MUNICIPALITY OF EAST ST. PAUL
GROUNDWATER SUPPLY SYSTEM

MANITOBA ENVIRONMENT ACT
CLASS 2 DEVELOPMENT LICENCE PROPOSAL

SEPTEMBER 2008

KGS Group
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Principal

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September 25, 2008

File No. 08-1510-02

Manitoba Conservation
Environmental Assessment and Licensing Branch
123 Main Street, Suite 160
Winnipeg, Manitoba
R3C 1A5

ATTENTION: Ms. Tracey Braun, M.Sc.
Director

RE: R.M. of East St. Paul Water Supply System
Final Environment Act Proposal (EAP) Submission

Dear Ms. Braun:

On behalf of the RM of East St. Paul, KGS Group is pleased to submit twenty-seven (27) paper copies and one (1) electronic copy of the Environment Act Proposal (EAP) Submission for the R.M. of East St. Paul water supply system.

An Environment Act License is requested for the entire system including the Oasis Road wells completed in overburden, the Oasis Road well completed in the carbonate aquifer, and the Wenzel Street well completed in the carbonate aquifer. The supply pipelines and the Water Treatment Plant are also included. We understand that the existing Environment Act Licence for the Oasis Road overburden wells (Licence No 2035) would be rescinded when this new licence is issued

The proposal also addresses potential future development of the water supply system.

Please contact Ms. Marci Friedman Hamm P. Geo. or the undersigned if you have any questions or require additional information.

Yours truly,

J. Bert Smith, P.Eng.
Principal

MFH/sp

cc: Jerome Mauws, CAO, R.M. of East St. Paul

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1.0 INTRODUCTION

KGS Group was retained by the Rural Municipality (R.M.) of East St. Paul to prepare an Environment Act Proposal for a Class 2 Development Licence under the Manitoba Environment Act for the existing water supply system, including potential future development. In addition to the normal information requirements of the Environment Act Proposal Form, the information required in the document "Supplementary Guidelines for Municipal Water Supply Systems (March 8, 2002)" is included. An Environmental Licence was issued for the R.M. of East St. Paul Oasis Road overburden wells, water supply line and Wenzel St. Treatment Plant on May 9, 1995 (License No. 2035). Since that time, the R.M. has modified the water supply line, expanded the Water Treatment Plant reservoir and added a bedrock well in the carbonate aquifer at Oasis Road, and a bedrock well in the carbonate aquifer at Wenzel Street. This Environment Act proposal includes all components of the well fields, water supply lines and Water Treatment Plant, and potential future development. The intent is to have the proposed new Environment Act License cover the entire system.

The R.M. of East St. Paul is located adjacent to and northeast of the City of Winnipeg. An area plan is shown in Figure 1. This plan shows the Wenzel St. Water Treatment Plant and bedrock well ESP PW7, the Oasis Road Well field east of the Floodway (including wells ESP PW1, PW4, PW5 and PW6 and the bedrock well PW8), monitoring wells, and third party wells. In 2007 the R.M. of East St. Paul water system serviced 770 of the 3100 residences in the municipality. The system also serviced additional commercial and business consumers. Until the summer of 2007 the R.M. of East St. Paul obtained its water supply exclusively from four groundwater wells located in an overburden sand and gravel deposit on the east side of Oasis Road (ESP PW1, 4, 5, 6). A bedrock well in the Carbonate aquifer at Oasis Road (PW8) was added and began operation in July 2007 to meet increased water demand. A second bedrock well (PW7), located at the Water Treatment Plant on Wenzel Street was added in 2005 and has operated on an emergency basis only. A water rights licence is under review for PW7. Raw water treatment includes chlorination only.

This document provides the information required for the R.M. of East St. Paul to obtain a Class 2 Development Licence under the Manitoba Environment Act for existing works and operation of the water supply system and potential future development.

2.0 DESCRIPTION OF DEVELOPMENT

2.1 CERTIFICATE OF TITLE

2.1.1 Oasis Road Well Field and Water Supply Line

The Oasis Road well field is located in the Red River Floodway Right of Way. The legal land description is the southeast quarter of Section 33, in Township 11 and Range 4, East of the Principal Meridian in Manitoba. The property location is shown on Figure 1. The property is crown land, owned by the Province of Manitoba. The R.M. of East St. Paul was granted permission by Water Stewardship to establish a well field within the Floodway Right of Way at this location. The water supply line from the Oasis Road wells to the treatment plant crosses the Floodway Right of way and then runs along the C.N.R. Right of Way to the R.M. of East St. Paul as shown in the Location Plan attached to the water rights licence in Appendix B-3.

2.1.2 Wenzel St. Treatment Plant

The Wenzel Street Treatment plant is located west of Wenzel Street. The legal land description is River Lots 60 to 199 in the Parish of East St. Paul. The property is owned by the Rural Municipality of East St. Paul. The parcel is described as Parcel A Plan 35858 WLTO in OTM lot 101 Parish of St. Paul (Appendix A-1)

2.1.3 Water Main Distribution Lines

All water distribution lines from the treatment plant are located on public rights of way within the R.M. of East St. Paul.

2.2 MINERAL RIGHTS

Oasis Road Well Field (overburden and bedrock wells)- The Oasis Road well field is located on crown land and all mineral rights belong to the crown.

Wenzel St. Well- The Wenzel St. well is located on land owned by the R.M. of East St. Paul. The certificate of title does not indicate any exclusion of mineral rights; therefore it is assumed that the R.M., of East St. Paul is the owner of the mineral rights (Appendix A-1)

2.3 EXISTING AND ADJACENT LAND USE

At Oasis Road the existing land is vacant except for the wells and associated local power lines (Figure 1).The province of Manitoba maintains groundwater monitoring wells in the area, as does the Manitoba Floodway Authority. The Red River Floodway is located to the west of the wells. The Spring Hill Winter Park is located north of the wells. The Oasis Beach operates summer swimming and camping facilities south of the area. Inland Cement Gravel Pit is located east of the wells. A rural subdivision along Bluegrass Road is located northeast of the wells. Lands along the water supply line are used predominantly for the Red River Floodway, Manitoba Hydro transmission lines and Ridgeway Hydro sub station and for agricultural purposes.

At the Wenzel St. Well and Treatment Plant the existing land use is vacant industrial land. Zoning north, south and west in the R.M. of ESP is vacant Industrial. Zoning east is in the R.M. of Springfield. An industrial building (serviced by the water system) is located 100 m west of the Treatment Plant. A commercial stone cutting operation is located 100 m east of the well. The land is vacant north of the wells up to PTH 59. South of the wells, the land use is rural residential with the nearest home located 500 m south on Wenzel St. Rural residential development is present further south at 900 m along Bricker Avenue. The Meadows of East St. Paul Golf Course is located south of Bricker Avenue. It has a license for a groundwater irrigation well (shown as RW4 on Figure 1)

Land use along the pipeline is municipal roads, railroad or Floodway and associated allowances and Right of Ways.

2.4 LAND USE DESIGNATION AND ZONING

The R.M. of East St. Paul land use plan is shown in Appendix A-2. At Oasis Road the land is crown land, which is designated for the Red River Floodway Right of Way. The supply water line passes through crown land designated for the Red River Floodway Right of Way and then

enters the area zoned industrial west of Wenzel St. The land at the Wenzel St. Water Treatment Plant and the bedrock well is currently zoned Industrial Business Zone (East St. Paul Zoning By-Law No: 96-22), but is proposed to be zoned Industrial (East St. Paul Proposed Development By-Law No. 2007-14).

2.5 PREVIOUS STUDIES AND ACTIVITIES

The previous studies and pertinent drawings for the development are listed in the Reference Section 10.0 of this report. Major activities are summarized below with reference to these reports.

2.5.1 Initial Studies

The R.M. of East St. Paul conducted a series of studies to outline water supply options to supply homes in the Village of Birds Hill that were affected by hydrocarbon contamination, and to service new development. A background brief was prepared for these options (ID Engineering 1994) which contained a study of bacterial contamination in the bedrock aquifer in the Birds Hill area (ID Engineering 1992 b) and a modeling study and assessment of capacity from the bedrock aquifer east of the Floodway and the Oasis Road overburden (ID Engineering 1992a).

2.5.2 Oasis Rd. Overburden Wells, Pipeline and Water Treatment Plant

A test well BH 95-03 (the north supply well) was drilled in February 1995, which later became East St. Paul Well PW1. Two observation wells were also drilled. A 72-hour pump test was conducted and a hydrogeologic report was prepared (Woodbury March 1995). The groundwater studies (including consultation with Manitoba Water Resources Groundwater Branch) had indicated that the sand and gravel aquifer discharged approximately 300 USgpm of groundwater into the Floodway at the base of the Spring Hill Ski area. A series of wells was proposed to capture this otherwise unused discharge.

