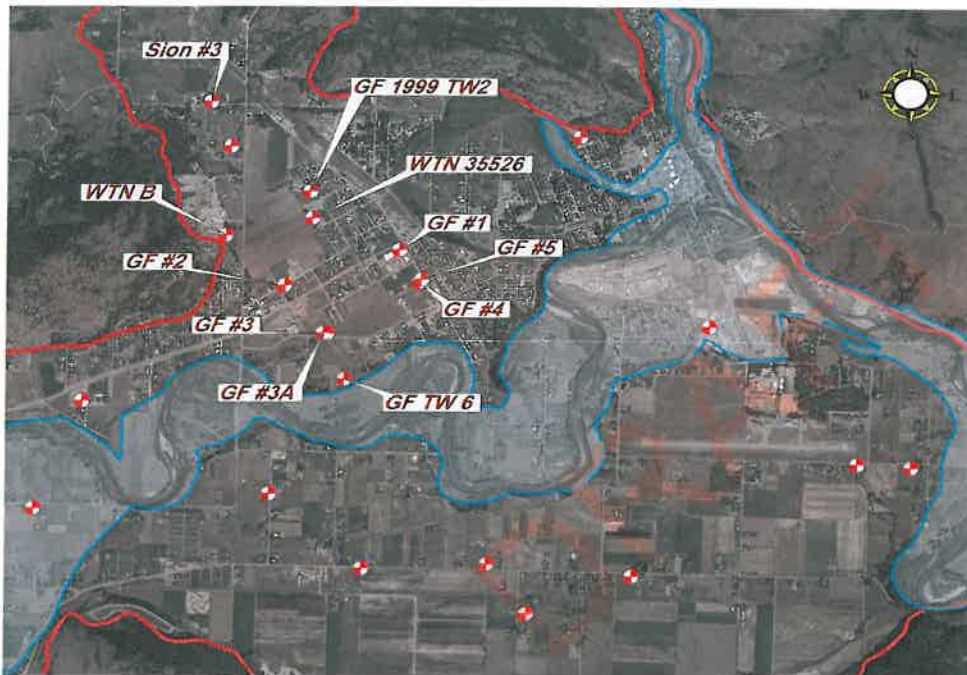
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Water Wells Project

Spatial and Temporal
Plot for Chloride

BY: RA
APPROVED: RA

DATE: OCT 12
FIG: 7



Legend

blue is extent of floodplain

Floodplain limits provided by Urban Systems Ltd.

City of Grand Forks

Management of Community Water Wells Project

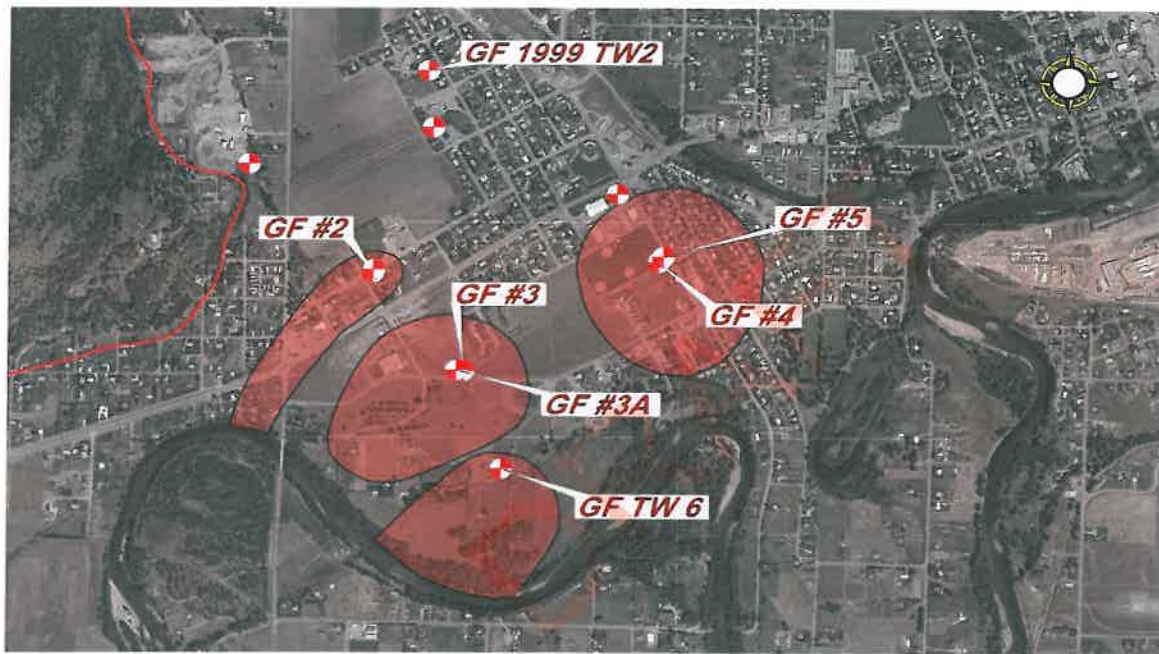
Well Locations in Relation to Extent of Floodplain



PITEAU ASSOCIATES
GEOTECHNICAL AND HYDROGEOLOGICAL CONSULTANTS

BY:	RA	DATE:	OCT 12
APPROVED:	RA	FIG:	8

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

City of Grand Forks

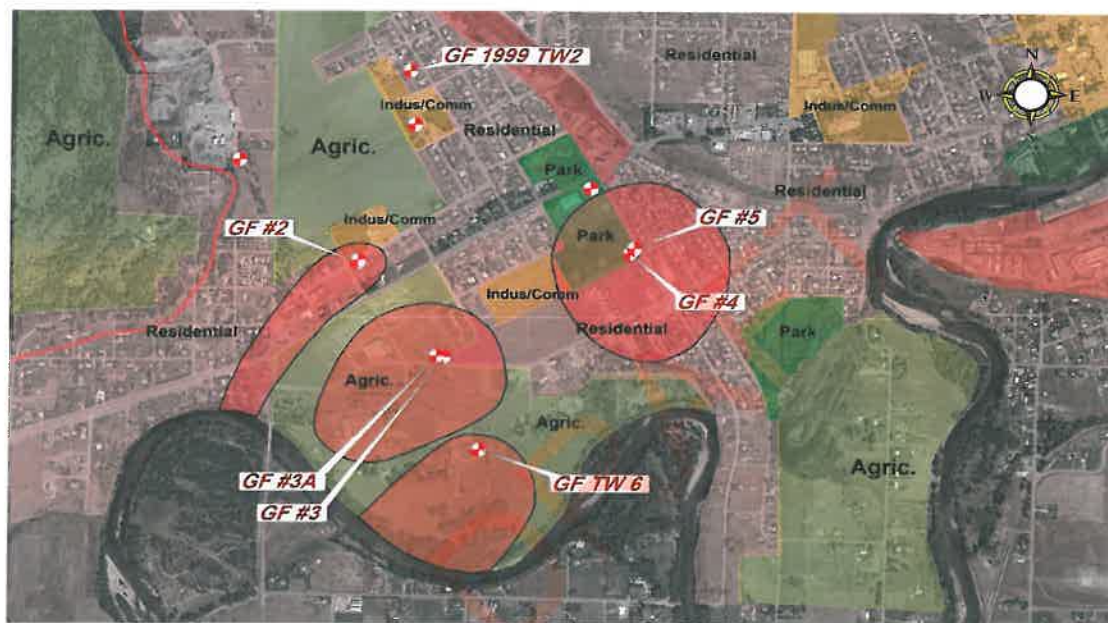


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Management of Community
Water Wells Project

Capture Zones for City Wells
for 1 Year Time of Travel

BY:	RA	DATE:	OCT 12
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.

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Management of Community
Water Wells Project

Land Use in Area of Capture
Zones for City Wells

BY:	RA	DATE:	OCT 12
APPROVED:	RA	FIG:	10

APPENDIX A

WELL RECORDS FOR CITY WELLS

DRAFT



Report 1 - Detailed Well Record

Well Tag Number: 14654	Construction Date: 1956-01-01 00:00:00.0		
Owner: CITY OF GRAND FORKS	Driller: Not Applicable		
Address: GRAND FORKS	Well Identification Plate Number:		
Area: GRAND FORKS	Plate Attached By:		
WELL LOCATION:	Where Plate Attached:		
SIMILKAMEEN Land District	PRODUCTION DATA AT TIME OF DRILLING:		
District Lot: Plan: Lot: 15	Well Yield: 750 (Driller's Estimate) U.S. Gallons per Minute		
Township: Section: Range:	Development Method:		
Indian Reserve: Meridian: Block: 21	Pump Test Info Flag: N		
Quarter:	Artesian Flow:		
Island:	Artesian Pressure (ft):		
BCGS Number (NAD 27): 082E008232 Well: 5	Static Level: 17 feet		
Class of Well: Water supply	WATER QUALITY:		
Subclass of Well: Domestic	Character:		
Orientation of Well:	Colour:		
Status of Well: New	Odour:		
Well Use: Water Supply System	Well Disinfected: N		
Observation Well Number:	EMS ID:		
Observation Well Status:	Water Chemistry Info Flag: Y		
Construction Method: Dug	Field Chemistry Info Flag:		
Diameter: 0.0 inches	Site Info (SEAM):		
Casing drive shoe:	Water Utility:		
Well Depth: 91 feet	Water Supply System Name:		
Elevation: 1727 feet (ASL)	Water Supply System Well Name:		
Final Casing Stick Up: inches	SURFACE SEAL:		
Well Cap Type:	Flag: N		
Bedrock Depth: feet	Material:		
Lithology Info Flag: N	Method:		
File Info Flag: N	Depth (ft):		
Sieve Info Flag: N	Thickness (in):		
Screen Info Flag: N	WELL CLOSURE INFORMATION:		
Site Info Details:	Reason For Closure:		
Other Info Flag:	Method of Closure:		
Other Info Details:	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.	Multistage 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.Weil)
From	0 to	0 Ft.	17/5/94 - Min. of Health, Grand Forks
From	0 to	0 Ft.	well # 1

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DRAFT



Report 1 - Detailed Well Record

Well Tag Number: 19226	Construction Date: 1965-04-16 00:00:00.0		
Owner: CITY OF GRAND FORKS	Driller: Budhenning Co.		
Address: GRAND FORKS	Well Identification Plate Number:		
Area: GRAND FORKS	Plate Attached By:		
WELL LOCATION:	Where Plate Attached:		
SIMILKAMEEN Land District	PRODUCTION DATA AT TIME OF DRILLING:		
District Lot: Plan: Lot:	Well Yield: 500 (Driller's Estimate) Gallons per Minute (U.S./Imperial)		
Township: Section: Range:	Development Method:		
Indian Reserve: Meridian: Block:	Pump Test Info Flag: N		
Quarter:	Artesian Flow:		
Island:	Artesian Pressure (ft):		
BCGS Number (NAD 27): 082E008232 Well: 10	Static Level: 40 feet		
Class of Well: Water supply	WATER QUALITY:		
Subclass of Well: Domestic	Character:		
Orientation of Well:	Colour:		
Status of Well: New	Odour:		
Well Use: Water Supply System	Well Disinfected: N		
Observation Well Number:	EHS ID: E217403		
Observation Well Status:	Water Chemistry Info Flag: Y		
Construction Method: Drilled	Field Chemistry Info Flag:		
Diameter: 16.0 inches	Site Info (SEAM): Y		
Casing drive shoe:	Water Utility:		
Well Depth: 100 feet	Water Supply System Name:		
Elevation: 0 feet (ASL)	Water Supply System Well Name:		
Final Casing Stick Up: inches	SURFACE SEAL:		
Well Cap Type:	Flag: N		
Bedrock Depth: feet	Material:		
Lithology Info Flag: N	Method:		
File Info Flag: N	Depth (ft):		
Sieve Info Flag: N	Thickness (in):		
Screen Info Flag: N	WELL CLOSURE: INFORMATION:		
Site Info Details:	Reason For Closure:		
Other Info Flag:	Method of Closure:		
Other Info Details:	Closure Sealant Material:		
	Closure Backfill Material:		
	Details of Closure:		
Screen from	to feet	Size	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 14, 1965.			
From 0 to 0 Ft. Med.			
From 0 to 46 Ft. dk.			
From 46 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 61 Ft. med. sand (61' - boulder?)			
From 61 to 62 Ft. crse sand			
From 62 to 67 Ft. med. sand			
From 67 to 75 Ft. yellow sandy clay			
From 75 to 90 Ft. sand & grvl (tight, hard)			
From 90 to 109 Ft. grvl (Robin egg size)			
From 109 to 114 Ft. sand -some grvl			
From 114 to 135 Ft. fine gry sand (dirty)			

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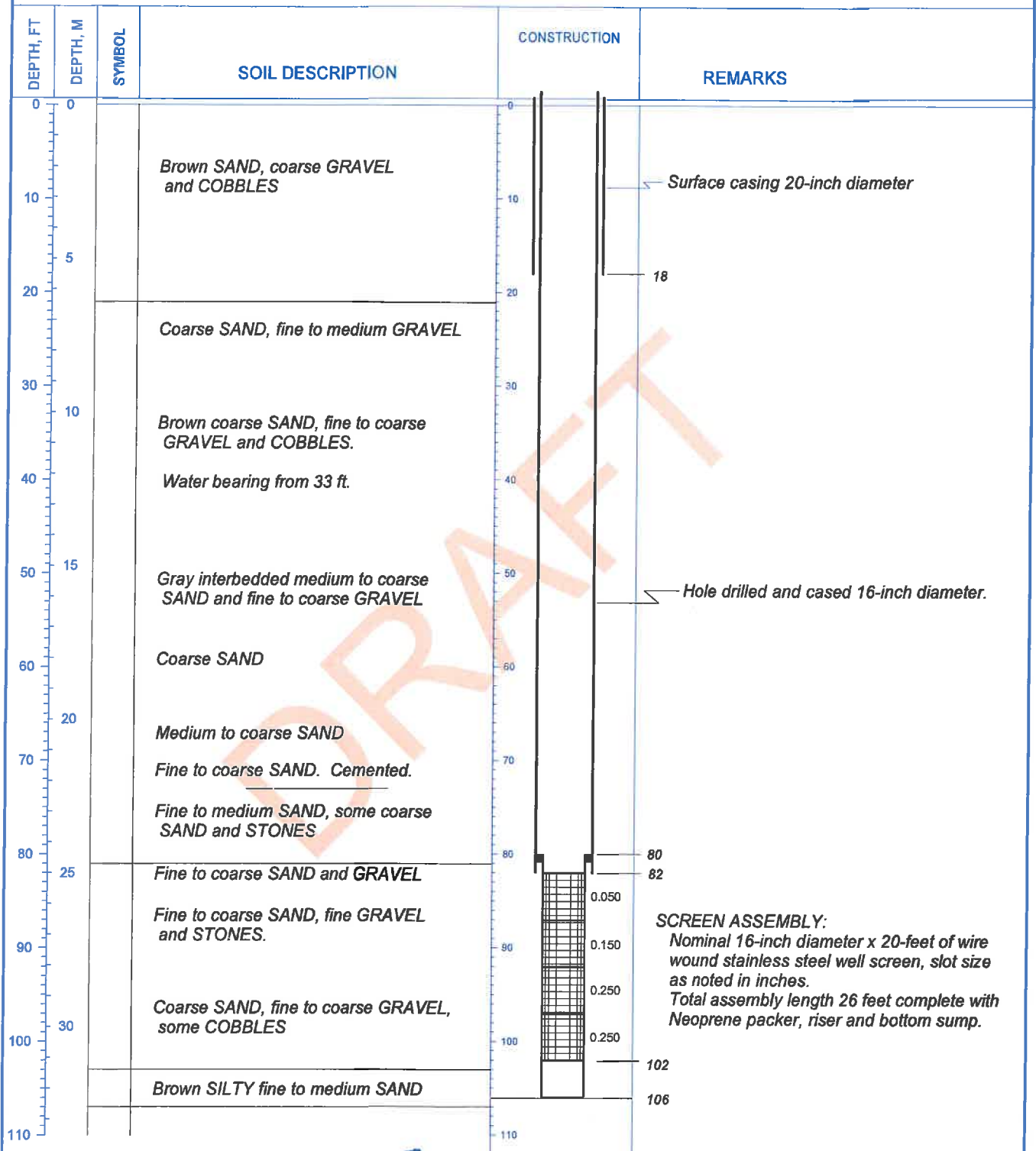
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BOREHOLE NO. WELL NO. 3A

LOCATION WEST SIDE AREA
GRAND FORKS BC

DRILLER COLUMBIA WATER WELLS (1986) LTD.

EQUIPMENT B.E. 22W CABLE TOOL DRILL



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

BY

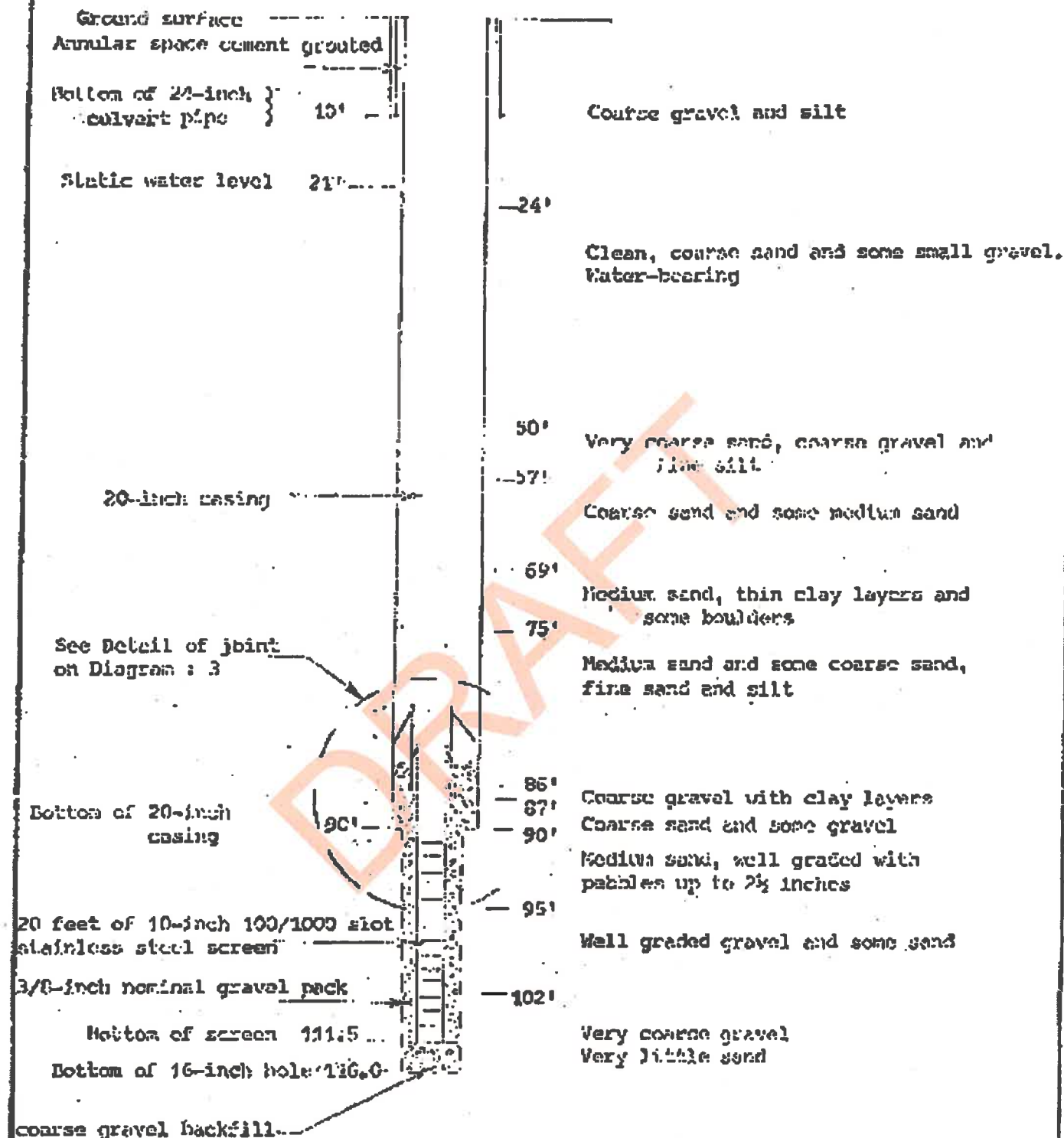
HWR

CONSTRUCTION DATE

15 JUL 00

DRAWING NO.

102



CITY OF GRAND FERKS

Grand Forks, B.C.

