



March 18, 2019

Reference No. 11190595

New Brunswick Department of Environment and Local Government
Marysville Place
PO Box 6000
Fredericton, NB E3B 5H1

**Re: Water Supply Source Assessment
Initial Application
Village of Eel River Crossing Dundee, New Brunswick**

The Village of Eel River Crossing and Local Service District (LSD) of Dundee have recently amalgamated. GHD has been retained by Boissonnault McGraw, on behalf of the Village of Eel River Crossing Dundee, to complete a groundwater exploration study for the development of a new groundwater source for the community. The purpose of the water supply is to supplement/replace the existing water source (infiltration gallery) to meet the current and projected future water demand for the community. The water system will be operated by the Village of Eel River Crossing Dundee, and will supply water to nearby residential and commercial properties.

Background

The Village of Eel River Crossing installed a municipal water supply system in 1976. The water supply consists of an infiltration gallery located on the Eel River near Shannonvale, approximately 1.1 kilometres (km) west of Eel River Crossing (Figure 1). The infiltration gallery includes a fine gelinite pipes installed under the bed of the river to collect filtered river water, which flows into a wet well and then to a pump house adjacent to the river.

The Village's water consumption is metered at the pump house located near the water infiltration gallery along Eel River. A total of 720 properties are supplied by the current water system. The location of the water distribution system is identified in Figure 1.

The Eel River watershed is a Designated Watershed Protected Area and is located in the Dalhousie and Balmoral Parishes adjacent to the Village of Eel River Crossing Dundee. The predominant land use in the watershed is forest with some agricultural land use along Route 270. Other land users within the watershed include gravel pits and an asphalt plant located in the community of Dundee. According to the Village information and based on the Canadian Drinking Water Quality Guidelines (CDWQG), on occasion, during the spring run-off or heavy rain events, the turbidity and colour levels are excessive in the current water supply. During these events, the Village must increase the chlorine dosage in the water system in order to maintain a chlorine free residual in the distribution system.

Levels of total trihalomethanes (THM) have also been reported throughout the Village's water distribution system during high turbidity events, indicating the relationship between turbidity and organic matter.



This letter is an application to initiate a water supply source assessment project for Boissonnault McGraw, on behalf of the Village of Eel River Crossing Dundee, as defined in the “Water Supply Source Assessment Guidelines” document dated April 2017. It is our intention to complete the proposed testing work following the spring recharge (June 2019).

Name of Proponent

Village of Eel River Crossing Dundee

1) Location of drill targets and purpose of the proposed water supply

TAP Environmental Resources Inc. (TAP) conducted an assessment of the hydrogeological conditions of the Eel River Crossing Dundee area in 2005 to identify potential test drill targets. One potential drill target was identified on property identification (PID) #50138411, located to the south of the Eel River near Dundee, approximately 3.5 km southwest of the current infiltration gallery (Figure 2). This location is favourable as it is located on the southern extent of a fairly large sand and gravel deposit; however, the aquifer thickness in this area is unknown.

The proposed target area for this study was selected based on the 2005 TAP report. The test well will establish whether the depth of the sand and gravel aquifer is sufficient and provide the municipal water requirements. The well will be located approximately 40 m north of the river. The site will require grading to allow access for a rotary drill rig and service vehicle.

2) Required water quantity (in m³/day) and/or required pumping rate

The required water quantity estimated at approximately 1,000 m³/day to meet the current requirement and allow a buffer for future expansion.

3) List alternate water supply sources in area (including municipal systems)

There are no other known municipal water supplies in the area, other than the existing infiltration gallery. The nearest municipal water supply is the Town of Dalhousie, located approximately six km north of Eel River Crossing Dundee.

4) Area hydrogeology

As stated in the 2005 TAP report, the study area is underlain by the geological structure known as the Chaleur Bay Sunclinorium, a large northeast-trending structure that extends from the Maine-New Brunswick border in the southwest to the Gaspé Peninsula of Quebec in the northeast. These Silurian-Devonian aged sedimentary and volcanic rocks are mildly deformed and metamorphosed. Late Silurian-Devonian plutonic rocks in the form of dykes, sills, and small stocks intrude the older formations. The youngest rocks in the study area are flat-lying redbeds of the Carboniferous aged Bonaventure Formation. Bedrock in the area generally have low hydraulic conductivities and are considered to have low potential for the development of a water supply.