The initial Environment Act Proposal (ID Engineering 1995a) covered the development of 2 groundwater wells at Oasis Road in the overburden, a 2.1 km, 350 millimetre diameter supply line, plus a reservoir and water distribution system for the Village of Birds Hill. The second well,

BH95-04 (the south supply well) was drilled in October 1995 and became ESP PW4. Two additional overburden wells were completed in November 2000, the south well (PW5) and the north well (PW6).

The water line was originally constructed in 1995 and was modified in 2001 by East St. Paul and then in 2007 and 2008 by the Manitoba Floodway Authority. It extends northeast from the treatment plant across Wenzel Street and north across the CN Pine Fall Sub (Appendix F-1, ID Engineering 1995b). It then travels southeast along the rail right of way to the Floodway Right of Way (Appendix F-1, ID Engineering 1996a). At the end of the Floodway water line relocation in 2008, the water line will cross the Floodway at three locations. Details of the water supply well locations, the water line connections to the wells at Oasis Road and the water line crossings of the Floodway Channel are provided in Appendix F-2 (KGS Group April 2008 c).

The Water Treatment Plant was constructed in 1995 with a reservoir (Stantec 2005 b). The reservoir was expanded to a capacity of 530,000 Igal in 2003.

2.5.3 Wenzel St. Bedrock Carbonate Aquifer Well (PW7) Development

A study was completed on a test well in the carbonate at the Wenzel St. Treatment Plant (PW7) in 2004 in order to expand the capacity of the water supply system (Stantec April 2004). Additional studies were completed relating to assessing potential effects on area water supplies (KGS Group- April 2008a, KGS Group April 2008 b). The application for a water rights licence is now under review by Manitoba Water Stewardship Water Licensing.

2.5.4 Oasis Rd. Bedrock Carbonate Aquifer Well (PW8) Development

The R.M. of East St. Paul then conducted groundwater investigations in the carbonate aquifer at four locations in 2005 (Stantec Consulting January 2005a):

- TW3-04 at Bray Road and the Floodway
- TW 4-04 north of Birds Hill
- TW-2-04 (PW-8) at Oasis Road
- Loading Well east of the Floodway near Dunning Road.

Based on this study, a decision was made to develop a well in the carbonate aquifer at Oasis Road (Stantec 2005c). A hydrogeologic study was prepared and the well received a water rights

licence in 2005. Operation began in July 2007. An Environment Act approval was not required at that time because the taking from the carbonate aquifer was below 200 dam^3.

2.5.5 Water Distribution Master Plan

The R.M. of East St. Paul had a water distribution master plan prepared (Stantec Consulting February 2008). This summarizes 10 years of water use data and projects future water demand and proposed needs for additional wells and reservoir capacities based on potential expansions to the distribution system.

2.6 PROPOSED DEVELOPMENT

The proposed development consists of the following components:

- Four wells developed in the overburden aquifer at Oasis Road (PW1, PW 4, PW5, PW6) with an existing water rights license;
- Two wells developed in the bedrock carbonate aquifer (one at Oasis Road- PW8 with an existing water rights license and one at Wenzel St. (PW7);
- Supply pipeline from Oasis Road to the Wenzel St. Treatment Plant;
- Reservoir;
- Wenzel Street Water Treatment Plant;
- Distribution System.

All components of the project have been constructed and are operational. The Wenzel Street bedrock well PW7 is not being operated pending licensing. A section of the supply pipeline on Oasis Road will be relocated in 2008 by the Manitoba Floodway Authority. This work was previously assessed and is proceeding under the Environment Act license for the Red River Floodway Expansion. A summary of well system and licensed allocations is given in Table 1.

2.6.1 Environment Act License

Environment Act License 2035 was issued on May 9, 1995 for the construction and operation of the municipal water supply system consisting of overburden wells on Oasis Road and a reservoir, pump house and distribution system at Wenzel Street.

The license included a requirement to develop a plan for the monitoring of the effects of the development on adjacent wells including the locations and frequency of monitoring proposed.

The combined rate of water withdrawal was not to exceed 19 l/sec (250 lgpm). A copy of the license is included in Appendix B-1.

2.6.2 Water Rights Licenses

Oasis Road Overburden Wells- Water Rights License 2007-074 was issued on September 15, 2007 for operation of wells PW1, PW4, PW5 and PW6 at Oasis Road. The license specifies a maximum pumping rate from the combined system of 11.4 l/sec and a total quantity of water of 358 cubic decametres (290.23 acre feet) that is equivalent to continuous pumping at that rate. A copy of the License is included in Appendix B-3

Oasis Road Bedrock Well- Water Rights License 2005-60 was issued on July 15, 2005 for operation of the bedrock wells at Oasis Road (PW8). The license specifies a maximum pumping rate of 20 l/sec (264 lgpm) and a total quantity of water of 195 cubic decametres (158.09 acre feet). This is equivalent to full-time operation of the well for a 3 month summer period. A copy of the license is included in Appendix B-2.

Wenzel St. Bedrock Well- An application to licence this well (PW7) was submitted in April 2004 (Stantec Consulting April 2004) . Additional information requested by Manitoba Water Licensing was submitted in April 2008 (KGS Group April 2008a, KGS Group April 2008b). The application is currently under review. It requests a continuous withdrawal rate of 19 L/sec which would result in an annual withdrawal of 599 cubic decametres and a licensed annual withdrawal of 485 acre-ft.

2.6.3 Water Treatment Plant

The R.M. received a facility classification certificate for the Water Treatment Plant and distribution system in March 2007.

2.6.4 Water System Use

Current Use

The water system use is summarized in the February 2008 R.M. of East St. Paul Water Distribution Master Plan (Stantec 2008), which has been excerpted in Appendix C. The past 10 years of data (1998 to 2007) were used for the analysis. Water use data from 1995 to 1997 was excluded because it was not typical of current usage.

The historical residential treated water consumption is shown in Appendix C, Table 4.1. One residence is assumed to be equal to one equivalent residential unit (ERU). The 2007 gross water use was 623,146 litres per day (lpd), equivalent to 7.2 lps. There were 769 residential connections with an assumed population density of 3.2 people per home for a total population of 2461. The per capita usage was 256 litres per capita per day (lpcpd) in 2007 and 280 lpcpd average over the 10-year period. A per capita water consumption of 270 lpcpd is used in the master plan for future planning, considering water conservation and reduction initiatives in the municipality. Table 4.2 shows the commercial business water use converted into equivalent residential units. In 2007, there were 49 commercial ERU's, which, when added to the 769 residential units, totalled 818 ERU's.

The daily values for 1998 through 2008 are shown in the Table 4.3. The average daily use was 670,955 lpd in 2007, while the maximum daily use was 2,246,000 l on July 25, 2007. The system currently serves only residential subdivisions and the commercial and business areas. No agricultural or livestock operations are connected to the system.

In the master plan the current 2008 demand on the water system was calculated at 8.2 l/sec (706,800 lpd) assuming 818 ERU's connected to the system with a usage of 270 lpcpd (Stantec 2008). The reservoir storage design guideline is estimated to be 1,487,600 l in the master plan. The current reservoir capacity is 2,415,000 l, which meets these guidelines.

Future Use

The existing reservoir has the capacity to handle up to 1900 ERUs (800 current plus 1100 additional) according to the Master Plan, assuming current demands and peaking factors, operation of the new carbonate well PW8, and enforcement of conservation measures. The R.M. of East St. Paul reports a housing growth of 10% per year, which could double residential connections within 10 years (2018) to approximately 1600 ERUs. Therefore the existing reservoir is not expected to require expansion within the next 10 years.

This growth would create a water demand of 16.4 l/sec for average use in 2018. For peak use, the master plan peaking factor of 4 can be used to obtain a potential peak use of 66 l/sec in 2018.

An increase in well capacity would be required within the 10-year timeframe to meet this demand. For example, the Oasis Rd overburden wells have a licenced capacity of 11.4 l/sec. If the Oasis Rd. bedrock well license can be increased to year-round operation it could provide 20 l/sec continuously. The application for PW7 has a proposed rate of 19 l/sec for continuous operation. These sources would total 50 l/sec, which could meet the average demand and make up 75% of the peak demand. Additional water sources would be required to make up the remaining 25% and to provide back up if pumping rates at the wells need to be reduced due to drought conditions.

Development beyond the 10-year timeframe is difficult to estimate, however it would require additional water sources and reservoir capacity. Increasing demand due to higher growth rates, increased serviced area, or changes in water use could also require additional system capacity within 10 years. Future development options are outlined in Section 9.0.

