

Attachment A

**Copy of EIA Registration and Step 2 WSSA Application
re: EIA File 4561-3-1228**



Village of Memramcook

**Memramcook Groundwater Supply
Exploration Work**

**Compilation of Reports by Others from 2009
to 2011**

Project Number
MON-00203023-A0

Prepared By:

exp Services Inc.
40 Henri Dunant Street
Moncton, NB E1E 1E5
Canada

Date Submitted
February 28, 2013

**WATER SUPPLY SOURCE ASSESSMENT
MEMRAMCOOK WATER SYSTEM - 30 YEAR PROJECTION**

EIA Registration Document

Prepared for:



Village de Memramcook
540 rue Centrale Street
Memramcook, N.B.
E4K 3S6

Prepared by:



Crandall Engineering Ltd.
1077 St. George Blvd., Suite 400
Moncton, N.B.
E1E 4C9

August 19, 2009
Project No. 0820-1



Our File 0820-1
August 19, 2009

Project Assessment and Approvals Branch
Department of Environment
20 McGloin Street
P. O. Box 6000, Fredericton, N.B. E3B 5H1

Attention: Mr. Pierre Doucet, Project Assessment (EIA)

Dear Sir,

**EIA Registration Document
Water Supply Source Assessment - Memramcook Water System - 30 Year Projection
Village de Memramcook, N.B.**

Crandall Engineering Ltd. is pleased to provide the Department with six (6) copies of the EIA Registration Document for your review and comments on behalf of our Client, the Village de Memramcook for the above referenced project.

This also includes the Step One EIA Application (submitted on July 24, 2009) and the Water System Design Brief for the 30 year water requirements.

Please do not hesitate to contact us should you require additional information.

Yours very truly,
CRANDALL ENGINEERING LTD.

Pierre Plourde, P.Eng.
Project Engineer

- Cc. Mr. Pierre LaForest, CAO - Village de Memramcook.
Ms. Annie Daigle, NBDENV.
Mr. Mike Cormier, P. Eng. - Crandall Engineering Ltd.
Mr. John Hart, Hydrogeologist - TerrAtlantic Engineering Ltd.
Mr. Geoff Dickinson, M. Eng., P. Eng., FEC - TerrAtlantic Engineering Ltd.

G:\Administration\Saint-Antoine\Village\0909-1\Letters\Transmittal EIA Registration Form - April 14, 2009.doc



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Village de Memramcook

EIA Registration Document

Submitted to:

PROVINCE OF NEW BRUNSWICK
DEPARTMENT OF ENVIRONMENT
P.O. Box 6000
Fredericton, N.B.
E3B 5H1

Prepared by:



Crandall Engineering Ltd.
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August 19, 2009
Project No. 0820-1

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- Appendix A: Water Supply Source Assessment - Step One Application
Memramcook Water System - 30 Year Projection
Crandall Engineering Ltd. - July 24, 2009 (drawings updated August 17, 2009)
- Appendix B: 1:50 000 Scale Topographic Map - Drawing 0820-1P-C09 Location Plan
Drilling Investigations (Zone "A", "B", "E", "F" and "G")
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REGISTRATION FORM

**PURSUANT TO SECTION 5 (2) OF
THE ENVIRONMENTAL IMPACT ASSESSMENT REGULATION 87-83
CLEAN ENVIRONMENT ACT**

1.0 THE PROPONENT

(i) Name of Proponent: Village de Memramcook

(ii) Address: 540 rue Centrale Street
Memramcook, N.B.
E4K 3S6

(iii) Chief Executive Office:

Name: Mr. Pierre LaForest
Official Title: Chief Administrative Officer - Village de Memramcook
Telephone: 506-758-4078
Fax: 506-758-4079

(iv) Principal Contact Person for purposes of Environmental Impact Assessment:

Name: Mr. Pierre Plourde, P. Eng.
Official Title: Project Engineer - Crandall Engineering Ltd.
Telephone: 506-857-2777
Fax: 506-857-2753
E-mail: pp@crandallengineering.ca

(v) Property Ownership:

As noted in the Water Supply Source Assessment Step One Application prepared by Crandall Engineering Ltd., dated July 24, 2009 (revised August 14, 2009) (Appendix A), the following preliminary test sites have been identified during the non-intrusive site investigations and reconnaissance geophysical surveys done by TerrAtlantic Engineering Ltd.