Unconsolidated surficial (lying above the bedrock) deposits in the area consist of thin glacial tills and sand and gravel deposits of variable thickness. The direction of glacial ice movement, as indicated by glacial striations and grooves in bedrock exposures, was to the northeast and to the east. Deposition by the receding glaciers resulted in a complex system of granular materials in the area, particularly near the present coast of Chaleur Bay. Evidence of glacial flow directions suggests that these sand and gravels were source from two different ice lobes. The Chaleur Bay ice lobe existed to the north, and another lobe was situated inland, on the Chaleur upland. These ice masses coalesced near Charlo.

The surficial deposits within the study area consist of glacial till, glaciofluvial outwash, glaciofluvial deltaic deposition, marine shallow-water sediments, ice-contact stratified drift, and ancient alluvial deposits. From a hydrogeological perspective, all except the glacial till can provide significant groundwater extraction in the right setting. Within the area, the glaciofluvial deltaic and glaciofluvial outwash deposits can provide excellent aquifer characteristics and present the best target options due to their thickness as well as their groundwater storage and transmission properties.

The region ranges in elevation from about 250 m to sea level at Chaleur Bay. The inland plateau is dissected by streams that flow in the Chaleur Coastal Plain that slopes gently to the north to the Bay. The regional stream drainage is to the northeast into Chaleur Bay. The fluvial systems in the area are strongly controlled by the underlying bedrock northeast structure.

5) Proposed hydrogeological testing and work schedule

Following approval of the undertaking from New Brunswick Department of Environment and Local Government (NBDELG), GHD will supervise the drilling of one 150 millimetre (mm) diameter test well at the drill target site (Figure 2). The well will be logged by an experienced GHD professional and the drilling contractor will be a licensed well driller.

Detailed formation samples will be collected during well construction for grain size analysis. A preliminary yield estimate will also be completed based on airlift volumes during construction of the test well. Preliminary groundwater samples will be collected after initial development and analyzed for general chemistry and metals.

If the estimated yield and preliminary chemistry results are acceptable, a 200 mm diameter test well and a second 150 mm diameter observation well will be constructed near the initial test well. Following well construction, a step test will be completed on the 200 mm test well to determine the appropriate pumping rate for the constant rate pump test. Following the step tests, a 72-hour pump test will be completed to evaluate the aquifer parameters and yield. Water levels will be measured in the test well and the two monitoring wells during the pump test. Water samples will be collected at 24-hour intervals during the test for chemical analysis.

A detailed report on the hydrogeological investigation will be submitted to the NBDELG office upon completion of the testing program. The report will meet the requirements outlined in



NBDELG's Water Supply Source Assessment Guidelines, and will include well logs, pump test information, chemistry data, grain size analysis and yield estimate.

The proponent intends to undertake the proposed testing work as soon as approval to proceed is received, shortly after the spring recharge period (June 2019).

6) Existing pollution or contamination hazards within a (minimum) 500 m radius of the proposed drill targets

The land use in the study area includes an abandoned gravel quarry (no longer active). No constraints have been identified within a 500 m radius of the proposed drill target area (Figure 2).

7) Groundwater use problems (quantity or quality) that have occurred in the area

As detailed in the 2005 TAP report, the groundwater quality in the area is fairly good in general, but can be hard. Much of the Silurian aged bedrock is calcareous and secondary calcium carbonate mineralization is also prevalent within the bedrock resulting in moderately hard waters. In the past, the dissolution and reprecipitation of calcium carbonate within the sand and gravel glacial deposits has resulted in the associated aquifers having a moderately high hardness. As stated in the CDWQG, public acceptance of hardness varies considerably. Levels greater than 200 milligrams per liter (mg/L) are considered poor but tolerated; levels greater than 500 mg/L are considered unacceptable.

