



## **EIA Registration – Town of Shediac Wellfield Expansion**

*Town of Shediac*

**Type of Document:**

Final

**Project Name:**

EIA Registration – Town of Shediac Wellfield Expansion

**Project Number:**

MON-00262741-A0

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**Date Submitted:**

December 2020

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EXP Quality System Checks	
Project No.: MON-00262741-A0	Date: 2020-12-16
Type of Document: Final	Revision No.: 0
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## 1 Proponent

### 1.1 Name of Proponent

Ville de Shediac/ Town of Shediac

### 1.2 Address of Proponent

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### 1.5 Property Ownership

The subject property for this EIA registration is PID 00866939, civic address 125 Bellevue Heights Street, Shediac, NB (Figure 1). It is the Ville de Shediac's intent to develop a new production well on this property; the new well will be incorporated into the existing Town of Shediac wellfield which services the town's potable water supply requirements.

This registration document includes a Step 1 Water Supply Source Assessment (WSSA) Application in Appendix A. The figures provided in this document are relevant to both the EIA registration (main body) and the Step 1 WSSA application (Appendix A).

## 2 Project Description

### 2.1 Project Name

Town of Shediac Wellfield Expansion

### 2.2 Project Overview

The Town of Shediac intends to increase the capacity of its existing municipal groundwater supply source. The Town's existing wellfield is comprised of seven (7) production wells (Well 1, Well 2, Well 5, Well 6, Well 9, Well 10 and Well 11) of which four (5) production wells (Well 1, Well 5, Well 9, Well 10 and Well 11) serve as the main operational wells, and two (2) wells (Well 2 and Well 6) with lower yield are currently not used on a regular basis. Due to their lower yield, these two wells are planned to be decommissioned at some point in the future, e.g. when replacement supply is identified. The production wells are located within the immediate Town limits and are spread across the Town from west to east (Figure 3). All wells are located on municipal property parcels.

The primary components of the Town's municipal water distribution and treatment system currently include the seven production wells; one biological oxidation/filtration type manganese water treatment plant (located at 253 Breaux Bridge Street); one chlorine gas and three sodium hypochlorite disinfection systems; one storage reservoir/standpipe with a capacity of 1,637 m<sup>3</sup>(located adjacent the Breaux Bridge storage tank); one new water tower constructed in 2019 (located on the east side of Ohio Road near Bombardier Street); and the associated distribution piping and related ancillary equipment (e.g. booster stations, hydrants, process controls, etc.). The Town's raw water supply source is subjected to chlorination for disinfection purposes at the existing central treatment system (located on Breaux Bridge) which also treats selected raw supply water (from Wells 2, 6, 9 and 11) for manganese. The treated/ chlorinated water then is pumped to the storage tanks and subsequently flows into the two-zone distribution system (a pressure zone and gravity zone).

The Town's individual production wells have been developed on an incremental basis over the years, with Well 9, 10 and 11 having been developed over the past 20 years under the provincial EIA legislation. In a water master plan prepared for the Town (EXP, 2014) and preceding documents related to water infrastructure planning for the Town (refer to *Section 2.10 Project Related Documents*, below), it was planned that additional wells would be added to the production well system as operational conditions warranted. During the summer of 2020, the Town experienced operational issues with two of the main wells (Well 10 and Well 11) and has determined that they wish to proceed with further development of a proposed production well on PID 00866939 to provide additional backup capacity and operational flexibility. During 2005 a test well (TH05-1) was drilled on the subject property under an earlier provincial EIA registration (NBDELG EIA FILE NO. 4561-3-920) and it is planned that the next production well be developed on this property assuming results of the planned pump test indicate acceptable long-term safe yield.

The primary EIA trigger for the project relates to the requirement for *“all waterworks with a capacity greater than fifty cubic metres of water daily”* to be registered as an undertaking in accordance with NB Regulation 87-83 under the *Clean Environment Act*. The planned work under this current EIA registration is to drill out and pump test a test well on the property (either the existing TH05-1 or a planned second related observation well depending on which well has the larger yield) in accordance with the NBDELG Water Supply Source Assessment (WSSA) guidelines (NBDELG, 2017). Should the well long-term safe yield be adequate and pending approval of the Step 2 WSSA report, the well will be completed as a production well and connected to the raw water supply collection piping.

The existing raw water supply line to the central treatment building is in place to the current end of Breaux Bridge (approximately 300 m west of Bellevue Heights). General project components are shown in Figure 2; the raw water line will be extended approximately 300 m east to intersect Breaux Bridge, and supply/ connector piping from the new production well will be installed a distance of approximately 125 m south along Bellevue and be connected to the raw water supply line, which will carry the water to the central treatment building. The Town's existing wellfield network, location of wells, and the general study area environmental features are shown on Figures 3. A copy of the

existing test well TH05-1 drilled on the subject property in 2005 driller’s well log is included in the Step 1 WSSA application (Appendix A).

In general, the provincial WSSA process consists of the completion of a Step 1 application form with the EIA registration document which provides background information on the proposed project including water quality and quantity requirements; the proposed test well drilling location(s) and the rationale for the proposed source development; a discussion of local hydrogeological conditions and existing area groundwater users; and a discussion of potential sources of contamination in the study area. The Step 1 application for this EIA is provided in Appendix A. As noted, a test well was drilled on the property during 2005 under NBDELG EIA FILE NO. 4561-3-920. Additional information on previous groundwater supply exploration work and project rationale can be found in documentation provided under the previous EIA, and the related reports listed in Section 2.10, below.

Following their review of the EIA registration document which includes the information required for the Step 1 WSSA application, NBDELG will grant the proponent permission to proceed with well drilling and pump testing to identify the aquifer hydrogeological parameters and characterize the safe yield and water quality of the proposed groundwater source(s) at the target drilling/ pump test location(s) if they are in agreement with the proposed WSSA work plan. Following the completion of the test well development and pump testing program, a summary of this work which includes the key findings and recommendations for the future development of the proposed new groundwater supply source(s) is provided in the Step 2 WSSA report. The latter report is subsequently submitted to NBDELG for technical review in conjunction with the overall EIA Determination Review process.

For the current project, specific work under the WSSA program is expected to include the following:

- To provide for an observation well during the planned constant rate WSSA pump test, drill a new 150 mm diameter test well (TH20-01) on the subject property on the order of 30 m from the existing TH05-1;
- Depending on the yield observed in the new test well (TH20-01), for the proposed pumping/ long term production well, either drill out this new well or the original/ existing TH05-1 (drilled during 2005 to 150 mm diameter), to open the preferred (i.e. higher yielding test well) borehole to 200 mm diameter;
- Complete a step drawdown test (e.g. four steps of 30 to 60 minutes duration per step) to assess appropriate constant rate pump test;
- Complete a 72-hr constant rate pumping test. The constant rate pump test will include manual water level readings obtained from the pumping well and the primary water level observation well. Electronic water level dataloggers will also be placed where practical in each of the well (pumping and main observation well). Following the completion of the 72-hr pumping period, water level recovery will be monitored in the pumping and observation wells for the lesser of the time required for 100% recovery or 36 hrs in accordance with the provincial WSSA guidelines.

The Town’s existing production wells are connected to a SCADA system which allows for the monitoring of several parameters including but not limited to the variation in water level elevation with time in each well. Therefore, it is planned to utilize the existing SCADA system to monitor the water levels in the existing Town production wells during the completion of the pump test program.

Water quality samples will be collected from the pumping well at pumping times of 24-hrs, 48-hrs and 72-hrs and subjected to analysis for bacteriological (i.e. total and faecal coliforms and E. Coli) and inorganic (i.e. general chemistry and trace metals including mercury/fluoride) parameters. At 72-hr pumping time, an additional water quality sample will be collected from the pumping well for analysis for low-level petroleum hydrocarbons and methyl tert-butyl ether (MtBE).

## 2.3 Purpose/Rationale/Need for Undertaking

The purpose and rationale for the undertaking has been summarized above and has also been provided in earlier EIA submissions for production well development in the Town.

As noted above, development of the raw water supply well network has progressed incrementally over the years to address demand and since circa 2000 the development of a more centralized raw water supply and central treatment and distribution system. During 2020, the Town determined it is now warranted to adding an additional well to the system to provide for additional supply and flexibility during high demand periods, and/or additional back-up supply in the event one of the main current operational wells requires maintenance or has to be brought offline due to unforeseen circumstances.

**Demand Analysis (2014)** - An analysis of the water availability and water supply demand for the Town was provided by EXP (2014, Section 2.3). Using water monitoring data from January 2010 through to September 2013 Shediac’s total consumption averaged 2,700 m<sup>3</sup> per day from January 2010 to September 2013; an average of approximately 450 Litres per person per day based on a population of 6,000. Higher consumptions were recorded during the summer months, during the peak of tourism season. The peak daily demand between January 2010 and September 2013 occurred on August 1, 2011 with a demand of approximately 4,500 m<sup>3</sup>, or 750 Litres per person for that particular day. Flow during the peak hourly demand was estimated at 76 L/s (1000 IGPM).

**Supply Analysis (2014)** - On the supply side, EXP (2014) reported the individual production well safe yields as follows:

- Well 1 (Chesley) = 21 L/s (278 IGPM)
- Well 2 (Pont Breaux) = 5 L/s (61 IGPM)
- Well 5 (Victoria) = 16/L/s (207 IGPM)
- Well 6 (Pont Breaux) = 4 L/s (48 IGPM)
- Well 9 (La Rosette) = 12 L/s (160 IGPM)
- Well 10 (Harper) = 19 L/s (250 IGPM)
- Well 11 (Geraldine) = 34 L/s (450 IGPM)

Yield from these wells total approximately 111 L/s (1,455 IGPM). Considering a maximum operating period of 18 hours per day for the pumps, the maximum daily production for the existing wells is approximately 7,200 m<sup>3</sup> per day (1,583,000 Imperial Gallons; equivalent to 1,100 IGPM spread over a 24-hour period). Therefore, considering an average daily consumption of 450L per capita (approx. 100 IGal per person), EXP (2014) estimated that these wells could potentially service a population of up to 16,000, if storage requirements were met. It was noted in the EXP (2014) report that the wells’ capacity to supply peak demands might however become strained without the addition of one or more storage tanks. This potential situation was alleviated during 2019 with the construction of the new water storage tower off Ohio Road.