2.6.5 Water Conservation Report

The R.M. of East St. Paul has implement several water conservation measures including:

- Development Agreements
- Public Education Programs
- Comprehensive Metering
- Pricing
- Public Communications
- Watering By-Law

Development Agreements- All developments within the R.M. of East St. Paul are subject to a development agreement to be approved by the R.M. The agreement states that the developer must have a public education program that encourages water conservation and sustainable turf management. The education program is cost shared on a 50- 50 basis by the developer and the R.M. In addition, public reserve land within the development must use sustainable turf management in the design, which must be approved by the R.M.

Public Education Programs- In addition to the public education programs through the development agreements, the R.M. publishes a quarterly newsletter that is distributed in the municipality. The newsletter has contained articles on the water supply system and conservation measures including a summary of the watering by law. A water conservation

brochure titles “Water Smart” was published and distributed. Copies of the book “Household Guide to Water Efficiency” were purchased and are available at the R.M. offices. The R.M. maintains a web site (www.eaststpaul.com), which contains links to information on municipal services including the quarterly newsletters. The R.M. also hosts an annual open house at the R.M. offices, which includes a display and information on the water system and water conservation.

Comprehensive Metering- Since a water rate study conducted in 2004, the R.M. has improved the metering system. This resulted in short term increases in water and sewer bills to many homeowners and a subsequent decrease in water use. Water meter readings increased from twice per year to four times per year. The R.M. adopted a similar model to larger municipalities where the consumer is charged for water volume into the home plus a water charge on the sewer bill (for those homes on municipal water). Improvements were made in the meter reading system and a phone-in water reading service was started. These measures resulted in more accurate and up to date billings. A downward trend has been seen in water consumption since 2004 despite an increased in serviced homes, indicating a move toward water conservation.

Watering By-Law- The R. M. has a Water Sprinkling By-law as shown in Appendix D. The By-law restricts water sprinkling between the last Saturday of May and September 30th to early morning and evening hours three days per week as specified by addresses. The By-law has staged restrictions so that the municipality can further restrict sprinkling to two days per week or ban sprinkling altogether when required. Washing sidewalks, driveways, cars and watering landscaping or gardens can also be restricted under the by-law.

2.6.6 Water Supply Wells

Oasis Road Overburden Wells

The Oasis Road overburden wells consist of PW1, PW4, PW5 and PW6. Well logs are contained in Appendix E-1. The wells are enclosed in locked, alarmed, protective steel boxes. Wells 1 and 4 are located in a fenced compound and there is security camera surveillance for all wells.

Well PW1- Well PW1 is located furthest north and was drilled on February 13, 1995 by Friesen Drillers. The well was drilled through the overburden 0.15 m (0.5 ft) into limestone bedrock. Coarse sandy gravel was found at 14.3 to 20.4 m (46 to 67 ft), underlain by 1.2 m (4 ft) of silty sand till. A 250 mm (10 inch) diameter steel casing was installed from 1.1 m (3.7 ft) above ground to 16 m (52.5 ft) below ground surface, with a 0.1 slot wire wound stainless steel screen installed from 16.0 to 20 m (52.5 to 65.5 ft) in the sandy gravel deposit. The well was pumped for 72 hours from February 13 to 16, 1995 at a rate of 83 lgpm with a drawdown on 2.4 m (8 ft).

Well PW4- Well PW4 (BH 95-04) was located furthest south and was drilled on October 1, 1995 by Friesen Drillers. The well was drilled through the overburden 1.1 m (3.5 ft) into limestone bedrock. Coarse sand and gravel was found at 18.2 to 22.4 m (60 to 73.5 ft), underlain by 0.46 m (1.5 ft) of silty sand till. A 200 mm (8 inch) diameter steel casing was installed from 1 m (3 ft) above ground to 18.6 m (61 ft) below ground surface with a 0.14 slot wire wound stainless steel screen installed from 19.2 to 22.3 m (63 to 73 ft) in the sandy gravel deposit, and 0.005 slot screen above that zone to the solid casing and blow that zone to the limestone at 23.7 m (78 ft). There was no pump test data for the well.

Well PW5- Well PW5 is located between PW6 and PW4 and was drilled on November 15, 2000 by Friesen Drillers. The well was drilled through the overburden 1.2 m (4 ft) into limestone/till. Sand and gravel and boulders and gravel were found at 10.7 to 22 m (35 to 72 ft), underlain by 0.3 m (1 ft) of till. A 200 mm (8 inch) diameter steel casing was installed from 0.73 m (2.4 ft) above ground to 18.3 m (60 ft) below ground surface, with a wire wound stainless steel screen installed with open 120 slot from 18.6 to 21.6 m (61 to 71 ft) in the sand and gravel deposit. The well was pumped for 3 hours on November 14, 2000, at a rate of 54 USgpm with a drawdown of 5.6 m (18.4 ft).

Well PW6- Well PW6 is located between PW1 and PW5 and was drilled on November 15, 2000 by Friesen Drillers. The well was drilled through the overburden 0.6 m (2 ft) into limestone/till. Sand and gravel was found at 13.7 to 22.6 m (45 to 74 ft), underlain by 0.6 m (2 ft) of till. A 200 mm (8 inch) diameter steel casing was installed from 0.5 m (1.65 ft) above ground to 18.6 m (61 ft) below ground surface, with a wire wound stainless steel screen installed with open 100 slot from 18.9 to 21.9 m (62 to 72 ft) in the sand and gravel deposit. The well was pumped for 3 hours on November 13, 2000, at a rate of 60 USgpm with a drawdown of 5.2 m (17.03 ft).

Oasis Road Bedrock Well (PW8)

Well PW8 is located north west of PW1 and was converted from test well TW2-04 to a supply well on February 22 to 23, 2005 by Friesen Drillers. The well is enclosed in a locked, alarmed, protective steel box within a locked fenced compound with security camera surveillance. The well was drilled through 22 m (73 ft) of overburden to the limestone and extended to 42.6 m (140 ft). A 250 mm (10 inch) diameter steel casing was installed from 0.6 m (2 ft) above ground to 22.9 m (75 ft) below ground surface, with an open hole to 42.6 m (140 ft). The well was

pumped for 72 hours from February 29 to March 3, 2005, at a rate of 310 USgpm with a drawdown of 1.85 m (6.09 ft).

Wenzel Street Bedrock Well (PW7)

Well PW7 is located at the Wenzel Street Water Treatment Plant and was converted from test well TW1-04 to a supply well on February 23 to 24, 2004 by Friesen Drillers. The well location is shown on Figure 1 and Appendix G. The well is enclosed in a locked, alarmed, protective steel box within a fenced compound with restricted access during working hours. The well was drilled through 15.85 m (52 ft) of overburden to the limestone and extended to 42.67 m (140 ft). A 250 mm (10 inch) diameter steel casing was installed from 0.4 m (1.3 ft) above ground to 15.85 m (52 ft) below ground surface and the annulus sealed with Portland cement with a bentonite plug at the base. An open hole was extended to 42.6 m (140 ft). The well was pumped for 48 hours from February 25 to 27, 2004, at a rate of 26 l/sec (412 USgpm) with a drawdown of 3.2m (10.5 ft).

Monitoring Wells

The R.M. of East St. Paul has installed two monitoring wells in the Carbonate Aquifer. Well MW1-05 is located adjacent to PW8 at Oasis Road. The second monitoring well, MW2-04 is located at Camsell Road. Provincial monitors with chart recorders are also installed in the overburden at Oasis Road, and provincial monitors in the carbonate bedrock are installed at the Water Treatment Plant, at Bricker Avenue and at McGregor Farm Road. The Manitoba Floodway Authority also currently maintains monitoring wells at the Oasis Road site.

2.6.7 Water Supply Line

The water supply line from the wells to the treatment plant crosses the Floodway in three locations as shown in Appendix F-2. The supply line entrance to the Water Treatment Plant is shown in Appendix F-3 and Appendix G.

2.6.8 Water Quality

Water quality was monitored from each raw water source and results were included in the original hydrogeology reports. The R. M. of East St. Paul conducts water quality monitoring to comply with the Manitoba Drinking Water Safety Regulation. Daily testing of treated water for free and total chlorine is conducted prior to water leaving the treatment plant, and periodic testing is done on distribution system water. Bacteria tests are conducted on raw water entering the treatment plant and on the treated water for Total coliform and *E. Coli.* Chlorine and bacteria results are reported to the Office of Drinking Water in accordance with the regulation.

The R.M. of East St. Paul also conducts additional monitoring over and above requirements. For the treated water, pH and temperature are also monitored daily. In-line turbidity meters were installed at the Water Treatment Plant for the treated water. Turbidity meters are also installed to monitor raw water at the Oasis Road well field, one for the overburden system (PW1, 4, 5 and 6) and one for the Oasis Road bedrock (PW8). The meters are intended to provide early warning of water quality changes in the raw water and treated water. Trihalomethanes (THM's) in the treated water are also analyzed quarterly.