Log
of Production Well

ROBINSON, ROBERTS & BROWN LTD.
CONSULTING GROUNDWATER ENGINEERS
NORTH VANCOUVER, CANADA

June, 1969

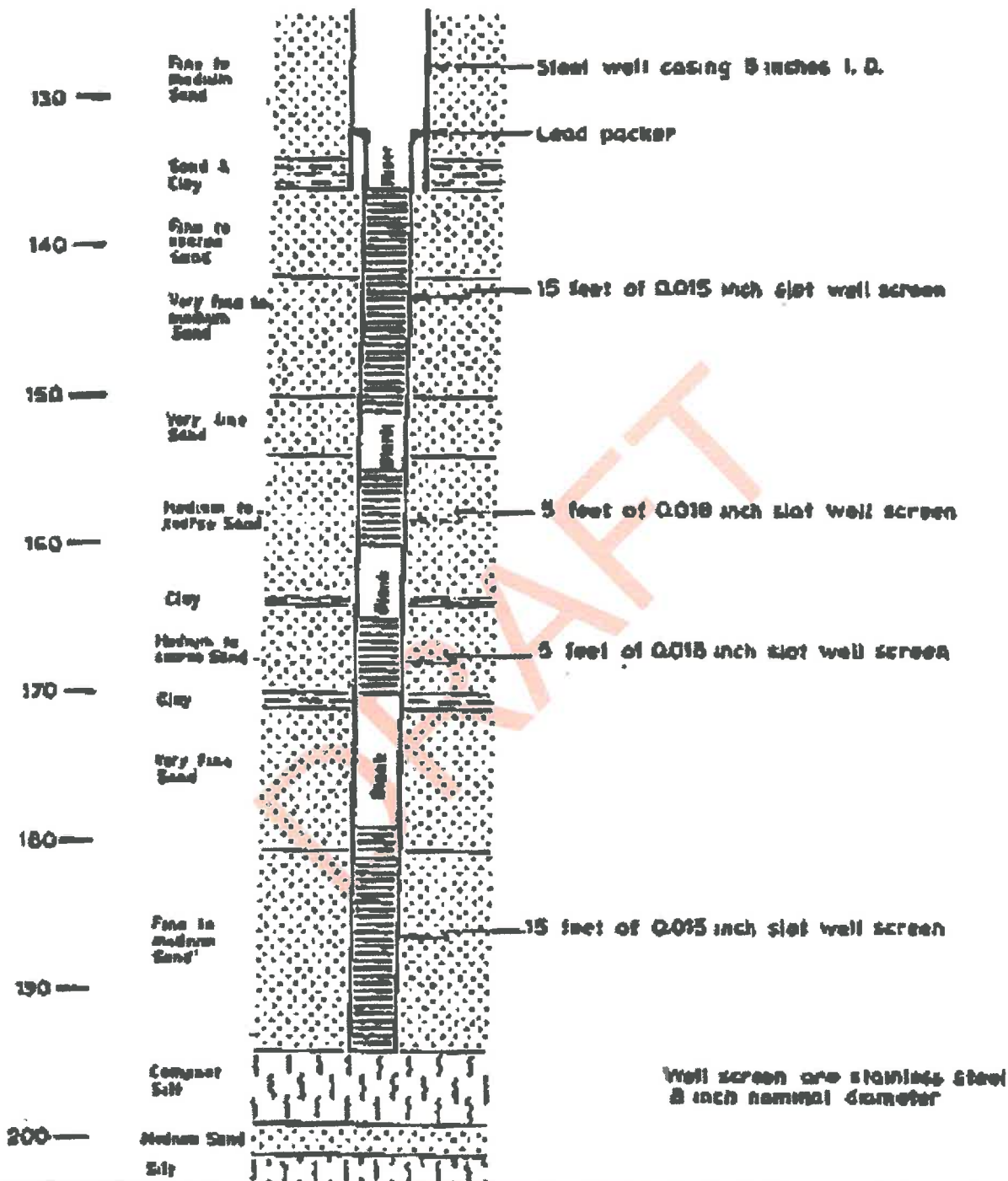
WELL #4

GRAND FORKS:

T.H. 77-2

<u>Depth Below Ground</u>	<u>Description</u>
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 fine 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.

Depth, feet



CITY OF GRAND FORKS



INTERNATIONAL GROUNDWATER CONSULTANTS LTD.
NORTH VANCOUVER, BRITISH COLUMBIA

BRITISH COLUMBIA

TEST WELL
SCREEN ASSEMBLY

BY	HWR	DATE
JOB	77-036	11-8-77
		CHECK 1

HYDROGEOLOGIC LOG (Continued)

DRILLHOLE NO. 1111

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				After Drilling			Comments
			(2) Depth (m)	(2)(4) Water Level (m)	(5) Water Flow (Lps)	(6) Other	(2)(7) Water Level (m)	(8) Hydraulic Conductivity		
								Test Type	Value (m/s)	
40	40.237 SILT Grey/brn md-crs SAND 0.1 41.5 (484.65) 42.8 (483.35)	40.5 (485.65) 400mm 250mm 44 (482.65)						h 7.2x10 ⁻⁵ 43.0	Water temperature during pump test was approx 9.5°C Electrical conductivity during pump test ranged from 490 µmhos/cm after 1 hour to 430 µmhos/cm after 14 hours. pH values during pump test ranged from 8.0-8.3	
	Grey/brown fn - med. SAND, trace Silt							h 1.0x10 ⁻⁴ 44.8		
	47.6 (478.55)							h 1.7x10 ⁻⁴ 46.6		
	Grey/brown-coarse SAND, trace Silt, occasional gravelly (5-10%) layers	1 ss, 1						h 1.6x10 ⁻⁴ 47.6		
	51.2 (474.95)	F9 Monterey Sand pack						h 1.2x10 ⁻⁴ 48.7		
50	Grey/brown fn-med. SAND, trace Silt occasional pebbles							h 5.3x10 ⁻⁴ 50.0		
	0.10 54.7 Silt (471.45)							h 1.4x10 ⁻⁴ 51.2		
	Grey/brown fn-med. SAND, trace Silt							h 4.2x10 ⁻⁵ 51.8		
								h 2.1x10 ⁻⁴ 53.0		
								RCC 2.1x10 ⁻⁴ 54.3		
								h 1.6x10 ⁻⁴ 54.9		
								h 2.3x10 ⁻⁴ 56.1		
	0.07 59.7 (466.45)	Cement Grout Seal 59.4 (466.75)								
60										

Logged by PPI

Checked by RMD

SCALE: Vertical 1" = 150' approximate
Horizontal - N.T.S.
PITEAU & ASSOCIATES
 GEOTECHNICAL CONSULTANTS
 VANCOUVER CALGARY

* Bracketed numbers refer to notes following the logs



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
null	null	null	null
			Drive Shoe
			null

GENERAL REMARKS:
UTM LOCATION GIVEN IS NAD 83

LITHOLOGY INFORMATION:

From	To	Depth	Description
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

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DRAFT

HYDROGEOLOGIC LOGWell 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

Page 1 of 3

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, silt 11.0			
12.0					
14.0	517.0	Well-graded SAND and GRAVEL, graded SAND and GRAVEL	July 29, 1999; SWL (m) = 13.71		
16.0					
18.0	512.4	Well-graded SAND and GRAVEL, Well-graded SAND			
20.0	510.6	Fine-medium SAND, some silt lenses, fine-medium SAND			
22.0			152mm steel casing		
24.0	508.1	Fine-medium SAND, some silt lenses, Fine-medium SAND			
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 CALGARYHYDROGEOLOGICAL ASSESSMENT OF
WATER SUPPLY WELL FOR CITY,
GRAND FORKS, B.C.

WELL TH99-2

BY: MDP DATE: AUG 99
APPROVED: [Signature] FIG: A-2

HYDROGEOLOGIC LOGWell 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

Page 2 of 3

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			
48.0			bail bottom		
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, fine-m. 60.4			
62.0					
64.0	468.2	Fine-medium silty SAND, some tight silt lenses 62.8		backfill	
66.0					
68.0	463.9	Fine silty SAND, some silt lenses 67.1			
70.0					
72.0					
74.0	457.8	Brown fine SAND, some silt 73.2			
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