It is to be noted that the majority of these sites have been visited by Mrs. Annie Daigle, Hydrogeologist at the NBDENV, on August 5, 2009 (except Zone "F"). Following the site visit with Mrs. Daigle and due to unsuccessful discussion with some land owners, the following are the amended preliminary test sites.

The Village does not presently own these properties but have been in discussion with each land Owner and is finalizing the legal documents to have an option of ownership, in the event that acceptable yield are found following the preliminary drilling investigations:

Drilling Zone "A":

Test Hole 09-01 & 02: PID 00918805

Test Hole 09-03: PID 70127410

Drilling Zone "B":

Test Hole 09-04: PID 70034939

Test Hole 09-05: PID 70024476

Drilling Zone "E":

Test Hole 09-06: PID 00912642

Test Hole 09-07: PID 70122338

Drilling Zone "F":

Test Hole 09-08: PID 70102421

Test Hole 09-09: PID 00906974

Drilling Zone "G":

Test Hole 09-10 & 11: PID 70003827

2.0 THE UNDERTAKING

(i) Name of the Undertaking:

Water Supply Source Assessment - Memramcook Water System - 30 Year Projection.

(ii) Project Overview:

The Village de Memramcook is conducting a water study to establish the ground water profiles throughout its boundaries. The proposed water supply is to be used to provide the Village de Memramcook (all Wards) with a municipal water system in the future.

At the present time, the municipal water system is providing only water for the Saint-Joseph area (part of Ward No. 3). The majority of the existing residential wells in the Village are characterized with poor water quality and low yield. Furthermore, many residents are using dug wells for their water supply which are affected by surface water.

The purpose of this work is to secure the land for each successful test hole to be used in the present or future municipal water system. The project will therefore include the following:

- Drilling of eleven (11) test holes to establish the ground water profiles and determine the yield of each successful test hole.
- Where required, construction access roads including clearing and grubbing operations and access road construction (use of imported sandstone).

(iii) Purpose / Rationale / Need for the Undertaking:

The results of the work proposed herein will be used to establish the ground water profiles throughout the Village. This is required for the development and/or expansion of the municipal system to provide all the residents with a municipal system in the future.

As noted in the previous section, the existing municipal water system is providing water only for the Saint-Joseph area (part of Ward No. 3) due to insufficient yield of the existing wellfield. The majority of the existing residential wells in the Village are characterized with poor water quality and low yield. Furthermore, many residents are using dug wells for their water supply which are affected by surface water.

The Village of Memramcook is spread on more than 185 km². Other options to provide the residents with a water system would be to use the water supply for adjacent communities (Dieppe and Dorchester). This option was evaluated but was not selected due to major investments required since both these existing systems are far from the Memramcook Boundaries. However, depending on the results of the exploratory drilling and preliminary yield, this option may be re-evaluated for some area close to the boundaries.

A “do-nothing” approach is not acceptable in this case since most regions do not have a municipal water system and the existing private wells in the Village are characterized with poor water quality and low yield.

(iv) Project Location:

As identified in Section 1 (v), a total of eleven (11) test holes are proposed to establish the ground water profiles. The location are shown in Appendix A of the Water Supply Source Assessment Step One Application prepared by Crandall Engineering Ltd., dated July 24, 2009 (revised August 14, 2009) (Appendix A of this document). The drawings are showing the location of each proposed test hole over an existing aerial photograph. It is to be noted that the exact location of each test hole will be determined during the actual on-site work following approval to proceed from the NBDENV (Step One EIA).