The R.M. also conducts additional water quality testing at each raw water sources. An annual sample for general chemistry, metals VOCs, hydrocarbons and pesticides is taken and analyzed for each of the six wells on the system. The R.M. reviews the results of all water quality testing and maintains their own records.

2.6.9 Water Treatment Plant and Reservoir

Water Treatment Plant

The Water Treatment Plant is a Class I plant, with chlorination the only source of disinfection. The facility is a semi-automated plant running off a PLC panel to control well activation and distribution pumps. The following on-line monitoring devices are used:

- Chlorine analyzer
- Turbidimeter
- System pressure
- Influent
- Effluent

- Reservoir level indicator
- Magnetic flow meters for both raw and treated water
- Chart recorder

Emergency power is provided by an emergency generator housed inside of the Water Treatment Plant that is capable of completely powering both the building and the Wenzel St. bedrock well (PW7). The generator is activated by an automatic transfer switch. A diesel storage tank is located inside the building.

Process Description

Water is pumped into the Treatment Plant for a combined total of 45 lps. Consumption varies between 350 m^3 per day (4 lps) during low demand and 2600 m^3 (30 lps) during peak periods. There are no process discharges from the treatment plant.

Reservoir

Water pumped from the wells enters the reservoir. It consists of 4 separate chambers with a combined capacity of approximately 650,000 US Gallons. The reservoir is a below ground covered concrete reservoir with a metal clad pump room and treatment superstructure.

2.6.10 Water Distribution System

The water distribution system line from the Water Treatment Plant is shown in Appendix F-3. The water distribution system current to March 2008 is shown in Appendix F-1 (Figure 2 by Stantec Consulting). Many homes and businesses in the area are not connected to the municipal system and use domestic wells.

2.6.11 Operation and Maintenance

Operation and maintenance of the water system requires daily and monthly duties and general maintenance. The facilities are monitored by R.M. of East St. Paul utility staff reporting to the Public Works Manager. Maintenance is set out in the operation and maintenance manuals.

Operators are certified by the Province to ensure system performance and compliance with *The Public Health Act.* Operator duties are summarized below:

Daily Checks:

- Check well heads and panels, record operation times, check amperage under load
- Check PLC signal to well pump panel
- Record all pump times, document water flows and record all water meter ETM's
- Check distribution water pressure, pump packings, and general operation of pump sequence, and motor noise
- Check fan operation, unit heaters, and fresh air intake
- Check chlorine pump for leaks, air locks or malfunctions
- Mix sodium hypochlorite as necessary
- Inspect outside building including reservoirs, locks, holding tank, sump pit, and diesel storage tank
- Inspect emergency gen-set for battery leaks, battery charger, and block heater
- Check output of well pumps to reservoir
- Conduct and record tests for free/total chlorine, pH, temperature, treated, raw supplies and turbidity

Monthly Checks:

- Perform emergency gen-set test (1 hour)
- Record all running times quarterly for up to one hour
- Inspect inside and outside reservoirs
- Observe neutral and transfer switch operations
- Grease pump packing and pump motors as necessary
- Inspect outside building including reservoirs, locks, holding tank, sump pit, and diesel storage tank

2.7 STORAGE OF PETROLEUM PRODUCTS AND OTHER CHEMICALS

Construction activities have been completed for the project. Maintenance activities do not require re-fuelling on-site. There is no storage of fuel at the Oasis Road site. There will be no storage of petroleum products or other chemicals in the vicinity of any of the supply wells during operation of the proposed project.

A 600 l steel storage tank is located inside of the water treatment facility. A concrete containment wall surrounds the tank. A record of fuel volumes used will be maintained and an emergency response plan that includes petroleum spill prevention, notification and response will be prepared and implemented.

Sodium hypochlorite is stored for use in the chlorination system. Up to 480 litres of sodium hypochlorite is stored which is delivered in 24-20 l plastic containers. The sodium hypochlorite is stored in cabinets built in the treatment facility. General household cleaning products are stored under the sink at this facility.

3.0 PHYSICAL ENVIRONMENT

3.1 LOCATION, PHYSIOGRAPHIC SETTING AND CLIMATE

The Oasis Road well field consist of overburden wells PW1, PW4 and PW5 and PW6 and bedrock well PW8. It is located along Oasis Road within the east boundary of the Red River Floodway adjacent to the R.M. of Springfield. Well PW7 is located at the Wenzel Street Treatment Plant. The area is located within the Lake Manitoba Plain Ecoregion within the Prairies Ecozone (Environment Canada July 2008a). The Prairies Ecozone is characterized by a sub-humid to semiarid climate (Environment Canada July 2008a). This ecozone is the most human-altered region in Canada.

The Lake Manitoba Plain Ecoregion is one of the warmest and most humid regions on the Canadian prairies. It is transitional between boreal forests to the north and aspen parkland to the southwest. The mean annual precipitation is approximately 450 to 700 mm (Environment Canada July 2008b). The mean annual air temperature at the Winnipeg weather station is 2.6°C and the daily mean temperature ranges between 19.5°C in July and -17.8°C in January (Environment Canada July 2008b). The highest temperature recorded was 40.6°C in August 1949, whereas the lowest temperature was - 45.0°C in February 1966. The average annual precipitation is approximately 513.7 mm, with 415.6 mm falling as rain and the rest as snowfall. June has the highest average rainfall (89.5 mm), whereas November and January have the highest average snowfalls (21.4 cm and 23.1 cm respectively). An extreme daily snowfall of 35.6 cm occurred on March 4, 1966 (Environment Canada July 2008b).

3.2 GEOLOGY

The geology and hydrogeology of the area is discussed in detail in previous reports (Stantec 2005 c, Woodbury 1995). An overview is presented here.

3.2.1 Regional Geology

The regional geology of the area consists of glaciolacustrine deposits of silt, clay and sand, 1 to 30 m thick, deposited in proglacial lakes. The underlying Paleozoic bedrock consists of the Ordovician Stonewall Formation consisting of dolomite and medial sandy argillaceous markers

(Geological Survey of Canada 1994). The Birds Hill Complex consists of glaciofluvial sands and gravels 15 to 30 m thick deposited by ice contact with glacial meltwater.

3.2.2 Local Geology

Local geology is shown in Appendix H Figure H-1 (Stantec 2005c). Geology at the Wenzel St. Well PW7 consists of glaciolacustrine clay overlying till above the carbonate bedrock.

The Oasis Road area is located at the western extension of the Birds Hill esker deposits. These deposits extend northwest across the Red River Floodway to the Town of Birds Hill.

3.3 HYDROGEOLOGY

The upper carbonate aquifer is located in the upper 15 m of the Red River Formation. It is the major source of groundwater in the Winnipeg area due to its relatively high transmissivity. Groundwater development in the lower carbonate aquifer is generally avoided because is typically more saline and the aquifer is less permeable. Wells PW7 at the Water Treatment Plant and Well PW8 at Oasis Road are both developed in the upper carbonate aquifer as shown in Figure H-1. Domestic wells surrounding the Water Treatment Plant and west are developed the carbonate aquifer

Groundwater in the sand and gravel deposits of the Birds Hill complex is a major source of recharge to the underlying carbonate aquifer. The piezometric surface of the upper carbonate aquifer is higher than the underlying bedrock with flow restricted by a discontinuous layer of basal till which separates the two aquifers. Existing production wells PW6 (shown) and PW1 through PW5 are developed in the sand and gravels of the overburden. In the Oasis Road area, residential development is located on the outer flanks of the deposit and domestic well logs indicate development in the upper carbonate.

The aquifer properties at each well location are summarized below based on previous testing.

Oasis Road Overburden Wells- Woodbury et al (1995) estimated transmissivity of 0.005 to 0.02 m^2/sec (35,000 to 140,000 USgpd/ft), a storativity of 0.001 and a specific yield of 0.05 to 0.09 from a 100 USgpm, 72-hour test in the sand and gravel at Oasis Road (BH95-03). The R.M. of East St. Paul Well ESP PW1 was developed in the overburden from that test well.

Distance drawdown plots constructed from that data by KGS Group show transmissivity values in the range of 30,000 to 35,000 USgpd/ft. Using a transmissivity of 30,000 USgpd/ft and a saturated thickness of 10 m at that location, the estimated hydraulic conductivity would be $4x10^{-4}$ m/sec.

Oasis Road Bedrock Well-(PW8) A transmissivity of 1800 m^2/day (145,000 USgpd/ft) and a storativity of 7.8 x 10^{-8} were estimated from a 72-hour pumping test performed at ESP well PW8 by Stantec in February 2005. A distance drawdown plot of the data constructed by KGS Group gave a similar transmissivity in the order of 140,000 USgpd/t and a storativity of 1 $x10^{-3}$. A plot of the drawdown cone from that test is given in Appendix H-3.