**Current Demand, Supply and Storage Situation** – A review of the water supply system (Crandall, 2020) used 2017 through 2020 well production information to provide an update on current demand as follows: maximum daily demand 5,778 m<sup>3</sup> (equivalent of 883 IGPM over a 24 hour period); low season average daily demand 2,883 m<sup>3</sup> (440 IGPM); and high season average daily demand 3,900 m<sup>3</sup> (595 IGPM). Therefore, in theory, assuming all wells were operational, the existing supply of 7,200 m<sup>3</sup> (1,100 IGPM over a 24-hour period) should be more than adequate to meet current and near-term demand. However, the review identified representative “worst-case” scenarios (e.g. if the main well, Well #11, was off-line for an extended period of time; if the water treatment plant for unforeseen reasons was down or had to be brought off-line for an extended period of time) wherein planning for new raw water supply capacity was warranted in the immediate future. In addition, it is noted that during the summer tourist season, demand can significantly increase and in the event a “worst-case” scenario developed, or flexibility and



capacity to operate were compromised, this would particularly exacerbate a potential raw water supply shortfall. For these reasons the Town has identified the need to develop additional well capacity to provide supply buffer and operational flexibility.

Since the EXP 2014 study, the Town constructed and brought online (during 2019) a new water storage tower near Ohio Road in the area of the former and now decommissioned Well #3. This new water tower has minimized the storage constraints noted in the EXP 2014 water distribution system study.

## 2.4 Project Location

**Location/PID:** As indicated above the new production well will be developed on the land parcel identified as PID 00866939, located on the west side of Bellevue Heights (civic address 125), Shediac, NB (Figure 1 and Figure 2). The approximate co-ordinates of centre of the land parcel are Lat: 46.2178° N and Long: 64.5176°W .

**Address:** The property is located roughly in the center of the developed area of the Town of Shediac and will be accessed directly from the existing Bellevue Heights municipal street. At this time no need for additional work on the property (e.g. access road, culverts) is identified; i.e. the property is readily accessible.

**Location Map:** The project location relative to communities, roads, existing environmental features, etc. is indicated on attached figures.

## 2.5 Siting Considerations

Siting considerations include the following:

- The existing property (and test well location TH05-1) was identified and drilled in 2005 as part of an earlier EIA file involving development of production well capacity for the Town, and therefore is the logical next target location to proceed further with developing additional production well capacity for the Town;
- Based on the general topographical (and hydrogeologic) setting of the Town, the general rationale for development/ expansion of the Town's groundwater production well supply network, is to infill wells toward within the general area defined by the Scoudouc River to the west, toward Ohio Road to the east. Part of this rationale is that the land slopes upward from the Shediac Bay coastline (north), to progressively higher ground in a south direction. This general topographic setting is expected to result in pumping well drawdown and areas of influence to be elongated from a south to north direction. As such, it is expected by locating wells from east to west this will minimize the potential for interference effects between wells. This general assumption of the influence of topography on drawdown cone configuration is illustrated the representative wellfield protection zones estimated during the earlier EIA work (refer to appended figures).
- Infilling wells within the general area indicated above will provide for efficient and cost effective tie in of new wells to the raw water supply lone leading to the central treatment plant, and fits with the overall municipal water infrastructure development plan.
- The property is owned by the Town of Shediac which will simplify access and minimize cost to the Town if an acceptable yield can be developed on the property.

## 2.6 Physical Components and Dimensions of the Project

Physical components are expected to include:

- a) Production well and observation well on the subject property;

- b) A small building constructed adjacent the pumping well to house electrical controls for the well pump, and electrical panel for SCADA monitoring components;
- c) Fencing around the wellhouse;
- d) Extension of the raw water supply transmission piping from its current limit at the end of Breaux Bridge to Bellevue Heights, and transmission piping from the new wellhouse to connect to the raw water line extension, with associated valves along pipe alignments as warranted by standard municipal engineering design practice.
- e) Power poles and wiring as required to supply power from the existing service along Brea Bridge to the wellhouse.

Since the work is being completed within existing municipal developed area, and there are no wetlands or watercourse within the limits of the work area, it is expected there will be no net loss of natural habitat.

## 2.7 Construction Details

Subject to approval to proceed it is intended that the well drilling and pump testing would be completed during the winter period of 2021 (e.g. February). This should allow the work to be completed when there is minimal potential for significant rainfall/ snowmelt events to effect water level observations during the pump test period.

Assuming the drilling and pump test work is completed, that well yield is sufficient, and report provided to NBDELG by late spring 2021, it is planned that the raw water main extension and pumphouse would be completed during the 2021 construction season.

**Approximate duration:** It is anticipated that the well drilling and pump test work can be completed within a six (6) week period. Construction of the new pumphouse including fit-up and connection to the raw water line is expected to take approximately 4 to 6 months to complete.

**Estimated Hours:** The estimated working hours during construction are as follows: 7:00 hrs to 18:00 hrs, 5 days per week, Monday to Friday.

**Anticipated Equipment:** Air rotary drill rig, boom truck (for submersible pump installation and well completion), and generator for pump testing. Excavators, dump trucks and compaction equipment for civil pipe work and pumphouse construction. Ancillary items to include municipal infrastructure piping installation tools and equipment.

**Date of First Physical Construction-Related Activity:** Drilling and pump testing, February through early March pending NBDELG approval to proceed.

**Potential Sources of Pollutants:** fugitive dust emissions, noise, suspended solids runoff, spillage of fluids used in equipment such as hydraulic fluid and fuels.

**Fate of Wastes:** Wastes associated with the project will be minimal and expected to potentially include some equipment and supplies packaging (e.g. metal or plastic bands to secure new pipe sections, wood pallets, etc.). Where not recycled, all waste materials will be collected and transported off-site for ultimate disposal at the nearest municipal solid waste landfill facility. Portable toilets will be provided on-site for construction workers and these units will be maintained as required by a qualified sub-contractor.

**Access and Traffic Management:** Access to the site and work areas will be via the existing municipal roadways. Given the limited scale of the project, it is anticipated that site construction related activities will not have any significant impact on local traffic.

**Clearing and Grubbing:** There is minimal grubbing anticipated since access will be by existing roadways. Some minor grubbing may be required to extend the raw water line the approximately 300 m from its existing location at Breaux

Bridge to Bellevue Heights so that the production well can be connected. It is expected that tree clearing (if any) will take place outside of the bird breeding period to avoid any potential impact on migratory bird species. Grubbed material (if any) will either be removed from the project site and disposed or reused at an appropriate location.

**Fill Material:** Appropriate granular material (e.g. free draining granular fill for the raw water supply transmission main pipe bedding) will be used where needed. All fill materials will be obtained from existing sources.

**Work Near Wetlands/Watercourses:** There will be no work by wetlands or watercourses; in particular, no work within 30 m of a watercourse or wetland will be required.

## 2.8 Operation and Maintenance Details

**General:** The existing Town's public works staff will be responsible for the day-to-day operation and maintenance of the existing water supply source. Qualified contractors (e.g. Licensed Well Drilling Contractor, electrical contractor, etc.) will be retained to conduct any necessary repairs and/or maintenance, as required (e.g. pump replacement, etc.).

**Water Supply:** As indicated above the current Town water demand (Crandall, 2020) is estimated to be on the order of average 2,883 m<sup>3</sup>/day (low season) to 3,900 m<sup>3</sup>/day (high season) (equivalent to range of 440 to 595 IGPM over a 24 hour period) with peak of 5,778 m<sup>3</sup>/day (883 IGPM over a 24 hours period). It is the objective that the new production well will provide for a minimum long-term safe yield on the order of 200 to 250 IGPM so that it can provide reasonable back-up. However, because yields are dependent in large part on encountering higher yielding fracture zones in the sandstone/ siltstone bedrock aquifer and finding yields sufficient to serve as production wells is subject to uncertainty, the Town may consider completing the well as a production well even if well yield was lower (e.g. in the range of 50 to 70 IGPM, similar to the existing Well 2 and Well 6), and water quality was acceptable.

**Operation and Maintenance:** The existing Town public works staff will continue to be responsible for the operation and maintenance of the upgraded wellfield and the related water supply and distribution system components in accordance with the Approval to Operate. The existing Approval to Operate will need to be updated to reflect the proposed wellfield expansion. Town staff will also be responsible for the on-going maintenance of the pumphouse property including any wellhouse access lane, as required.

**Lifespan of Project:** The lifespan of municipal production wells varies in accordance with site specific considerations, but a typical lifespan would be expected to be 40 years or greater. Associated mechanical equipment (e.g. well pumps) will need to be replaced on a more frequent basis.

**Power Requirements:** the proposed production wells will be connected to the NB Power electrical transmission grid via new utility poles (as required) and overhead power lines as warranted along the wellhouse access lanes.

**Fate of Wastes:** No waste will be generated during the operation of the proposed new municipal production well.

## 2.9 Future Modifications, Extensions or Abandonment

It is anticipated that the completion of the currently proposed work will provide the Town with adequate and supplemental water supply capacity to meet current and near-term future needs. In the event additional production wells are required in the future in response to increased demand, additional pump testing and assessment will be required under the NBDELG EIA and WSSA processes.

There are currently no plans to decommission or abandon any of the existing approved production wells. Any production well(s) to be abandoned at the end of its service life will need to be decommissioned by a licensed well driller in accordance with the NBDELG *Guidelines for the Decommissioning (Abandonment) of Water Wells*.

## 2.10 Project Related Documents

Project related documents include the following:

- 1) *Groundwater Supply Investigation Town of Shediac, January 1999, ADI Limited file (80) 1683-013.1* - This report presents results of a groundwater supply study/review initiated in 1998 to assist the Town in planning for the immediate and long-term development of the groundwater supply system. Additional information includes bibliography of pre-1998 groundwater exploration work.

Part of the ADI study/review was to complete an information review and to identify suitable well drilling areas to develop the future groundwater requirement in the context of the Town's infrastructure and resources. Based on the information review in combination with practical considerations concerning infrastructure development, wellfield development envisioned retaining existing wells on the east side of the Scoudouc River, and "infilling" eastward with additional wells from the Scoudouc River to the former Well #3 located along Ohio Road and representing the eastern most well in the system in order to provide for practical logistics in connecting new wells into a planned central treatment and distribution building (now constructed following NBELG review and approval).