The sites are accessible from public right-of-ways and via small existing dirt roads. All the sites are located within the Memramcook boundaries. The Village de Memramcook is located in southeastern N.B., approximately 20 km from the City of Moncton. It is located in the county of Westmorland and is part of the parish of Dorchester.

The latitude and longitude of the proposed project sites are as follows (approximately):

Drilling Zone “A”:

Test Hole 09-01: PID 00918805 - Latitude: 46° 01' 22.4" (N) - Longitude 68° 38' 2.5" (W)

Test Hole 09-02: PID 00918805 - Latitude: 46° 01' 18.8" (N) - Longitude 64° 38' 0.9" (W)

Test Hole 09-03: PID 70127410 - Latitude: 46° 01' 13.9" (N) - Longitude 64° 37' 59.1" (W)

Drilling Zone “B”:

Test Hole 09-04: PID 70034939 - Latitude: 46° 00' 56.5" (N) - Longitude 64° 38' 54.2" (W)

Test Hole 09-05: PID 70024476 - Latitude: 46° 00' 44.3" (N) - Longitude 64° 38' 53.8" (W)

Drilling Zone "E":

Test Hole 09-06: PID 00912642 - Latitude: 45° 57' 37.9" (N) - Longitude 64° 34' 58.7" (W)

Test Hole 09-07: PID 70122338 - Latitude: 45° 57' 51.9" (N) - Longitude 64° 34' 25.9" (W)

Drilling Zone "F":

Test Hole 09-08: PID 70102421 - Latitude: 45° 58' 28.0" (N) - Longitude 64° 31' 39.5" (W)

Test Hole 09-09: PID 00906974 - Latitude: 45° 58' 18.0" (N) - Longitude 64° 31' 37.6" (W)

Drilling Zone "G":

Test Hole 09-10: PID 70003827 - Latitude: 45° 58' 34.9" (N) - Longitude 64° 29' 55.3" (W)

Test Hole 09-11: PID 70003827 - Latitude: 45° 58' 45.8" (N) - Longitude 64° 29' 21.1" (W)

A 1:50,000 scale map showing the proposed site in reference to the existing features is also included (Appendix B).

(v) Siting Considerations:

GENERAL SITING CONSIDERATIONS

As noted in Item 5) of the Step One EIA (Appendix A), the preliminary non-intrusive site investigations and reconnaissance geophysical surveys were completed by Crandall's Hydrogeologist, Mr. John Hart in conjunction with Mr. Geoff R. E. Dickinson, M. Eng. P. Eng., P.E., Principal Hydrogeologist from TerrAtlantic Engineering Ltd. During the work, the sites were evaluated to ensure that no pollution or contamination hazards were found nearby the proposed drill targets.

As shown on the attached drawings, the proposed drilling targets are not within 30 m of any Wetland and Watercourse according to the NBDNR and NBDENV delineation. Furthermore, the sites were visited by Mrs. Annie Daigle, Hydrogeologist, for the NBDENV on August 5, 2009 (except Zone "F") and were found to be acceptable (amended sites as noted in Section 2 (iv)). It is to be noted that Zone "F" will be visited by the NBDENV during the next site visit (next few weeks).

For additional information on the geology and hydrogeology of each zone, please refer to the Step One Application in Appendix A of this document (Progress Report No. 1 and No. 2 by TerrAtlantic Engineering Ltd.) which was used to determine the preliminary location of each test hole.

It shall be noted that the route selection for future pipelines have not yet being identified since the results of the preliminary yield testing will dictate its location (s).

OTHER LOCATION CONSIDERED:

The location for each test hole was the results of the preliminary non-intrusive site investigations and reconnaissance geophysical surveys performed by Crandall's Hydrogeologist and TerrAtlantic Engineering Ltd. Some sites were changed due to past or present activities which could affect the water quality of the area and other due to refusal to access the land from the Owner.