Wenzel St. Bedrock Well-(PW7) A transmissivity of 106,000 USgpd/ft and a storativity of 1.4 x 10^{-4} were estimated based on the aquifer parameters calculated from a 72 hour pumping test of PW7 at a rate of 26 L/sec in February 2004 (Stantec Consulting 2004). A distance drawdown plot and a table of maximum drawdown are included in Appendix H-4-1. The response northwest of the site was approximately 60 to 75% of predicted. To the east of PW7, response on the west side of the Floodway channel and in the Floodway channel was less than 10% of predicted.

3.4 SURFACE WATER

The Wenzel St. well is located 1.2 km from the Low Flow Channel of the Red River Floodway and 750 m southwest of the ponds in the former pits at Birds Hill. The Oasis Road wells are 50 to 100 m west of the pond in the former pits at Oasis Road. A road drainage ditch runs along the west side of Oasis Road adjacent to the wells.

3.5 FISH AND FISH HABITAT

Manitoba Conservation Water Stewardship Fisheries Branch (Mr. Wade Biggin) has conducted a review of the FIHCS species information for the water bodies in the project area. The fisheries resources for the Red River Floodway are listed in the response contained in Appendix I-3. All species identified are common in the area and none have been identified as rare or endangered.

3.6 WILDLIFE, HABITAT AND VEGETATION

The project area is located within the Prairies Ecozone of the Lake Manitoba Plain Ecoregion. Typical wildlife and bird species found in the area include waterfowl, white-tailed deer, coyote, rabbit and ground squirrel. The area at Oasis Road is a gravel area and has been disturbed by

the original Floodway development in the 1960's, and by use as a truck driver training location in the past. Recent excavation and construction activities for the Red River Floodway expansion have disturbed the area surrounding the wells. These activities would have resulted in reduction of habitat for several of these species. Restoration and re-vegetation activities associated with the Floodway expansion will restore some areas. Prior to the development of the Water Treatment Plant at Wenzel St., the area was agricultural land.

Avian and terrestrial wildlife present in the area are typical of developed environments and include Canada geese, songbirds such as sparrows, robins, blue jays or starlings, and small mammals such as rabbits and squirrels.

Ms. Nicole Firlotte of Manitoba Conservation, Wildlife and Ecosystem Protection Branch conducted a review of Branch files for the subject area and surrounding area and found no records of any rare or endangered wildlife or vegetation species. A formal letter of reply from Manitoba Conservation, Wildlife and Ecosystem Protection Branch is included in Appendix I-1.

3.7 SOCIOECONOMIC

The project area (with the exception of the Oasis Road well field) is located within the R.M. of East St. Paul that has an area of 42.1 km^2 and in 2006 had a population of 8,733 with 2,944 private dwellings (Statistics Canada July 2008). It is located immediately outside of the City of Winnipeg, past the north perimeter. In 2006, 7,040 people within the R.M. of East St. Paul were 15 years or older, 5,010 of these people were in the labour force resulting in a 71% participation rate (Statistics Canada July 2008). From this labour force, 4,935 people were employed, resulting in an employment rate of 98.5%. Approximately 18% were employed in the manufacturing and construction industries, 17% in the business sector, 11.6% in health care and social services, 18% in the wholesale and retail trade, and 19% in other services (Statistics Canada July 2008).

3.8 HERITAGE RESOURCES

Mr. Gordon Hill of Manitoba Culture, Heritage, and Tourism, Historic Resources Branch examined Branch records for areas of potential archaeological concern. He noted that the potential to impact significant heritage resources is low, and therefore, the Historic Resources

Branch has no concerns with the project (Appendix I-2).

4.0 POTENTIAL ENVIRONMENTAL EFFECTS ASSESSMENT

An environmental effect includes any change that the project may cause to the environment. Environmental effects were identified from interactions between proposed project activities and environmental components. Mitigation measures and follow-up activities were identified for environmental effects determined to be adverse.

4.1 AIR QUALITY

Air quality in the Oasis Road area is influenced by vehicle traffic unrelated to the R.M. of East St. Paul. Traffic includes residential access seasonal traffic to the Oasis Beach and industrial gravel trucks from the gravel pits east of the site. This traffic contributes to fugitive dust levels in the local area. The Manitoba Floodway Authority conducted a temporary construction program to widen the Floodway west of Oasis Road in fall 2007. No additional air quality impacts are expected since this work is now complete The project activities are limited to regular monitoring of wells consisting of single vehicle traffic from the Oasis Road access or Wenzel St. access that is unlikely to increase fugitive dust levels above background in the local area. Maintenance activities may involve other types of vehicles or heavy equipment, however wells and the treatment plant are close to or adjacent to the road, so driving on bare soils and gravel will be minimized. Maintenance and repairs involving excavation could temporarily increase fugitive dust emissions, however these effects are assessed to be negligible to minor and short term in duration and it is unlikely that Manitoba's air quality guidelines would be exceeded. Mitigation measures may include using water to control dust, controlling vehicular speeds, limiting excavation activities during periods of high wind, and re-establishing vegetation on any disturbed areas.

4.2 SOILS

The area at Oasis Road has been disturbed by Floodway construction in the 1960's and 2007, past use as a Truck Driver training facility, and on-going off-road recreational traffic. The project activities are limited to regular monitoring and maintenance activities that have a negligible effect on soil disturbance and compaction because of low vehicle traffic, and established roads or gravel surfaces near the wells and treatment plant. If vehicle traffic is required in undisturbed

areas, proposed mitigation measures include minimizing surface disturbance, and restricting activities during periods of high wind and restoring disturbed areas.

Regular monitoring and maintenance activities will have a negligible effect on soil contamination since fuel trucks or other hazardous substances will not be brought on-site on a regular basis. Soils in the project areas may become contaminated from accidental spills or releases of fuels or other hazardous substances and waste from large maintenance or repair projects. The potential adverse effects on soil quality were assessed to be minor to moderate. Proposed mitigation includes preparing an emergency (spill) response plan as needed, providing spill clean-up equipment, providing fuel handling training for operators, and periodic inspection of vehicles for any leaks. If a spill should occur, the contractor would be responsible to notify Manitoba Conservation and the appropriate clean up would be determined according the size of spill and quantity of contamination.

4.3 SURFACE WATER , FISH AND FISH HABITAT

Project activities are limited to regular maintenance and monitoring activities which are not expected to result in changes to surface water drainage pattern in the local area. Any extensive construction activities may result in a temporary modification to the surface water drainage patterns (i.e. trenching).

Proposed mitigation includes minimizing excavation, visually monitoring any surface water runoff, if required, directing surface water runoff or pumping any accumulated water to adjacent ditches and providing erosion control.

The operation of the existing wells (PW7 and PW8) presently has no effect on surface water flows in the area. Therefore, no environmental practices to mitigate potentially adverse environmental effects are required, and no mitigation measures have been proposed.

Surface water in the area of Oasis Road (Red River Floodway, ponds in pits) may become contaminated by accidental spills or releases of fuels or other hazardous substances. The potential for this to occur is low since project activities do not generally include these materials. The potential adverse effects on water quality from a spill were assessed to be negligible to moderate due to the distance to surface water (for the Floodway) and the upgradient position of

the gravel pit. Proposed mitigation by the R.M. of East St. Paul includes establishing an emergency (spill) response plan if needed, periodic inspection of vehicles attending the site for any leaks/releases, and proper fuel containment.

4.4 GROUNDWATER QUALITY

4.4.1 Effects of the Project on Groundwater Quality

Groundwater is used by residential wells in the R.M. of East St. Paul that are not connected to the water supply system, and by residents of the R.M. of Springfield along Wenzel Street and McGregor Farm Road, and east of Oasis Road. Construction of the system is completed, with the exception of the west section upgrade of the water line scheduled for summer and fall 2008 as part of the Floodway expansion, which was evaluated under the Environmental Assessment for the Red River Floodway Expansion. Operations and maintenance activities at the wells include daily visits in a vehicle to the wellheads, which are located adjacent to existing roads.

Pumping of groundwater could change the non-pumping groundwater flow directions and may result in minor changes in groundwater quality as follows:

- ***Oasis Road Overburden Wells***- On Oasis Road, pumping of the overburden wells will have a local effect. Domestic wells are not located in the overburden aquifer and are unlikely to be within the small groundwater capture zone for these wells.

- ***Oasis Road Bedrock Well***- Pumping of the bedrock well at Oasis Road will draw in groundwater from the east, from bedrock beneath the Birds Hill aquifer deposits, which are typically low in dissolved solids. If pumping were continuous, bedrock groundwater from west of the Floodway could be drawn to the east. This groundwater would be potable, but may have slightly higher dissolved solids. Domestic wells north and east of the pumping wells would not be influenced by these water quality changes, since the bedrock well on Oasis Road would be capturing the water from west of the Floodway. When the pumping well is shut off, the prevailing groundwater flow direction from east to west would re-establish itself quickly.