- 2) *Shediac Water Supply, Distribution, Storage and Infrastructure Development, March 1999, ADI Limited file (80) 1683-014.1* - This report outlined a water supply development work plan for the purpose of providing the Town with the framework, schedule, and cost estimates for proceeding with a 4 year development plan of the groundwater supply and municipal water system to provide for more centralized water treatment, storage and distribution. This work plan formed the basis for the municipal water supply infrastructure development plan which continues to be implemented by the Town, with modifications where warranted.
- 3) *Town of Shediac Water Supply Development, July 2000, ADI Limited file (80) 1683-017.1* - This report presented results of a test drilling program, with the test well subsequently completed as Well #9. This well was the first of the more recent wells required to address the water supply requirement identified in the reports cited in items (1) and (2) above.
- 4) *Town of Shediac Water Supply Development (2001), January 2002, ADI Limited file (80) 1683-024.1* - This report presented results of a test drilling program, with the test well subsequently completed as a planned production well (Well #10). This well was the second of the wells required to address the water supply requirement identified in the reports cited in items (1) and (2) above.
- 5) *Town of Shediac Water Supply Development (Well #11, 2005). Report to the Town of Shediac dated September, 2005. ADI File No. (80) 1683-031.2* - This report presented results of a test drilling program, with one test well subsequently completed as a production well (Well #11). This well was the third and most recent production well to address the water supply requirement objectives identified in the reports cited in items (1) and (2) above.
- 6) *Town of Shediac Water Distribution Master Plan (2014), EXP Services Inc. file MON-00213155-A0* – this report summarized the current status of the system and provided a work plan for future development.
- 7) *Town of Shediac Wellfield Protection Planning (1996 through 2018)* – As part of the NBDELG wellfield protection planning policies and regulations, the Town of Shediac has completed various iterations and progressive development of wellfield protection zones for the Town's active production wells. However, until circa 2015 it is understood that only one of the Town's municipal production wells (Well #10) had been designated under the New Brunswick Department of the Environment and Local Government (NBDELG) Wellfield Protection Program and *NB Regulation 2000-47* under the *Clean Water Act*. In 2015 following submission of the report entitled *Ville de Shediac Hydrogeological Services – Shediac Municipal Wellfield Protection Zone Update (letter report)*, EXP Services Inc. file no. *MON-00223959-A0*, February 6, 2015 it is understood that the remaining wells and related wellfield protection zones were legislated. The 2015 report

used a groundwater flow model developed by others in earlier studies to produce production well time-of-travel capture zones for 250 days (Zone A), 5 years (Zone B) and 25 years (Zone C). A site plan depicting the extent of the capture zones was provided, and Geographic Information System (GIS) shape files associated with the capture zones were exported from the model and submitted to NBDELG, who made any necessary “administrative adjustments” to the capture zone areas in order to develop the final wellfield protected areas. An example administrative adjustment would include extending portions of the protection area which bisects a relatively small property to include the entire property to facilitate the administration of the wellfield protected areas in the field. Existing wellfield protection zones are shown on Figure 4. Representative wellfield protection zones (assuming suitable yield) around the proposed new well are indicated on Figure 5.

- 8) *Town of Shediac Well Supply Study Final Report TS20-28162, Crandall (a division of Englobe), Crandall Project No. 2000174, October 29, 2020* – this report updated existing information, assessed existing conditions, and provided a list of recommendations for future water supply requirements and planning for a 20-year timeline out to circa 2040.

### 3 Description of the Existing Environment

The subject property and surrounding area are located within the Town of Shediac. The Southeast Regional Service Commission zoning map (<https://www.nbse.ca/planning/area/shediac>, copy attached) indicates that the subject property and surrounding properties are zoned R2, residential development. The area is predominately comprised of residential building lots that are variably developed, and mainly grassed with some treed areas. Figure 3 provides an overview of study area environmental features.

#### 3.1 Physical and Natural Features

**Topography and Surface Water Drainage:** Key hydrological and topographic features in the study area are depicted in the figures accompanying this registration. The property is located within the main limits of the Town proper, and in particular the area zoned for R2 residential development. Based on a review of regional scale topographic mapping, the ground surface elevation in the vicinity of the site rises from sea level at the coastline of Shediac Bay approximately 1,400 m north of the site, to approximately 30 m at the site. The slope of the terrain continues to rise in a south direction away from the coastline. There are no natural surface water features in the vicinity of the site. Surface water drainage is expected to be dominated by overland flow north/ northwest toward the Shediac Bay coastline influenced by local roadway/ municipal drainage (e.g. curbs and ditching along Bellevue Heights) where present, and the general lay of the land.

**Geology and Hydrogeology:** The surficial geology of the study area as depicted on regional scale mapping consists of hummocky, ribbed and rolling ablation moraines comprised of loamy ablation till; some lodgement till; and minor silt, sand, gravel and boulders (Rampton et al., 1984). The thickness of the overburden material generally exceeds 1.5 m.

Bedrock geology mapping of the Shediac area indicates that the study area is underlain by sandstone and siltstone bedrock of the Richibucto Formation (GSC, Bulletin 589, 2008).

**Watercourses and Wetlands:** There are no mapped watercourses in the immediate vicinity of the subject property based on a review of study area mapping in the GeoNB MapViewer on-line application. The nearest watercourse is shown to be approximately 330 m west of the subject property; this unnamed feature drains from south to north to discharge into Shediac Bay.

A review of the NBDNRED wetlands layer in the GeoNB MapViewer application indicates the presence of a small wetland on PID 00797472 west of the subject property. This small feature is approximately 120 m to the southwest (includes 30 m wetland buffer) of the subject property. Therefore, existing watercourse and wetlands are setback well outside the 30 m buffer zone normally used to regulate activities near watercourses and wetlands.

**Significant Fish/Wildlife Populations or Habitats:** Based on review of a recent EIA completed for a proposed development within the Town limits (WSP, 2017), information (dated January 4, 2017) from the Atlantic Canada Conservation Data Centre (ACDC) databases for a roughly 5 km buffer around the subject site indicated no rare or endangered flora and/or fauna near the subject property (e.g. within 500 m). Managed areas in the general area were Parlee Beach (Provincial Park), and Shediac Island Environmentally Significant Area (ESA); both these areas are a significant distance north of the subject property. An updated information request has been sent to ACCDC (results pending); in the event this indicates conditions have changed since the 2017 report NBDELG will be advised.

**Environmentally Sensitive Areas:** As noted above, Shediac Island locate approximately 4 km north of the subject property is identified as an Environmentally Sensitive Area (ESA), and the Parlee Beach Provincial Park is approximately 2.5 m north of the subject property.

The subject property is not located near any Watershed Protected Area. For the Town's existing designated production wells and related Town of Shediac's existing wellfield protected areas (i.e. Zone A, Zone B and Zone C), the property falls just at the outside of the Well #11 Zone C (refer to figures in Appendix A). The Wellfield Protected



Area is subject to land use restrictions in accordance with the Wellfield Protected Area Designation Order (NB Regulation 2000-47) under the *Clean Water Act*. It is expected that should sufficient yield be found the new production well will require protection zones to be established around the wellhead.

### 3.2 Cultural Features

There are no known cultural features at or in the immediate vicinity of the proposed project. Furthermore, based on the project location in residentially developed area of the Town and the fact that it is not located near any watercourses, wetlands, or lakes, it is expected that the potential for encountering any items of archaeological significance during construction would be extremely low.

### 3.3 Existing and Historic Land Use

**Existing and Previous Uses of the Subject Property and Adjoining Lands:** There is no existing use of the property other than Town of Shediac use for test well development. Prior to that, existing aerial imagery suggests that previous use of the property was as forested area and/ or agricultural land.

**Ownership of Adjoining Properties:** The study area is comprised mainly of residential land area. Adjoining property ownership is as follows:

- East = Bellevue Heights (Town of Shediac Municipal roadway, approximately 20 m wide) (on the east side of Bellevue opposite of the subject property the land is undeveloped residential property);
- West = PID 00797472 owned by Maisons AML Homes Ltée./Ltd.; this is a relatively large (16.49 hectare) undeveloped treed and grassed property designated for R2 residential construction;
- South = PID 00798918 [REDACTED] a 1 hectare residential lot with existing home;
- North = 00883678 owned by the Town of Shediac (no civic address), a 2.65 hectare undeveloped mainly grassed property designated R2 residential.

**Type and Extent of Any Known or Suspected Contamination Resulting from Previous Use of the Subject Property or Adjoining Property:** The NBDELG maintains a PID-based database of environmental information pertaining to petroleum storage tank registrations and removals; historical solid waste landfill sites; PCB storage facilities; Ministerial orders; and contamination remediation files. It should be noted that the NBDELG petroleum storage tank database only goes back to 1987, and therefore information pertaining to any petroleum storage tank registrations and removals prior to this date is not available from NBDELG. Registration is only mandatory for tanks with a capacity in excess of 2000 L. Furthermore, it is noted that the NBDELG remediation database was not established until about the mid-1990s.

The Land Gazette feature of the SNB Real Property Information Website was used to screen the subject, the adjoining properties identified above, and three PIDs (00866491, 70384086 and 00883603) opposite the subject property on the east side of Bellevue Heights, for the presence of any environmental notices pertaining to the above noted property-based environmental information maintained by NBDELG. Based on this review. The Land Gazette feature returned no records indicating possible contamination events associated with any of these nearby properties.

A site drive-by on November 27, 2020 indicated no evidence of significant potential sources of contamination within 500 m of the proposed target drilling locations.

## 4 Summary of Environmental Impacts

**General:** The well drilling and pump testing portion of the proposed undertaking will involve minimal disturbance as the site is readily accessible off the existing paved municipal roadway (Bellevue Heights). Some clearing and grubbing related activities would be associated with extension of the raw water line from its existing location on Breaux Bridge to Bellevue Heights (approximately 300 m linear distance).

In general terms, potential environmental impact considerations associated with this type of development project including socio-economic factors are sediment and erosion control; avoidance of heritage resources; avoidance of species at risk and environmentally sensitive areas; mitigation of potential impacts on groundwater quality; minimization of noise and air quality impacts during construction; and mitigation of construction related impacts on adjoining properties and residents. It is noted that given that the location of the proposed undertaking is within a residentially zoned area but well setback from existing homes, it is expected there is limited to no potential for the proposed drilling and pump test, and (if yield warrants) construction work to adversely impact area residents businesses, and properties.

Potential project-environment interactions for the future operation and maintenance phase of the expanded wellfield would be identical to the current potential interactions with groundwater quality, land use and human-health. Standard mitigation measures will be required to protect groundwater quality/human health during wellfield operation and maintenance activities such as the replacement of existing submersible pumps, etc. When complete, the project in theory may result in land use changes in the study area (i.e. land use restrictions to protect groundwater quality in the wellfield) due to the requirement to update the existing wellfield protection zone boundaries in the Assessment Area to reflect the new municipal production wells within one year of commissioning the new wells. However, in practice, it is anticipated that the updating of the existing wellfield protection zone boundaries will not result in any changes to existing land use as existing and proposed future land use in the study area is limited to the operation of the existing municipal wellfield within a residentially zoned area.

Concerning socio-economic impacts, it is anticipated that the project will have a significant positive impact on the local economy due to the increased water supply capacity. This increased capacity will support the continued population growth (and seasonal tourism peaks) that the Town has experienced in recent years and is expected to attract future commercial/industrial ventures to the area which, in turn, will result in a reduction in unemployment and economic growth (i.e. increased municipal tax base, disposal income, etc.). These socio-economic considerations are of paramount importance to the Town so that it can continue to maintain and enhance its public services.