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		Well Log Examined (Y/N) Yes	
392461E, 5431281N (UTM 10)		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 <i>E. coli</i> .		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	Well Log Examined (Y/N) Yes		
392720E, 5430952 N (UTM 10)	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 <i>E. coli</i> .		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		Well Log Examined (Y/N) Yes	
392700E, 5430957N (UTM 10)		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 <i>E.coli</i> .		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	Well Log Examined (Y/N) Yes		
393316E, 5431312 (UTM 10)	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 <i>E.coli</i> .		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	Well Log Examined (Y/N) Yes		
393329E, 5431332N (UTM 10)	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 <i>E.coli</i> .		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		Well Log Examined (Y/N) Yes	
392629E, 5431955N (UTM 10)		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 <i>E.coli</i> .		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		Well Log Examined (Y/N) Yes	
392841E, 5430633N (UTM 10)		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 <i>E.coli</i> .		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
Jan 30 2006	Valley Heights Booster	X		NEG/ back ground	Tested in House
Feb 20 2006	Valley Heights Booster	X		NEG/ back ground	Tested in House
Mar 20 2006	Valley Heights Booster	X		NEG/ back ground	Tested in House
Apr 3 2006	Valley Heights Booster	X		NEG/ back ground	Tested in House
Apr 10 2006	Valley Heights Booster	X		NEG/ back ground	Tested in House
May 8 2006	Valley Heights Booster	X		NEG/ back ground	Tested in House
May 22 2006	7645 Granby rd.	X		NEG/ back ground	Tested in House
May 22 2006	Valley Heights Booster	0	0	background	Tested at Caro Lab
May 25 2006	Granby Rd.	2	< 1		Audit by I.H.A.
May 31 2006	#4 7625 Granby Rd.	X		NEG/ back ground	Tested in House
May 31 2006	Valley Heights Booster	11	0	background	Tested at Caro Lab
June 2 2006	7389 Valley Heights	3	0		Tested at Caro Lab
June 2 2006	7434 Valley Heights	4	0		Tested at Caro Lab
June 6 2006	243 Winnipeg Ave.	X	X	NEG/ back ground	Tested in House
June 6 2006	129 Victoria Way	5	0		Tested at Caro Lab
June 6 2006	Valley Heights Booster	1	0		Tested at Caro Lab
June 12 2006	Valley Heights Booster	0	0	background	Tested at Caro Lab
June 12 2006	7389 Valley Heights	1	0	background	Tested at Caro Lab
June 19 2006	Valley Heights Booster	X	X	Pos/ pumps off	Tested in House
June 20 2006	Valley Heights Booster	X	X	Pos/ pumps off	Tested in House
June 20 2006	Valley Heights Booster	0	0	background	Tested at Caro Lab
June 20 2006	Valley Heights Booster	3	0	background	Tested at Caro Lab
June 21 2006	#1 Valley Heights	X	X	Pos/ pumps off	Tested in House
June 26 2006	Main Res standpipe	X	X	Pos/ pumps off	Tested in House
July 17 2006	Market st Fountain	X	X	POS	Tested in House
Oct 18 2006	Firehall	X	X	POS/ NEG E COLI	Tested in House
Oct 18 2006	Firehall	X	X	POS/ NEG E COLI	Tested in House
Nov 23 2006	East Zone Reservoir	X	X	POS / no e coli	Tested in House
Dec 3 2007	East Zone Reservoir	POS	NEG	POS	Tested in House
Dec 4 2007	East Zone Reservoir	POS	NEG	POS	Tested in House
Dec 10 2007	East Zone Reservoir	POS	NEG	POS	Tested in House
Jan 3 2006	Aquatic Center	X		NEG	Tested in House
Jan 3 2006	Valley Heights Booster	0	0		Tested at Caro Lab
Jan 3 2006	Boundary Hospital	0	0		Tested at Caro Lab
Jan 9 2006	Treatment Plant	X		NEG	Tested in House
Jan 9 2006	Valley Heights Booster	X		NEG	Tested in House
Jan 10 2006	Boundary Hospital	0	0		Tested at Caro Lab
Jan 10 2006	Valley Heights Booster	0	0		Tested at Caro Lab
Jan 16 2006	Fire Hall	X		NEG	Tested in House
Jan 16 2006	Aquatic Center	X		NEG	Tested in House
Jan 16 2006	Valley Heights Booster	X		NEG	Tested in House
Jan 17 2006	Boundary Hospital	0	0		Tested at Caro Lab
Jan 17 2006	Valley Heights Booster	0	0		Tested at Caro Lab
Jan 23 2006	Boundary Electric	X		NEG	Tested in House
Jan 23 2006	Valley Heights Booster	X		NEG	Tested in House
Jan 24 2006	Jan 31 2006	0	0		Tested at Caro Lab
Jan 24 2006	Valley Heights Booster	0	0		Tested at Caro Lab
Jan 30 2006	Hutton School	X		NEG	Tested in House
Jan 31 2006	Valley Heights Booster	0	0		Tested at Caro Lab
Jan 31 2006	Boundary Hospital	0	0		Tested at Caro Lab
Feb 6 2006	Boundary Hospital	X		NEG	Tested in House
Feb 6 2006	Works Yard	X		NEG	Tested in House
Feb 6 2006	Valley Heights Booster	X		NEG	Tested in House
Feb 6 2006	Valley Heights Booster	0	0		Tested at Caro Lab
Feb 6 2006	Boundary Hospital	0	0		Tested at Caro Lab
Feb 13 2006	Valley Heights Booster	X		NEG	Tested in House
Feb 13 2006	1524 77th Ave.	X		NEG	Tested in House
Feb 14 2006	Valley Heights Booster	0	0		Tested at Caro Lab
Feb 14 2006	Boundary Hospital	0	0		Tested at Caro Lab
Feb 20 2006	Selkirk College	X		NEG	Tested in House
Feb 20 2006	B & F Sales	X		NEG	Tested in House
Feb 21 2006	Valley Heights Booster	0	0		Tested at Caro Lab
Feb 21 2006	Boundary Hospital	0	0		Tested at Caro Lab
Feb 27 2006	Black Knight Market	X		NEG	Tested in House
Feb 27 2006	Valley Heights Booster	X		NEG	Tested in House
Feb 28 2006	Valley Heights Booster	0	0		Tested at Caro Lab
Feb 28 2006	Boundary Hospital	0	0		Tested at Caro Lab
Mar 7 2006	Boundary Hospital	0	0		Tested at Caro Lab
Mar 7 2006	Valley Heights Booster	0	0		Tested at Caro Lab
Mar 7 2006	Petro Canada	X		NEG	Tested in House
Mar 7 2006	Valley Heights Booster	X		NEG	Tested in House
Mar 13 2006	Aquatic Center	X		NEG	Tested in House
Mar 13 2006	Valley Heights Booster	X		NEG	Tested in House
Mar 14 2006	Boundary Hospital	0	0		Tested at Caro Lab
Mar 14 2006	Valley Heights Booster	0	0		Tested at Caro Lab
Mar 20 2006	Boundary Hospital	X		NEG	Tested in House
Mar 21 2006	Boundary Hospital	0	0		Tested at Caro Lab
Mar 21 2006	Valley Heights Booster	0	0		Tested at Caro Lab
Mar 27 2006	WWTF	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
Mar 27 2006	Valley Heights Booster	X		NEG	Tested in House
Mar 28 2006	Boundary Hospital	0	0		Tested at Caro Lab
Mar 28 2006	Valley Heights Booster	0	0		Tested at Caro Lab
Apr 3 2006	Aquatic Center	X		NEG	Tested in House
Apr 3 2006	Fire Hall	X		NEG	Tested in House
Apr 4 2006	Valley Heights Booster	0	0		Tested at Caro Lab
Apr 4 2006	Boundary Hospital	0	0		Tested at Caro Lab
Apr 10 2006	Hutton School	X		NEG	Tested in House
Apr 11 2006	Valley Heights Booster	0	0		Tested at Caro Lab
Apr 11 2006	Boundary Hospital	0	0		Tested at Caro Lab
Apr 18 2006	Valley Heights Booster	X		NEG	Tested in House
Apr 18 2006	WWTF	X		NEG	Tested in House
Apr 18 2006	Valley Heights Booster	0	0		Tested at Caro Lab
Apr 18 2006	Boundary Hospital	0	0		Tested at Caro Lab
Apr 25 2006	Valley Heights Booster	0	0		Tested at Caro Lab
Apr 25 2006	Boundary Hospital	0	0		Tested at Caro Lab
May 1 2006	Valley Heights Booster	X		NEG	Tested in House
May 1 2006	Boundary Hospital	X		NEG	Tested in House
May 3 2006	Valley Heights Booster	0	0		Tested at Caro Lab
May 3 2006	Boundary Hospital	0	0		Tested at Caro Lab
May 8 2006	Aquatic Center	X		NEG	Tested in House
May 9 2006	City Hall	0	0		Tested at Caro Lab
May 9 2006	Valley Heights Booster	0	0		Tested at Caro Lab
May 15 2006	Hutton School	X		NEG	Tested in House
May 15 2006	Valley Heights Booster	X		NEG	Tested in House
May 16 2006	Boundary Hospital	0	0		Tested at Caro Lab
May 16 2006	Tested in House	0	0		Tested at Caro Lab
May 22 2006	Jake Raven's 2nd st.	X		NEG	Tested in House
May 22 2006	Cemetery	X		NEG	Tested in House
May 22 2006	7645 Granby rd.	0	0		Tested at Caro Lab
May 22 2006	Jake Raven's 2nd st.	0	0		Tested at Caro Lab
May 22 2006	Boundary Hospital	0	0		Tested at Caro Lab
May 22 2006	Cemetery	0	0		Tested at Caro Lab
May 26 2006	7649 22nd st.	< 1	< 1		Audit by I.H.A.
May 26 2006	236 Market st.	< 1	< 1		Audit by I.H.A.
May 26 2006	7007 27th st.	< 1	< 1		Audit by I.H.A.
May 26 2006	7130 9th st.	< 1	< 1		Audit by I.H.A.
May 29 2006	Valley Heights Booster	X		NEG	Tested in House
May 29 2006	Bartlett Park Fountain	X		NEG	Tested in House
May 29 2006	Donaldson Fountain	X		NEG	Tested in House
May 31 2006	#2 7625 Granby Rd.	X		NEG	Tested in House
May 31 2006	#14 7625 Granby Rd.	X		NEG	Tested in House
May 31 2006	Boundary Hospital	0	0		Tested at Caro Lab
May 31 2006	#4 7625 Granby Rd.	0	0		Tested at Caro Lab
June 5 2006	128 Victoria Way	X	X	NEG	Tested in House
June 5 2006	Skate Park	X	X	NEG	Tested in House
June 5 2006	Valley Heights Booster	X	X	NEG	Tested in House
June 5 2006	Boundary Hospital	X	X	NEG	Tested in House
June 6 2006	7389 Valley Heights	0	0		Tested at Caro Lab
June 6 2006	Boundary Hospital	0	0		Tested at Caro Lab
June 13 2006	Boundary Hospital	0	0		Tested at Caro Lab
June 13 2006	Valley Heights Booster	0	0		Tested at Caro Lab
June 19 2006	Bartlett Park Fountain	X	X		Tested in House
June 19 2006	Boundary Hospital	X	X	Neg	Tested in House
June 20 2006	#1 Valley Heights	X	X	NEG/ pumps on	Tested in House
June 20 2006	#2 Valley Heights	X	X	NEG/ pumps on	Tested in House
June 20 2006	Boundary Hospital	0	0		Tested at Caro Lab
June 21 2006	#2 Valley Heights	X	X	Pos/ pumps off	Tested in House
June 21 2006	#1 Valley Heights	X	X	NEG/ pumps on	Tested in House
June 21 2006	#2 Valley Heights	X	X	NEG/ pumps on	Tested in House
June 22 2006	#1 Valley Heights	0	0	pumps on	Tested at Caro Lab
June 22 2006	#2 Valley Heights	0	0	pumps on	Tested at Caro Lab
June 26 2006	Bartlett Park Fountain	X	X	NEG	Tested in House
June 26 2006	Valley Heights Booster	X	X	NEG/ pumps on	Tested in House
June 26 2006	Main Res standpipe	X	X	NEG/ pumps on	Tested in House
June 26 2006	Market st Fountain	X	X	NEG	Tested in House
June 27 2006	7389 Valley Heights	0	0		Tested at Caro Lab
June 27 2006	Valley Heights Booster	0	0		Tested at Caro Lab
June 27 2006	Boundary Hospital	0	0		Tested at Caro Lab
July 4 2006	7389 Valley Heights	0	0		Tested at Caro Lab
July 4 2006	Boundary Hospital	0	0		Tested at Caro Lab
July 4 2006	Valley Heights Booster	0	0		Tested at Caro Lab
July 4 2006	Fire Hall	X	X	NEG	Tested in House
July 4 2006	Jim Fields V.H.	X	X	NEG	Tested in House
July 4 2006	Market st Fountain	X	X	NEG	Tested in House
July 4 2006	Bartlett Park Fountain	X	X	NEG	Tested in House
July 11 2006	Boundary Hospital	0	0		Tested at Caro Lab
July 11 2006	City Hall	0	0		Tested at Caro Lab
July 17 2006	Donaldson Fountain	X	X	NEG	Tested in House
July 17 2006	128 Victoria Way	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
July 18 2006	Market st Fountain	X	X	NEG	Tested in House
July 18 2006	City Hall	0	0		Tested at Caro Lab
July 18 2006	Valley Heights Booster	0	0		Tested at Caro Lab
July 18 2006	Boundary Hospital	0	0		Tested at Caro Lab
July 24 2006	Valley Heights Booster	X	X	NEG	Tested in House
July 24 2003	Market st Fountain	X	X	NEG	Tested in House
July 24 2006	#46 7225 Boundary Dr.	X	X	NEG	Tested in House
July 26 2006	Firehall	0	0		Tested at Caro Lab
July 26 2006	Valley Heights Booster	0	0		Tested at Caro Lab
July 26 2006	Boundary Hospital	0	0		Tested at Caro Lab
July 31 2006	Market st Fountain	X	X	NEG	Tested in House
July 31 2006	Skate Park	X	X	NEG	Tested in House
July 31 2006	128 Victoria Way	X	X	NEG	Tested in House
July 31 2006	1349 67th Ave.	X	X	NEG	Tested in House
Aug 1 2006	1349 67th ave	0	0		Tested at Caro Lab
Aug 1 2006	Valley Heights Booster	0	0		Tested at Caro Lab
Aug 1 2006	Boundary Hospital	0	0		Tested at Caro Lab
Aug 8 2006	Victoria Way	X	X	NEG	Tested in House
Aug 8 2006	Donaldson Fountain	X	X	NEG	Tested in House
Aug 8 2006	Market st Fountain	X	X	NEG	Tested in House
Aug 9 2006	Valley Heights Booster	0	0		Tested at Caro Lab
Aug 9 2006	Boundary Hospital	0	0		Tested at Caro Lab
Aug 14 2006	Market st Fountain	X	X	NEG	Tested in House
Aug 14 2006	Valley Heights Booster	X	X	NEG	Tested in House
Aug 16 2006	Boundary Hospital	0	0		Tested at Caro Lab
Aug 16 2006	Valley Heights Booster	0	0		Tested at Caro Lab
Aug 21 2006	Market st Fountain	X	X	NEG	Tested in House
Aug 21 2006	Valley Heights Booster	X	X	NEG	Tested in House
Aug 22 2006	Boundary Hospital	0	0		Tested at Caro Lab
Aug 22 2006	Valley Heights Booster	0	0		Tested at Caro Lab
Aug 29 2006	Donaldson Fountain	X	X	NEG	Tested in House
Aug 29 2006	Market st Fountain	X	X	NEG	Tested in House
Aug 29 2006	Boundary Hospital	0	0		Tested at Caro Lab
Aug 29 2006	Valley Heights Booster	0	0		Tested at Caro Lab
Aug 29 2006	Boundary Hospital	0	0		Tested at Caro Lab
Sept 5 2006	Valley Heights Booster	0	0		Tested at Caro Lab
Sept 5 2006	Market st Fountain	X	X	NEG	Tested in House
Sept 5 2006	Skate Park	X	X	NEG	Tested in House
Sept 11 2006	Market st Fountain	X	X	NEG	Tested in House
Sept 11 2006	Skate Park	X	X	NEG	Tested in House
Sept 12 2006	Boundary Hospital	0	0		Tested at Caro Lab
Sept 12 2006	Valley Heights Booster	0	0		Tested at Caro Lab
Sept 18 2006	Skate Park	X	X	NEG	Tested in House
Sept 18 2006	Firehall	X	X	NEG	Tested in House
Sept 18 2006	Market st Fountain	X	X	NEG	Tested in House
Sept 19 2006	Boundary Hospital	0	0		Tested at Caro Lab
Sept 19 2006	Valley Heights Booster	0	0		Tested at Caro Lab
Sept 25 2006	Market st Fountain	X	X	NEG	Tested in House
Sept 25 2006	Skate Park	X	X	NEG	Tested in House
Sept 27 2006	Boundary Hospital	0	0		Tested at Caro Lab
Sept 27 2006	Valley Heights Booster	0	0		Tested at Caro Lab
Oct 2 2006	128 Victoria Way	X	X	NEG	Tested in House
Oct 2 2006	City Hall	X	X	NEG	Tested in House
Oct 3 2006	Valley Heights Booster	< 1	< 1		Tested at Caro Lab
Oct 3 2006	Boundary Hospital	< 1	< 1		Tested at Caro Lab
Oct 10 2006	Valley Heights Booster	X	X	NEG	Tested in House
Oct 10 2006	City Hall	X	X	NEG	Tested in House
Oct 10 2006	Boundary Hospital	< 1	< 1		Tested at Caro Lab
Oct 10 2006	Valley Heights Booster	< 1	< 1		Tested at Caro Lab
Oct 16 2006	Valley Heights Booster	X	X	NEG	Tested in House
Oct 18 2006	Boundary Hospital	< 1	< 1		Tested at Caro Lab
Oct 18 2006	Valley Heights Booster	< 1	< 1		Tested at Caro Lab
Oct 19 2006	City Hall	X	X	NEG	Tested in House
Oct 21 2006	Firehall	X	X	NEG	Tested in House
Oct 23 2006	City Cemetery	X	X	NEG	Tested in House
Oct 23 2006	Firehall	X	X	NEG	Tested in House
Oct 24 2006	Boundary Hospital	< 1	< 1		Tested at Caro Lab
Oct 24 2006	Valley Heights Booster	< 1	< 1		Tested at Caro Lab
Oct 30 2006	Valley Heights Booster	X	X	NEG	Tested in House
Oct 30 2006	Firehall	X	X	NEG	Tested in House
Oct 31 2006	Boundary Hospital	< 1	< 1		Tested at Caro Lab
Oct 31 2006	Valley Heights Booster	< 1	< 1		Tested at Caro Lab
Nov 6 2006	Valley Heights Booster	X	X	NEG	Tested in House
Nov 6 2006	City Hall	X	X	NEG	Tested in House
Nov 6 2006	Boundary Hospital	< 1	< 1		Tested at Caro Lab
Nov 6 2006	Valley Heights Booster	< 1	< 1		Tested at Caro Lab
Nov 15 2006	East Zone Reservoir	X	X	NEG	Tested in House
Nov 15 2006	Boundary Hospital	< 1	< 1		Tested at Caro Lab
Nov 15 2006	Valley Heights Booster	< 1	< 1		Tested at Caro Lab
Nov 15 2006	East Zone Reservoir	< 1	< 1		Tested at Caro Lab
Nov 17 2006	East Zone Reservoir	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
Nov 20 2003	Valley Heights Booster	X	X	NEG	Tested in House
Nov 20 2006	City Hall	X	X	NEG	Tested in House
Nov 21 2006	Boundary Hospital	<1	<1		Tested at Caro Lab
Nov 21 2006	Valley Heights Booster	<1	<1		Tested at Caro Lab
Nov 26 2006	East Zone Reservoir	X	X	NEG	Tested in House
Nov 27 2006	Valley Heights Booster	X	X	NEG	Tested in House
Nov 27 2006	Firehall	X	X	NEG	Tested in House
Nov 28 2006	Boundary Hospital	<1	<1		Tested at Caro Lab
Nov 28 2006	Valley Heights Booster	<1	<1		Tested at Caro Lab
Dec 11 2006	Firehall	X	X	NEG	Tested in House
Dec 12 2006	Boundary Hospital	<1	<1		Tested at Caro Lab
Dec 12 2006	Valley Heights Booster	<1	<1		Tested at Caro Lab
Dec 18 2006	Hutton School	X	X	NEG	Tested in House
Dec 16 2006	Valley Heights Booster	X	X	NEG	Tested in House
Dec 19 2006	Boundary Hospital	<1	<1		Tested at Caro Lab
Dec 19 2006	Valley Heights Booster	<1	<1		Tested at Caro Lab
Dec 27 2006	Boundary Hospital	<1	<1		Tested at Caro Lab
Dec 27 2006	Valley Heights Booster	<1	<1		Tested at Caro Lab
Dec 3 2007	Valley Heights Booster			NEG	Tested in House
Dec 3 2007	Hutton School			NEG	Tested in House
Dec 3 2007	East Zone Reservoir	<1	<1		Tested at Caro
Dec 3 2007	Valley Heights Booster	<1	<1		Tested at Caro
Dec 4 2007	Perley School	<1	<1		Tested at Caro
Dec 4 2007	East Zone Reservoir	<1	<1		Tested at Caro
Dec 4 2007	Valley Heights Booster	<1	<1		Tested at Caro
Dec 4 2007	Boundary Hospital	<1	<1		Tested at Caro
Dec 4 2007	Well 2	<1	<1		Tested at Caro
Dec 4 2007	Well 5	<1	<1		Tested at Caro
Dec 4 2007	Valley Heights Booster			NEG	Tested in House
Dec 4 2007	Well 3			NEG	Tested in House
Dec 5 2007	Well 3A			NEG	Tested in House
Dec 5 2007	East Zone Reservoir			NEG	Tested in House
Dec 5 2007	East Zone Reservoir			NEG	Tested in House
Dec 5 2007	Valley Heights Booster			NEG	Tested in House
Dec 5 2007	Abbyfield			NEG	Tested in House
Dec 5 2007	East Zone Reservoir	<1	<1		Tested at Caro
Dec 6 2007	Highschool	<1	<1		Tested at Caro
Dec 6 2007	East Zone Reservoir	<1	<1		Tested at Caro
Dec 6 2007	Boundary Lodge	<1	<1		Tested at Caro
Dec 6 2007	Pope & Talbot	<1	<1		Tested at Caro
Dec 6 2007	Can Par	<1	<1		Tested at Caro
Dec 6 2007	East Zone Reservoir			NEG	Tested in House
Dec 6 2007	EZ DRAIN			NEG	Tested in House
Dec 6 2007	Valley Heights Booster			NEG	Tested in House
Dec 7 2007	Omega II			NEG	Tested in House
Dec 7 2007	East Zone Reservoir			NEG	Tested in House
Dec 7 2007	Valley Heights Booster			NEG	Tested in House
Dec 7 2007	128 Victoria Way			NEG	Tested in House
Dec 8 2007	7619 Granby Rd.			NEG	Tested in House
Dec 8 2007	East Zone Reservoir			NEG	Tested in House
Dec 8 2007	Valley Heights Booster			NEG	Tested in House
Dec 9 2007	Chevron			NEG	Tested in House
Dec 9 2007	East Zone Reservoir			NEG	Tested in House
Dec 9 2007	Valley Heights Booster			NEG	Tested in House
Dec 10 2007	6435 9th St.			NEG	Tested in House
Dec 10 2007	Valley Heights Booster			NEG	Tested in House
Dec 10 2007	6144 12th St.			NEG	Tested in House
Dec 11 2007	N 19th dead end			NEG	Tested in House
Dec 11 2007	East Zone Reservoir	<1	<1		Tested at Caro
Dec 11 2007	Valley Heights Booster	<1	<1		Tested at Caro
Dec 11 2007	Boundary Hospital	<1	<1		Tested at Caro
Dec 11 2007	Well 3	<1	<1		Tested at Caro
Dec 11 2007	Well 3A	<1	<1		Tested at Caro
Dec 11 2007	East Zone Reservoir			NEG	Tested in House
Dec 11 2007	Valley Heights Booster			NEG	Tested in House
Dec 11 2007	Well 2			NEG	Tested in House
Dec 11 2007	Well 5			NEG	Tested in House
Dec 12 2007	Hutton School			NEG	Tested in House
Dec 12 2007	East Zone Reservoir	<1	<1		Tested at Caro
Dec 12 2007	Valley Heights Booster	<1	<1		Tested at Caro
Dec 12 2007	Firehall	<1	<1		Tested at Caro
Dec 12 2007	East Zone Reservoir			NEG	Tested in House
Dec 12 2007	Valley Heights Booster			NEG	Tested in House
Dec 13 2007	Super Save			NEG	Tested in House
Dec 13 2007	East Zone Reservoir	<1	<1		Tested at Caro
Dec 13 2007	Valley Heights Booster	<1	<1		Tested at Caro
Dec 13 2007	6933 16th St.	<1	<1		Tested at Caro
Dec 13 2007	East Zone Reservoir			NEG	Tested in House
Dec 13 2007	Valley Heights Booster			NEG	Tested in House
Dec 13 2007	7487 2nd St.			NEG	Tested in House
Dec 14 2007	Mix's House			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
Dec 14 2007	East Zone Reservoir			NEG	Tested in House
Dec 14 2007	Valley Heights Booster			NEG	Tested in House
Dec 15 2007	Went End Store			NEG	Tested in House
Dec 15 2007	East Zone Reservoir			NEG	Tested in House
Dec 16 2007	Valley Heights Booster			NEG	Tested in House
Dec 16 2007	East Zone Reservoir	<1	<1		Tested at Caro
Dec 16 2007	Valley Heights Booster	<1	<1		Tested at Caro
Dec 16 2007	East Zone Reservoir			NEG	Tested in House
Dec 17 2007	Valley Heights Booster			NEG	Tested in House
Dec 17 2007	East Zone Reservoir			NEG	Tested in House
Dec 17 2007	Valley Heights Booster			NEG	Tested in House
Dec 17 2007	PRV Station			NEG	Tested in House
Dec 17 2007	Perley Annex			NEG	Tested in House
Dec 17 2007	Cemetery			NEG	Tested in House
Dec 18 2007	Hutton School			NEG	Tested in House
Dec 18 2007	East Zone Reservoir	<1	<1		Tested at Caro
Dec 18 2007	Valley Heights Booster	<1	<1		Tested at Caro
Dec 18 2007	Boundary Hospital	<1	<1		Tested at Caro
Dec 18 2007	East Zone Reservoir			NEG	Tested in House
Dec 18 2007	Valley Heights Booster			NEG	Tested in House
Dec 18 2007	Boundary Lodge			NEG	Tested in House
Dec 19 2007	Super Save			NEG	Tested in House
Dec 19 2007	East Zone Reservoir			NEG	Tested in House
Dec 19 2007	Valley Heights Booster			NEG	Tested in House
Dec 20 2007	Petro Canada			NEG	Tested in House
Dec 20 2007	East Zone Reservoir			NEG	Tested in House
Dec 20 2007	Valley Heights Booster			NEG	Tested in House
Dec 20 2007	Aquatic Center			NEG	Tested in House
Dec 27 2007	Curves			NEG	Tested in House
Dec 27 2007	East Zone Reservoir			NEG	Tested in House
Dec 27 2007	Valley Heights Booster			NEG	Tested in House
Dec 27 2007	Boundary Hospital			NEG	Tested in House
Dec 28 2007	City Hall			NEG	Tested in House
Dec 28 2007	East Zone Reservoir			NEG	Tested in House
Dec 28 2007	Valley Heights Booster			NEG	Tested in House
Dec 28 2007	G F Arena			NEG	Tested in House
Dec 31 2007	Boundary Lodge			NEG	Tested in House
Dec 31 2007	East Zone Reservoir			NEG	Tested in House
Dec 31 2007	Valley Heights Booster			NEG	Tested in House
Dec 31 2007	Emcon Services			NEG	Tested in House
Dec 31 2007	Hardyview Lodge			NEG	Tested in House
Jan 2 2008	East Zone Reservoir			NEG	Tested in House
Jan 2 2008	Valley Heights Booster			NEG	Tested in House
Jan 2 2008	Boundary Hospital			NEG	Tested in House
Jan 3 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Jan 3 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Jan 3 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Jan 7 2008	Super Save Gas			NEG	Tested in House
Jan 7 2008	Valley Heights Booster			NEG	Tested in House
Jan 7 2008	East Zone Reservoir			NEG	Tested in House
Jan 8 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Jan 8 2008	Well 3A	<1	<1		Tested at Caro Lab
Jan 8 2008	Well 5	<1	<1		Tested at Caro Lab
Jan 8 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Jan 8 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Jan 9 2008	East Zone Reservoir			NEG	Tested in House
Jan 9 2008	Well 3			NEG	Tested in House
Jan 9 2008	Well 2			NEG	Tested in House
Jan 14 2008	Valley Heights Booster			NEG	Tested in House
Jan 14 2008	East Zone Reservoir			NEG	Tested in House
Jan 15 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Jan 15 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Jan 15 2008	Well 3	<1	<1		Tested at Caro Lab
Jan 16 2008	Well 2	<1	<1		Tested at Caro Lab
Jan 16 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Jan 16 2008	Well 5			NEG	Tested in House
Jan 16 2008	East Zone Reservoir			NEG	Tested in House
Jan 16 2008	Well 3A			NEG	Tested in House
Jan 21 2008	East Zone Reservoir			NEG	Tested in House
Jan 22 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Jan 22 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Jan 22 2008	Well 5	<1	<1		Tested at Caro Lab
Jan 22 2008	Well 3A	<1	<1		Tested at Caro Lab
Jan 22 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Jan 24 2008	East Zone Reservoir			NEG	Tested in House
Jan 29 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Jan 29 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Jan 29 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Jan 29 2008	Well 3A	<1	<1		Tested at Caro Lab
Jan 29 2008	Well 5	<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
Feb 4 2008	East Zone Reservoir			NEG	Tested in House
Feb 5 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Feb 5 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Feb 5 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Feb 5 2008	Well 3	<1	<1		Tested at Caro Lab
Feb 5 2008	Well 2	<1	<1		Tested at Caro Lab
Feb 6 2008	East Zone Reservoir			NEG	Tested in House
Feb 12 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Feb 12 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Feb 12 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Feb 12 2008	Well 3A	<1	<1		Tested at Caro Lab
Feb 12 2008	Well 5	<1	<1		Tested at Caro Lab
Feb 12 2008	East Zone Reservoir			NEG	Tested in House
Feb 12 2008	Valley Heights Booster			NEG	Tested in House
Feb 12 2008	High School			NEG	Tested in House
Feb 14 2008	East Zone Reservoir			NEG	Tested in House
Feb 18 2008	East Zone Reservoir			NEG	Tested in House
Feb 18 2008	Hutton School			NEG	Tested in House
Feb 19 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Feb 19 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Feb 19 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Feb 20 2008	East Zone Reservoir			NEG	Tested in House
Feb 25 2008	East Zone Reservoir			NEG	Tested in House
Feb 26 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Feb 26 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Feb 26 2008	Well 5	<1	<1		Tested at Caro Lab
Feb 26 2008	Well 3	<1	<1		Tested at Caro Lab
Feb 26 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Mar 4 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Mar 4 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Mar 4 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Mar 4 2008	Well 2	<1	<1		Tested at Caro Lab
Mar 4 2008	Well 3A	<1	<1		Tested at Caro Lab
Mar 5 2008	Well 5			NEG	Tested in House
Mar 5 2008	Well 3			NEG	Tested in House
Mar 6 2008	East Zone Reservoir			NEG	Tested in House
Mar 11 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Mar 11 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Mar 11 2008	Well 3	<1	<1		Tested at Caro Lab
Mar 11 2008	Well 5	<1	<1		Tested at Caro Lab
Mar 11 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Mar 13 2008	East Zone Reservoir			NEG	Tested in House
Mar 18 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Mar 18 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Mar 18 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Mar 18 2008	Well 2	<1	<1		Tested at Caro Lab
Mar 18 2008	Well 3A	<1	<1		Tested at Caro Lab
Mar 25 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Mar 25 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Mar 25 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Mar 25 2008	Well 3	<1	<1		Tested at Caro Lab
Mar 25 2008	Well 5	<1	<1		Tested at Caro Lab
Mar 27 2008	East Zone Reservoir			NEG	Tested in House
Apr 1 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Apr 1 2008	Hutton School	<1	<1		Tested at Caro Lab
Apr 1 2008	Well 3A	<1	<1		Tested at Caro Lab
Apr 1 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Apr 1 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Apr 2 2008	5th St. and 71st Ave.			NEG	Tested in House
Apr 2 2008	City Park Campground			NEG	Tested in House
Apr 9 2008	Well 5	<1	<1		Tested at Caro Lab
Apr 9 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Apr 9 2008	Boundary Lodge	<1	<1		Tested at Caro Lab
Apr 9 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Apr 9 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Apr 15 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Apr 15 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Apr 15 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Apr 15 2008	Perley School	<1	<1		Tested at Caro Lab
Apr 15 2008	Well 3A	<1	<1		Tested at Caro Lab
Apr 17 2008	East Zone Reservoir			NEG	Tested in House
Apr 22 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Apr 22 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Apr 22 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Apr 22 2008	Hutton School	<1	<1		Tested at Caro Lab
Apr 22 2008	Well 5	<1	<1		Tested at Caro Lab
Apr 24 2008	East Zone Reservoir			NEG	Tested in House
Apr 29 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Apr 29 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Apr 29 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Apr 29 2008	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
Apr 29 2008	Well 3	<1	<1		Tested at Caro Lab
May 1 2008	East Zone Reservoir			NEG	Tested in House
May 6 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
May 6 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
May 6 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
May 8 2008	Well 2	<1	<1		Tested at Caro Lab