ZONING

As shown on Drawing 8020-1P-C03 in Appendix A, all the proposed sites are located in the "Resource Development" which acceptable and the same as the existing wells.

WETLAND

As shown on the attached drawings in Appendix A, the proposed drilling targets are not within 30 m of any Wetland and Watercourse according to the NBDNR and NBDENV delineation. Furthermore, the sites were visited by Mrs. Annie Daigle, Hydrogeologist at the NBDENV on August 5, 2009 (except for zone "F" which will be visited in the next few weeks), and there was no concern with the preliminary sites (site as shown on drawings in Appendix A).

(vi) Physical Components and Dimensions of the Project:

LAND REQUIREMENTS

A map showing the location of each proposed test hole (11) relative to the environmental features of the region and a colour aerial photograph is attached as part of the Step One EIA Submittal (Appendix A).

It shall be noted that the total area required on each land will only be known at the end of the exploratory drilling investigations. Test holes not providing sufficient yield will be capped in accordance with the NBDENV guidelines. Test holes providing sufficient yield will be developed with proper casing and properly secured for future utilization.

As this project consist of the establishment of the ground water profiles for future water system (s), infrastructures will not be constructed as part of this work. Therefore, pump houses, water transmission lines, water treatment systems, reservoirs and all other components will not be done under this project.

To perform the drilling investigations, the following work will be undertaken:

- Construction of access roads (clearing and grubbing and installation of Sandstone sub-base material);
- Drilling of test hole and environmental protection during drilling and pump testing, in accordance with the NBDENV guidelines.

The total area of each subject property to be affected by this work is as follows:

Drilling Zone "A":

Test Hole 09-01 & 02: PID 00918805 - 10.12 hectares (25 acres)

Test Hole 09-03: PID 70127410 - 10.12 hectares (25 acres)

Drilling Zone "B":

Test Hole 09-04: PID 70034939 - 5.06 hectares (12.5 acres)

Test Hole 09-05: PID 70024476 - 40.87 hectares (101 acres)

Drilling Zone "E":

- Test Hole 09-06: PID 00912642 - 26.3 hectares (65 acres)
- Test Hole 09-07: PID 70122338 - 103.2 hectares (255 acres)

Drilling Zone "F":

- Test Hole 09-08: PID 70102421 - 43.3 hectares (107 acres)
- Test Hole 09-09: PID 00906974 - 13.9 hectares (34.4 acres)

Drilling Zone "G":

- Test Hole 09-10 & 11: PID 70003827 44.53 hectares (110 acres)

However, only a portion of the total area of each successful site is to be developed. The total area on each property will be determined following the results of the pump testing and each individual water protection buffer zone.

PHYSICAL COMPONENTS AND INFRASTRUCTURE

As noted above, at this time, the only infrastructure being constructed under this contract will be the preliminary test holes and related casing for the successful test holes. The results of the preliminary testing will be used to determine the location of future infrastructure.

(vii) Construction Details:

As discussed with Mrs. Annie Daigle, Hydrogeologist at the NBDENV, as soon as the EIA Registration Document and Step One EIA are approved, the site investigations will be immediately undertaken. To minimize the reviewing time, it is proposed that the project be divided in two (2) phase as follow:

Phase 1: Drilling investigation for Zone "E", "G" and "B":

Phase 2: Drilling investigation for Zone "A", "F":

The following is a preliminary schedule of the work to be performed for this project:

- **Step One EIA and Registration Document (including submittal and reviewing process by NBDENV):**
 - Phase 1: July 27 to August 25, 2009.
 - Phase 2: July 27 to September 11, 2009.
- **Preliminary drilling investigations and water sampling (including access road construction):**
 - Phase 1 - Zone "E" (Test Hole 09-06 & 09-07): August 26 to September 4, 2009;
 - Phase 1 - Zone "G" (Test Hole 09-10 & 09-11): August 28 to September 11, 2009.
 - Phase 1 - Zone "B" (Test Hole 09-04 & 09-05): September 5 to September 18, 2009.
 - Phase 2 - Zone "A" (Test Hole 09-01, 09-02 & 09-03): September 11 to September 30, 2009.