Concerning potential accidents and malfunctions, it is noted that hazardous materials spills (e.g. fuel, hydraulic oil, etc.) and accidental fires are a possibility during all phases of the project. However, the likelihood of the occurrence of these events for the current project is considered to be low in light of standard/existing mitigation measures and best management practices (BMPs).

A summary of the interpreted project related environmental interaction with key valued environmental components (VECs) for the construction and operation phases of the project in addition to potential accidents, malfunctions and unplanned events is provided in Table 1 which follows **Section 10** of this report. A qualitative rating system was employed as outlined below to assist with the assessment which was based on the professional judgement and experience of the project team in addition to our current understanding of the project.

Rating	Interpretation
0	No interaction with this VEC is anticipated;
1	Interaction occurs, but it would not be expected to result in a significant effect even without mitigation; or the interaction would not be expected to result in a significant



environmental effect upon the implementation of suitable mitigation measures (e.g. typical environmental “best practices”, project specific mitigation, etc.); and,

- 2 Interaction occurs and may result in an environmental effect of concern even with mitigation (this would typically require compensation for habitat loss, etc.).

As indicated in Table 1, mitigation measures will be required for some potential impact categories (e.g. sedimentation and erosion control) as detailed in **Section 5.0**.

There are no known species at risk in the immediate vicinity of the project. In addition, no rare plants were identified in a Rare Plant Survey of the Assessment Area from work referenced above (WSP, 2017). It is currently anticipated that the small amount of clearing and grubbing related activities associated with planned construction will be scheduled to occur outside of the bird breeding season to mitigate potential impacts on migratory birds. Should clearing need to occur during the nesting period, a nesting survey will be conducted and any identified areas to be avoided will be clearly flagged in the field.

**Climate Change and Effects of Climate on the Project:** Concerning the potential effects of the environment on the project, it is noted that sustainable well yields are generally expected to decrease in the future in response to diminishing groundwater supplies which is one of the predicted adverse effects of climate change in the province (NBDELG, 2020). It is noted that the completion of the proposed undertaking will serve to mitigate against this potential impact.

No other extraordinary potential adverse effects of the environment on the project are anticipated.

## 5 Summary of Proposed Mitigation

A summary of the proposed mitigation efforts associated with the undertaking are outlined herein. A tiered approach was utilized in developing the project mitigation measures as suggested in the technical guide to EIA in New Brunswick. Under this approach, environmental impact avoidance opportunities are implemented wherever possible. If it is not possible or practical to avoid some degree of environmental impact, impact reduction measures are stipulated. Finally, in occasional instances where more extensive impacts are unavoidable and justifiable (e.g. public good, etc.), compensation measures are proposed.

The main aspects of the work that may require mitigation include erosion control (re: suspended solids runoff); potential spills (e.g. fuel or oil leak from equipment) and related impacts on groundwater quality/human health; heritage resource encounters; fugitive dust emissions; fires; limited encroachment on wetland habitat; and effects of the environment on the project. These will be mitigated as follows:

**Suspended Solids:** Mitigative measures will include standard erosion control measures (e.g. silt fences, check dams, etc.) which will be employed and maintained as required during the construction phase of the project. For the pump testing of the test well, the outlet of the discharge piping will be situated a suitable distance away from the wells to avoid artificial groundwater recharge. In addition, suitable erosion control structures will be put in place, as and if required, downstream of the point of discharge for sediment and erosion control prior to the initiation of pump testing.

**Hazardous Materials Spills:** Spills (if any) will be addressed by applicable regulatory requirements (e.g. notification and response). On-site construction and drilling equipment will be required to be in good condition and free of any known fluid leaks. During the operational phase of the project, a licensed well drilling contractor will also be retained to complete any necessary future well maintenance related work (e.g. replacement of well pump, etc.).

**Heritage Resource Encounters:** In the unlikely event that an item of cultural/archaeological significance is encountered during construction, all work in the vicinity of the discovery will be immediately halted and the Archaeological Services branch of the New Brunswick Department of Tourism, Heritage and Culture will be contacted to obtain further instructions and/or directives.

**Fugitive Dust Emissions:** For aspects of the work that may lead to an increase in fugitive dust emissions above ambient conditions, standard dust suppression techniques such as water application to work areas/roadways will be utilized.

**Fires:** Portable fire extinguishers will be required on the work site during construction and a no smoking policy will be permitted at the work site outside of designated areas. A portable fire extinguisher will also be made available within the existing water treatment building over the operational life of the wellfield.

**Wetlands and Watercourses:** There are no wetlands or watercourses in the project footprint.

**Effects of the Environment on the Project:** As previously indicated, over the long term, the sustainable yield of groundwater supply wells in the province including the proposed new municipal production well associated with the current project may decrease due to the predicted adverse effects of climate change. To mitigate against this potential effect, water levels and/or flows; water quality information; and other operational data will be collected from the new production wells on a regular basis. In accordance with standard water supply engineering practice, it will be recommended in the Step 2 WSSA report that this operational data be periodically reviewed by a qualified hydrogeologist. Based on these reviews, it may be recommended that the initial recommended safe well yields and/or pumping schedules be revised, as and if required. It is noted that the scope and frequency of the operational monitoring program could be reduced with time, pending the receipt of favorable results.

**Other:** In the event of a power outage, a propane fueled emergency generator can be considered. Alternately, the existing operational wells with related storage infrastructure is considered adequate in the event of temporary outage.

It is expected that the project will not result in any significant residual adverse environmental impacts if the mitigation measures outlined herein are implemented.

The above discussion of proposed mitigation measures for the key environmental aspects of the project are intended to provide a general overview. More detailed mitigation measures will be outlined in an Environmental Protection Plan measures which will be developed and included with the project tender documents.

## 6 Public and First Nations Involvement

The minimum public and First Nations consultation requirements outlined in Appendix C of the Provincial EIA registration guide will be followed (NBDELG, 2018). Stakeholders include the Town residents, and more particularly those residents or property owners that may be located in a potential future wellfield protection zone. Since designation of wellfield protection zones is subject to NBDELG requirements, and a number of the wells have been already legislated for protection within the Town limits by NBDELG, it is expected the project specific public consultation and First Nation engagement requirements will be completed following consultation with the NBDELG.

Concurrent with this EIA Registration and consistent with the Appendix C provincial registration guide, at this time the Town is planning to send a letter to the local MLA (Mayor and Council have already been briefed on the planned project), and is planning to brief other potentially directly effected stakeholders (e.g. area residents, private developer(s) with land holdings in the assumed representative wellfield protection zones – refer to Figure 5). The notification to the stakeholders identified is expected to be through direct written notification or invitation to a public information session. Further clarification on the specific measures will be as determined in consultation with NBDELG (e.g. wellfield protection staff).

As previously indicated herein, the proposed wellfield expansion project is located on Town land. It is not anticipated this will trigger the province of New Brunswick's Duty to Consult Policy; however, clarification regarding the potential of the proposed undertaking to adversely impact the exercise of Aboriginal or Treaty rights will be further determined in consultation with applicable authorities (e.g. the Provincial Department of Aboriginal Affairs subsequent to registering the undertaking under the Provincial EIA process).

## 7 Approval of the Project

The following permits and approvals will be required for the proposed project:

- Project approval from NBDELG under the WSSA process to proceed with further test well drilling on the property and a Step 2 WSSA Hydrogeological Assessment of the proposed test well(s) under the WSSA process.
- Authorization/conditional approval of the undertaking under the Provincial EIA requirements as outlined in NB Regulation 87-83.

Assuming sufficient yield is found to warrant completion of one of the test wells as a municipal production well, it is expected the Town will be required to complete a wellfield protection study for the new well in accordance to the Province of New Brunswick *Wellfield Protected Area Designation Order Regulation*, and incorporate use of the well into the Town's existing approval to operate the water system.

## 8 Funding

The proposed project will be funded by the Town of Shediac.

## 9 Signature

This EIA registration document was prepared by a team of professionals from EXP Services Inc. on behalf of the Town of Shediac.

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Date

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Marc Cormier, ing., PMP  
Directeur des Opérations municipales / Director Municipal Operations  
Town of Shediac, NB

## 10 References

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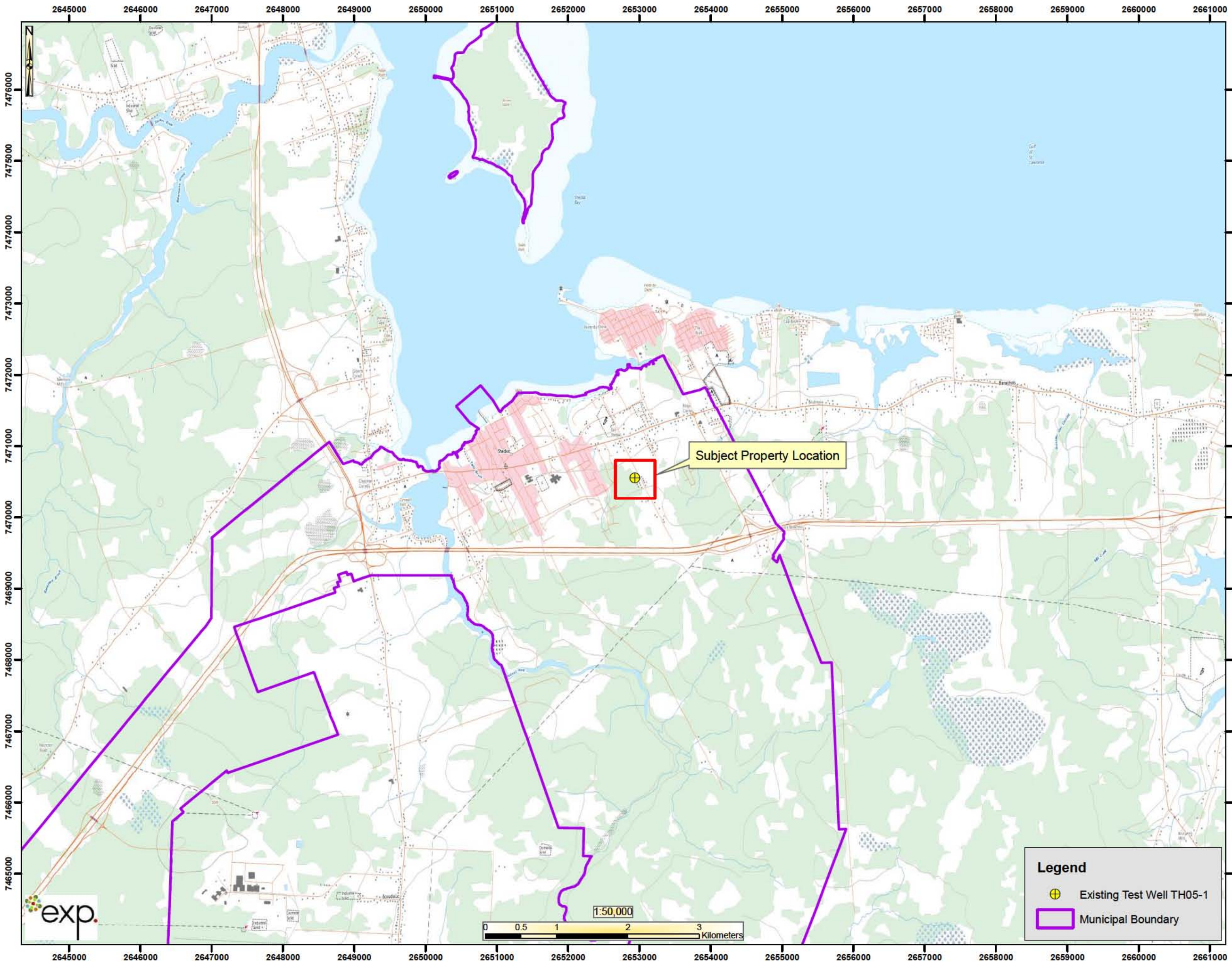
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## Figures and Tables