May 8 2008	Well 5	<1	<1		Tested at Caro Lab
May 13 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
May 13 2008	Well 3	<1	<1		Tested at Caro Lab
May 13 2008	Boundary Lodge	<1	<1		Tested at Caro Lab
May 13 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
May 13 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
May 22 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
May 22 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
May 22 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
May 22 2008	Well 3	<1	<1		Tested at Caro Lab
May 22 2008	Perley School	<1	<1		Tested at Caro Lab
May 28 2008	Hutton School	<1	<1		Tested at Caro Lab
May 28 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
May 28 2008	Well 3	<1	<1		Tested at Caro Lab
May 28 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
May 28 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
June 3 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
June 3 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
June 3 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
June 3 2008	Well 5	<1	<1		Tested at Caro Lab
June 3 2008	Perley School	<1	<1		Tested at Caro Lab
June 10 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
June 10 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
June 10 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
June 10 2008	Highschool	<1	<1		Tested at Caro Lab
June 10 2008	Well 2	<1	<1		Tested at Caro Lab
June 17 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
June 17 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
June 17 2008	Well 3A	<1	<1		Tested at Caro Lab
June 17 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
June 24 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
June 24 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
June 24 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
June 24 2008	Well 5	<1	<1		Tested at Caro Lab
June 24 2008	Well 3A	<1	<1		Tested at Caro Lab
July 2 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
July 2 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
July 2 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
July 2 2008	Well 2	<1	<1		Tested at Caro Lab
July 2 2008	Well 3	<1	<1		Tested at Caro Lab
July 8 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
July 8 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
July 8 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
July 8 2008	City Hall	<1	<1		Tested at Caro Lab
July 9 2008	2181 72nd Ave.			NEG	Tested in House
July 15 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
July 15 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
July 15 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
July 15 2008	Well 2	<1	<1		Tested at Caro Lab
July 15 2008	Works Yard	<1	<1		Tested at Caro Lab
July 22 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
July 22 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
July 22 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
July 22 2008	Lordco Autoparts	<1	<1		Tested at Caro Lab
July 22 2008	Well 3A	<1	<1		Tested at Caro Lab
July 29 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
July 29 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
July 29 2008	City Hall	<1	<1		Tested at Caro Lab
July 29 2008	Well 3	<1	<1		Tested at Caro Lab
July 29 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Aug 5 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Aug 5 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Aug 5 2008	Well 2	<1	<1		Tested at Caro Lab
Aug 5 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Aug 5 2008	Boundary Lodge	<1	<1		Tested at Caro Lab
Aug 13 2008	Shell on Central Ave.			NEG	Tested in House
Aug 13 2008	CL2 Contact Chamber			NEG	Tested in House
Aug 15 2008	East Zone Reservoir			NEG	Tested in House
Aug 15 2008	Valley Heights Booster			NEG	Tested in House
Aug 15 2008	Boundary Hospital			NEG	Tested in House
Aug 19 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Aug 19 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Aug 19 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Aug 19 2008	Donaldson Park	<1	<1		Tested at Caro Lab
Aug 26 2008	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
Aug 26 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Aug 26 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Aug 26 2008	Highschool	<1	<1		Tested at Caro Lab
Sept 2 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Sept 2 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Sept 2 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Sept 2 2008	Well 3A	<1	<1		Tested at Caro Lab
Sept 8 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Sept 8 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Sept 8 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Sept 8 2008	Alf's subdivision	<1	<1		Tested at Caro Lab
Sept 8 2008	Well 5	<1	<1		Tested at Caro Lab
Sept 16 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Sept 16 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Sept 16 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Sept 16 2008	Alf's subdivision	<1	<1		Tested at Caro Lab
Sept 16 2008	Well 3	<1	<1		Tested at Caro Lab
Sept 23 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Sept 23 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Sept 23 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Sept 23 2008	Perley School	<1	<1		Tested at Caro Lab
Sept 30 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Sept 30 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Sept 30 2008	Well 2	<1	<1		Tested at Caro Lab
Sept 30 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Oct 7 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Oct 7 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Oct 7 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Oct 7 2008	G.F. High school	<1	<1		Tested at Caro Lab
Oct 14 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Oct 14 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Oct 14 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Oct 14 2008	Well 2	<1	<1		Tested at Caro Lab
Oct 14 2008	Well 5	<1	<1		Tested at Caro Lab
Oct 21 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Oct 21 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Oct 21 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Oct 21 2008	Well 3	<1	<1		Tested at Caro Lab
Oct 21 2008	Hutton School	<1	<1		Tested at Caro Lab
Nov 12 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Nov 12 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Nov 12 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Nov 12 2008	Well 2	<1	<1		Tested at Caro Lab
Nov 12 2008	Well 4	<1	<1		Tested at Caro Lab
Nov 12 2008	City Hall	<1	<1		Tested at Caro Lab
Nov 18 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Nov 18 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Nov 18 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Nov 18 2008	Super Save Gas	<1	<1		Tested at Caro Lab
Nov 18 2008	G.F. Fire Hall	<1	<1		Tested at Caro Lab
Nov 19 2008	Well 4	<1	<1		Tested at Caro Lab
Nov 25 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Nov 25 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Nov 25 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Nov 25 2008	Hutton School	<1	<1		Tested at Caro Lab
Nov 25 2008	Well 5	<1	<1		Tested at Caro Lab
Dec 2 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Dec 2 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Dec 2 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Dec 2 2008	Perley School	<1	<1		Tested at Caro Lab
Dec 2 2008	Well 2	<1	<1		Tested at Caro Lab
Dec 9 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Dec 9 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Dec 9 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Dec 9 2008	Hutton School	<1	<1		Tested at Caro Lab
Dec 9 2008	Well 3A	<1	<1		Tested at Caro Lab
Dec 16 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Dec 16 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Dec 16 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Dec 16 2008	Perley School	<1	<1		Tested at Caro Lab
Dec 16 2008	Well 3	<1	<1		Tested at Caro Lab
Dec 22 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Dec 22 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Dec 22 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Dec 22 2008	Super Save Gas	<1	<1		Tested at Caro Lab
Dec 22 2008	Well 5	<1	<1		Tested at Caro Lab
Dec 29 2008	East Zone Reservoir	<1	<1		Tested at Caro Lab
Dec 29 2008	Valley Heights Booster	<1	<1		Tested at Caro Lab
Dec 29 2008	Boundary Hospital	<1	<1		Tested at Caro Lab
Dec 29 2008	Petro Can Gas	<1	<1		Tested at Caro Lab
Dec 29 2008	Buy Low Foods	<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
Jan. 6, 2009	East Zone Reservoir	<1	<1		Tested at Caro Lab
Jan. 6, 2009	Valley Heights Booster	<1	<1		Tested at Caro Lab
Jan. 6, 2009	Boundary Hospital	<1	<1		Tested at Caro Lab
Jan. 6, 2009	Well 3A	<1	<1		Tested at Caro Lab
Jan. 13, 2009	Curves	<1	<1		Tested at Caro Lab
Jan. 13, 2009	East Zone Reservoir	<1	<1		Tested at Caro Lab
Jan. 13, 2009	Valley Heights Booster	<1	<1		Tested at Caro Lab
Jan. 13, 2009	Boundary Hospital	<1	<1		Tested at Caro Lab
Jan. 13, 2009	Hutton School	<1	<1		Tested at Caro Lab
Jan. 20, 2009	Well 5	<1	<1		Tested at Caro Lab
Jan. 20, 2009	Boundary Hospital	<1	<1		Tested at Caro Lab
Jan. 20, 2009	Valley Heights Booster	<1	<1		Tested at Caro Lab
Jan. 20, 2009	East Zone Reservoir	<1	<1		Tested at Caro Lab
Jan. 20, 2009	Firehall	<1	<1		Tested at Caro Lab
Jan. 27, 2009	Perley School	<1	<1		Tested at Caro Lab
Jan. 27, 2009	East Zone Reservoir	<1	<1		Tested at Caro Lab
Jan. 27, 2009	Valley Heights Booster	<1	<1		Tested at Caro Lab
Jan. 27, 2009	Boundary Hospital	<1	<1		Tested at Caro Lab
Jan. 27, 2009	Hutton School	<1	<1		Tested at Caro Lab
Feb. 3/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Feb. 3/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Feb. 3/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Feb. 3/09	GF Aquatic Center	<1	<1		Tested at Caro Lab
Feb. 10/09	Pressure reducing station	<1	<1		Tested at Caro Lab
Feb. 10/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Feb. 10/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Feb. 10/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Feb. 10/09	Super Save Gas	<1	<1		Tested at Caro Lab
Feb. 17/09	Well 5	<1	<1		Tested at Caro Lab
Feb. 17/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Feb. 17/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Feb. 17/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Feb. 17/09	Perley School	<1	<1		Tested at Caro Lab
Feb. 24/09	City Hall	<1	<1		Tested at Caro Lab
Feb. 24/09	Aquatic Center			NEG	Tested in House
Feb. 24/09	Curves			NEG	Tested in House
Feb. 24/09	Buy Low Foods			NEG	Tested in House
Feb. 24/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Feb. 24/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Feb. 24/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Feb. 24/09	Well 3	<1	<1		Tested at Caro Lab
Feb. 24/09	Omega II	<1	<1		Tested at Caro Lab
Mar. 3/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Mar. 3/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Mar. 3/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Mar. 3/09	Well 2	<1	<1		Tested at Caro Lab
Mar. 10/09	Perley School	<1	<1		Tested at Caro Lab
Mar. 10/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Mar. 10/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Mar. 10/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Mar. 10/09	City Hall	<1	<1		Tested at Caro Lab
Mar. 10/09	Hutton School	<1	<1		Tested at Caro Lab
Mar. 12/09	Well 3	<1	<1		Tested at Caro Lab
Mar. 12/09	8015 McCallum			NEG	Tested in house
Mar. 12/09	GF Pool			NEG	Tested in house
Mar. 16/09	Lordco			NEG	Tested in house
Mar. 16/09	Super Save Gas			NEG	Tested in house
Mar. 16/09	GF Firehall			NEG	Tested in house
Mar. 17/09	GF Construction			NEG	Tested in house
Mar. 17/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Mar. 17/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Mar. 17/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Mar. 17/09	ABH Car Sales	<1	<1		Tested at Caro Lab
Mar. 23/09	PRV Station	<1	<1		Tested at Caro Lab
Mar. 23/09	Old Court House (washrm)			NEG	Tested in house
Mar. 23/09	Station Pub			NEG	Tested in house
Mar. 24/09	8167 Donaldson Dr.			NEG	Tested in house
Mar. 24/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Mar. 24/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Mar. 24/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Mar. 24/09	Well 5	<1	<1		Tested at Caro Lab
Mar. 31/09	Evergreen Cemetery	<1	<1		Tested at Caro Lab
Mar. 31/09	Liquor Store			NEG	Tested in house
Mar. 31/09	7426 Valley Heights			NEG	Tested in house
Mar. 31/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Mar. 31/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Mar. 31/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Mar. 31/09	Airport	<1	<1		Tested at Caro Lab
Apr. 1/09	Val-Mar Hydrant	<1	<1		Tested at Caro Lab
Apr. 7/09	2735 - 75th Street			NEG	Tested in house
Apr. 7/09	City Hall			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
Apr. 7/09	Shell Gas			NEG	Tested in house
Apr. 7/09	Super Save Gas	<1	<1		Tested at Caro Lab
Apr. 7/09	Well 3A	<1	<1		Tested at Caro Lab
Apr. 7/09	Curves	<1	<1		Tested at Caro Lab
Apr. 7/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Apr. 14/09	VH Booster Pump	<1	<1		Tested at Caro Lab
Apr. 14/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Apr. 14/09	VH Booster Pump	<1	<1		Tested at Caro Lab
Apr. 14/09	Hospital	<1	<1		Tested at Caro Lab
Apr. 14/09	Evergreen Cemetary	<1	<1		Tested at Caro Lab
Apr. 21/09	City Hall	<1	<1		Tested at Caro Lab
Apr. 21/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Apr. 21/09	VH Booster Pump	<1	<1		Tested at Caro Lab
Apr. 21/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Apr. 21/09	Well 2	<1	<1		Tested at Caro Lab
Apr. 28/09	Airport	<1	<1		Tested at Caro Lab
Apr. 28/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Apr. 28/09	VH Booster Pump	<1	<1		Tested at Caro Lab
Apr. 28/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Apr. 28/09	Perley Elementary	<1	<1		Tested at Caro Lab
May 6/09	Well 2	<1	<1		Tested at Caro Lab
May 6/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
May 6/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
May 6/09	Boundary Hospital	<1	<1		Tested at Caro Lab
May 6/09	Hutton School	<1	<1		Tested at Caro Lab
May 12/09	Del's Bistro	<1	<1		Tested at Caro Lab
May 12/09	Boundary Hospital	<1	<1		Tested at Caro Lab
May 12/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
May 12/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
May 19/09	GF Arena	<1	<1		Tested at Caro Lab
May 19/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
May 19/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
May 19/09	Boundary Hospital	<1	<1		Tested at Caro Lab
May 19/09	Well 5	<1	<1		Tested at Caro Lab
May 26/09	Firehall	<1	<1		Tested at Caro Lab
May 26/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
May 26/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
May 26/09	Boundary Hospital	<1	<1		Tested at Caro Lab
June 2/09	Hutton School	<1	<1		Tested at Caro Lab
June 2/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
June 2/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
June 2/09	Boundary Hospital	<1	<1		Tested at Caro Lab
June 9/09	Works Yard	<1	<1		Tested at Caro Lab
June 9/09	Boundary Hospital	<1	<1		Tested at Caro Lab
June 9/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
June 9/09	Booster Station	<1	<1		Tested at Caro Lab
June 9/09	Super Save			NEG	Tested in house
June 9/09	Cemetery			NEG	Tested in house
June 10/09	Blow Out @ Subdivision			NEG	Tested in house
June 16/09	Hydrant #74			NEG	Tested in house
June 16/09	Grand Forks Airport			NEG	Tested in house
June 16/09	Grand Forks City Hall			NEG	Tested in house
June 16/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
June 16/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
June 23/09	Boundary Hospital	<1	<1		Tested at Caro Lab
June 23/09	Well #2			NEG	Tested in house
June 23/09	Evergreen Cemetary			NEG	Tested in house
June 23/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
June 23/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
June 23/09	Boundary Hospital	<1	<1		Tested at Caro Lab
July 2, 2009	Well #3			NEG	Tested in house
July 2, 2009	Lordco			NEG	Tested in house
July 2, 2009	East Zone Reservoir	<1	<1		Tested at Caro Lab
July 2, 2009	Valley Heights Booster	<1	<1		Tested at Caro Lab
July 2, 2009	Boundary Hospital	<1	<1		Tested at Caro Lab
July 7, 2009	East Zone Reservoir	<1	<1		Tested at Caro Lab
July 7, 2009	Valley Heights Booster	<1	<1		Tested at Caro Lab
July 7, 2009	Boundary Hospital	<1	<1		Tested at Caro Lab
July 14/09	Market St Fountain			NEG	Tested in house
July 14/09	Dick Bartlett Pk Fountain			NEG	Tested in house
July 14/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
July 14/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
July 23/09	Boundary Hospital	<1	<1		Tested at Caro Lab
July 23/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
July 23/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
July 26/09	Boundary Hospital	<1	<1		Tested at Caro Lab
July 26/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
July 26/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Aug. 6/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Aug. 6/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Aug. 6/09	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
Aug. 8/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Aug. 8/09	CL2 Contact Bldg			NEG	Tested in house
Aug. 11/09	Campers Washroom			NEG	Tested in house
Aug. 11/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Aug. 11/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Aug. 13/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Aug. 13/09	Lordco-mens washroom			NEG	Tested in house
Aug. 18/09	Pool-first aid room			NEG	Tested in house
Aug. 18/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Aug. 18/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Aug. 20/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Aug. 20/09	334 C Market (Hookers)			NEG	Tested in house
Aug. 24/09	Cal Lamontanges			NEG	Tested in house
Aug. 24/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Aug. 24/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Aug. 27/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Aug. 27/09	JD Park			NEG	Tested in house
Aug. 31/09	Rod Fofonoff residence			NEG	Tested in house
Aug. 31/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Aug. 31/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Sept. 2/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Sept. 2/09	Lordco			NEG	Tested in house
Sept. 8/09	Super Save Gas			NEG	Tested in house
Sept. 8/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Sept. 8/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Sept. 9/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Sept. 9/09	Anex			NEG	Tested in house
Sept. 14/09	PetroCan			NEG	Tested in house
Sept. 14/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Sept. 14/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Sept. 16/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Sept. 16/09	Hutton Elementary			NEG	Tested in house
Sept. 21/09	7425 - 2nd St.			NEG	Tested in house
Sept. 21/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Sept. 21/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Sept. 22/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Sept. 22/09	Cemetery			NEG	Tested in house
Sept. 28/09	Airport			NEG	Tested in house
Sept. 28/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Sept. 28/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Oct. 6/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Oct. 6/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Oct. 6/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Oct. 13/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Oct. 13/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Oct. 13/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Oct. 15/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Oct. 15/09	WWTP			NEG	Tested in house
Oct. 20/09	Scout Hall			NEG	Tested in house
Oct. 20/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Oct. 20/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Oct. 22/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Oct. 22/09	Perley School			NEG	Tested in house
Oct. 22/09	Hutton School			NEG	Tested in house
Oct. 26/09	Curves			NEG	Tested in house
Oct. 26/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Oct. 26/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Nov. 2/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Nov. 2/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Nov. 2/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Nov. 9/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Nov. 9/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Nov. 9/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Nov. 16/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Nov. 16/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Nov. 16/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Nov. 19/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Nov. 19/09	Liquor Store & More			NEG	Tested in House
Nov. 23/09	Buy Low Foods			NEG	Tested in House
Nov. 23/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Nov. 23/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Nov. 30/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Nov. 30/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Nov. 30/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Dec. 3/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Dec. 3/09	City Hall			NEG	Tested in House
Dec. 3/09	Super Save Gas			NEG	Tested in House
Dec. 7/09	Petro Can			NEG	Tested in House
Dec. 7/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Dec. 7/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Dec. 8/09	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
Dec. 8/09	Aquatic Centre			NEG	Tested in House
Dec. 14/09	7425-2nd Street			NEG	Tested in House
Dec. 14/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Dec. 14/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Dec. 17/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Dec. 17/09	Hutton School			NEG	Tested in House
Dec. 21/09	Clyde's Pub			NEG	Tested in House
Dec. 21/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Dec. 21/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Dec. 23/09	Boundary Hospital	<1	<1		Tested at Caro Lab
Dec. 23/09	Apt7 7560 - 21st St			NEG	Tested in House
Dec. 23/09	GF Construction			NEG	Tested in House
Dec. 28/09	Home Hardware			NEG	Tested in House
Dec. 29/09	East Zone Reservoir	<1	<1		Tested at Caro Lab
Dec. 29/09	Valley Heights Booster	<1	<1		Tested at Caro Lab
Jan. 4, 2010	Boundary Hospital	<1	<1		Tested at Caro Lab
Jan. 4, 2010	East Zone Reservoir	<1	<1		Tested at Caro Lab
Jan. 4, 2010	Valley Heights Booster	<1	<1		Tested at Caro Lab
Jan. 11, 2010	Boundary Hospital	<1	<1		Tested at Caro Lab
Jan. 11, 2010	East Zone Reservoir	<1	<1		Tested at Caro Lab
Jan. 11, 2010	Valley Heights Booster	<1	<1		Tested at Caro Lab
Jan. 14, 2010	Boundary Hospital	<1	<1		Tested at Caro Lab
Jan. 14, 2010	Super Save Gas			NEG	Tested in-House
Jan. 25, 2010	Fire Hall			NEG	Tested in-House
Jan. 25, 2010	East Zone Reservoir	<1	<1		Tested at Caro Lab
Jan. 25, 2010	Valley Heights Booster	<1	<1		Tested at Caro Lab
Feb. 1, 2010	Boundary Hospital	<1	<1		Tested at Caro Lab
Feb. 1, 2010	East Zone Reservoir	<1	<1		Tested at Caro Lab
Feb. 1, 2010	Valley Heights Booster	<1	<1		Tested at Caro Lab
Feb. 8, 2010	Boundary Hospital	<1	<1		Tested at Caro Lab
Feb. 8, 2010	East Zone Reservoir	<1	<1		Tested at Caro Lab
Feb. 8, 2010	Valley Heights Booster	<1	<1		Tested at Caro Lab
Feb. 11, 2010	Boundary Hospital	<1	<1		Tested at Caro Lab
Feb. 11, 2010	Airport Terminal			NEG	Tested in-House
Feb. 15, 2010	Cemetery Shack			NEG	Tested in-House
Feb. 15, 2010	East Zone Reservoir	<1	<1		Tested at Caro Lab
Feb. 15, 2010	Valley Heights Booster	<1	<1		Tested at Caro Lab
Feb. 22, 2010	Boundary Hospital	<1	<1		Tested at Caro Lab
Feb. 22, 2010	East Zone Reservoir	<1	<1		Tested at Caro Lab
Feb. 22, 2010	Valley Heights Booster	<1	<1		Tested at Caro Lab
Feb. 24, 2010	Boundary Hospital	<1	<1		Tested at Caro Lab
Feb. 24, 2010	Super Save Gas			NEG	Tested in-House
Mar. 1, 2010	Sears			NEG	Tested in-House
Mar. 1, 2010	East Zone Reservoir	<1	<1		Tested at Caro Lab
Mar. 1, 2010	Valley Heights Booster	<1	<1		Tested at Caro Lab
Mar. 3, 2010	Boundary Hospital	<1	<1		Tested at Caro Lab
Mar. 3, 2010	Aquatic Centre			NEG	Tested in-House
Mar. 8, 2010	Contact Chamber			NEG	Tested in-House
Mar. 10, 2010	Bill Durham			NEG	Tested in-House
Mar. 10, 2010	Valley Heights Booster	<1	<1		Tested at Caro Lab
Mar. 10, 2010	Boundary Hospital	<1	<1		Tested at Caro Lab
Mar. 10, 2010	GF Construction			NEG	Tested in-House
Mar. 15, 2010	Buy Low Foods			NEG	Tested in-House
Mar. 15, 2010	East Zone Reservoir	<1	<1		Tested at Caro Lab
Mar. 15, 2010	Valley Heights Booster	<1	<1		Tested at Caro Lab
Mar. 16, 2010	Boundary Hospital	<1	<1		Tested at Caro Lab
Mar. 24, 2010	SPCA			NEG	Tested in-House
Mar. 24, 2010	East Zone Reservoir	<1	<1		Tested at Caro Lab
Mar. 24, 2010	Valley Heights Booster	<1	<1		Tested at Caro Lab
Mar. 24, 2010	Boundary Hospital	<1	<1		Tested at Caro Lab
Mar. 24, 2010	Firehall			NEG	Tested in-House
Mar. 29, 2010	6908-17th Street			NEG	Tested in-House
Mar. 29, 2010	Lordco			NEG	Tested in-House
Mar. 29, 2010	Flexus			NEG	Tested in-House
Mar. 29, 2010	East Zone Reservoir	<1	<1		Tested at Caro Lab
Mar. 29, 2010	Valley Heights Booster	<1	<1		Tested at Caro Lab
Apr. 6, 2010	Boundary Hospital	<1	<1		Tested at Caro Lab
Apr. 6, 2010	East Zone Reservoir	<1	<1		Tested at Caro Lab
Apr. 6, 2010	Valley Heights Booster	<1	<1		Tested at Caro Lab
Apr. 7, 2010	Boundary Hospital	<1	<1		Tested at Caro Lab
Apr. 7, 2010	Super Save Gas			NEG	Tested in-House
Apr. 12, 2010	Curves			NEG	Tested in-House
Apr. 12, 2010	East Zone Reservoir	<1	<1		Tested at Caro Lab
Apr. 12, 2010	Valley Heights Booster	<1	<1		Tested at Caro Lab
Apr. 13, 2010	Boundary Hospital	<1	<1		Tested at Caro Lab
Apr. 13, 2010	BC Liquor Store			NEG	Tested in-House
Apr. 19, 2010	Clydes Brew & Cue			NEG	Tested in-House
Apr. 19, 2010	East Zone Reservoir	<1	<1		Tested at Caro Lab
Apr. 19, 2010	Valley Heights Booster	<1	<1		Tested at Caro Lab
Apr. 22, 2010	Boundary Hospital	<1	<1		Tested at Caro Lab
Apr. 22, 2010	WWTP			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
Apr.26.2010	Petro Canada Gas			NEG	Tested in-House
Apr.26.2010	East Zone Reservoir	<1	<1		Tested at Caro Lab
Apr.26.2010	Valley Heights Booster	<1	<1		Tested at Caro Lab
May.3.2010	Boundary Hospital	<1	<1		Tested at Caro Lab
May.3.2010	East Zone Reservoir	<1	<1		Tested at Caro Lab
May.3.2010	Valley Heights Booster	<1	<1		Tested at Caro Lab
May.4.2010	Boundary Hospital	<1	<1		Tested at Caro Lab
May.5.2010	City Park			NEG	Tested in-House
May.12/10	City Park			NEG	Tested in-House
May.12/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
May.12/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
May.18/10	Boundary Hospital	<1	<1		Tested at Caro Lab
May.19/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
May.19/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
May.26/10	Boundary Hospital	<1	<1		Tested at Caro Lab
May.23/10	Super Save Gas			NEG	Tested in-House
May.27/10	6144-12th St.			NEG	Tested in-House
May.27/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
May.27/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
June.1/10	Boundary Hospital	<1	<1		Tested at Caro Lab
June.1/10	Petro Canada			NEG	Tested in-House
June.9/10	Fire Hall			NEG	Tested in-House
June.9/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
June.9/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