Though hardness of water samples collected from the municipal water supplies and test wells in the area range from moderately high to high, the infiltration gallery source of the Eel River Crossing distribution system are soft due to the effect of surface water. Water samples from the Eel River Crossing test wells have indicated high conductivity and associated hardness. As previously mentioned, the current water supply is also susceptible to elevated colour and turbidity levels during high recharge periods, bacterial impacts as well as the presence of THM. As indicated by a Boissonnault McGraw representative, the latest upgrades to the existing infiltration gallery including the installation of an ultraviolet (UV) treatment system.

8) Watercourse(s) within 60 m of the proposed drill targets

Eel River is located approximately 40 m of the proposed drill target. No other water courses or regulated wetlands are located within 60 m of the proposed target area.

9) Site supervisory personnel involved in the source development (municipal officials, consultants and drillers)

- Client Contact:
 - Kim Bujold (Village of Eel River Crossing Dundee)
 - Email: kb@ercvillage.com
 - Phone: (506) 826-6080
- Project Manager/Senior Hydrogeologist: Erika Graves (Project Manager, GHD), Roger Poirier (Senior Hydrogeologist, GHD)
 - Email: Erika.Graves@ghd.com



- Phone: (506) 458-1248
- Site Supervisors: Mario Theriault / Mike Gaines / Mike Graves (Senior Technicians, GHD)
- Licensed Well Driller: A qualified licensed well driller will be identified to complete the drilling and pump test activities.

10) 1:10,000 map and/or recent air photo identifying:

- **Proposed location of drill targets and property PID**
- **Domestic or production wells within a 500 m radius from the drill target**
- **Any potential hazards identified in Question 6**

A recent aerial photograph (1:10,000 scale) identifying the potential drill target is attached as Figure 2. There are no other known municipal or residential water supplies within a 500 m radius of the target area. There are no water wells listed in the NBDELG Online Well Log System database within 500 m of the drill target site. The location of the proposed drill target site, nearby watercourses and regulated wetlands are identified on Figure 2 for reference purposes.

11) Land use/zoning map of the area. Superimpose drill targets on this map

The Village of Eel River Crossing Dundee and the Regional Service Commission (RSC) #2, Planning Division was contacted for information on land use and/or zoning map for the area. The RSC indicated zoning does not apply in Dundee and therefore land use and/or zoning map is not available for the study area. The aerial photograph shows the land use within 500 m of the target area to be vacant/woodlot with an abandoned gravel pit to the north of the target area (Figure 2).

12) Contingency plan for open loop earth energy systems

Not applicable to this project.

We trust this information is sufficient for your evaluation at this time. Please contact our office should there be questions.

Sincerely,

GHD

Erika Graves, P.Eng.

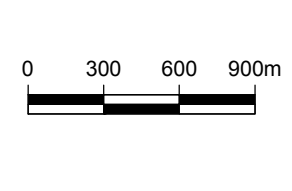
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Encl.

Roger Poirier, M.A.Sc., P.Eng.



Source: Microsoft Product Screen Shot reprinted with permission from Microsoft Corporation, Acquisition Date 2013, Accessed February, 2019.