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No.	Issue	Date

No.	Revision	Date

**FOR INFORMATION ONLY**

Drawn By: WJ

Map Standards Checked By: JS

Designed By: JS

Design Checked By: JS

Scale: 1:50,000

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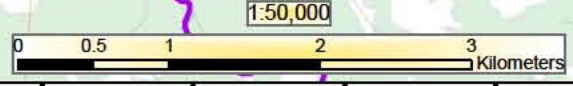
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 Site Location Plan

Project No.  
 MON-00262741-A0

Fig No: 1	Rev. No.
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**Legend**

- Existing Test Well TH05-1
- Municipal Boundary







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 Scale: 1:1,200

Project Title:  
 Town of Shediac Wellfield Expansion (2020/2021)

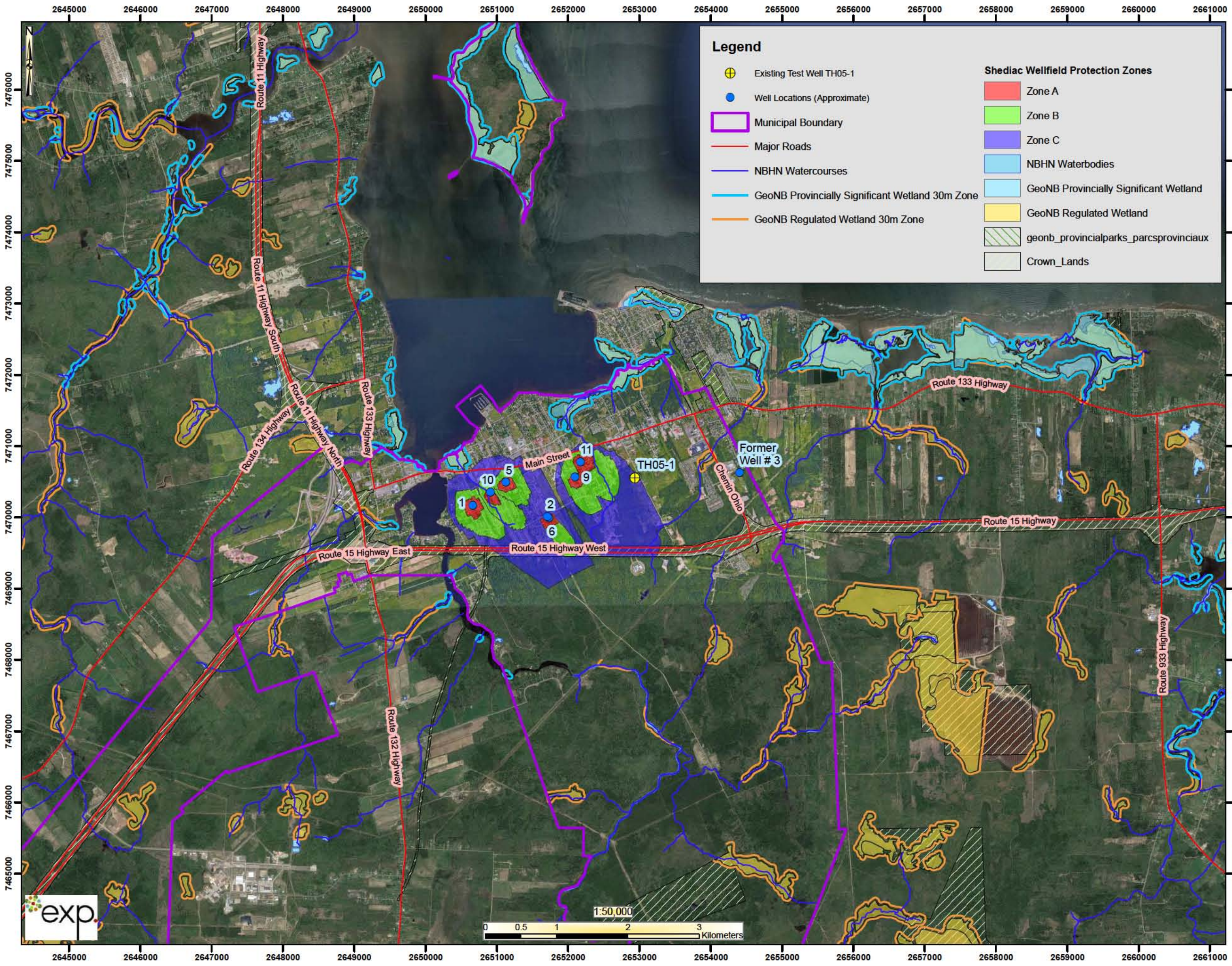
Map Title:  
 Figure 2 - Aerial Site Plan

Project No.  
 MON-00262741-A0

Map No.	Rev. No.







**Legend**

- ⊕ Existing Test Well TH05-1
- Well Locations (Approximate)
- Municipal Boundary
- Major Roads
- NBHN Watercourses
- GeoNB Provincially Significant Wetland 30m Zone
- GeoNB Regulated Wetland 30m Zone

**Shediac Wellfield Protection Zones**

- Zone A
- Zone B
- Zone C
- NBHN Waterbodies
- GeoNB Provincially Significant Wetland
- GeoNB Regulated Wetland
- geonb\_provincialparks\_parcsprouvinciaux
- Crown\_Lands

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Scale: 1:50,000

Project Title:  
 Town of Shediac Wellfield Expansion (2020/2021)

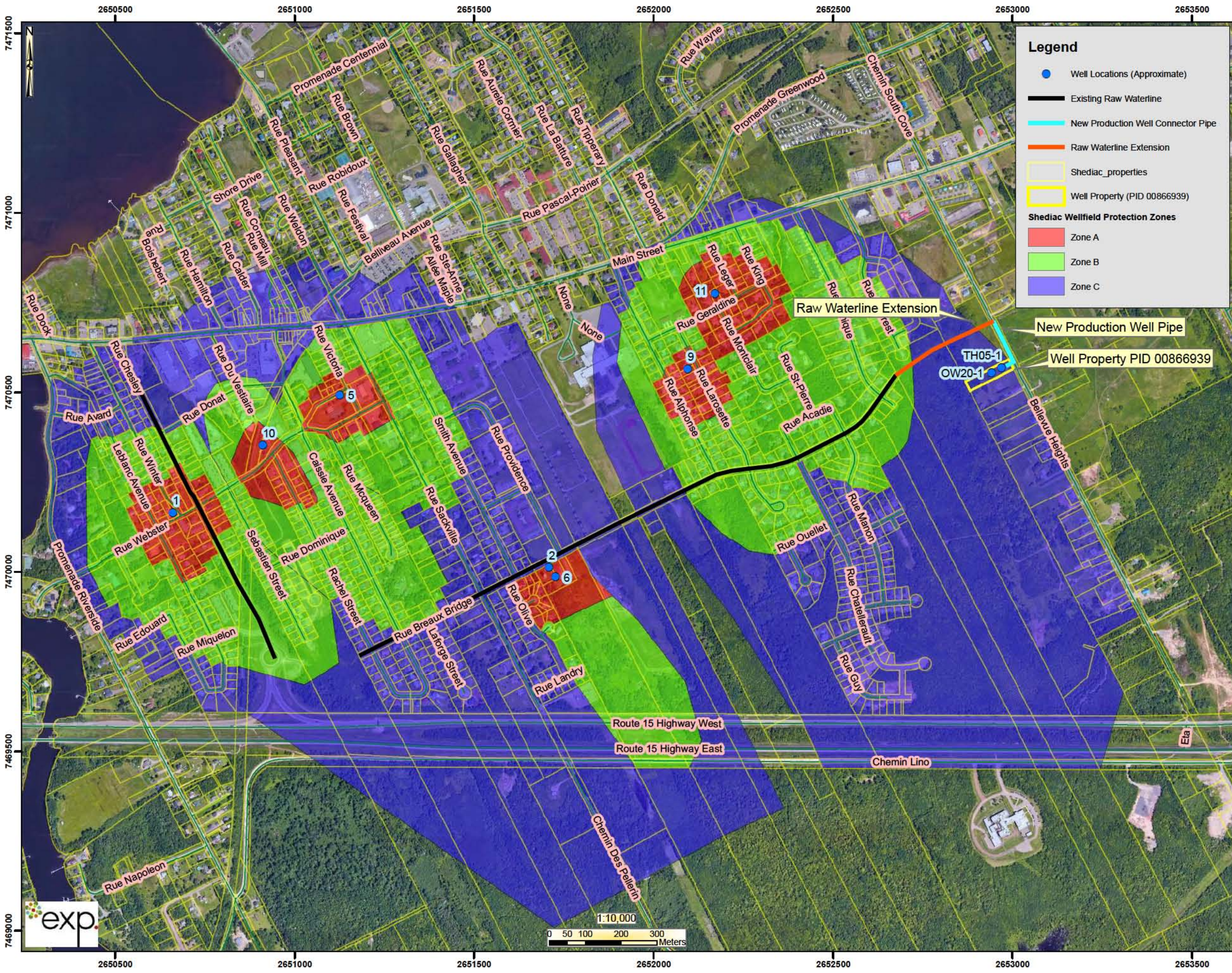
Map Title:  
 Site Area Environmental Features

Project No.  
 MON-00262741-A0

Fig No: 3	Rev. No.
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### Legend

- Well Locations (Approximate)
- Existing Raw Waterline
- New Production Well Connector Pipe
- Raw Waterline Extension
- Shediac\_properties
- Well Property (PID 00866939)

#### Shediac Wellfield Protection Zones

- Zone A
- Zone B
- Zone C

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Map Standards Checked By: JS