- Phase 3 - Zone "F" (Test Hole 09-08 & 09-09): September 23 to October 9, 2009.
- Preliminary Well Construction, step pumping tests and 48-72 hrs constant pumping tests at each successful test hole: September 28 to November 9, 2009.
- Step 2 EIA (including submittal and reviewing process by NBDENV): November 6 to November 30, 2009.
- Final Well Construction (based on results and approval of Step 2 EIA): December 1 to December 18, 2009.

The estimated hours of construction will be from Monday to Friday from 7:00 am to 7:00 PM except during the constant rate pumping where the work is 24 hrs / day.

The following equipment is anticipated to be used for the construction procedures:

- Earthwork: Excavators and dozers.
- Drilling: Well Drilling Equipment.

Potential sources of pollutants during the construction period are anticipated to include:

- Exhaust and other emissions from construction equipment.
- Noise from construction equipment.
- Water for drilling. The run-off water from the drilling operation will be controlled by the installation of erosion control structures. Typical installation for a drilling site include, the excavation of a drilling ditch, installation of erosion control structure (silt fencing and hay bales) and utilization of the existing wooded land where possible to minimize the effect of nearby stream. Each site will be evaluated separately.
- Silt from disturbed surface areas. This will be minimized by requiring the contractor to install silt fences and other erosion protection devices around work area and to reinstate disturbed areas as soon as is practical.

All wastes generated during construction will be stored in containers and removed off-site by the Contractor.

The following sequence and procedures are recommended during the construction process for each drilling site:

1. Mobilization and installation of environmental protection devices.
2. Clearing and grubbing.
3. Construction of access road (imported sandstone).
4. Mobilization of drilling equipment and installation of environmental protection devices for the drilling work.
5. Drilling of test holes and step pumping test.
6. For non-success test holes only:
 - Abandon of test holes and removal of casing.
 - Clean-up, property restoration and demobilization.
7. For success test holes only:
 - Enlargement of test hole.

- Constant pumping rate testing including installation of environmental protection devices as required for selected pumping rate.
- Clean-up, property restoration and demobilization.

As noted above, clearing and grubbing activities will be required on this land for the construction of access roads. The grubbing material will be disposed of off-site by the Contractor. The topsoil and organic material will be re-used for the restoration following the completion of the work. Trees will be returned to the Owners or will be used by the municipality.

As shown on the drawings in Appendix A, the work in each zone will be kept at least 30 m from streams and NBDNR wetlands.

(viii) Operation and Maintenance Details:

Operation and maintenance is not a part of this project since the work is done to establish the ground water profiles. Pump houses and other infrastructures will not be constructed during this phase.

(ix) Future Modification, Extensions, or Abandonment:

Not applicable.

(x) Project-Related Documents

The Water Supply Source Assessment Step One Application prepared by Crandall Engineering Ltd., dated July 24, 2009 (revised August 14, 2009) is appended to this document (Appendix A) which also contain the Water System Design Brief - 30 Year Water Projection.

3.0 DESCRIPTION OF THE EXISTING ENVIRONMENT

(i) Physical and Natural Features:

As noted in the previous sections, the proposed drilling targets are not within 30 m of any Wetland and Watercourse according to the NBDNR and NBDENV delineation.

The complete geology and hydrogeology related to each zone is available in the Step One Application in Appendix A of this document (Progress Report No. 1 and No. 2 by TerrAtlantic Engineering Ltd.).

Additional soils information will be obtained following the preliminary investigations in each zone during the drilling of the proposed test holes.

Preliminary discussions with the NBDNR are underway to verify that there are no *Environmentally Significant Areas* within 500 meters of the subject property as per the *New Brunswick Nature Trust*. This shall be confirmed shortly.