- ***Wenzel St. Bedrock Well***- Pumping of the bedrock well at Wenzel St. will draw in water from the west (McGregor Farm Rd.) and south (Bricker Ave.) with higher dissolved solids and water from the east with lower dissolved solids. A portion of the lower dissolved solids groundwater flow from the east would be captured by the pumping wells and would not reach the domestic wells further to the west. When the well is shut off, the regional east to west groundwater flow would be re-established. Any existing groundwater contamination near the domestic wells would presently move west with the

natural groundwater flow, or toward the Meadows of East St. Paul irrigation well when it is pumping seasonally. The addition of the pumping well at Wenzel Street will induce some flow to the north from the Bricker Ave. area.

4.4.2 Potential Adverse Effects of the Project on Groundwater Quality

The potential adverse effects of the project on groundwater quality are considered negligible. Construction activities for the water system are complete with the exception of the 2008 section of the water line at Oasis Road, which has been previously assessed. Maintenance and operations visits require vehicle traffic only. Slight water quality changes in domestic wells, if they occur, are unlikely to be noticeable and would be unlikely to require modification to or new treatment systems at the domestic wells. Water treatment systems such as water softeners and iron filters, are commonly used at some wells in the area. If groundwater contamination (such as nitrates or bacteria) is present within the aquifer, the transport of this contamination may vary depending on which water supply wells (Golf Course, East St. Paul) are being pumped at a given time. The R.M. of East St. Paul has not conducted domestic groundwater quality monitoring in domestic wells. However, the Manitoba Floodway Authority has collected data in this area, which could be requested if required.

4.4.3 Effects of Groundwater Quality on the Project

Leaks, Spills and Fertilizer/Pesticide Use- Groundwater in the project area may become contaminated from leaks, accidental spills, or releases of fuels or other hazardous substances on surrounding lands. This may include vehicle traffic on Oasis Road, recreational vehicles at the Spring Hill Winter Park, vehicle traffic on Wenzel Street. Fertilizer/pesticide use within the well field areas on Wenzel Street or on the Floodway right of way on Oasis Road may also affect groundwater quality. The existing gravel pit owned by Inland Cement located 50 to 100 m west of Oasis Road is also a potential source for groundwater contamination. During periods when the pit is active, fuel spills from vehicles would be the largest concern.

Infiltration from Improperly Sealed Wells and Septic Systems-Groundwater quality may also be impacted by contaminants moving in surface water and infiltrating improperly sealed domestic wells. Bacteria and contaminants from individual septic systems can also infiltrate groundwater. The Oasis Road wells are located 150 m south west from the nearest residential development served by domestic wells completed in bedrock. These residences have septic

systems. Groundwater from beneath some of this area would be within the capture zone of the wells. The Wenzel St. Well is approximately 900 m north of a low-density rural residential area to the south. Pumping of the PW7 well would capture groundwater for a portion of this area.

Surface Water/Groundwater Infiltration- Surface water is present in the gravel pit east of Oasis Road and in the Red River Floodway. Surface water has the potential to infiltrate into the groundwater in the gravel pit and beneath the Floodway. Infiltrating surface water can increase the risk of groundwater contamination from bacteria or water borne cysts such as *Giardia lamblia* and *Cryptosporidium,* or from fertilizer/pesticide runoff or other contaminants carried in the surface water. An evaluation of the potential for these wells to be Groundwater Under Direct Influence of Surface water (GUDI) has not been done formally by the R.M. of East St. Paul.

- ***Oasis Road Wells-*** The Oasis Road wells are located 50 to 100 m west of the gravel pit and 350 m east of the low flow channel of the Red River Floodway. Infiltration of surface water from the Floodway into the bedrock or overburden deposits may occur during flood events or during various groundwater pumping scenarios.

- ***Wenzel St. Well-*** The Wenzel St. well (PW7) is located 1 km west of the Floodway. Infiltration of surface water from the Floodway into the bedrock or overburden deposits on the west side of the Floodway may occur during flood events. The regional groundwater flow is from the Floodway toward the well PW7. Pumping the well increases the local hydraulic gradient toward the well and decreases the time needed for groundwater from beneath the Floodway to reach the well.

4.4.4 Potential Adverse Effects of Groundwater Quality on the Project

Leaks, Spills and Fertilizer/Pesticide Use- At the Oasis Road wells the risk to the project from leaks, spills and fertilizer use is rated minor to moderate. There are no known storage tanks on site. There is a low potential for spills, however a release would be difficult to contain in the high permeability soils, or in the gravel pit. Herbicides/pesticides may enter the drainage ditches during runoff events in the residential subdivision north of Oasis Road. Recreational traffic on the Floodway area is not restricted, however the bedrock well at Oasis Road is located in a fenced compound, the other overburden wells are secured individually in steel covers and the bedrock monitoring well is locked. Fertilizer/pesticide use on the Floodway is documented and monitored. The R.M. of East St. Paul treatment system consists of chlorination that would provide protection from bacterial contamination. Annual monitoring for volatile organics and pesticides is conducted.

At Wenzel St. the risk to the project from leaks spills and fertilizer use is negligible. The well is located in an alarmed steel structure in a fenced compound. Overburden soils consisting of 16 m of lower permeability clay and till overlie the bedrock deposits in this area. Residential density is low surrounding the wells resulting in less residential fertilizer/pesticide use. Agricultural land use is limited in the area.

Infiltration from Improperly Sealed Wells and Septic systems- At Oasis Road the potential for adverse effects from infiltration from improperly sealed wells and/or septic systems is minor. There is a residential subdivision of homes within 150 m of the wells, however it is the only subdivision in the area. Most of the area consists of new construction that would be more likely to follow current well construction and septic field regulations and practices. At Wenzel St. the risk is also minor. The higher density rural residential area is located at Bricker Ave., 900 m from the supply well. Current water treatment (chlorination) protects against bacterial contamination that may enter supply wells at both locations.

Surface Water/Groundwater Infiltration-

- ***Oasis Road Overburden Wells***- There may be a moderate potential for surface water from the gravel pit east of the road to enter the wells based on groundwater flow direction. Low pumping rates at the overburden wells help to minimize the rate of flow from the east. Chlorination of the water at the treatment plant would result in a negligible potential adverse effect with regards to bacterial water quality. There would be a potential for a moderate adverse effect from other contaminants.

There is a negligible potential for surface water from the Floodway to infiltrate the overburden wells as described below, although a GUDI study has not been completed for these wells. Therefore the potential for adverse effects is negligible Groundwater elevations in the overburden at Oasis Road would be higher than in a full Floodway channel. The area south and west of most of the wells is composed of till material with a high silt/clay contact. The Floodway Authority has constructed a cut-off wall of low permeability, compacted clay in the overburden above the bedrock groundwater level east of the channel, between the floodway and the Oasis Road well field. A second low permeability compacted till cutoff wall was constructed below the bedrock groundwater level to close to the bedrock surface. These cutoff walls protect against Floodway water infiltration into overburden deposits in this area.

- ***Oasis Road Bedrock Well***- There is a moderate potential for surface water from the gravel pit east of the road to infiltrate to the bedrock and enter the bedrock well at Oasis Road, although a GUDI study has not been completed for this well. The well has a continuous turbidity metre to alert the treatment plant of high turbidity levels that may indicate surface water influx. Chlorination of the water at the treatment plant would result in a negligible potential adverse effect with regards to bacterial water quality. There would be a potential for a moderate adverse effect from other contaminants.

There is a moderate potential for surface water from the Floodway to infiltrate the bedrock well, although a GUDI study has not been completed for this well. The well is intended to be operated during the high water demand period from June to August. Operation of this well can be avoided during periods of floodway operation, (when there is a higher risk of surface water infiltration) when water demand is low. The well has a continuous turbidity metre to alert the treatment plant of high turbidity levels that may indicate surface water influx. Chlorination of the water at the treatment plant would result in a negligible potential adverse effect with regards to bacterial water quality during operation. There would be a potential for a minor to moderate adverse effect on water quality from other contaminants.

- ***Wenzel St. Bedrock Well***- There is a moderate potential for adverse effects from infiltration of Floodway surface water into bedrock and transport west to the Wenzel St. site, primarily during a floodway operation, although a GUDI study has not been done. The well is located 1 km from the Floodway. A microscopic particulate analysis of this well was done in 2005 by the Manitoba Floodway Authority to assess the potential for surface water influence at this location and the results were negative.