June.9/10	Boundary Hospital	<1	<1		Tested at Caro Lab
June.9/10	Rec Centre			NEG	Tested in-House
June.14/10	Curves			NEG	Tested in-House
June.14/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
June.14/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
June.15/10	Boundary Hospital	<1	<1		Tested at Caro Lab
June.15/10	Grand Forks Airport			NEG	Tested in-House
June.21/10	Supersave Gas			NEG	Tested in-House
June.21/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
June.21/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
June.23/10	Boundary Hospital	<1	<1		Tested at Caro Lab
June.23/10	Selkirk College			NEG	Tested in-House
June.26/10	Petro Canada			NEG	Tested in-House
June.28/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
June.28/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
June.29/10	Boundary Hospital	<1	<1		Tested at Caro Lab
June.29/10	7223-5th St.			NEG	Tested in-House
July.5/10	Liquor Store & More			NEG	Tested in-House
July.5/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
July.5/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
July.6/10	Boundary Hospital	<1	<1		Tested at Caro Lab
July.6/10	Super Save Gas			NEG	Tested in-House
July.12/10	6885-3rd St.			NEG	Tested in-House
July.12/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
July.12/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
July.13/10	Boundary Hospital	<1	<1		Tested at Caro Lab
July.13/10	129 Victoria Way			NEG	Tested in-House
July.19/10	Kal Tire			NEG	Tested in-House
July.19/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
July.19/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
July.20/10	Boundary Hospital	<1	<1		Tested at Caro Lab
July.20/10	6311-12th St.			NEG	Tested in-House
July.26/10	City Hall			NEG	Tested in-House
July.26/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
July.26/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
July.28/10	Boundary Hospital	<1	<1		Tested at Caro Lab
July.28/10	8780 Riverside Dr.			NEG	Tested in-House
Aug.3/10	McLaren Sub. N. Hydrant			NEG	Tested in-House
Aug.3/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
Aug.3/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
Aug.4/10	Boundary Hospital	<1	<1		Tested at Caro Lab
Aug.4/10	Airport			NEG	Tested in-House
Aug.8/10	Redl Electric			NEG	Tested in-House
Aug.8/10	Barbarann Park Washroom			NEG	Tested in-House
Aug.8/10	Ok Tire Car Wash			NEG	Tested in-House
Aug.9/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
Aug.9/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
Aug.16/10	Boundary Hospital	<1	<1		Tested at Caro Lab
Aug.16/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
Aug.16/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
Aug.17/10	Boundary Hospital	<1	<1		Tested at Caro Lab
Aug.17/10	Flexus			NEG	Tested in-House
Aug.23/10	City Hall			NEG	Tested in-House
Aug.23/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
Aug.23/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
Aug.30/10	Boundary Hospital	<1	<1		Tested at Caro Lab
Aug.30/10	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
Aug. 30/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
Aug. 31/10	Boundary Hospital	<1	<1		Tested at Caro Lab
Aug. 31/10	Petro Canada			NEG	Tested in-House
Sept. 7/10	6432-8th St.			NEG	Tested in-House
Sept. 7/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
Sept. 7/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
Sept. 7/10	Boundary Hospital	<1	<1		Tested at Caro Lab
Sept. 7/10	Riverside Washroom			NEG	Tested in-House
Sept. 13/10	Cemetery			NEG	Tested in-House
Sept. 13/10	7269-22nd St.			NEG	Tested in-House
Sept. 13/10	7307-22nd St.			NEG	Tested in-House
Sept. 13/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
Sept. 15/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
Sept. 20/10	Boundary Hospital	<1	<1		Tested at Caro Lab
Sept. 20/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
Sept. 20/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
Sept. 27/10	Boundary Hospital	<1	<1		Tested at Caro Lab
Sept. 27/10	Loroco			NEG	Tested in-House
Sept. 28/10	Super Save Gas			NEG	Tested in-House
Sept. 28/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
Sept. 28/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
Oct. 6/10	Boundary Hospital	<1	<1		Tested at Caro Lab
Oct. 6/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
Oct. 6/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
Oct. 12/10	Boundary Hospital	<1	<1		Tested at Caro Lab
Oct. 12/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
Oct. 12/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
Oct. 13/10	Boundary Hospital	<1	<1		Tested at Caro Lab
Oct. 13/10	Petro Canada Gas			NEG	Tested in-House
Oct. 18/10	B.C. Liquor Store			NEG	Tested in-House
Oct. 18/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
Oct. 18/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
Oct. 21/10	Boundary Hospital	<1	<1		Tested at Caro Lab
Oct. 21/10	Super Save Gas			NEG	Tested in-House
Oct. 25/10	Selkirk College			NEG	Tested in-House
Oct. 25/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
Oct. 25/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
Nov. 8/10	Boundary Hospital	<1	<1		Tested at Caro Lab
Nov. 8/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
Nov. 8/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
Nov. 15/10	Boundary Hospital	<1	<1		Tested at Caro Lab
Nov. 15/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
Nov. 15/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
Nov. 17/10	Boundary Hospital	<1	<1		Tested at Caro Lab
Nov. 17/10	Super Save			NEG	Tested in-House
Nov. 22/10	Petro Canada			NEG	Tested in-House
Nov. 22/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
Nov. 22/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
Nov. 29/10	Boundary Hospital	<1	<1		Tested at Caro Lab
Nov. 29/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
Nov. 29/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
Dec. 8/10	Boundary Hospital	<1	<1		Tested at Caro Lab
Dec. 8/10	Airport			NEG	Tested in-House
Dec. 13/10	O.K. Tire Car Wash			NEG	Tested in-House
Dec. 13/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
Dec. 13/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
Dec. 15/10	Boundary Hospital	<1	<1		Tested at Caro Lab
Dec. 15/10	Cemetery			NEG	Tested in-House
Dec. 20/10	City Hall			NEG	Tested in-House
Dec. 20/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
Dec. 20/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
Dec. 22/10	Boundary Hospital	<1	<1		Tested at Caro Lab
Dec. 22/10	Super Save Gas			NEG	Tested in-House
Dec. 29/10	Curves			NEG	Tested in-House
Dec. 26/10	Omega Restaurant			NEG	Tested in-House
Dec. 28/10	SPCA			NEG	Tested in-House
Dec. 29/10	East Zone Reservoir	<1	<1		Tested at Caro Lab
Dec. 29/10	Valley Heights Booster	<1	<1		Tested at Caro Lab
Dec. 29/10	Boundary Hospital	<1	<1		Tested at Caro Lab
Jan. 10/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Jan. 10/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Jan. 13/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Jan. 13/11	Hutton Elementary School			NEG	Tested in-House
Jan. 17/11	Perley Elementary School			NEG	Tested in-House
Jan. 17/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Jan. 17/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Jan. 18/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Jan. 18/11	Flexus			NEG	Tested in-House
Jan. 24/11	Curves			NEG	Tested in-House
Jan. 24/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Jan. 24/11	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
Jan.24/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Jan.24/11	Video Express			NEG	Tested in-House
Jan.31/11	Super Save Gas			NEG	Tested in-House
Jan.31/11	City Hall			NEG	Tested in-House
Jan.31/11	Petro			NEG	Tested in-House
Jan.31/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Jan.31/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Feb.7/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Feb.7/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Feb.7/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Feb.9/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Feb.6/11	Public Works Yard			NEG	Tested in-House
Feb.14/11	Fire Hall			NEG	Tested in-House
Feb.14/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Feb.14/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Feb.17/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Feb.17/11	Community Futures			NEG	Tested in-House
Feb.28/11	Sears			NEG	Tested in-House
Feb.28/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Feb.28/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Mar.2/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Mar.2/11	Super Save Gas			NEG	Tested in-House
Mar.7/11	6311-12th St.			NEG	Tested in-House
Mar.7/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Mar.7/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Mar.8/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Mar.6/11	Petro Canada			NEG	Tested in-House
Mar.14/11	6337-Como St.			NEG	Tested in-House
Mar.14/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Mar.14/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Mar.14/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Mar.14/11	Works Yard			NEG	Tested in-House
Mar.21/11	Liquor Store N More			NEG	Tested in-House
Mar.21/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Mar.21/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Mar.23/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Mar.23/11	Airport			NEG	Tested in-House
Mar.26/11	Sun Valley Car Wash			NEG	Tested in-House
Mar.28/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Mar.28/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Mar.30/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Mar.30/11	Petro Canada			NEG	Tested in-House
Apr.4/11	City Hall			NEG	Tested in-House
Apr.4/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Apr.4/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Apr.11/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Apr.11/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Apr.11/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Apr.16/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Apr.18/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Apr.18/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Apr.27/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Apr.27/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Apr.27/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
May.3/11	Boundary Hospital	<1	<1		Tested at Caro Lab
May.3/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
May.3/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
May.9/11	Boundary Hospital	<1	<1		Tested at Caro Lab
May.9/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
May.9/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
May.11/11	Boundary Hospital	<1	<1		Tested at Caro Lab
May.11/11	Petro Canada			NEG	Tested in-House
May.16/11	Curves			NEG	Tested in-House
May.16/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
May.16/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
May.18/11	Boundary Hospital	<1	<1		Tested at Caro Lab
May.16/11	Super Save Gas			NEG	Tested in-House
May.24/11	BC Liquor Store			NEG	Tested in-House
May.24/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
May.24/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
May.24/11	Boundary Hospital	<1	<1		Tested at Caro Lab
May.26/11	Cemetery			NEG	Tested in-House
May.20/11	6155-12th St.			NEG	Tested in-House
May.20/11	6660-10th St.			NEG	Tested in-House
May.20/11	131-Central			NEG	Tested in-House
May.30/11	Super Save Gas			NEG	Tested in-House
May.30/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
May.30/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
May.30/11	Boundary Hospital	<1	<1		Tested at Caro Lab
May.30/11	6337-Como Street	<1	<1		Tested at Caro Lab
May.31/11	6144 Johnson Flats	<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
May.31/11	Petro Canada			NEG	Tested In-House
May.31/11	Sun Valley Car Wash			NEG	Tested in-House
May.31/11	Airport			NEG	Tested in-House
June.1/11	Barbarann Park Washroom			NEG	Tested in-House
June.1/11	Angus McDonald Washroom			NEG	Tested in-House
June.6/11	8120 Donaldson Drive			NEG	Tested In-House
June.6/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
June.6/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
June.6/11	Boundary Hospital	<1	<1		Tested at Caro Lab
June.8/11	Kal Tire			NEG	Tested in-House
June.10/11	Cemetary			NEG	Tested in-House
June.13/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
June.13/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
June.14/11	Boundary Hospital	<1	<1		Tested at Caro Lab
June.14/11	Flexus			NEG	Tested In-House
June.16/11	6144-12th St.			NEG	Tested in-House
June.16/11	East Zone Reservoir #1			NEG	Tested in-House
June.16/11	East Zone Reservoir #2			NEG	Tested In-House
June.16/11	East Zone Reservoir #1	<1	<1		Tested at Caro Lab
June.20/11	East Zone Reservoir #2	<1	<1		Tested at Caro Lab
June.20/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
June.20/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
June.23/11	Boundary Hospital	<1	<1		Tested at Caro Lab
June.25/11	East Zone Reservoir #1	<1	<1		Tested at Caro Lab
June.27/11	East Zone Reservoir #2	<1	<1		Tested at Caro Lab
June.27/11	Petro Canada			NEG	Tested in-House
June.27/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
June.27/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
July.4/11	Boundary Hospital	<1	<1		Tested at Caro Lab
July.4/11	Roxul			NEG	Tested In-House
July.4/11	Interfor Office			NEG	Tested in-House
July.4/11	Interfor J-Bar			NEG	Tested In-House
July.4/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
July.4/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
July.4/11	Boundary Hospital	<1	<1		Tested at Caro Lab
July.11/11	Interfor	<1	<1		Tested at Caro Lab
July.11/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
July.11/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
July.13/11	Boundary Hospital	<1	<1		Tested at Caro Lab
July.15/11	Super Save Gas			NEG	Tested in-House
July.16/11	City Hall			NEG	Tested in-House
July.18/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
July.18/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
July.20/11	Boundary Hospital	<1	<1		Tested at Caro Lab
July.26/11	Curves			NEG	Tested in-House
July.26/11	Petro Canada			NEG	Tested in-House
July.26/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
July.26/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
July.26/11	Boundary Hospital	<1	<1		Tested at Caro Lab
July.26/11	Super Save Gas			NEG	Tested in-House
Aug.2/11	GF Fire Hall			NEG	Tested in-House
Aug.2/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Aug.2/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Aug.3/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Aug.3/11	Petro Canada			NEG	Tested in-House
Aug.8/11	Lordco			NEG	Tested in-House
Aug.8/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Aug.8/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Aug.11/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Aug.11/11	City Works Yard			NEG	Tested in-House
Aug.16/11	2348 - Central			NEG	Tested in-House
Aug.16/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Aug.16/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Aug.22/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Aug.22/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Aug.22/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Aug.26/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Aug.29/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Aug.29/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Aug.30/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Aug.30/11	City Works Yard			NEG	Tested in-House
Sept.2/11	Super Save Gas			NEG	Tested in-House
Sept.2/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Sept.2/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Sept.8/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Sept.8/11	Hutton School			NEG	Tested in-House
Sept.12/11	Perley Change Room			NEG	Tested in-House
Sept.12/11	Evergreen Cemetery			NEG	Tested in-House
Sept.12/11	Super Save Gas			NEG	Tested in-House
Sept.12/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Sept.12/11	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
Sept.19/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Sept.19/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Sept.19/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Sept.26/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Sept.26/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Sept.26/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Sept.26/11	Works Yard			NEG	Tested in-House
Oct.5/11	Petro Canada			NEG	Tested in-House
Oct.9/11	Perley School			NEG	Tested in-House
Oct.9/11	Hutton School			NEG	Tested in-House
Oct.9/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Oct.9/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Oct.11/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Oct.11/11	Contact Chamber			NEG	Tested in-House
Oct.17/11	Super Save Gas			NEG	Tested in-House
Oct.17/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Oct.17/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Oct.24/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Oct.24/11	Hutton School			NEG	Tested in-House
Oct.24/11	G.F.S.S. (High School)			NEG	Tested in-House
Oct.24/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Oct.24/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Oct.31/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Oct.31/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Oct.31/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Nov.7/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Nov.7/11	Grand Forks Construction			NEG	Tested in-House
Nov.7/11	City Hall			NEG	Tested in-House
Nov.7/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Nov.7/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Nov.14/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Nov.14/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Nov.14/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Nov.17/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Nov.17/11	City Hall			NEG	Tested in-House
Nov.21/11	Hutton School			NEG	Tested in-House
Nov.21/11	Sears			NEG	Tested in-House
Nov.21/11	Super Save Gas			NEG	Tested in-House
Nov.21/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Nov.21/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Nov.28/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Nov.28/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Nov.28/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Nov.30/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Nov.30/11	BC Liquor Store			NEG	Tested in-House
Dec.6/11	Petro Canada			NEG	Tested in-House
Dec.5/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Dec.5/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Dec.7/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Dec.7/11	Hutton School			NEG	Tested in-House
Dec.12/11	Aquatic Centre			NEG	Tested in-House
Dec.12/11	Petro Canada			NEG	Tested in-House
Dec.12/11	Fire Hall			NEG	Tested in-House
Dec.12/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Dec.12/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Dec.18/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Dec.18/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Dec.18/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Dec.28/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Dec.28/11	East Zone Reservoir	<1	<1		Tested at Caro Lab
Dec.28/11	Valley Heights Booster	<1	<1		Tested at Caro Lab
Dec.29/11	Boundary Hospital	<1	<1		Tested at Caro Lab
Dec.29/11	G.F. Public Library			NEG	Tested in-House
Dec.29/11	Super Save Gas			NEG	Tested in-House
Jan.3/12	BC Liquor Store			NEG	Tested in-House
Jan.3/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
Jan.3/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
Jan.5/12	Boundary Hospital	<1	<1		Tested at Caro Lab
Jan.5/12	Hutton School			NEG	Tested in-House
Jan.9/12	Cemetery			NEG	Tested in-House
Jan.9/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
Jan.9/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
Jan.10/12	Boundary Hospital	<1	<1		Tested at Caro Lab
Jan.10/12	Super Save Gas			NEG	Tested in-House
Jan.18/12	Fire Hall			NEG	Tested in-House
Jan.16/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
Jan.16/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
Jan.17/12	Boundary Hospital	<1	<1		Tested at Caro Lab
Jan.17/12	Petro Canada			NEG	Tested in-House
Jan.28/12	Lordco Auto Parts			NEG	Tested in-House
Jan.26/12	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
Jan.30/12	Public Works Yard			NEG	Tested in-House
Jan.30/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
Jan.30/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
Jan.31/12	Boundary Hospital	<1	<1		Tested at Caro Lab
Jan.31/12	Aquatic Centre			NEG	Tested in-House
Feb.8/12	6311-12th Street			NEG	Tested in-House
Feb.6/12	City Hall			NEG	Tested in-House
Feb.6/12	Super Save Gas			NEG	Tested in-House
Feb.6/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
Feb.6/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
Feb.13/12	Boundary Hospital	<1	<1		Tested at Caro Lab
Feb.13/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
Feb.13/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
Feb.15/12	Boundary Hospital	<1	<1		Tested at Caro Lab
Feb.15/12	Hutton School			NEG	Tested in-House
Feb.20/12	City Hall			NEG	Tested in-House
Feb.20/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
Feb.20/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
Feb.21/12	Boundary Hospital	<1	<1		Tested at Caro Lab
Feb.21/12	Works Yard			NEG	Tested in-House
Feb.27/12	Petro Canada			NEG	Tested
Feb.27/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
Feb.27/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
Mar.5/12	Boundary Hospital	<1	<1		Tested at Caro Lab
Mar.5/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
Mar.5/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
Mar.14/12	Boundary Hospital	<1	<1		Tested at Caro Lab
Mar.14/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
Mar.14/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
Mar.14/12	Boundary Hospital	<1	<1		Tested at Caro Lab
Mar.14/12	Super Save Gas			NEG	Tested in-House
Mar.18/12	City Hall			NEG	Tested in-House
Mar.19/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
Mar.19/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
Mar.26/12	Boundary Hospital	<1	<1		Tested at Caro Lab
Mar.26/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
Mar.26/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
Mar.26/12	Boundary Hospital	<1	<1		Tested at Caro Lab
Mar.26/12	Works Yard			NEG	Tested in-House
Apr.2/12	Cemetery			NEG	Tested in-House
Apr.2/12	City Hall			NEG	Tested in-House
Apr.2/12	Hutton School			NEG	Tested in-House
Apr.2/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
Apr.2/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
Apr.10/12	Boundary Hospital	<1	<1		Tested at Caro Lab
Apr.10/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
Apr.10/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
Apr.11/12	Boundary Hospital	<1	<1		Tested at Caro Lab
Apr.11/12	Petro Canada			NEG	Tested in-House
Apr.16/12	Tom Kat			NEG	Tested in-House
Apr.16/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
Apr.16/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
Apr.23/12	Boundary Hospital	<1	<1		Tested at Caro Lab
Apr.23/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
Apr.23/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
Apr.23/12	Boundary Hospital	<1	<1		Tested at Caro Lab
Apr.23/12	Super Save Gas			NEG	Tested in-House
Apr.28/12	City Hall			NEG	Tested in-House
Apr.30/12	Boundary Hospital	<1	<1		Tested at Caro Lab
Apr.30/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
Apr.30/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
May.1/12	Boundary Hospital	<1	<1		Tested at Caro Lab
May.1/12	Cemetery			NEG	Tested in-House
May.7/12	Aquatic Centre			NEG	Tested in-House
May.7/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
May.7/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
May.22/12	Boundary Hospital	<1	<1		Tested at Caro Lab
May.22/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
May.27/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
May.28/12	Boundary Hospital	<1	<1		Tested at Caro Lab
May.28/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
May.28/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
May.28/12	Boundary Hospital	<1	<1		Tested at Caro Lab
May.28/12	Well #3	<1	<1		Tested at Caro Lab
May.29/12	Boundary Hospital	<1	<1		Tested at Caro Lab
May.29/12	Super Save Gas			NEG	Tested in-House
June.4/12	Petro Canada			NEG	Tested in-House
June.4/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
June.4/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
June.5/12	Boundary Hospital	<1	<1		Tested at Caro Lab
June.5/12	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
June.11/12	Aquatic Centre			NEG	Tested in-House
June.11/12	East Zone Reservoir			NEG	Tested in-House
June.11/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
June.11/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
June.18/12	Boundary Hospital	<1	<1		Tested at Caro Lab
June.18/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
June.16/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
June.16/12	Boundary Hospital	<1	<1		Tested at Caro Lab
June.19/12	Aquatic Centre			NEG	Tested in-House
June.25/12	City Hall			NEG	Tested in-House
June.25/12	Fire Hall			NEG	Tested in-House
June.25/12	Super Save Gas			NEG	Tested in-House
June.25/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
June.25/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
June.26/12	Boundary Hospital	<1	<1		Tested at Caro Lab
July.3/12	7619 Granby Rd.			NEG	Tested in-House
July.3/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
July.3/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
July.4/12	Boundary Hospital	<1	<1		Tested at Caro Lab
July.9/12	Barbra Ann Washroom	<1	<1		Tested at Caro Lab
July.9/12	Video Store			NEG	Tested in-House
July.9/12	Selkirk College			NEG	Tested in-House
July.9/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
July.9/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
July.10/12	Boundary Hospital	<1	<1		Tested at Caro Lab
July.16/12	City Hall			NEG	Tested in-House
July.16/12	Valley Heights Booster			NEG	Tested in-House
July.16/12	Super Save Gas			NEG	Tested in-House
July.16/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
July.16/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
July.23/12	Boundary Hospital	<1	<1		Tested at Caro Lab
July.23/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
July.23/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
July.23/12	Boundary Hospital	<1	<1		Tested at Caro Lab
July.23/12	Fire Hall			NEG	Tested in-House
July.30/12	Super Save Gas			NEG	Tested in-House
July.30/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
July.30/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
Aug.1/12	Boundary Hospital	<1	<1		Tested at Caro Lab
Aug.1/12	Super Save Gas			NEG	Tested in-House
Aug.1/12	Aquatic Centre			NEG	Tested in-House
Aug.7/12	Fire Hall			NEG	Tested in-House
Aug.7/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
Aug.7/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
Aug.8/12	Boundary Hospital	<1	<1		Tested at Caro Lab
Aug.8/12	Super Save Gas				Tested in-House
Aug.14/12	Barbra Ann Park			NEG	Tested in-House
Aug.14/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
Aug.14/12	Valley Heights Booster	<1	<1		Tested at Caro Lab
Aug.20/12	Boundary Hospital	<1	<1		Tested at Caro Lab
Aug.20/12	East Zone Reservoir	<1	<1		Tested at Caro Lab
Aug.20/12	Valley Heights Booster	<1	<1		Tested at Caro Lab