Site Topography, General Surface Drainage Regime and Watercourses:

Drilling Zone "A":

- Test Hole 09-01 & 02: PID 00918805 and Test Hole 09-03: PID 70127410.

The approximate elevations at the proposed locations are 95 metres for Test Hole 09-01, 100 metres for Test Hole 09-02 and 105 metres for Test Hole 09-03. The average gradient is approximately 1.2%. The majority of the property drains toward the northeast. From the aerial photographs and topographical mapping, the site drains towards existing small drainage ditches and eventually to Smith Brook.

Drilling Zone "B":

- Test Hole 09-04: PID 70034939 and Test Hole 09-05: PID 70024476

The approximate elevations at the proposed locations are 98 metres for Test Hole 09-04 and 100 metres for Test Hole 09-05. The average gradient is approximately 2.4%. The majority of the property drains toward the north. From the aerial photographs and topographical mapping, the site drains towards existing small drainage ditches and eventually to Mc Farlane Creek.

Drilling Zone "E":

- Test Hole 09-06: PID 00912642

The approximate elevation at this proposed location is 55 metres. The average gradient is approximately 4.3%. The majority of the property drains toward the southeast. From the aerial photographs and topographical mapping, the site drains towards existing small drainage ditches and eventually to the Memramcook River.

- Test Hole 09-07: PID 70122338

The approximate elevation at this proposed location is 31 metres. The average gradient is approximately 2.1%. The majority of the property drains toward the southeast. From the aerial photographs and topographical mapping, the site drains towards existing small drainage ditches and eventually to the Memramcook River.

Drilling Zone "F":

- Test Hole 09-08: PID 70102421 and Test Hole 09-09: PID 00906974

The approximate elevations at the proposed locations are 31 metres for Test Hole 09-08 and 23 metres for Test Hole 09-09. The average gradient is approximately 2.1%. The majority of the property drains toward the south. From the aerial photographs and topographical mapping, the site drains towards existing small drainage ditches and eventually to Breau Creek (tributary to the Memramcook River).

Drilling Zone "G":

- Test Hole 09-10 & 11: PID 70003827

The approximate elevations at the proposed locations are 40 metres for Test Hole 09-10 and 45 metres for Test Hole 09-11. The average gradient is approximately 4.0%. The majority of the property drains toward the south. From the aerial photographs

and topographical mapping, the site drains towards existing small drainage ditches and eventually to Breau Creek (tributary to the Memramcook River).

As shown on the drawings in Appendix A, there are no private wells located within 500 metres of each proposed test holes. Zone "F" (Test Hole No. 09-06 & 07) is located within the Memramcook water supply and wellfield protection plan. Following the preliminary investigations in Zone "F" and in the event that the test holes are developed as municipal production wells, the wellfield protection plan would then be updated in accordance with the NBDENV guidelines.

(ii) Cultural Features:

There are no known major recreational activities close to any of the proposed drilling sites. All the sites are located in remote areas.

(iii) Existing and Historic Land Uses:

All the sites are located in remote areas with no adjacent developed land and most are presently wooded. The drawings in Appendix A are showing the subject properties with their 500 metres radius from the proposed test holes. From the area photograph (see drawings in Appendix A), it can be observed that some adjacent properties have been cleared in the past but are not heavily operated.

As shown on the drawings in Appendix A, Zone "F" is nearby existing gravel pits along Royal Road. The proposed test holes are up-gradient of those pits and are more than 500 metres from the working areas. This site has not yet been visited by Mrs. Annie Daigle, Hydrogeologist at the NBDENV but will be done over the next few weeks.

Test Hole 09-07 (Zone "E") is located in an open field and is close to the existing Well No.3. The field is used to grow hay and is harvested a few times during the summer and does not have any effect on the existing Well No.3.

Test Hole No. 09-10 (Zone "G") is located at the end of an open field. This field is currently used to grow hay and is harvested a few times during the summer.