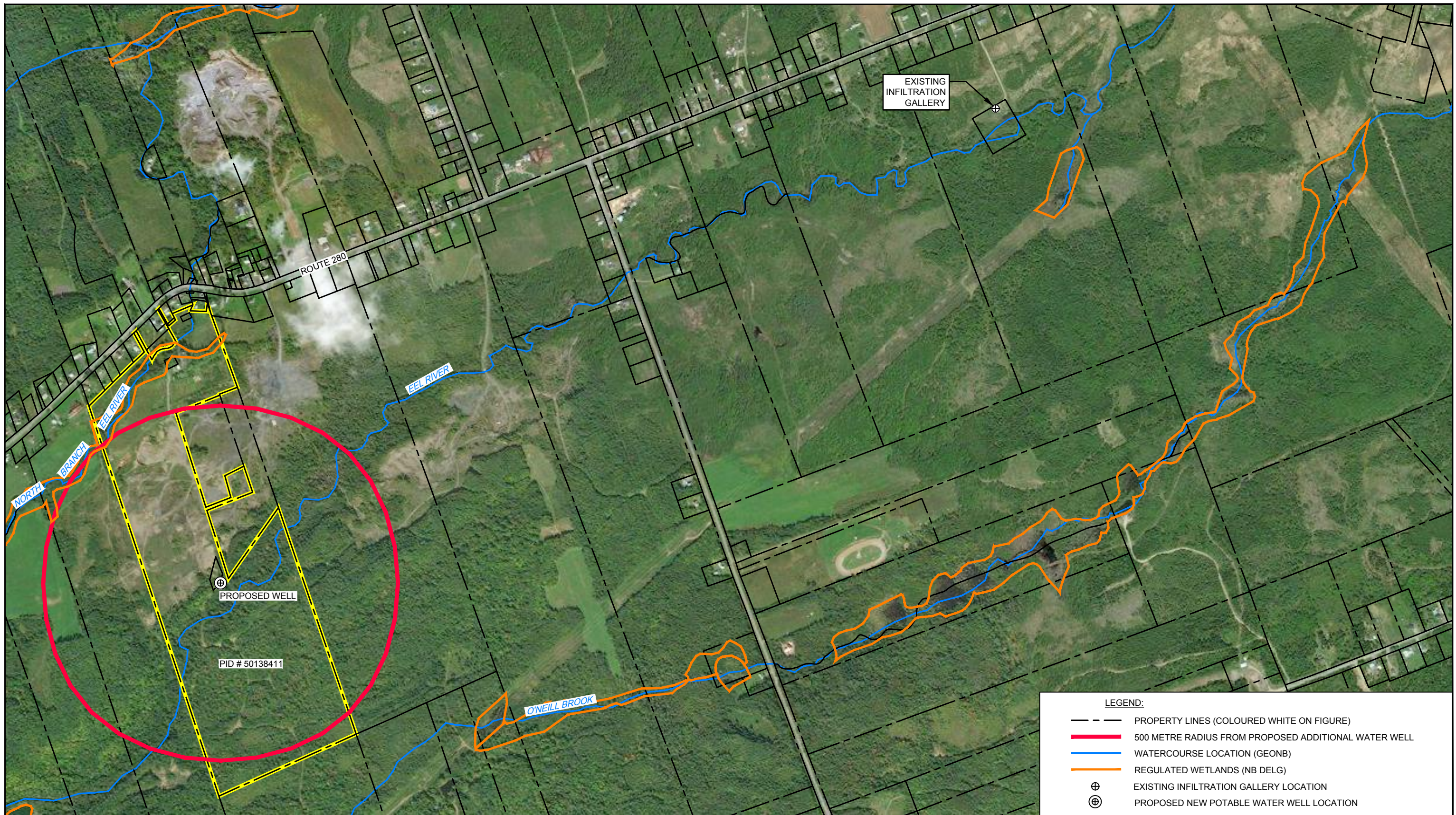
- LEGEND:**
- PROPERTY LINES
 - WATER DISTRIBUTION SYSTEM
 - ⊕ EXISTING INFILTRATION GALLERY LOCATION
 - ⊕ PROPOSED NEW POTABLE WATER WELL LOCATION



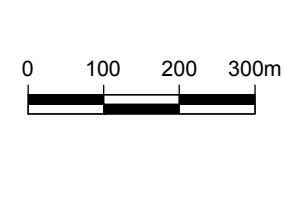
BOISSONNAULT McGRAW
 345 ROUTE 280, DUNDEE, NEW BRUNSWICK
 WATER SUPPLY SOURCE ASSESSMENT - INITIAL APPLICATION
 WATER SUPPLY SOURCE ASSESSMENT
SITE LOCATION

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FIGURE 1



Source: Microsoft Product Screen Shot reprinted with permission from Microsoft Corporation, Acquisition Date 2013, Accessed February, 2019.



BOISSONNAULT McGRW
 345 ROUTE 280, DUNDEE, NEW BRUNSWICK
 WATER SUPPLY SOURCE ASSESSMENT - INITIAL APPLICATION
 WATER SUPPLY SOURCE ASSESSMENT
 SITE PLAN

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FIGURE 2