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Design Checked By: JS

Scale: 1:10,000

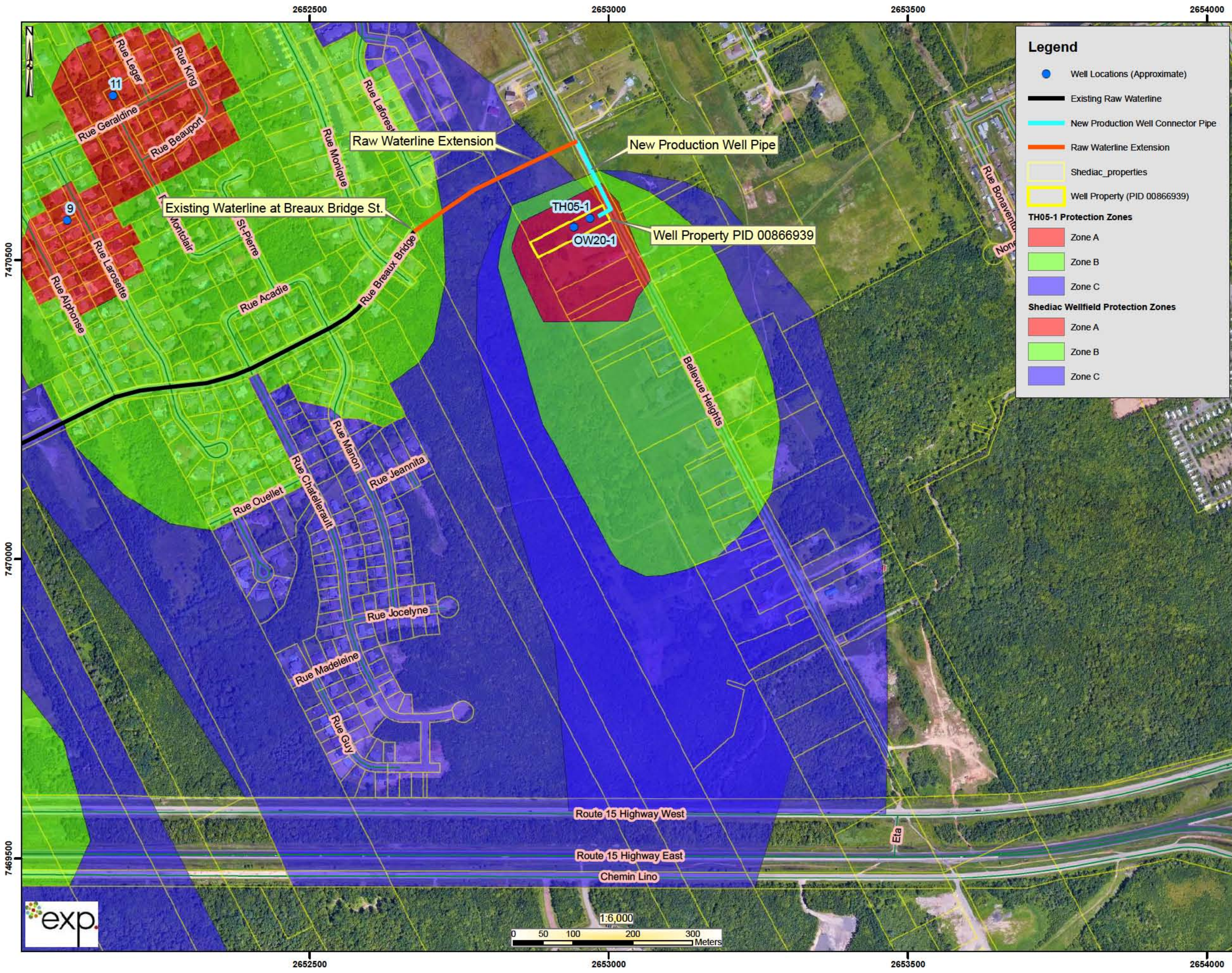
Project Title:  
 Town of Shediac Wellfield Expansion (2020/2021)

Map Title:  
 Existing Wellfield Protection Zones

Project No.  
 MON-00262741-A0

Fig No: 4	Rev. No.
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**Legend**

- Well Locations (Approximate)
- Existing Raw Waterline
- New Production Well Connector Pipe
- Raw Waterline Extension
- Shediac\_properties
- Well Property (PID 00866939)

**TH05-1 Protection Zones**

- Zone A
- Zone B
- Zone C

**Shediac Wellfield Protection Zones**

- Zone A
- Zone B
- Zone C

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Drawn By: WJ

Map Standards Checked By: JS

Designed By: JS

Design Checked By: JS

Scale: 1:6,000

Project Title:  
 Town of Shediac Wellfield Expansion (2020/2021)

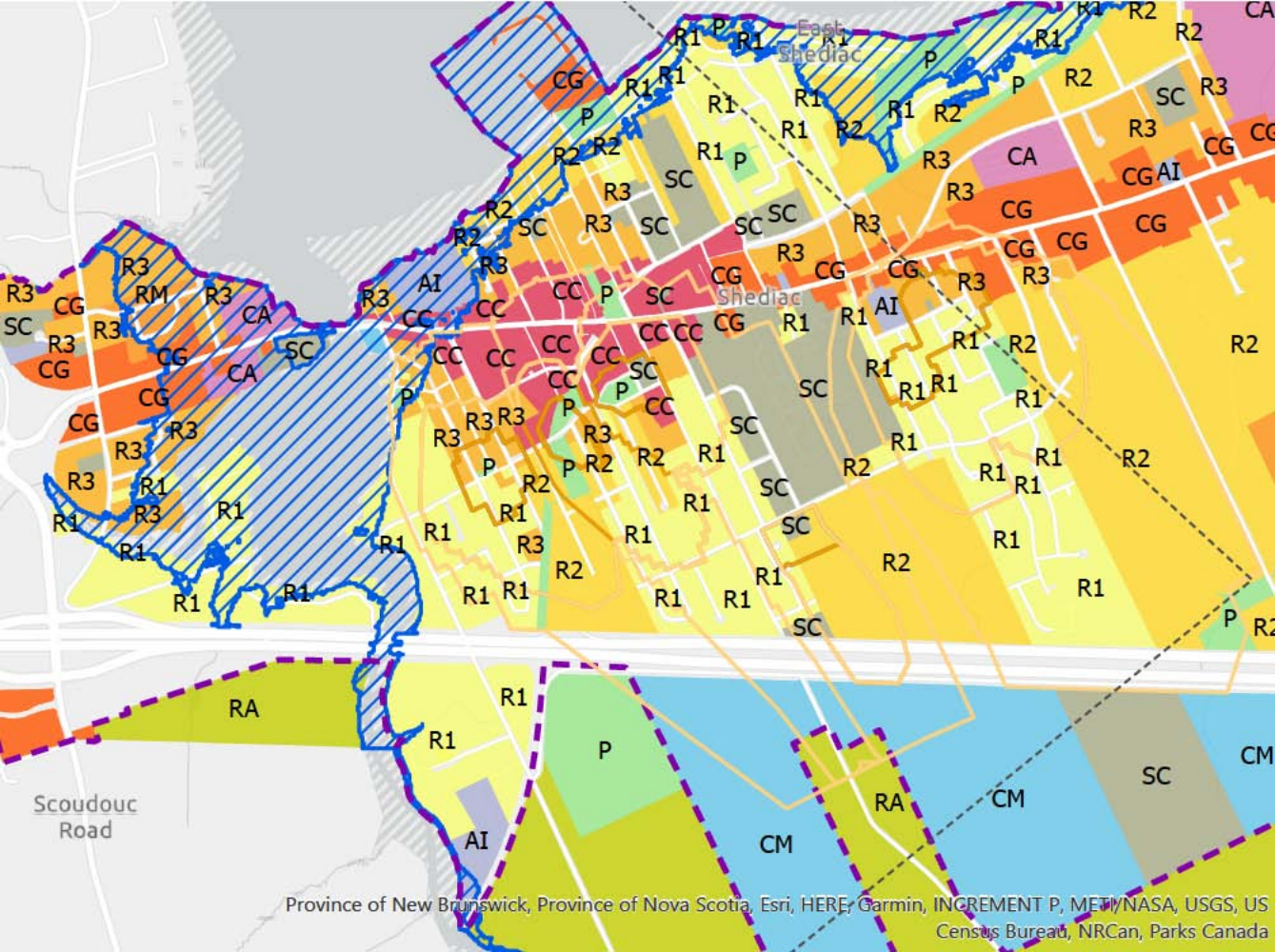
Map Title:  
 Representative Well Protection Zones (New Well)

Project No.  
 MON-00262741-A0

Fig No: 5	Rev. No.
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**Table 1: Project-Environment Interaction Matrix**

Component	Air Quality	Sound Quality	Groundwater	Surface Water	Fish and Fish Habitat	Wildlife/Habitat	Species at Risk	Wetlands	Heritage/ Archaeology	Land Use	Land Use by First Nations	Human Health	Transportation and Navigation
<b>Construction Activities</b>													
Clearing, grubbing and grading	1	0	0	0	0	1	0	0	1	0	0	0	0
Access trail and access lane construction	1	0	0	0	0	0	0	0	0	0	0	0	0
Well drilling and pump testing	1	0	1	0	0	0	0	0	0	0	0	0	0
Wellhouse, underground services installation/ raw water line hook-up	1	1	1	1	0	0	0	0	1	0	0	0	0
<b>Operation and Maintenance</b>													
Well maintenance	0	0	1	0	0	0	0	0	0	1	0	1	0
Well monitoring and wellfield protection	0	0	1	0	0	0	0	0	0	1	0	1	0
<b>Potential Accidents/Malfunctions/Unplanned Events</b>													
Hazardous material spills	0	0	1	0	0	0	0	0	0	0	0	1	0
Erosion & sediment control failure	0	0	0	1	0	0	0	0	0	0	0	0	0
Wildlife encounters	0	0	0	0	0	0	0	0	0	0	0	0	0
Fires	1	0	0	0	0	1	0	0	0	1	0	1	1



Appendix A –  
Step 1 Water Supply Source Assessment (WSSA) Application

**Water Supply Source Assessment**  
**Step One Application – Shediac Bellevue Heights Well** Page 1 of 3

Pursuant to Section 3(5) of  
The Water Quality Regulation 82-126  
Clean Environment Act

***NOTE: Refer to accompanying EIA registration document submission for Figures and additional information.***

- 1) **Name of Proponent:** Town of Shediac
  
- 2) **The proposed water supply is to be used for what purpose:** To provide for additional capacity for the Town of Shediac's municipal groundwater supply well network which currently consists of seven operational municipal production wells (refer to Figure 1, site location; and Figure 3, existing production well locations).
  