As noted in the Step One EIA (see Appendix A), from the preliminary reconnaissance geophysical surveys conducted in the field by TerrAtlantic Engineering Ltd., we do not anticipate any water quality concerns due to the surrounding land use but this will be confirmed during the preliminary drilling investigations.

4.0 SUMMARY OF ENVIRONMENTAL IMPACTS

As noted in previous sections of this document, at this time, the construction work will be limited to clearing and grubbing activities to access the identified drilling targets, the construction of access roads using imported sandstone, drilling of test holes, enlargement of successful test holes and property restoration.

The proposed test holes are well above the flood level of Memramcook. The Memramcook Region as a flood level of approximate 8.0 metres (value used in the design of the municipal

WWTP completed in 2008). As noted in section 3 (i) of this document, the elevation of the sites are from 23 metres to 105 metres, which are well above the approximate flood level for the Memramcook Region.

It is anticipated that the proposed work will have little effects on the surrounding environmental features. As noted in the previous section, the proposed drilling targets are not within 30 m of any Wetland and Watercourse according to the NBDNR and NBDENV delineation. The only disturbance to existing environmental features will be during the construction of access roads and during drilling operations which will be protected with environmental protection structures as noted in Section 2 (vii) of this document.

5.0 SUMMARY OF PROPOSED MITIGATION

Different mitigation measures will be used throughout the project to minimize environmental impacts as follows:

- Disturbed areas will be reinstated as soon as is practical, silt fences and other erosion protection devices around excavations and stockpiles will also be used until the fully grown.
- Clearing and grubbing activities and access road construction will be limited to the requirements of the drilling equipments.
- A set-back of 30 meters from major streams and rivers will be respected.
- The construction will be inspected by the village's engineering consultant.
- The Contractor will be responsible to have on site the proper leak and spill prevention equipments prior to commencement of any work. In the event of a spill, the contaminated soils will be removed from the site and disposed of at an approved decontamination site.

6.0 PUBLIC INVOLVEMENT

A public notice was sent by the Village de Memramcook on May 29, 2009 in the local paper (see copy in Appendix D). Following the identification of the preliminary test holes, the Village de Memramcook and Crandall Engineering Ltd. have initiate discussion with various land owners to receive approbation to access their land and perform preliminary drilling investigations (actual work on-site will only be started upon approval from NBDENV).

The Village has also met with each individual resident at the preliminary drilling sites.

7.0 APPROVAL OF THE UNDERTAKING

The following technical approvals are anticipated as being required for this project:

- Approval under the EIA Legislation from the NBDENV.
- Approval of Step One EIA under the Water Supply Source Assessment.
- For construction, the contractor will be required to obtain the drilling permit from the NBDENV before undertaking the drilling operations.


8.0 FUNDING

This project is funded by the Federation of Canadian Municipalities, the Village de Memramcook and the Canada-New Brunswick Gas Tax Fund with the following contributions:

- Federation of Canadian Municipalities: +- 50 %
- Village de Memramcook: +- 30 %
- Canada-New-Brunswick Gas Tax Fund +- 20 %
- **Total:** 100 %

9.0 SIGNATURE

19 août 2009
Date



Pierre LaForest
Chief Administrative Officer
Village de Memramcook

APPENDIX A:
Water Supply Source Assessment - Step One Application
Memramcook Water System - 30 Year Projection
Crandall Engineering Ltd. - July 24, 2009 (drawings updated August 17, 2009)

**WATER SUPPLY SOURCE ASSESSMENT
STEP ONE APPLICATION
MEMRAMCOOK WATER SYSTEM - 30 YEAR PROJECTION**



VILLAGE DE MEMRAMCOOK

Submitted to:
**PROVINCE OF NEW BRUNSWICK
DEPARTMENT OF ENVIRONMENT**

Prepared by:
Crandall Engineering Ltd.
1077 St. George Blvd., Suite 400
Moncton, N.B.
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Consultant's Project No. 0820-1
July 24, 2009 (Revised August 17, 2009)