4.5 GROUNDWATER LEVELS

4.5.1 Potential Adverse Effect of the Project on Groundwater Levels

Oasis Road Overburden Wells- The potential adverse effects on area domestic wells from pumping the overburden wells are negligible. The wells are pumped at a low rate up to a combined rate of 11.4 l/sec (150 lgpm). Drawdown from pumping the overburden wells has been shown to result in less than 0.3 m of drawdown in an adjacent bedrock monitoring well. At overburden Provincial monitoring well G05OJ006, located just east of Oasis Road, groundwater elevations since 1995 are similar to prior well installation, with the exception of seasonal highs during floodway operation and season lows during drought conditions (Appendix H-2). The hydrograph shows about 1 m seasonal fluctuation from elevation 231 to 232 m, which includes typical summer lows and some spring recharge, excluding the peak of large flood events.

Domestic wells in the area are located outside of the main area of surficial sand deposits. The wells are completed in bedrock, with variable connection between the overburden and bedrock aquifer through the underlying till where it occurs. East St. Paul has a groundwater response plan that applies to the entire system. This plan outlines commitments to respond to water supply complaints and take actions if complaints are related to the municipal well operation. Long term monitoring records of the overburden aquifer are maintained from the two overburden wells shown in Appendix H-2.

Oasis Road PW8 Bedrock Well –The potential adverse effects on area domestic bedrock wells from pumping the R.M. bedrock well (PW8) is negligible. The pumping test at PW8 (Appendix H-3) showed approximately 1 m of drawdown at Oasis Road after 72 hours of continuous operations. Pumping records from 2007, after operation began, show that the drawdown at Oasis Road is typically 1 m, which is similar to typical seasonal fluctuations in the area. The well does not operate continuously. Well inventories in the subdivision area conducted by the Manitoba Floodway Authority have shown that that most wells have in excess of 2.5 to 3 m of available drawdown and can accommodate a 1 m drop in water level with no adverse effects. The groundwater response plan would apply to effects from the bedrock well at Oasis Road.

Wenzel St. Bedrock Well-

- ***Typical Conditions-***The potential effects on area domestic bedrock wells from pumping the R.M. bedrock well (PW7) at Wenzel St. is negligible to minor during non-drought conditions. Drawdown from pumping the wells during various scenarios was predicted to be in the order of 0.5 to 0.75 m for typical operation; within the typical regional groundwater fluctuation of 2.5 m. Actual measured drawdown was also in this range (KGS Group 2008 b).

  Because the ESP wells operate on demand to fill the reservoir, assuming continuous well operation over long periods of time would overpredict drawdown. If the operating rate of 19 l/sec is adjusted for a 10-month period, the equivalent annual rate would be approximately 15 l/sec representing more typical operations. The predicted drawdown at Bricker Avenue at a continuous pumping rate of 15 l/sec for 30 days would be in the order of 0.5 m as shown in the map in Appendix H-4-2. Using a 20 year timeframe at 15 l/sec, predicted drawdown would be 1 m or less.

- ***Summer and Drought Conditions***- During the summer months the regional aquifer level declines due to heavy residential use of individual domestic wells. In addition, the Meadows of East St, Paul Golf Course has a license to pump groundwater overnight at a rate of 24 L/sec (375 USgpm) during the summer months. The R.M. East St. Paul has completed a well measurement program of domestic wells in the area to assess their

sensitivity to low groundwater elevations (KGS Group April 2008a). The groundwater response plan would apply to effects on third party wells from the bedrock well at Wenzel St. It also includes an operating plan for the Wenzel St. Treatment plant to address operations during drought conditions. With these mitigation measures, the potential effects on area groundwater user are predicted to be minor during operation in summer or drought conditions.

4.5.2 Effect of Groundwater Levels on the Project

Oasis Road Overburden Wells- Decreases in the groundwater level in the overburden due to drought conditions could limit yield from the wells, as they are already operating at full capacity with water levels within the screen intake. Increases in groundwater level in the overburden would create a positive effect, and could increase well efficiency.

Oasis Road Bedrock Well- Decreases in groundwater levels in the bedrock due to drought conditions could limit well yield in the R.M. bedrock pumping well (PW8). Domestic wells would have less available drawdown and would be more likely to experience adverse effects. Mitigative measure such as increasing well efficiency at the pumping well could be done to limit drawdown. Groundwater response measures could be used to insure operations of domestic wells with limited available drawdown during these conditions. The potential adverse environmental effect after mitigation would be minor.

Wenzel Street Bedrock Well – Decreases in groundwater levels in the bedrock due to drought conditions could limit well yield in the R.M. bedrock pumping well (PW7). Mitigation measures include following the R.M. of East St. Paul operations plant for PW7.

4.6 VEGETATION

Regular maintenance and monitoring activities may result in a loss of vegetation around the wells. The amount of vegetation disturbance is expected to be very small. The potential adverse effects of vegetation loss were assessed to be minor. Proposed mitigation includes minimizing loss and disturbance of vegetation by limiting maintenance and/or monitoring activities to designated and previously disturbed areas and limiting maintenance/monitoring activities during high wind events.

The Manitoba Conservation Data Centre did not identify any rare plant species that could

potentially occur in the subject areas (Appendix I-1). Therefore, the potential adverse effects for loss of rare and or endangered species were assessed to be nil, and proposed mitigation measures were not determined or needed.

4.7 WILDLIFE, HABITAT AND VEGETATION

Regular maintenance and monitoring activities will potentially result in a very small loss and/or disturbance of wildlife habitat. As the subject areas are already predominantly developed for commercial/industrial land use and residential use, most native wildlife will not use the areas. Therefore, the potential adverse effects of wildlife habitat loss were assessed to be negligible to minor. Proposed mitigation measures include limiting any monitoring and maintenance activities to designated and previously disturbed areas.

4.8 HERITAGE RESOURCES

Mr. Gordon Hill of Manitoba Culture, Heritage, and Tourism, Historic Resources Branch examined Branch records for areas of potential concern (Appendix I-2). The potential to impact heritage resources was found to be low. Therefore, the Historic Resources Branch has no concerns with this project. As no such environmental management practices to mitigate potentially adverse environmental effects are required, no mitigation measures have been proposed.

4.9 NOISE AND VIBRATION

Regular maintenance and monitoring activities will potentially result in temporary increased noise and vibration levels in the subject areas. The potential adverse effects of noise and vibration were assessed to be negligible to minor. Proposed mitigation includes limiting maintenance/monitoring activities to normal working hours, as per municipal by-laws, and limiting unnecessary long-term idling.

4.10 EMPLOYMENT/ECONOMY

The proposed increase in water allocation from PW7 and PW8 could potentially increase employment opportunities for the R.M. of East St. Paul, and increase the economy in the local

and surrounding areas. Increase in commercial businesses and increase in residential homes could potentially result. The potential effects of the proposal on employment and economy were assessed to be positive. Therefore, no environmental management practices to mitigate potentially adverse environmental effects are required, and no mitigation measures have been proposed.

4.11 HUMAN HEALTH AND WELL BEING

The potential adverse effects of the project on human health were assessed to be negligible. Construction is already completed. Operation of the system results in minimal traffic consisting of a daily trip to the well sites with one vehicle. Periodic well maintenance may require temporary additional vehicular traffic. Proposed mitigation measures during more extensive well maintenance include preventing leaks, spills and releases by providing secondary containment for fuel storage, requiring drip trays for equipment, providing spill clean-up equipment and materials, providing fuel handling training for operators, complying with provincial fuel storage and dispensing regulations, storing hazardous materials in approved containers, and providing an emergency (spill) response plan.

The only stored materials are kept in the Water Treatment Plant. They have proper containment and there is no public contact with them. The potential adverse effects on human health from the water quality are negligible. Operation of the system provides a positive effect in that the water is very good potable quality with low dissolved solids and does not require treatment for mineral residues. For serviced homes in the Town of Birds Hill, the operation of the water supply replaced the hydrocarbon-contaminated groundwater source used prior to 1995. The groundwater sources in the bedrock and carbonate aquifers provide good quality potable water without the need for treatment to reduce dissolved solids. The Water Treatment Plant is presently licensed as a Class 2 plant under Manitoba Water Stewardship and provides chlorination prior to water distribution. Groundwater monitoring with a continuous turbidity metre is used to provide early warning of potential surface water intrusion. Regular groundwater monitoring for chlorine residuals, bacteria, trihalomethanes and general chemistry allows early identification of potential groundwater contamination that may affect human health.

5.0 ENVIRONMENTAL MANAGEMENT PRACTICES

Environmental management practices proposed to prevent or mitigate environmental effects that were determined to be adverse, as described in Section 4.0, are identified and described below. Under the *Canadian Environmental Assessment Act*, mitigation is defined as the elimination, reduction and control of the adverse effects of a project and includes restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means. Mitigation measures must be technically and economically feasible and implemented.