- 3) **Required water quantity (in m<sup>3</sup>/day):** It is the Town's objective that the yield from the well be on the order of that produced by some of its higher capacity wells (e.g. in the range 1,312 to 2,624 m<sup>3</sup>/day (200 to 400 IGPM). However, the Town will re-evaluate the desired yield requirement based on the actual results of the pump test (i.e. predicted long-term safe yield) balanced against construction and expected operational and maintenance costs. (The Town's most recent production wells included Well #9 which has an estimated yield of 1310 m<sup>3</sup>/day (200 IGPM) brought on line in 1999; Well #10 drilled in 2002, with 1640 m<sup>3</sup>/day (250 IGPM) and commissioned in 2005; and Well 11 (Geraldine), 2,938 m<sup>3</sup>/day (450 IGPM)) brought on line circa 2006.

The Town has relegated to standby or decommissioned some earlier wells (e.g. Well #3, Well #7 and Well #8 for various reasons including lower yield, elevated manganese, or the fact that the wells were located at the extremes of the system and during water infrastructure upgrading the raw water system was modified from wells pumping directly into the distribution system with chlorination at the wellhead to wells pumped to a central treatment and storage system before distribution into a 2-zone (pressure and gravity fed zones) distribution system.

Regarding water quality, the objective is to obtain a raw water source which meets or can be treated with the Town's existing treatment system to comply with the Canadian Drinking Water Guidelines established by Health Canada. The existing groundwater supply for the Town is of good quality with respect to the drinking water guidelines with the general exception of manganese which is elevated in several of the community's wells. A manganese water treatment plant was constructed and commissioned during 2001 - 2002 and currently treats water from selected wells at the central treatment plant located off Breaux Bridge. It is planned that the proposed and future wells will also lead to the central treatment building where the water is also chlorinated prior to entering the storage and distribution system.

- 4) **List alternate water supply sources in the area (including municipal systems):** Continued development of the groundwater supply is considered the most viable alternative for water supply. The Scoudouc River represents a possible alternate water supply source for the Town. However, the development of a reservoir on or supplied by the river would be unattractive from an economic and environmental perspective due to the availability of comparatively cheap groundwater resources which are currently capable of meeting both water quality and quantity

requirements. It is noted that, if developed, a treatment plant would likely be required in order to use the Scoudouc River as a water source due to the potential for estuarine (saltwater) mixing and other potential surface water quality issues, and the expected requirement for a higher level of treatment if a surface water source was developed.

- 5) **Discuss area hydrogeology as it relates to the project requirements:** A detailed examination of the area hydrogeology was conducted as part of a water supply investigation for the Town (ADI, 1999). A brief overview of the area hydrogeology indicates the Town of Shediac area to be underlain by sedimentary rocks of the Petitcodiac Group Richibucto Formation. This unit is predominately comprised of yellowish orange to grey sandstone with occasional finer grained siltstone and claystone. The sandstone bedrock which forms the area aquifer is one of the better aquifers in the Moncton/Shediac area (Carr, 1968; GSC Bulletin 589, 2008). The Town is located near a regional groundwater discharge zone (Shediac Bay) and the shallow groundwater flow system in the area is typically topographically controlled. In the Shediac area, the bedrock is overlain by marine or till deposits of variable thickness. Well yields are variable and strongly dependent on intersecting higher flow discrete water zones (e.g. joints and fractures in the bedrock). The depth of the existing production wells range from 62 m to 148 m.

- 6) **Outline proposed work schedule:** Currently, there is one test well (TH05-1) located on the subject property (copy of driller's well log attached). This well was drilled during 2005 under an earlier EIA registration ((NBDELG EIA File No. 4561-3-920). TH05-1 was drill to 400 feet depth, with yield encountered predominantly above 200 feet. To accommodate testing objectives and provide for an observation well during the proposed pump testing portion of the work, the proposed work program is to drill one additional well (OW20-01) on the property approximately 20 to 30 m west of the exiting TH05-1. Depending on well yields, this new well or the original TH05-1 will be drilled out to larger diameter and used as the pumping well.

Observation/ test well OW20-01 will be drilled to 200 feet depth and the air lift yield assessed. Assuming the existing TH05-1 has the preferred yield, referring to the attached well log, it is noted that the main well yield occurred above 200 feet, with little increase in yield below this depth. Therefore, the existing 19 feet of well surface casing would be pulled and the existing hole opened from 8 inch to 12 inch diameter to 80 feet depth with 8 inch casing then installed to 80 feet depth. The borehole would then be opened to 8 inch diameter to 200 feet depth and cleaned. The pump testing program would then be completed (step test followed by 72-hour constant rate test and recovery monitoring).

Pending EIA approval, and that results of the drilling and pump test program indicate sufficient yield, it is planned that the drilling and pump test program will be completed during February/ March 2021, and the construction work to hook the existing well to the raw water line at Breaux Bridge would be completed during the 2021 summer into fall construction season.

- 7) **Identify any existing pollution or contamination hazards within a (minimum) 500 m radius of the proposed drill targets. Historical land use that might pose a contamination hazard (i.e. tannery, industrial, disposal, etc.) should also be discussed.** There are no known contamination hazards near the existing (TH05-1) or proposed (OW20-1) drilling location. In general, petroleum hydrocarbons are considered the most likely potential source of groundwater

contamination in the Shediac area at the present time, with automobile service stations representing the most concentrated sources of petroleum hydrocarbons in the area. However, all the automobile service stations in the Town are currently located along Main Street and downgradient of the proposed subject property on which the wells are located. Regarding other contaminant/ petroleum sources, other than the major 4-lane highway (Route 15) located approximately 950 m upslope, land use in the area of the test wells is residential or greenfield, and the only potential sources of contamination are expected to be those associated with residential/greenfield type of environment.

It is understood that wellfield protection areas have been designated by NBDELG for the existing Town of Shediac production wells (refer to Figure 4). It is expected that should the proposed program lead to develop of a permanent production well on the subject property it will require designation under the NBDELG program (Wellfield Protection Designation Order Regulation). Representative wellfield protection zones for the new production well are indicated on Figure 5.

- 8) Identify any groundwater use problems (quantity or quality) that have occurred in the area –**  
 There are no known groundwater use problems other than the general need to treat production well raw water for elevated manganese (variable between wells).
  
- 9) Identify any watercourse(s) (stream, brook, river, wetland,etc.) within 60 m of the proposed drill targets –** None within 60 m of the drill targets (refer to Figure 3).
  
- 10) Identification of Site Supervisory Personnel -** The following persons will be involved in the supervision of the groundwater supply investigation:
 

Marc Cormier, ing.	Director Municipal Operations, Town of Shediac
John Sims, M.Sc., P.Eng., P.Geo.	Senior Hydrogeologist EXP Services Inc., Moncton, NB
Licensed Well Driller	Eastern Well Drilling Shediac, NB
  
- 11) Attach a 1:10,000 map and/or recent air photo clearly identifying the following (proposed location of drill targets and property PID; domestic or production wells within 500 m radius from the drill targets; any potential hazards identified in question 7) -** Mapping is attached in main EIA document.
  
- 12) Attach a land use/ zoning map of the area (if any). Superimpose drill targets on this map.** Mapping attached in main EIA document.
  
- 13) Contingency plan for open loop earth energy systems –** The Town does not expect open loop energy systems will be allowed to be developed in the vicinity of the well. Closed loop heat pump systems (e.g. mini-splits) are expected to provide an adequate option.

OFFICE USE ONLY FIELD NO.		COUNTY CODE	HEALTH REGION	INCRG NO.	SAMPLE RECEIVED DATE YR MO DAY
SEC	YR	SEQ	MICRO NO.	EVENT NO.	
TESTING VOUCHER INFORMATION SEE BACK FOR DETAILS PLEASE PRINT			SAME AS WELL OWNER INFORMATION . . . . OR INFORMATION INCLUDED HEREIN SHOULD BE THE WELL OWNER AT TIME OF SAMPLING		P.I.D. NO. 00866939
FIRST NAME			LAST NAME		WELL I.D. NO. 0029320
ADDRESS			WELL OWNER INFORMATION INFORMATION INCLUDED HEREIN SHOULD BE THE WELL OWNER AT TIME OF DRILLING		
CITY/TOWN/VILLAGE			FIRST NAME VILLE DE SHEDIAU		
PROV.			LAST NAME		
POSTAL CODE			ADDRESS 290 Rue Main, Unite 300		
TEL. NO.			CITY/TOWN/VILLAGE Shediac		
FAX NO.			PROVINCE N.B.		
E-MAIL			POSTAL CODE E4P 2E3		
DO YOU NEED A SAMPLE FOR YOUR MORTGAGE? IF YOU WISH THE RESULTS TO BE RELEASED TO A MORTGAGE INSTITUTION PLEASE INCLUDE THE FOLLOWING CONTACT INFORMATION:			WELL LOCATION: SAME AS ABOVE . . . . OR CIVIC NUMBER STREET NAME 125 Bellevue Heights		
INSTITUTION			CITY/TOWN/VILLAGE Shediac		
FIRST NAME			WELL ID FOR BY PROVINCIAL DEPT. OF		
LAST NAME			WELL ON RESERVE? YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>		
FAX NO.			WELL ALREADY TAGGED? YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>		
E-MAIL			OLD WELL I.D.		
SIGNATURE OF WELL OWNER			DRILLER'S LOG *		
WAS THE COST OF THIS WELL FINANCED BY NB HOUSING? YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>			FROM (FT.)		
WELL / WATER USE:			TO (FT.)		
INDUSTRIAL <input type="checkbox"/>			COLOUR		
ABANDONED <input type="checkbox"/>			ROCK TYPE		
EXPLORATORY <input type="checkbox"/>			6 26 Brown Overburden		
HEAT PUMP <input type="checkbox"/>			6 26 Grey (Soft) Sandstone		
OTHER <input type="checkbox"/>			26 35 Grey Sandstone		
MUNICIPAL <input checked="" type="checkbox"/>			35 44 Grey (Sandstone / Conglomerate)		
OBSERVATION <input type="checkbox"/>			44 101 Grey Coarse Sandstone		
MONITORING <input type="checkbox"/>			101 106 Grey Sandstone		
NEW WELL <input checked="" type="checkbox"/>			106 118 Grey Coarse Sandstone		
DEEPEMED <input type="checkbox"/>			118 119 Grey Sandstone		
OTHER: <u>Test Hole only</u>			119 172 Grey Coarse Sandstone		
METHOD:			172 175 Brown Shale		
CABLE TOOL <input type="checkbox"/>			175 179 Grey Sandstone / Soapstone		
ROTARY <input checked="" type="checkbox"/>			179 254 Brown Shale		
OTHER			254 278 Grey Sandstone		
CASING INSTALLED:			278 280 Grey Sandstone (Magogues)		
LENGTH OF CASING ABOVE GROUND: <u>2</u> FT. <u>0</u> IN.			280 281 Grey Sandstone		
STEEL: <u>8 5/8</u> IN DIAM. FROM <u>0</u> FT. TO <u>19</u> FT.			281 286 Grey Shale / Soapstone		
PVC: _____ IN DIAM. FROM _____ FT. TO _____ FT.			286 287 Grey Shale / Soapstone (Magogues)		
SLOTTED _____ IN DIAM. FROM _____ FT. TO _____ FT.			287 310 Grey Sandstone		
SCREENS: TYPE: _____ SLOT SIZE _____			310 326 Grey (Coarse) Sandstone		
_____ IN DIAM. FROM _____ FT. TO _____ FT.			326 333 Grey Sandstone / Brown Shale		
DRIVE SHOE: YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>			333 352 Grey (Coarse) Sandstone		
SETBACKS: SEE BACK FOR DETAILS			352 357 Brown Shale		
SEPTIC TANK (1) <u>X</u> FT.			357 374 Grey Sandstone		
SEPTIC TANK (2) _____ FT.			IF INSUFFICIENT SPACE PLEASE USE ADDITIONAL SHEETS		
FIELD (2) _____ FT.			TOTAL WELL DEPTH: <u>400</u> FT.		
FIELD (1) _____ FT.			DEPTH TO BEDROCK: <u>26</u> FT.		
RIGHT OF WAY OF ANY PUBLIC ROAD (1) _____ ROAD (2) _____			WATER BEARING: <u>17-8</u> lpm AT <u>31</u> FT.		
SETBACKS MEASURED _____ (NEW CONSTRUCTION)			lpm AT <u>35</u> FT.		
APPROXIMATE SETBACKS AS INDICATED BY HOMEOWNER _____ (EXISTING CONST.)			FRACTURE ZONES: <u>135</u> lpm AT <u>148</u> FT.		
FLOWING WELL? YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> IF YES - RATE: _____ lpm (approx.)			PUMP INSTALLATION: INSTALLED <input type="checkbox"/> NOT INSTALLED <input checked="" type="checkbox"/>		
AQUIFER TEST: METHOD: AIR <input checked="" type="checkbox"/> BAILER <input type="checkbox"/> PUMP <input type="checkbox"/>			PUMP INTAKE SETTING: _____ FT. BELOW TOP OF CASING		
INITIAL WATER LEVEL: _____ FT. BELOW TOP OF CASING			PUMP TYPE: SUBMERSIBLE <input type="checkbox"/> JET <input type="checkbox"/> TURBINE <input type="checkbox"/>		
PUMPING RATE: <u>180</u> lpm DURATION: <u>1</u> hrs. <u>0</u> min.			OTHER _____		
FINAL WATER LEVEL: <u>10</u> FT. BELOW TOP OF CASING			WELL DISINFECTED? YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>		
ESTIMATED SAFE YIELD: <u>180</u> lpm			TYPE: <u>Chlorine Tablets</u>		
WELL GROUTED? YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>			DRILLER'S COMMENTS		
FROM _____ FT. TO _____ FT. GROUT TYPE: _____			<u>* City Sewers</u>		
DRILLING FLUIDS USED: YES <input type="checkbox"/> NO <input type="checkbox"/>			DRILLING COMPANY: <u>Eastern Well Drillers Ltd.</u>		
TYPE: _____			COMPLETION DATE: <u>0.50502</u> LICENSE NO. <u>67</u>		
DRILLER'S COMMENTS			YR MO DAY		
DRILLER'S COMMENTS			WHITE - NB DELG		
DRILLER'S COMMENTS			YELLOW - Homeowner		
DRILLER'S COMMENTS			BLUE - Homeowner / Voucher		
DRILLER'S COMMENTS			PINK - Drilling Company		