APPENDIX D

SUMMARY OF GROUNDWATER MODEL INPUTS AND RESULTS



PITEAU ASSOCIATES
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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 DESCRIPTION

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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**THE CITY OF GRAND FORKS
REQUEST FOR PRIMARY COMMITTEE RECOMMENDATION
DELEGATION**

DATE : November 13th, 2012

TOPIC : Delegation from the Grand Forks Community Trails Society

PROPOSAL : Grand Forks-Cascade Kettle River Heritage Trail Project

PROPOSED BY: Grand Forks Community Trails Society

=====

SUMMARY:

Chris Moslin and George Longden will make a presentation to the Committee, on behalf of the Grand Forks Community Trails Society, with regard to the Grand Forks-Cascade Kettle River Heritage Trail project.

STAFF RECOMMENDATIONS:

Primary Committee recommends to Council to receive the presentation given by Chris Moslin and George Longden, representative of the Grand Forks Community Trails Society with regard to the Grand Forks-Cascade Kettle River Heritage Trail Project.

OPTIONS AND ALTERNATIVES:

1. Receive the presentation: Under this option, Council is provided with the information on the Society's project regarding the Grand Forks-Cascade Kettle River Heritage Trail.
2. Receive the presentation and refer any issues for further discussion: The advantage to this option is the same as Option 1.

BENEFITS DISADVANTAGES AND NEGATIVE IMPACTS:

Option 1: The main advantage of this option is that information is provided to the City and the Community.

Option 2: The main advantage is same as Option 1.

COSTS AND BUDGET IMPACT - REVENUE GENERATION:

There is no cost of making the presentation.

LEGISLATIVE IMPACTS, PRECEDENTS, POLICIES:

Council procedures bylaw makes provisions for making presentations to Council.



Department Head or
CAO



Reviewed by CAO

Council Delegations

Background

Council for the City of Grand Forks welcomes public input and encourages individuals and groups to make their views known to Council at an open public meeting.

Council needs to know all sides of an issue, and the possible impacts of any action they make take, prior to making a decision that will affect the community. The following outline has been devised to assist you in preparing for your presentation, so that you will understand the kind of information that Council will require, and the expected time frame in which a decision will be forthcoming. Council may not make a decision at this meeting.

Presentation Outline

Presentations may be a maximum of 10 minutes.

Your Worship, Mayor Taylor, and Members of Council, I/We are here this evening on

behalf of Grand Forks Community Trails Society

to request that you consider The Grand Forks - Cascade, Kettle River Heritage Trail at your 19-Nov-2012 meeting.

The reason(s) that I/We are requesting this action are:

We want to know how we can partner with you on this project

I/We believe that in approving our request the community will benefit by:

Having a 'world class' destination trail that will attract tourists and provide unlimited access for locals of all ages to the 'Jewel' of the Boundary.

(over)

Council Delegations (cont.)

I/We believe that by not approving our request the result will be:
Missing an opportunity to improved vital community infrastructure.

In conclusion, I/we request that Council for the City of Grand Forks adopt a resolution
stating: Their support for this worthwhile project.

Name: Chris Moslin and George Longden

Organization: Grand Forks Community Trails Society

Mailing Address: Box 2921, Grand Forks, BC
(Including Postal Code)

Telephone Number: 250-442-2620, 250-6661262, 250-442-5653

Email Address: gfmoslin@shaw.ca, g-longden@telus.net

The information provided on this form is collected under the authority of the Community Charter and is a matter of public record, which will form a part of the Agenda for a Regular Meeting of Council. The information collected will be used to process your request to be a delegation before Council. If you have questions about the collection, use and disclosure of this information contact the "Coordinator" City of Grand Forks.

N:Forms/Delegation form

Form may be submitted by email to:
info@grandforks.ca

**THE CITY OF GRAND FORKS
REQUEST FOR PRIMARY COMMITTEE RECOMMENDATION
DELEGATION**

DATE : November 13th, 2012

TOPIC : Delegation from the Kootenay Boundary Pet Dog Association

PROPOSAL : To advocate for responsible dog management in our community

PROPOSED BY: Sandy McKelir of the Kootenay Boundary Pet Dog Association

=====

SUMMARY:

Sandy McKelir, a representative of the Kootenay Boundary Pet Dog Association, will make a presentation to the Committee, requesting Council's consideration in relation to a progressive and effective bylaw to address responsible dog management in our community. The Delegation has included, as documentation, a sample bylaw for discussion purposes

STAFF RECOMMENDATIONS:

1. Primary Committee recommends to Council to receive the presentation.

OPTIONS AND ALTERNATIVES:

1. Receive the presentation: Under this option, Council and the Community is provided with the information regarding their request.
2. Receive the presentation and refer the sample bylaw to the Regional District of Kootenay Boundary, for information.

BENEFITS DISADVANTAGES AND NEGATIVE IMPACTS:

Option 1: The main advantage of this option is that information is provided to the City and the Community.

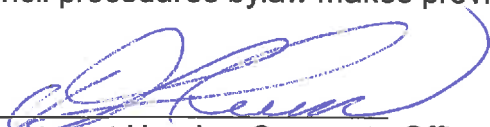
Option 2: The main advantage is same as Option 1.

COSTS AND BUDGET IMPACT - REVENUE GENERATION:

There is no cost of making the presentation.

LEGISLATIVE IMPACTS, PRECEDENTS, POLICIES:

Council procedures bylaw makes provisions for making presentations to Council.



Department Head or Corporate Officer
or Chief Administrative Officer



Reviewed by the Chief Administrative
Officer

From:  anitackrause@gmail.com
Anita Krause <anitackrause@gmail.com>
Subject: [BULK] New Delegation Form Submission from Anita Krause
To:  Info City of Grand Forks
Attachments:  Attach0.html

Tue, Nov 06, 2012 9:19:45 PM 

RECEIVED

NOV - 7 2012

THE CORPORATION OF
THE CITY OF GRAND FORKS

12K

Your Worship, Mayor Taylor, and Members of Council, I/We are here this evening on behalf of:

Kootenay Boundary Pet Dog Association, a group of concerned people who own and operate dog facilities

To request that you consider:

Adopting a proposal of progressive and effective by-laws to address the humane treatment of dogs

The reasons that I/We are requesting this action are:

To advocate for responsible dog management in our community. We recognize the City and Area have long needed the tools to effectively deal with problem dogs whether it be owning, breeding, boarding or training.

I/We believe that in approving our request the community will benefit by:

The adoption of more sustainable and enforceable dog regulations while supporting successful and important pet related business in the city and area.

I/We believe that by not approving our request the result will be:

An implementation of punitive by-laws makes us an unfriendly community to dog lovers. Further this does not support good management of dogs. If our dogs needs are not a priority, there will be more problem dogs.

In conclusion, I/we request that Council for the City of Grand Forks adopt a resolution stating:

We are a community that supports responsible dog ownership and mangement as demonstrated by our progressive by-laws

Name

Anita Krause

Organization

Kootenay Boundary Pet Dog Association

Mailing Address

5045 Almond Gardens Rd,
Grand Forks, BC V0H 1H4

[Map It](#)

FILE CODE

D2 - Kootenay Boundary Pet Dog Assoc.

Telephone Number

(250)442-3260

Email Address

anitackrause@gmail.com

REGIONAL DISTRICT OF KOOTENAY BOUNDARY ANIMAL CONTROL BY-LAW PROPOSALS

RECEIVED

NOV - 7 2012

SECTION 1

PART 1

THE CORPORATION OF
THE CITY OF GRAND FORKS

DEFINITIONS: The following definitions shall apply:

- (a) *Altered* means an animal that has been spayed or neutered.
- (b) *Abate* means to take action to remove a nuisance and may include confining, isolating or destroying an animal.
- (c) *At Large* means
 - (1) Being on private property without permission of the owner or person who has the right to possess or use the property, or
 - (2) Being unrestrained by a leash on private property open to the public or on public property, unless a law or regulation expressly allows an animal to be unrestrained on the property. If the leash is not being held in the hand of a person capable of controlling the animal or a person is not actually controlling an animal attached to the leash, the animal is *at large*, or
 - (3) In a place or manner which presents a substantial risk of imminent interference with animal or public health, safety or welfare.
- (d) *Attack* means an action by an animal which places a person in reasonable apprehension that the animal will cause the person immediate bodily harm.
- (e) *Bite* means an action by an animal with its teeth or mouth that breaks the skin of a human or animal and does not require the presence of teeth marks.
- (f) *Custodian* means a person not the owner of an animal who has been instructed by the owner or the owner's agent to care for and maintain an animal until it is returned to the owner.
- (g) *Dangerous Dog* means a dog that has attacked, bitten or in some other manner injured a person engaged in lawful activity 1) two or more times in a 48 month period or 2) one or more times resulting in death or substantial injury.
- (h) *Department* means an officer or agent designated by the city or area as pertains to animal control or public health and safety.
- (i) *Dispose of* means to make arrangements for an animal that includes euthanasia.
- (j) *Dog* refers to an animal of the *Canis familiaris* or any other member of the *canis* genus if a person owns, keeps, or harbours the animal.
- (k) *Dog licence* means a certificate authorised by animal control authorities indicating that a dog has been registered.
- (l) *Guard Dog* (including *Attack Dog* or *Sentry Dog*), refers to an animal that is trained and used to protect a property or person.
- (m) *Guard dog operator* refers to the owner of an attack, guard or sentry dog, or other person that operates or maintains a business to sell, rent, or train an attack, guard or sentry dog.

Proposal

Page 1 of 20

FILE CODE

WE3 RDKB Animal Control
+ B2- Bylaw Proposals

- (n) *Guard dog premises* refers to the place where a guard dog operator keeps or maintains an attack, guard, or sentry dog.
- (o) *Impound or Impoundment* means an action by the Department to take possession of an animal.
- (p) *Kennel* means a facility, whether or not operated for profit, that keeps or maintains seven or more dogs at least six months old. It includes a facility owned and operated by an animal welfare agency, but does not include an animal shelter operated or established by the Department or a veterinary hospital operated by a veterinarian licensed by the city or area. A kennel also includes a facility with the requisite seven dogs that also keeps or maintains other animals. As used in this definition a *facility* means any combination of adjacent building, structures, enclosures or lots under common ownership or operated as one unit, to keep or maintain dogs. A kennel facility's purpose may be keeping, training, breeding or boarding. If a kennel meets city and area standards to house, safely enclose and maintain dogs, it may be multipurpose.
- (q) *Kennel house* means a protected space or enclosure in a kennel in which an animal is assigned to sleep, rest, or be segregated from other animals.
- (r) *Kennel operator* means a person who owns, controls, or operates a kennel or who participates in the control or operation of a kennel.
- (s) *Leash* means any rope, leather strap, chain or other material six feet or less in length intended to be held in the hand of a person for the purpose of controlling an animal to which it is attached.
- (t) *Tethered* means any use of rope, chain or other material attached to a dog, as the principal means of confining the dog to a property.
- (u) *License tag* means the official tag the authorised agency issues to a dog owner or custodian signifying the dog that has been registered with that agency.
- (v) *Neutered* means a male animal whose testicles have been surgically removed.
- (w) *Owner* means a person, other than a custodian, who owns, keeps or harbours an animal or a person who takes possession of an animal after claiming to be the owner.
- (x) *Potentially dangerous animal* means any of the following:
 - 1) An animal of a species or type likely to cause injury to a person, or
 - 2) An animal, other than a declared dangerous dog, which has within the prior 48 month period attacked, bitten or otherwise caused injury to a person engaged in lawful activity.
- (y) *Primary enclosure* means a structure in a kennel, other than a kennel house, used to restrict an animal to a limited amount of space, such as a room, pen, pen fenced area, cage or compartment.
- (z) *Spayed* means a female animal whose ovaries and uterus have been surgically removed.
- (aa) *Stray* refers to an animal that is *at large*.
- (bb) *Substantial injury* means a substantial impairment of a person's physical condition which requires professional medical treatment including loss of consciousness, concussion, bone fracture, protracted loss or impairment of function of a bodily member or organ, a muscle tear, a disfiguring, laceration, a wound requiring sutures or an injury that requires surgery to restore the person to the condition the person was in before the incident that resulted in the injury.
- (cc) *Veterinarian* means a person currently licensed to practice veterinary medicine in Canada.

PART 2

VACCINATION REQUIRED

- a) An owner or custodian of a dog shall have current either:
 - 1) Vaccination by a 3, 4, 5 or 6 way combination of (Distemper, Adenovirus, Parvo Virus, Parainfluenza, Corona Virus and Leptospirosis) according to the protocol attached to the vaccine.
 - 2) A current titer test result showing adequate levels of the antibodies to the above Viruses being vaccinated against.
- b) As rabies is not a Canadian vaccination requirement it should be left up to the owner/custodian discretion. Rabies vaccination is recommended for dogs travelling out of country.
- c) The owner or custodian shall retain the rabies certificate for inspection and produce the certificate where requested by 1) any person who enforces this chapter 2) any person bitten by the dog or 3) any law enforcement officer. No person who possess a vaccination certificate shall refuse to produce the certificate when requested.

CERTIFICATE OF VACCINATION

- a) A veterinarian who vaccinates a dog shall certify the vaccination detailing which protocol was used and which canine diseases the dog was vaccinated for. In order to be complete the certificate shall contain the following:
 - 1) The dog owner's first and last name, street address and mailing address, if different, and phone number.
 - 2) The dog's name and description, including breed, colour, sex and if known, day, month and year of birth.
 - 3) The type, lot number and manufacturer of vaccine
 - 4) The date of vaccination
 - 5) The signature, or an authorized signature of the veterinarian administering the vaccine.

CONFINEMENT AND ISOLATION OF BITING ANIMALS

- a) The Department, a Veterinarian or the Health Officer may order any animal which has bitten to be impounded and isolated in strict confinement, and observed for at least 14 days after the bite. Except that a dog or cat need only be observed for at least 10 days. No person shall release an animal impounded or confined under this section until the Department, Veterinarian or the Health Officer examines the animal and approves its release.
- b) As an alternative to the 10 days of isolation of dog and cats referred to in subsection (a) dogs and cats which have been isolated in strict confinement under proper care and observation as approved by the Department, the Veterinarian or the Health Officer may be released from isolation after 5 days of veterinary observation if upon conducting a thorough physical examination on the 5th day or more after infliction of the bite, the observing veterinarian certifies that there are no clinical signs or symptoms of any disease.
- c) Notwithstanding the requirements in subsection (a) the Department, the Health Officer or the Veterinarian may authorize, with the consent of the owner if known, that the impounded animal be euthanized for the purpose of laboratory examination.

FEES AND EXPENSES FOR CONFINEMENT AND IMPOUNDMENT

The owner of an animal which is confined pursuant of this article shall pay all fees and expenses related to the cost of impounding, boarding and examining the animal and the altering deposit when required by this chapter.