5.1 AIR QUALITY

Fugitive dust levels can be kept to a minimum by controlling vehicular speeds during regular maintenance and monitoring activities. Limiting future construction activities during periods of high wind and limiting long-term vehicle/equipment idling could mitigate potential increased fugitive dust levels generated during these activities. By controlling fugitive dust levels, it is unlikely that Manitoba's air quality guidelines would be exceeded during construction activities.

5.2 SOILS

The potential adverse effects on soil arising from accidental fuel or other hazardous materials spillage and compaction by increased vehicular traffic may be mitigated by preparing an emergency (spill) response plan; preventing leaks, spills and releases, and reducing unnecessary vehicular traffic.

5.3 SURFACE WATER

The leak and spill prevention mitigation used to protect against soil contamination will also protect against surface water contamination that may enter nearby ditches.

5.4 GROUNDWATER

Leak and spill prevention mitigation measures mentioned in the soil section also will protect against groundwater contamination.

Wells are sealed at ground surface to prevent downward migration of surface contaminants. They are all capped and covered with locking steel protective boxes to prevent access to the well from surface. The bedrock well at the Wenzel St. Treatment plant and the bedrock well at Oasis Road are inside fenced compounds.

The only stored materials are kept in the Water Treatment Plant. They have proper containment and there is no public contact with them. The Water Treatment Plant provides mitigation for potential groundwater contamination. Groundwater monitoring with a continuous turbidity metre is used to provide early warning of potential surface water intrusion. Regular groundwater monitoring for bacteria, trihalomethanes and general chemistry parameters allows early identification of potential groundwater contamination that may affect human health.

5.5 VEGETATION

Any potential loss and disturbance to vegetation in the subject areas may be mitigated by restricting increased vehicular traffic to the areas, and limiting maintenance and monitoring areas to previously disturbed areas.

5.6 WILDLIFE

Minimizing disturbance and loss of vegetation, and limiting vehicular traffic during regular maintenance and monitoring activities to designated and previously disturbed areas can mitigate any potential loss and disturbance of wildlife habitat in the subject areas.

In addition, limiting monitoring and maintenance activities during high wind events, and limiting unnecessary vehicle idling can mitigate increased fugitive dust levels that may be generated and adversely effect wildlife and wildlife habitat in the area.

5.7 NOISE AND VIBRATION

Limiting any noise-creating activities, including regular maintenance and monitoring activities to normal working hours, and limiting unnecessary long-term idling can mitigate any potential increased noise and vibration effects.

5.8 HUMAN HEALTH AND WELL BEING

The mitigation measures used to lower the potential for groundwater contamination also protect against adverse effects on human health. These include leak and spill prevention as outlined above, containment of fuel products and hazardous materials at the Water Treatment Plant, operation of the water treatment facilities, operation of the on-line turbidity metre and water quality sampling to provide early warning of potential surface water infiltration

Operation of the system mitigates the negative effect of non-potable groundwater due to hydrocarbon contamination in portions of the Town of Birds Hill. It also provides an option in areas where groundwater is under a boil-water advisory in the Town of Birds Hill. Regular groundwater monitoring for bacteria, potable water parameters, VOCs, pesticides and hydrocarbons allows for early identification of potential groundwater contamination that may affect human health.

6.0 PUBLIC CONSULTATION

Public consultation about the water system and its components has been through municipal communications with residents as described in section in Section 2.6.5. These include:

- Public education programs on sustainable turf management and water conservation measures delivered through development agreements
- Information on water system projects and water conservation in the R.M.'s quarterly newsletter
- Distribution of water conservation brochures and availability of other materials
- Announcements on the web site
- Annual open houses

7.0 SCHEDULE

The R.M. of East St. Paul is currently operating the water system. An application for a water rights license for the Wenzel St. carbonate bedrock well PW7 has been submitted to Manitoba Water Stewardship Water Licensing. Operation of PW7 would commence upon issuance of the water rights and Environment Act licenses, as water demand requires.

8.0 FUNDING

The existing system was funded primarily by the R.M. of East St. Paul. Developers have funded distribution piping. A Canada-Manitoba Infrastructure grant was received for servicing the Community Club the Seniors Centre and the Curling Club. Waterline relocation programs on the Floodway in 2007 and 2008 were funded by the Manitoba Floodway Authority.

9.0 POTENTIAL FUTURE DEVELOPMENT

The R. M. of East St. Paul continues to expand. Future servicing requirements are estimated for a proposed water distribution system over a long term time frame, as shown in Appendix J, proposed water distribution system from the Water Distribution Master Plan (Stantec 2008). This would see the service area grow from the current 818 to 13,000 ERUs for a fully serviced system. Future growth to this maximum could result in an average daily water demand of 130 l/sec, a maximum daily flow of 332 l/sec and a peak hourly flow of 417 l/sec with a reservoir storage requirement in the order of 10 million litres as estimated in the Master Plan. The timeframe for this growth however is very uncertain.

In addition, the R.M. of East St. Paul may choose to distribute water to other municipalities in the future.

Future growth of the water system will depend on developing additional water sources and the infrastructure required to treat, store and distribute the water. The R. M. of East St. Paul is in the process of evaluating a number of alternatives to expand the water supply system. If any of these options were to be pursued, regulatory requirements would be determined and additional information would be supplied to Manitoba Environment at that time.

Options include:

- Increase Licensed Capacity at Oasis Rd. Bedrock Well PW8 (Figure 1)
- Use any of 3 bedrock wells at Oasis Road now owned by the Manitoba Floodway Authority (Figure 1)
- Develop Wells TW3-04 at Bray Road
- Develop Wells TW4-04 north of Birds Hill
- Develop Well at Kildare now owned by the Manitoba Floodway Authority.
- Develop New Wells at Other Locations
- Use the Loading Well east of the Floodway near Dunning Road.
- Construct additional pipelines from wells to the existing treatment plant
- Install additional treatment at the treatment plant (UV disinfection for surface water/groundwater concerns, other treatment for dissolved solids concerns)
- Increase the Reservoir Size at the Treatment Plant
- Locate a second treatment plant in another portion of the municipality
- Pipeline construction to distribute water to other municipalities (West St. Paul, St. Clements, St. Andrews, Springfield)

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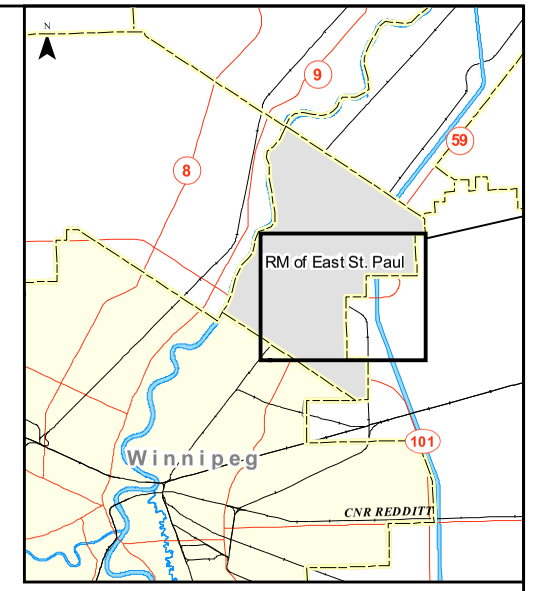
TABLES

TABLE 1
R.M. OF EAST ST.PAUL WATER SYSTEM OVERVIEW

LOCATION	AQUIFER		LICENSED MAXIMUM PUMPING RATE	LICENSED ANNUAL WITHDRAWAL	
	OVERBURDEN	CARBONATE BEDROCK			
OASIS ROAD	WELLS PW1, 2, 5 AND 6		11.4 l/sec (150 lgpm)	358 dm^3	290.23 ac-ft
		WELL PW8	20 l/s (264lgpm)	195 dm^3	158 acre-ft
WENZEL ST.		WELL PW7	19 l/sec (262 lgpm) requested)	599 dm^3 requested	485 acre-ft requested

FIGURES



- Third Party Wells
- Monitoring Wells
- Bedrock Well (MFA)
- R.M. of ESP Supply Wells
- **ESP PW1** Well Identification Number
- RM Boundaries
- Red River Floodway Right of Way Limits

Notes:
1. Monitoring Wells, MW2-04 and MW1-05 Belong to R.M. of ESP.
2. Bedrock Wells K07-12124, K07-12126, and K07-12136 Belong to the Manitoba Floodway Authority (MFA) and Are not In Use.

1:20,000

0 0.5 1

Kilometres

All units are metric and in metres unless otherwise specified.
Universal Transverse Mercator Projection, NAD 1983, Zone 14
Elevations are in metres above sea level (MSL)

KGS GROUP

Manitoba Environment Act Proposal
R.M of East St. Paul Water Supply System

AREA PLAN AND WELL LOCATIONS

SEPTEMBER 2008	FIGURE 1	REV: 0

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