I CERTIFY THAT THE WELL HEREIN DESCRIBED HAS BEEN CONSTRUCTED IN ACCORDANCE WITH THE WATER WELL REGULATION UNDER THE NEW BRUNSWICK CLEAN WATER ACT.

Signature of Driller

Signature of Halper

KEEP THIS REPORT WITH YOUR IMPORTANT DOCUMENTS

OFFICE USE ONLY FIELD NO.	COUNTY CODE	HEALTH REGION	INCRG NO.	SAMPLE RECEIVED DATE	
SEC	YR	SEQ	YR	MO	DAY
MICRO NO.		EVENT NO.			

TESTING VOUCHER INFORMATION  
SEE BACK FOR DETAILS PLEASE PRINT

SAME AS WELL OWNER INFORMATION ..... OR INFORMATION INCLUDED HEREIN SHOULD BE THE WELL OWNER AT TIME OF SAMPLING

FIRST NAME \_\_\_\_\_ LAST NAME \_\_\_\_\_

P.I.D. NO. 00866939

WELL I.D. NO. 0029320

ADDRESS \_\_\_\_\_

FIRST NAME \_\_\_\_\_ LAST NAME \_\_\_\_\_  
Villeda Shediac

CITY/TOWN/VILLAGE \_\_\_\_\_ PROV. \_\_\_\_\_ POSTAL CODE \_\_\_\_\_

ADDRESS 290 Rue. Main, Unite 300

TEL. NO. \_\_\_\_\_ FAX NO. \_\_\_\_\_

CITY/TOWN/VILLAGE Shediac N.B. E4P 2E3

E-MAIL \_\_\_\_\_ SAMPLE COLLECTED YR \_\_\_\_\_ MO \_\_\_\_\_ DAY \_\_\_\_\_ HR \_\_\_\_\_ MIN \_\_\_\_\_ AM \_\_\_\_\_ PM

WELL LOCATION: SAME AS ABOVE ..... OR CIVIC NUMBER STREET NAME 125 Bellevue Heights

DO YOU NEED A SAMPLE FOR YOUR MORTGAGE? SEE BACK FOR DETAILS  
IF YOU WISH THE RESULTS TO BE RELEASED TO A MORTGAGE INSTITUTION PLEASE INCLUDE THE FOLLOWING CONTACT INFORMATION:

CITY/TOWN/VILLAGE Shediac

INSTITUTION \_\_\_\_\_

WELL ON RESERVE? YES  NO  WELL ALREADY TAGGED? YES  NO  OLD WELL I.D. \_\_\_\_\_

FIRST NAME \_\_\_\_\_ LAST NAME \_\_\_\_\_

DRILLER'S LOG

FAX NO. \_\_\_\_\_ E-MAIL \_\_\_\_\_

FROM (FT.)	TO (FT.)	COLOUR	ROCK TYPE
Ground Level			
374	382	Brown	Sandstone / Shale
382	383	Grey	Sandstone
383	388	Brown	Sandstone
388	394	Grey	(Dark) Sandstone
394	397	Grey	(Light) Sandstone
397	400	Grey	Sandstone (Magaree)

SIGNATURE OF WELL OWNER \_\_\_\_\_

WAS THE COST OF THIS WELL FINANCED BY NB HOUSING? YES  NO

WELL / WATER USE:

INDUSTRIAL  ABANDONED  DOMESTIC

EXPLORATORY  MUNICIPAL  MONITORING

HEAT PUMP  OBSERVATION

OTHER

TYPE OF WORK COMPLETED: NEW WELL  DEEPEINED

OTHER: Test Hole only

METHOD: \_\_\_\_\_

CABLE TOOL  ROTARY  OTHER \_\_\_\_\_

CASING INSTALLED:

LENGTH OF CASING ABOVE GROUND: 2 FT. 0 IN.

STEEL: 8 5/8 IN DIAM. FROM 0 FT. TO 19 FT.

PVC: \_\_\_\_\_ IN DIAM. FROM \_\_\_\_\_ FT. TO \_\_\_\_\_ FT.

SLOTTED \_\_\_\_\_ IN DIAM. FROM \_\_\_\_\_ FT. TO \_\_\_\_\_ FT.

SCREENS: TYPE: \_\_\_\_\_ SLOT SIZE \_\_\_\_\_

DRIVE SHOE: YES  NO

SETBACKS: SEE BACK FOR DETAILS SEPTIC TANK (1) \* FT.

SEPTIC TANK (2) \_\_\_\_\_ FT. FIELD (2) \_\_\_\_\_ FT. FIELD (1) \_\_\_\_\_ FT.

\*RIGHT OF WAY OF ANY PUBLIC ROAD (1) \_\_\_\_\_ ROAD (2) \_\_\_\_\_

SETBACKS MEASURED \_\_\_\_\_ (NEW CONSTRUCTION)

APPROXIMATE SETBACKS AS INDICATED BY HOMEOWNER \_\_\_\_\_ (EXISTING CONST.)

IF INSUFFICIENT SPACE PLEASE USE ADDITIONAL SHEETS

FLOWING WELL? YES  NO  IF YES - RATE: \_\_\_\_\_ l/gpm (approx.)

TOTAL WELL DEPTH: 400 FT. DEPTH TO BEDROCK: 26 FT.

AQUIFER TEST: METHOD: AIR  BAILER  PUMP

WATER BEARING 1 2-8 l/gpm AT 31 FT. 2 35+ l/gpm AT 68 FT.

INITIAL WATER LEVEL: \_\_\_\_\_ FT. BELOW TOP OF CASING

FRACTURE ZONES: 3 135 l/gpm AT 148 FT. 4 \_\_\_\_\_ l/gpm AT \_\_\_\_\_ FT.

PUMPING RATE 180 l/gpm DURATION: 1 hrs. 0 min.

FINAL WATER LEVEL: 10 FT. BELOW TOP OF CASING

ESTIMATED SAFE YIELD: 180 l/gpm

PUMP INSTALLATION: INSTALLED  NOT INSTALLED

WELL GROUTED? YES  NO

PUMP INTAKE SETTING: \_\_\_\_\_ FT. BELOW TOP OF CASING (Recommended)

FROM \_\_\_\_\_ FT. TO \_\_\_\_\_ FT. GROUT TYPE: \_\_\_\_\_

PUMP TYPE: SUBMERSIBLE  JET  TURBINE

DRILLING FLUIDS USED: YES  NO

OTHER \_\_\_\_\_

TYPE: \_\_\_\_\_

WELL DISINFECTED? YES  NO

DRILLER'S COMMENTS: K City Sewers

TYPE: Chlorine Tablets

DRILLING COMPANY: Eastern Well Drillers Ltd.

COMPLETION DATE: 05 05 02 LICENSE NO. 67

I CERTIFY THAT THE WELL HEREIN DESCRIBED HAS BEEN CONSTRUCTED IN ACCORDANCE WITH THE WATER WELL REGULATION UNDER THE NEW BRUNSWICK CLEAN WATER ACT.

Signature of Driller \_\_\_\_\_ Signature of Helper \_\_\_\_\_

- WHITE - NB DELG
- YELLOW - Homeowner
- BLUE - Homeowner / Voucher
- PINK - Drilling Company

KEEP THIS REPORT WITH YOUR IMPORTANT DOCUMENTS