PART 3

DOG LICENSES REQUIRED

- a) A dog owner or custodian, except a tourist or visitor who stays less than 60 days in the city or surrounding area, shall apply for and obtain from the Department a dog licence for the dog after the dog is four months old. The owner or custodian shall have a licence for a dog by the time the dog is five months old or within 30 days after obtaining a dog four months or older or brining a dog over four months old into the city or surrounding area. An attack dog, guard dog or sentry dog, however shall not work in the city or surrounding unless the dog has a current licence.
- b) A dog which the Department impounds pursuant to this chapter that does not have a valid dog licence at the time scheduled for release, shall be presumed to be a dog which, prior to impounding, required a Department issued dog licence, regardless of the dog's age or the owner or custodian's place of residence.
- c) If a dog owner or custodian presents a properly completed dog licence application form to the Department, including proof of vaccination will be valid throughout the licence period, and pays the proper licence fee and if applicable, a late fee, the Department shall issue a dog licence and with the initial licence, a dog licence tag. The dog owner or custodian shall retain the dog licence for inspection by any person authorized to enforce this chapter.
- d) A licence shall be valid for a period of one year. The licence shall be renewed prior to the expiration of the term by paying the current renewal fee.
- e) A dog owner or custodian shall securely affix the licence tag to the collar or harness of the dog for which the licence tag was issued and shall ensure that the dog wears the licence tag at all times, except when the dog is being exhibited at a dog show.
- f) No person shall transfer or attach a licence tag to a dog for which the licence was not issued.
- g) No person other than the dog owner, custodian, licensed veterinarian or member of the Department shall remove a licence tag from a collar or harness or remove the collar or harness bearing the tag from the dog.
- h) Whenever a licence tag is lost or damaged, the dog owner or custodian shall immediately apply for and obtain a replacement licence tag from the Department and shall pay the prescribed fee for the replacement tag.

CHANGE OF ADDRESS

An owner of a dog required to be licensed under this chapter shall notify the Department within 30 days of any change of address. The Department may presume an owner's last known address is valid and the Department may serve any notice required by this chapter at the owner's last known address.

CHANGE OF OWNERSHIP

- a) A person who acquires a dog licensed by the Department shall within 30 days of acquiring the dog apply for and obtain a change of ownership from the Department and pay the applicable fee.
- b) A dog's owner or custodian or the parent or guardian of a minor who sells or transfers ownership or custody of a dog shall inform the Department of the name, address and telephone number of the new owner or custodian and the name and description of the dog within 30 days of sale or transfer.

SECTION 2

KENNEL LICENSING REQUIREMENTS AND TERMS

- a) It shall be unlawful for a person to operate or maintain a kennel in the City or surrounding area D without a kennel licence
- b) A kennel licence shall expire one year from the date it is issued. Fees for kennel licences for less than one year shall be prorated.
- c) A kennel licence issued subject to any conditions or restrictions to protect the health and safety of animals or humans.
- d) The designated officer of the City or Area may inspect a kennel at any reasonable time.

KENNEL OPERATING REQUIREMENTS

A kennel operator shall comply with the following requirements:

- a) Each kennel building, fence and other structure shall be structurally sound and be maintained in good repair to protect the animals from injury, contain the animals and to prevent other animals from entering the kennel.
- b) The kennel shall have reliable and adequate electric power and potable water.
- c) The kennel shall have adequate quantities of food and supplies adequate refrigeration to protect perishable food and adequate storage facilities to keep food and supplies dry, clean and uncontaminated.
- d) The operator shall maintain the entire facility in a clean and sanitary condition at all times. The kennel operator shall clean and sanitize the facility and at a minimum shall remove excrement daily or more often if necessary, to keep the animals and staff safe from contamination disease and odours, and keep entire facility free of accumulation of trash and debris.
- e) The kennel shall have and maintain adequate supplied toilet rooms, washrooms and sinks that allow animal caretakers to practice good hygiene.
- f) The operator shall provide each animal housed in the kennel with food that is uncontaminated, wholesome and of sufficient quantity and nutritive value to meet the normal daily requirements for the condition and size of the animal. The food shall be provided accessible to each animal and located to minimize contamination by excreta.
- g) The operator shall provide each animal with potable water in clean and sanitary receptacles available to the animals at all times, unless a licensed veterinarian has restricted an animal's water intake. The water receptacle shall be secured to prevent the receptacle from being tipped over.
- h) The kennel shall protect each animal housed in the facility from the elements including sun, heat, cold, wind, dampness, rain and snow and shall maintain environmental conditions for each animal that are appropriate for that animal.
- i) The kennel shall provide adequate fresh air ventilation for the health and comfort of each animal in a manner that minimizes drafts, odours and moisture condensation.
- j) The kennel shall provide ample light that is uniformly distributed throughout the facility to allow staff to inspect and clean kennel, and shall protect the animals from harmful or annoying illumination.
- k) The kennels interior walls and floors shall be constructed of materials impervious to moisture and maintained in that condition. The material shall have a surface that may be readily sanitized.

Proposal

GENERAL REQUIREMENTS FOR PRIMARY ENCLOSURES

A kennel operator shall provide a primary enclosure for each animal housed at the kennel. Each primary enclosure shall be:

- a) Constructed and maintained in good repair to protect the animal housed in the enclosure from injury, to be able to keep animal from getting out of enclosure and keep other animals out.
- b) Constructed and maintained to enable each animal housed in enclosure to remain dry and clean.
- c) Constructed and maintained to enable the animal housed in the enclosure to have convenient access to clean food and water.
- d) Large enough to allow each animal housed in the enclosure to obtain adequate exercise. A separate kennel house that an animal uses as sleeping quarters shall provide sufficient space to allow each animal in the house to turn about freely, stand easily and sit or lie in a comfortable position. It is unlawful to keep an animal in a primary enclosure or kennel house that does not provide adequate space.
- e) Tethering is an unlawful means of ensuring an animal remains confined to kennel property as it is unsafe and unreasonably restrictive to the animals' movement.
- f) A passageway into the kennel house shall be large enough to allow easy access for each dog house.

MINIMUM SPACE REQUIREMENTS

PRIMARY ENCLOSURE		
Weight of Dog in Pounds	Width in Feet	Square Footage
Up to 15	2	6
Over 15 to 35	2.5	10
Over 35 to 65	3	15
Over 65 to 95	3	18
Over 95 to 130	3.5	24
Over 160	4	32

KENNEL HOUSE		
Weight of Dog in Pounds	Width in Feet	Square Footage
Up to 15	1.5	3
Over 15 to 35	2	5
Over 35 to 65	2.5	7.5
Over 65 to 95	2.5	9
Over 95 to 130	3	12
Over 160	3.5	14

CLASSIFICATION AND SEPARATION

Animals housed in the same primary enclosure shall be maintained in compatible group, with the following restrictions:

- A female in estrus shall not be housed in the same primary enclosure as a male, except for breeding purposes.
- Any animal exhibiting vicious disposition shall be housed by itself.
- An animal under quarantine or treatment for a communicable disease or an animal with a serious injury or disability shall be kept separate from any other animal.

RECORDS

- a) A kennel operator shall maintain a registry for each dog housed at the kennel that includes:
 - 1) Dog owners' name, address and telephone number
 - 2) The dog's name and description, including breed, colour, sex and age
 - 3) A copy of current vaccination and number of the veterinarian who vaccinated the dog

- b) The kennel operator shall have someone in attendance at the kennel when the facility is housing one or more animals who can identify each animal in the kennel, except that animals under four months of age may be identified as a litter.

VACCINATION REQUIRED FOR INDIVIDUAL DOGS

A kennel operator shall not be required to obtain the dog licence for each dog housed in the kennel, but shall not house a dog in the kennel that has not been vaccinated, except animals that are under six weeks of age may be identified as a litter.

SECTION 3

KENNELS OPERATED CONTRARY TO THIS CHAPTER

A kennel the Department determines, after on site investigation, is unsanitary or a treat to animal or public health safety or welfare, or being operated contrary to this chapter is declared to be a public nuisance. The Department may take action against the kennel operator as authorized by the City or Area to abate the nuisance. If the Department determines that immediate action is necessary to preserve or protect an animal or public health, safety or welfare, the Department may summarily abate the nuisance by any reasonable means including impoundment of any animal and immediate closure of a kennel until nuisance is abated. The Department may recover its abatement costs from the kennel operator.

CONTROL PROVISIONS

- a) In any prosecution under this chapter the Department is required to obtain proof of a violation through onsite inspection and may include eye witness testimony, statements taken from surrounding neighbours. Unsubstantiated complaints do not constitute proof of a violation. The Department is required to determine whether or not -
 - 1) an animal described in the complaint was found in violation of the section charged or
 - 2) the defendant named in the complaint was the owner or custodian of the animal at the time of the alleged violation, shall constitute *prima facie* evidence that the owner or custodian of the animal was the person responsible for the violation.
- b) The presumption of responsibility shall not apply if prior to the date of alleged violation the person charged has made a bona fide sale or transfer of the animal found in the violation and has complied with the applicable requirement for aa) a dangerous dog or bb) for a public nuisance animal.

ENTRY ON PRIVATE PROPERTY

The Department, the Health Officer or any peace officer may enter private property when the person entering has reasonable grounds to believe that there is a dangerous dog, an animal suffering from a contagious animal disease or there has been a violation of this chapter.

ANIMALS EXPOSED TO DANGEROUS DISEASES OR TOXIC SUBSTANCES

It shall be unlawful for a person to fail to comply with an order issued by the Health Officer or Veterinarian ordering the quarantine, vaccination or destruction of a diseased animal or animal exposed to a dangerous disease or toxic substance.

CONDITIONS OF ANIMAL OWNERSHIP

An animal owner or custodian shall maintain the area where an animal is kept in a sanitary condition and shall not allow the area to become a breeding area for flies, a source of offensive odours or of human or animal disease or an area that creates any other public nuisance or conditions hazardous to humans or animals.

RESTRAINT OF DOGS REQUIRED

- a) A dog's owners or custodian or a person who has control of a dog shall prevent the dog from being at large, except as provided in subsections b) and d) below.
- b) A dog's owner or custodian who has direct and effective voice control over a dog to ensure that it does not violate any law, may allow a dog to be unrestrained by a leash while a dog is assisting an owner or custodian who is:
 - 1) Legally hunting,
 - 2) Legally herding livestock, or
 - 3) On public property with the written permission of and for the purposes authorized by the agency responsible for regulating the use of the property.

- c) A dog's owner or custodian or a person having control of a dog that is lawfully on private property shall keep a dog 1) under direct or effective control by voice or electronic pet containment system or 2) in a building or enclosure that is adequate to ensure the physical confinement of the dog and that also meets humane standards. An animal is not considered leashed if the leash is not in the hand of a person capable of controlling the animal or if the person is not actually controlling the animal attached to the leash.
- d) This section shall not apply to a dog assisting or training to assist a law enforcement officer in the course and scope of the officer's duties.

PUBLIC PROTECTION FROM DOGS

- a) A dog's owner or custodian or other person having control of a dog shall exercise ordinary care to prevent the dog, while the dog is under the owner, custodian or other person's care, custody or control from:
 - 1) Attacking, biting or otherwise causing injury to any person engaged in a lawful act
 - 2) Interfering with a person or animal legally using public or private property
 - 3) Damaging personal property that is lawfully on public property or that is on private property with the permission of the property owner or other person who has the right to possess the use of the private property.
- b) This section shall not apply to a dog assisting or training to assist a law enforcement officer while that officer is executing law enforcement duties.

GUARD DOGS, DANGEROUS DOGS OR POTENTIALLY DANGEROUS ANIMALS

- a) It shall be unlawful for the owner, custodian or person having control of a guard dog, dangerous dog or potentially dangerous animal to fail to exercise ordinary care over the animal that results in the animal causing injury to a person engaged in lawful activity, if the owner, custodian or person having control of the animal knew or should have known the animal had vicious or dangerous propensities or that the animal was a guard dog, dangerous dog or potentially dangerous animal, as those terms are defined in this chapter.
- b) This section shall not apply to an animal that is being used by the military or law enforcement while the animal is performing in that capacity.

CURBING A DOG

No person having control of a dog shall allow a dog to defecate or to urinate on private property other than the property belonging to the dog owner, custodian or person having control of the dog. A person having control of the dog shall curb the dog and immediately remove any feces to a proper receptacle. This section shall not apply to a blind or visually impaired person who is relying on a seeing-eye dog.

FEMALE DOGS IN ESTRUS

The owner or custodian of a female dog in estrus shall securely confine the dog within an enclosure in a manner that will prevent the attraction of male dogs to the location where the female is located.

PROCEEDINGS TO DECLARE A DOG A DANGEROUS DOG.

- a) Whenever the Department has reasonable cause to believe that a dog is a dangerous dog it may commence proceedings to declare the dog a dangerous dog as follows:
 - 1) The Department shall serve on the owner or custodian a notice of intent to declare the dog a dangerous dog.
 - 2) The notice shall inform the dog's owner or custodian of all of the following
 - The Department's authority to declare a dog a dangerous dog

- Each incident that forms the basis for the Department proposed action
 - The owner or custodian's right to request a hearing to contest whether grounds exist for the Department's proposed declaration
 - The potential consequences if the Department issues a declaration declaring the dog a dangerous dog
 - That a request for a hearing must be in writing and must be received by the Department within 10 days from the date of notice
 - Failure to request a hearing or failure to attend or be represented at a scheduled hearing shall satisfy the Department's obligation to provide a hearing and shall result in the Department issuing a declaration that the dog is a declared dangerous dog
 - A finding at the hearing that the dog meets the definition of a dangerous dog shall result in the Department declaring the dog a dangerous dog. A declared dangerous dog designation shall remain in effect for the dog's lifetime.
- b) When the Department determines it is necessary to immediately impound a dog to preserve the public health and safety or the safety of an animal, before the Department follows the procedures in subsection (a) above, the Department may impound a dog before issuing the declaration declaring the dog a dangerous dog. In that case, with the notice required by subsection (a) the Department shall include the reasons why immediate impoundment was necessary.

IMPOUNDMENT, ABATEMENT, AND RESTRICTIONS ON DANGEROUS DOGS

- a) The Department may impound or abate any declared dangerous dog whenever the Department determines that impoundment or abatement is necessary to protect the public health and safety or the safety of an animal. When the Department determines abatement is necessary, the Department may destroy the dog or impose conditions enumerated in subsection (b) on the dog's owner or custodian, as a prerequisite for the dog's owner or custodian to continue to keep the dog. The Department may modify the conditions depending on a change in circumstances. It shall be unlawful for a person to fail to comply with a condition the Department imposes under this section.
- b) The Department may impose one or more of the following conditions on a dog owner or custodian for a declared dangerous dog:
- 1) A requirement that the owner or custodian obtain and maintain liability insurance from an insurer (licensed to transact insurance business in the Province of British Columbia) with coverage amounts that complies with the requirements of this subsection. The insurance shall provide liability insurance to the owner or custodian for any loss or injury that may result to any person or property caused by the dog. The insurance shall provide coverage of the owner or custodian in an amount of not less than \$100,000 per occurrence, combined single limit for bodily injury and property damage. The owner or custodian shall furnish a certificate of insurance to the Department and shall notify the Department by registered mail within ten days of receiving notice from the insurance company that the policy has been changed, cancelled, or will not be renewed. The insurance certificate shall provide the following information:
 - The full name and address of the insurer
 - The name and address of the insured
 - The insurance policy number
 - The type and limits of coverage
 - The effective dates of the coverage
 - The certificate issue date
 - 2) Requirements as to the design, specifications, materials, and other components of the dog's enclosure
 - 3) Requirements as to the type of residence where the dog shall be maintained
 - 4) Requirements as to the type and method of restraint or muzzling the owner or custodian shall employ when the dog is not within its approved enclosure

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- 5) Requirements for photo identification, microchip implantation, or permanent marking of the dog for purposes of identification
 - 6) A requirement that the owner or custodian obtain and maintain a dangerous dog registration in addition to the license required under *Section 1, Part 3*
 - 7) A requirement to alter the dog
 - 8) A requirement that the dog's owner or custodian allow the Department or any other law enforcement agency to inspect the dog and its enclosure
 - 9) A requirement that the dog's owner or custodian provide the Department with proof satisfactory to the Department that the owner or custodian is complying with all the requirements of this section
 - 10) A requirement that the dog's owner or custodian agree to surrender the dog to the Department on demand
 - 11) A requirement that the dog not be allowed to work as a guard dog, attack dog, or sentry dog
 - 12) Any other requirement the Department determines is necessary to protect the public health and safety or the safety of an animal from the actions of a declared dangerous dog
 - 13) A requirement that the owner or custodian pay the Department fees to recover the Department's costs to enforce and to verify compliance with this section
- c) The Department shall provide a dog's owner or custodian with written notice at least fifteen days before impounding or abating a declared dangerous dog. The notice shall inform the owner or custodian of the right to a hearing to contest whether grounds exist to impound or abate the dog. If the owner or custodian requests a hearing under this section, the hearing may be held in conjunction with the hearing pursuant to Section (a). If the dog's owner or custodian requests a hearing before the dog is impounded or abated, the Department shall not impound or abate the dog until the hearing is concluded unless there is a need for immediate action as provided for in subsection (e).
 - d) A dog's owner or custodian who receives a notice under subsection (c) may request a hearing to contest the Department's determination to impound or abate a dangerous dog. The owner or custodian's request shall be in writing and shall be received by the Department within ten days of the notice issued by the Department.
 - e) When the Department determines it is necessary to immediately impound a dog to preserve the public health and safety or the safety of an animal, or if a dog has already been impounded under provision of law, no pre-impoundment hearing shall be held. In that case, the Department shall provide the dog's owner or custodian with written notice allowing ten days from the date of the notice to request a hearing to contest the abatement of the dog. The hearing request shall be in writing and shall be received by the Department within the specified time period. If the owner or custodian requests a hearing, the dog shall not be disposed of until the hearing requirements are satisfied. Once the hearing procedures enumerated have been completed and there is a final decision that grounds exist to impound or abate a dog, the owner or custodian fails to request a hearing, or be represented at a scheduled hearing, the Department may impound or abate the dog.
 - f) The owner or custodian of a declared dangerous dog who intends to change the ownership, custody, or residence of the dog shall provide at least fifteen days' advance written notice to the Department of the proposed change. The notice shall identify the dog and provide the name, address, and telephone number of the proposed new owner or custodian or the proposed new residence. The Department may prohibit the proposed change when the Department has reasonable grounds to believe that the change would be harmful to the public health and safety or the safety of an animal, by issuing a written order to

the owner or custodian. No person shall fail to comply with an order the Department issues under this subsection.

- g) An owner or custodian who transfers ownership or custody shall provide written notice to a new owner of custodian that the dog is a declared dangerous dog and the conditions the Department imposed pursuant to subsection (b). The owner or custodian shall obtain a written acknowledgement signed and dated by the new owner or custodian, acknowledging receipt of the notice and acceptance of the conditions the Department imposed. The owner or custodian shall provide the Department with a copy of the notice and signed acknowledgement from the new owner or custodian.
- h) If a declared dangerous dog dies, the owner or custodian shall notify the Department no later than 24 hours after the dog's death. The owner or custodian shall produce the dog's remains when requested by the Department within five hours of the Department receiving such notice.
- i) If a declared dangerous dog escapes, the owner or custodian shall immediately notify the Department of the escape and make every reasonable effort to recapture it. The owner shall also notify the Department within 24 hours of the dog's recapture.
- j) The owner, custodian, or person in possession of a dog declared as a dangerous dog shall keep the dog restrained, confined, or muzzles as appropriate for the circumstances to prevent the dog from biting, attacking, or otherwise causing injury to another.
- k) The Department's authority to act under this section is independent of any pending or resolved criminal prosecution, no matter what stage in the proceeding or the result in that case.

CAPTURE OF DOGS AT LARGE

- a) An employee of the Department, a peace officer, or a person in an area where the Department provides animal services who is employed for animal control purposes may capture or attempt to capture any dog found at large in violation of law and may destroy the dog if, in the person's judgement, destroying the dog is required for public health and safety.
- b) The Department shall not seize or impound any dog for being at large that has strayed from but then returns to the private property of its owner or custodian, provided the owner or custodian is at home when the dog returns. In that case, the Department may issue the owner or custodian a citation. If the owner or custodian is not home, the Department may impound the dog, and shall post a notice that the dog was impounded on the front door of the owner or custodian's dwelling unit. The notice shall provide the following information:
 - The dog has been impounded
 - Where the dog is being held
 - The name, address, and telephone number of the Agency or person to be contacted regarding the release of the dog
 - An indication of the ultimate disposition of the dog if the owner or custodian does not take action to regain the dog within a specified time period
- c) A person who finds a dog at large may take the dog into the person's possession and shall, as soon as possible but no later than 24 hours, notify the Department. The Department may accept the animal for impoundment and the person who finds the animal shall surrender the animal to the Department upon demand. No person shall be entitled to any compensation for keeping the dog, but, with the permission of the Department, may keep the dog until the owner or custodian has been found. A person who takes possession of the dog shall use reasonable care to preserve it from injury, but shall not be held liable if the dog dies, escapes, or injures itself while under the person's care.

RELINQUISHING AN ANIMAL

A person who relinquishes an animal to the Department shall provide the person's name and address and, if the person is not the owner, the person shall also provide the circumstances under which the person came into possession of the animal.

NOTIFICATION OF OWNER – RIGHT TO HEARING

- a) Upon impoundment of an animal wearing a license tag or identification listing the owner's name and address, the Department shall as soon as practicable attempt to notify the owner at the owner's address of record by mail, personal delivery to the owner, or posting a notice on the owner's property advising that the animal is in the Department's custody.
- b) The notice shall include a statement that the owner may make a written request for a hearing within ten days of the notice to contest the legality of the impoundment.
- c) Requesting a hearing under this section extends the holding period during which the Department shall not dispose of an impounded animal other than by return to the owner until the conclusion of the hearing. If at the conclusion of the hearing the impoundment is found to be unwarranted, the Department shall return the animal to the owner or custodian without charge for the impoundment.

RETURN OF ANIMALS TO THEIR OWNERS, ALTERING DEPOSIT, MICROCHIP FEE REQUIRED

- a) The owner of an impounded animal that the Department is not seeking to abate may claim the animal prior to other legal disposition by providing proper identification, meeting all requirements, and paying the Department the applicable redemption fees.
- b) If an animal owner redeems an unaltered dog or cat found at large that the Department justifiably impounded pursuant to this chapter, the owner shall pay an altering deposit in addition to other redemption fees the Department establishes.
- c) A person paying an altering deposit shall be entitled to a refund if:
 - the person provides proof that the animal has been altered by a licensed veterinarian within thirty days of paying the deposit, unless the animal is under four months old at the time of payment. In that case, the person paying the deposit shall be entitled to a refund if the person provides proof that the animal has been altered by an licensed veterinarian by the time the animal is five months old
 - the owner submits, within the time period that the animal was required to be altered, a written certification from a licensed veterinarian stating that, due to health considerations, the animal should not be altered or that the animal has previously been altered.

If the person paying the altering deposit does not provide the Department with either the proof the animal was altered or the written certification from a licensed veterinarian that the animal should not be altered within the period the animal was required to be altered, the person shall forfeit the deposit. All forfeited deposits shall be used to offset the costs of animal control services.

- d) When a person redeems a justifiably impounded dog or cat found at large and without identification, the Department may require the owner to pay the cost to implant a microchip identification device, in addition to other fees that have been established.

HOLDING PERIODS AND AVAILABILITY FOR REDEMPTION, ADOPTION, OR RELEASE OF IMPOUNDED STRAY OR RELINQUISHED ANIMALS

- a) Holding period and availability for redemption, adoption, or release of an impounded stray or relinquished animal shall conform to applicable provisions of this chapter.

- b) The Department may determine the animal holding period and disposition not specified in subsection (a) or other provisions of the law.
- c) No person who adopts or accepts the transfer of an impounded dog or cat shall fail to have the animal altered within thirty days of the adoption or transfer unless a licensed veterinarian authorises a thirty day extension in writing. It shall be unlawful to fail to provide the Department with proof the animal was altered or that an extension was granted when demanded by the Department.
- d) The Department may create by policy, a Senior Citizen / Disabled Persons Pet Adoption Program for residents who are sixty years or older or recipients of either Supplemental Security Income or Social Security Disability payments, and who are qualified to adopt a dog or a cat. The Department may also develop policies for the administration of other special redemption, adoption, or release programs. The Director may waive or adjust applicable fees established by the Department in conjunction with this program, provided that the animals shall be vaccinated and shall be altered as required by law.

PUBLIC NUISANCE

- a) In addition to exercising abatement powers, the Department, the Health Officer, a veterinarian, or a peace officer may abate a public nuisance involving an animal by impounding or abating the animal pursuant to this section. If the Department determines that there is an immediate threat to the health and safety of the public or an animal, the Department may summarily abate a public nuisance involving an animal where an animal lives or is maintained, including destroying the animal involved.
- b) When the Department determines that an animal's behaviour or the failure of an animal owner or custodian to control an animal results in a public nuisance, the Department may require the owner or custodian of the animal to obtain a public nuisance registration from the Department, in addition to the license required. The Department may impose the same conditions on the owner or custodian of the animal deemed a public nuisance as it may impose on the owner or custodian of a dog declared a dangerous dog. It shall be unlawful for a person to violate any condition the Department imposes pursuant to this subsection.
- c) When the Department determines that a public nuisance exists due to an animal owner or custodian's failure to properly control or care for one or more animals, the Department, in addition to using its abatement powers under subsection (a) to abate any nuisance involving an animal, may require the owner or custodian to register with the Department. This registration need not name a specific animal if the Department is unable to determine which animal or animals were involved. The Department may impose any condition on the owner or custodian relative to any or all animals the person owns or is the custodian of. The Department may also limit the number of animals or type of animals the owner or custodian may own or have custody of. It shall be unlawful for a person to violate any condition the Department imposes pursuant to this subsection.
- d) If a person fails to properly control or care for one or more animals or the premises where one or more animals are maintained, and the Department determines that the person, based on the person's conduct, poses a risk to the health or safety of the public or an animal if that person were to own or have custody of any animal or a specific type or breed of an animal, the Department may enter a declaration against the person prohibiting that person from having ownership or custody of any animal or a specific type or breed of animal, for up to five years. It shall be unlawful for a person to violate the terms of the declaration entered pursuant to this subsection. If the Department determines a person violated this section, the Department may, in addition to taking any legal action authorised by this code, enter a new declaration against that person prohibiting that person from having ownership or custody of any animal or a specific type or breed of animal, for up to five years from the date of violation.
- e) Except as provided in subsection (g), the Department shall provide an owner or custodian with at least ten days' notice before impounding or abating an animal of their right to a hearing to contest whether grounds exist for an impoundment or abatement. If the owner or custodian requests a hearing before the Department impounds or abates the animal, the Animal Control officer shall not impound or abate the animal until the conclusion of the hearing except as provided in subsection (g). The Department

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shall also provide notice to an animal owner or custodian of its intent to proceed under subsection (c) or (d) and advise the owner of the right to request a hearing to contest the Department's determination.

- f) The owner or custodian of an animal who receives a notice under subsection (e) may request a hearing to contest the Department's determination to impound or abate an animal under this section or the Department's determination to proceed under subsection (c) or (d). The owner or custodian's request shall be in writing and the request shall be received by the Department within ten days.
 - g) When the Department determines it is necessary to immediately impound an animal under this section to preserve the public health and safety or the health or safety of an animal, or if the animal has already been impounded under another provision of law, no pre-impoundment hearing shall be held. The Department shall provide the owner or custodian with written notice allowing ten days from the date of the notice to request a hearing to contest abatement of the animal. The hearing request shall be in writing and shall be received by the Department within the specified time period. If the owner or custodian requests a hearing, the animal shall not be disposed of until the hearing requirements are satisfied.
- Once the hearing procedures have been completed and there is a decision that grounds exist to impound or abate an animal under this section or the animal owner or custodian fails to request a hearing, or attend, or be represented at a scheduled hearing, the Department may impound or abate an animal deemed a public nuisance under this section.
- h) The owner or custodian of an animal that is required to obtain a public nuisance registration for an animal shall provide at least fifteen days' advance written notice to the Department of a proposed change in the animal's ownership, custody, or residence. The notice shall identify the animal and provide the name, address, and telephone number of the proposed new owner or custodian or the proposed new residence. The Department may prohibit the proposed change when the Department has reasonable grounds to believe that the change would be harmful to the public health and safety or the safety of an animal by issuing a written order to the owner or custodian. No person shall fail to comply with an order the Department issues under this subsection.
 - i) The owner or custodian who transfers ownership or custody of an animal subject to this section shall provide written notice to the new owner or custodian that the animal requires a public nuisance registration and the terms of any conditions the Department has imposed pursuant to this section. The owner or custodian shall obtain a written acknowledgement signed and dated by the new owner or custodian acknowledging receipt of the notice and acceptance of the conditions the Department imposed. The owner or custodian shall provide the Department with a copy of the notice and the signed acknowledgement from the new owner or custodian.
 - j) If an animal that requires a public nuisance registration, the owner or custodian shall notify the Department no later than 24 hours after the animal's death. The owner or custodian shall produce the animal's remains when requested by the Department within five hours of the Department receiving such notice.
 - k) If an animal that requires a public nuisance registration escapes, the owner or custodian shall immediately notify the Department of the escape and make every reasonable effort to recapture it. The owner or custodian shall also notify the Department within 24 hours of the animal's recapture.
 - l) The owner, custodian, or person in possession of an animal that requires a public nuisance registration shall use all reasonable efforts to restrain or confine the animal to prevent it from being at large or from causing damage to any property or injury to any person or animal.
 - m) The Department's authority to act under this section is independent of any pending or resolved criminal prosecution, no matter what stage in the proceeding or the result in that case.

INJURIES AND COMMUNICABLE DISEASES

No person shall knowingly keep an animal that suffers from a serious injury or is afflicted with mange, ringworm, distemper, or other contagious disease without providing or obtaining adequate treatment for the animal. The Department or a veterinarian may take immediate possession of an animal if either determines that the owner or custodian is not providing adequate treatment and may dispose of the animal unless the owner or custodian places the animal with a licensed veterinarian for treatment.

HEARINGS

- a) Whenever a person (the "respondent") requests a hearing under this chapter, the Director shall appoint a Department employee who has not been directly involved in the case to serve as the hearing officer. The hearing officer shall hold the hearing within thirty days from the date the Department receives the request for a hearing. The hearing officer may continue a hearing at the request of either party for good cause. The hearing officer shall issue a written decision that contains findings and factual bases for the findings. The hearing officer's decision shall be final except as provided below. The fact that no hearing has been conducted shall have no bearing on any criminal prosecution alleging a violation of this chapter.
- b) The Department shall present its evidence first and have the burden of producing evidence at the hearing. The respondent shall have the right to present evidence contesting the Department's case and the Department shall have the right to present a rebuttal case. The standard of proof on the issues before the hearing officer shall be the preponderance of the evidence.
- c) Each party shall have the right at the hearing to call and examine witnesses, introduce evidence, cross-examine an opposing witness on any matter relevant to the issues in the case even though the matter was not covered during direct examination, and impeach any witness regardless of which party first called the witness to testify. The Department may call the animal's owner or custodian as a witness during its case in chief or during its rebuttal case and examine the person as if the person were under cross-examination.
- d) Strict rules of evidence shall not apply. Evidence that might otherwise be excluded under the Evidence Code may be admissible if the hearing officer determines it is relevant and of the kind that reasonable prudent persons rely on in making decisions. All rules of privilege recognised by the Evidence Code, however, apply to the hearing. The hearing officer shall also exclude irrelevant and cumulative evidence.
- e) The Department shall serve the hearing officer's decision on the respondent. If the hearing officer determines that sufficient grounds exist for the Department to declare a dog to be a dangerous dog or an animal a public nuisance animal, or that the Department will abate an animal, the hearing officer's decision shall include a notice that the respondent may apply for a departmental administrative review of the record. The notice shall advise the respondent that the request for review shall be in writing and served on the Department within ten days. The request for review shall provide the reasons why the respondent contends that the hearing officer's decision is erroneous.
- f) The administrative review shall be conducted by the Director or an employee the Director designates who has not been directly involved in the case and who shall be of the same rank or higher than the hearing officer.
- g) If a respondent timely requests an administrative review a hearing officer's decision approving the Department's determination to destroy an animal, the decision is stayed until the Department completes its review. A request for an administrative review shall not stay the hearing officer's decision approving the Department's determination to declare a dog a dangerous dog or an animal a public nuisance animal, or any condition the Department imposes to allow a person to continue owning or having custody of an animal.
- h) As part of the administrative review process, the employee conducting the review of the record shall consider: (1) the issues the respondent raised in the request for the review, (2) whether the
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Department's determination is supported by substantial evidence, and (3) whether the Department acted in compliance with this chapter.

- i) At the conclusion of the administrative review, the employee reviewing the record may uphold, modify, or overrule the hearing officer's decision or may order the Department to reconsider the case. The reviewer's decision shall be in writing and shall contain the reasons for the decision. If the reviewer upholds the hearing officer's decision to abate an animal by destruction, the Department shall serve the respondent with a written notice of the right to apply for a writ of mandate or other order from Superior Court within ten days from the date of the notice. The Department shall stay disposition of the animal while the Superior Court action is pending or until the time frame for filing an action contesting the decision to abate has expired.

ATTACK, GUARD, OR SENTRY DOG OPERATIONS

- a) Any person or owner of an attack, guard, or sentry dog (collectively "*guard dog*") that operates or maintains a business to sell, rent, or train a guard dog who is required to obtain an owner's permit from the Department pursuant to health and safety codes, (the permittee) shall pay the annual permit fee approved by the Department for this type of permit. The person or owner shall also obtain and pay the fee for a guard dog operator premises permit for each location where the person or owner houses a guard dog.
- b) The Department may suspend an animal from use as a guard dog if the Department determines that the animal is not healthy enough to work or if the Department has advised the operator that it intends to declare the dog a dangerous dog. The Department may also permanently bar an animal from working as a guard dog if the Department declares the dog a dangerous dog as provided in this chapter.
- c) A permittee under this section shall comply with all of the following requirements:
 - 1) Supply each animal with sufficient, good, and wholesome food and water as often as the animal's feeding habits require
 - 2) Keep each animal and each animal's quarters in a clean and sanitary condition
 - 3) Provide each animal with proper shelter and protection from the weather at all times. An animal shall not be overcrowded or exposed to temperatures detrimental to the welfare of the animal
 - 4) Not allow any animal to be without care or control in excess of twelve consecutive hours
 - 5) Take every reasonable precaution to ensure that no animal is teased, abused, mistreated, annoyed, tormented, or in any manner made to suffer by any person or by any means
 - 6) Not maintain or allow any animal to exist in any manner that is, or could be, injurious to that animal
 - 7) Not give an animal any alcoholic beverage unless prescribed by a veterinarian
 - 8) Not allow animals that are natural enemies, temperamentally unsuited, or otherwise incompatible to be quartered together or so near to each other as to cause injury, fear, or torment
 - 9) Not allow any tack equipment, device, substance, or material that is, or could be, injurious or cause unnecessary cruelty to any animal to be used on or with an animal
 - 10) Keep or maintain animals confined at all times on the premises for which the permit has been issued unless the Department grants the permittee special permission to remove an animal from the premises. If a guard dog escapes, the owner or custodian shall immediately notify the

Department of the escape and make every reasonable effort to recover it. The owner or custodian shall also notify the Department within 24 hours of the animal's recapture

- 11) Give proper rest periods to any working animal. Any confined or restrained animal shall be given exercise proper for the individual animal under the particular conditions
- 12) Not work, use, or rent any animal that is overheated, weakened, exhausted, sick, injured, diseased, lame, or otherwise unfit
- 13) Not use or work any animal the Department has suspended from use until the Department releases the animal from suspension
- 14) Not display any animal bearing evidence of malnutrition, ill health, unhealed injury, or having been kept in an unsanitary condition
- 15) Keep or maintain each animal in a manner as may be prescribed to protect the public from the animal and the animal from the public
- 16) Provide conspicuously posted, durable signs of sufficient size containing both a clear pictorial depiction of a guard dog and legible written warning of the presence of a guard dog for every location that houses a guard dog or where a guard dog is working. These signs shall be maintained at every entrance and not more than fifty foot intervals so as to be clearly visible on the fence or other enclosure where the dog is to be housed or working. Each sign required by this subsection shall measure a minimum of 11" x 8.5" and use lettering of a minimum of 1.25" x 0.5" (91 point) and of contrasting colour with the background. The signs shall also include the name and telephone number of the guard dog owner or operator housing or providing the dog.
- 17) Take any animal to a veterinarian for examination or treatment when ordered by the Department
- 18) Display no animal whose appearance is, or may be, offensive or contrary to public decency
- 19) Not allow any animal to constitute or cause a hazard, or be a menace to the health, peace, or safety of the community
- 20) Obtain and maintain liability insurance from an insurance company authorised to transact insurance business in the Province of British Columbia with coverage amounts that comply with this subsection. The insurance shall provide liability insurance coverage for the permittee for any loss due to bodily injury or death with not less than \$500,000 per occurrence and for any loss due property damage with not less than \$500,000 per occurrence. The permittee shall also furnish a certificate of insurance to the Department. The certificate shall state that the insurer will notify the Department in writing at least thirty days prior to policy cancellation or non-renewal. The certificate shall also provide the following information:
 - The full name and address of the insurer
 - The name and address of the insured
 - The insurance policy number
 - The type and limits of coverage
 - The effective dates of the certificate
 - The certificate issue date
- 21) Obtain a signed and dated acknowledgement from each person who hires a guard dog from the permittee before the guard dog is sent on assignment. The acknowledgement shall contain the name, address, and telephone number of the permittee, the name address, and telephone number of the person who hired the guard dog, and the location where the guard dog will be working on assignment. The acknowledgement shall also contain the following language:

In addition to other provision of law, any person or business entity who hires or has custody of a guard dog is responsible for preventing the dog from being at large and from preventing the dog from attacking or injuring a person engaged in a lawful act. A person who hires a guard dog should immediately notify the guard dog operator in the event a guard dog escapes from its enclosure and the Department of Animal Control in the event an escaped dog is not immediately recaptured.

The by-laws also state that a person who has custody or control of a dog that bites a person shall notify the Department as soon as practicable after the incident and not more than twenty-four hours after the incident.

- 22) Provide the department with a copy of the signed acknowledgement required by subsection (21)
- 23) Isolate and segregate at all times any sick or diseased animal from any healthy animal, so that the illness or disease will not be transmitted from one animal to another. Any sick or injured animal shall be isolated and given proper medical treatment
- 24) Immediately notify the owner of any animal held on consignment or boarded if the animal refuses to eat or drink beyond a reasonable period, is injured, becomes sick, or dies. In case of death, the body of the animal shall be retained for twelve hours after notification has been sent to the owner
- 25) Reimburse the Department for all costs incurred in enforcing the provisions of this section.

Our proposal information came from researching the by-laws of:

Kelowna, B.C.

Pitt Meadows, B.C.

Brooks, Alberta

Calgary, Alberta

Nova Scotia, New Brunswick

THE CITY OF GRAND FORKS REQUEST FOR PRIMARY COMMITTEE RECOMMENDATION

DATE : **November 8th, 2012**

TOPIC : **Proposed Closure of City Hall During Christmas Week 2012**

PROPOSAL : **Council's Consideration to Close City Hall from Dec 24th-28th Inclusive**

PROPOSED BY : **Chief Administrative Officer**

SUMMARY:

Traditionally, throughout the Christmas holiday week, City Hall experiences an extreme drop in public activity, both at the counter and by phone, as most residents are celebrating the holiday season with family and friends. Historically, staffing is considerably reduced as most City employees book holidays around the statutory days to be with their families. Staff is proposing that Council consider closing City Hall from December 24th to December 28th to allow all Staff to enjoy the Christmas season.

This gesture not only intends to foster good employee relations and contributes towards the wellbeing and best practices in work-life balance, but would also allow for building maintenance to be conducted within City Hall during this closure. This would include the upkeep and maintenance that needs to be done without any disruption to the public or staff. Council can be assured that this proposed closure would not impact daily operations or cause any labour issues from the Public Works perspective. Adequate advertising on the closure of City Hall would be implemented in the local papers and on the City's website in order to give residents proper notification.

Within this requested week are two required statutory holidays, December 25th and 26th. For December 24th, 27th and 28th, City Hall Staff would be required to take vacation days from their allotted vacation time; therefore there would be no additional cost attached to this proposal.

Throughout the province, most local governments and public service sectors traditionally close during this period, as well as service providers that the City confers with, such as engineers, consultants and legal counsel. Should Council consider Staff's proposal, the City will welcome any feedback during the proposed closure to prepare a future policy that would propose the closure of City Hall on an annual basis during the Christmas holidays.

STAFF RECOMMENDATION:

OPTION 1: Resolved that the Primary Committee recommends to Council to receive the Staff report dated November 8th, 2012, and authorizes staff to close City Hall from December 24th to December 28th, 2012, inclusive, for the Christmas holiday.

Be it further resolved that City Hall Staff will utilize their allotted vacation days to supplement the days that are not required statutory holidays, being December 24th, 27th and 28th, 2012.

OPTIONS AND ALTERNATIVES:

Option 1: Resolved that the Primary Committee recommends to Council to receive the Staff report dated November 8th, 2012, and authorizes staff to close City Hall from December 24th to December 28th, 2012, inclusive, for the Christmas holiday.

Be it further resolved that City Hall Staff will utilize their allotted vacation days to supplement the days that are not required statutory holidays, being December 24th, 27th and 28th, 2012.

Option 2: Council receives the Staff Report for information purposes.

BENEFITS, DISADVANTAGES AND NEGATIVE IMPACTS:

Option 1: The main advantage is that this will allow all City Hall Staff to enjoy the Christmas Season, which fosters best practices in work-life balance. Due to prior notification to the public, public impact should be minimal.

Option 2: By Council receiving the report, this will result in the status quo and no additional days off will be granted to City Staff as proposed.

COSTS AND BUDGET IMPACTS – REVENUE GENERATION:

As Staff would utilize vacation time during the proposed closure, no costs would be incurred by the City. There will be a minimal cost to advertising the closure.

LEGISLATIVE IMPACTS, PRECEDENTS, POLICIES:

Council has the authority within the Community Charter to provide the fundamental powers to grant exceptions or services that the Council considers necessary or desirable.



Department Head or Corporate Officer or
Chief Administrative Officer


Reviewed by the Chief Administrative
Officer