Our File: 0820-1
July 24, 2009

Province of New Brunswick
Department of Environment
P.O. Box 6000
Fredericton, N.B. E3B 5H1

Attention: Mr. Pierre Doucet, Project Assessment (EIA)

Dear Sir,

**Village de Memramcook Water Supply System
Water Supply Source Assessment - Step One Application (EIA)
Village de Memramcook, N.B.**

The Village de Memramcook is conducting a water study to establish the ground water profiles throughout its boundaries. The proposed water supply is to be used to provide the Village de Memramcook (all Wards) with a municipal water system in the future.

Please find attached two (2) copies of the Water Supply Source Assessment - Step One Application for this project. Completion of the EIA registration document is not included in this document and will be prepared over the next few days.

Please do not hesitate to call if you require additional information.

Yours truly,
CRANDALL ENGINEERING LTD.

Pierre Plourde, P. Eng.
Project Engineer

- Cc. Mr. Pierre LaForest, CAO - Village de Memramcook.
Ms. Annie Daigle, NBDENV.
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CRANDALLENGINEERING.CA

Water Supply Source Assessment Step One Application

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

Please answer the following questions:

1) Name of proponent:

Village de Memramcook.

2) The proposed water supply is to be used for what purpose?

The Village de Memramcook is conducting a water study to establish the ground water profiles throughout its boundaries. The proposed water supply is to be used to provide the Village de Memramcook (all Wards) with a municipal water system in the future.

At the present time, the municipal water system is providing only water for the Saint-Joseph area (part of Ward No. 3). The majority of the existing residential wells in the Village are characterized with poor water quality and low yield. Furthermore, many residents are using dug wells for their water supply which are affected by surface water.

3) Required water quantity (in m³/day):

As noted in the attached design brief (Appendix A) prepared by Crandall Engineering Ltd., dated May 25, 2009 (revised July 24, 2009), the water requirements have been developed using a 30 year design period. Each Ward (5) has been evaluated separately since the Village is distributed over 185 km².

The following is a summary of the required water quantity per Ward. It shall be noted that the total number of production wells required to provide the water quantity per Ward will be determined following the results of the preliminary drilling investigations in each Ward:

- Ward No. 1: 2,125 m³/day (325 lgpm);
- Ward No. 2: 2,226 m³/day (340 lgpm);
- Ward No. 3: 2,455 m³/day (375 lgpm);
- Ward No. 4: 1,866 m³/day (285 lgpm);
- Ward No. 5: 1,637 m³/day (250 lgpm).

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

The Memramcook water supply system is in the same area and consists of the following:

- Bourgeois Spring (PID 70066022): +/- 25 l/gpm;
- Well A (PID 00823393): +/- 8 l/gpm;
- Well C (PID 00823393): +/- 5 l/gpm;
- Well No. 3 (70122338): 30 l/gpm;
- Institute Spring (70122338): +/- 90 l/gpm;
- Well No. 1 (PID 70153572): 50 l/gpm;
- Existing Well No.2 (PID 70153580) to be decommissioned and New Well No. 2 to be completed in accordance with the NBDENV approval letter dated June 23, 2009 (File 4561-3-1216).

5) Outline proposed work schedule:

The preliminary non-intrusive site investigations and reconnaissance geophysical surveys were completed by Crandall's Hydrogeologist, Mr. John Hart in conjunction with Mr. Geoff R. E. Dickinson, M. Eng. P. Eng., P.E., Principal Hydrogeologist from TerrAtlantic Engineering Ltd. The results of their analysis are presented in two (2) progress reports in Appendix B. As noted in the attached reports, the following eleven (11) preliminary drilling sites have been identified:

- Ward 1: PID 70024476
- Ward 2: PID 70034939, 00918805 (2) & 70127410
- Ward 3: PID 70122338 & 00912642
- Ward 4: PID 70102421
- Ward 5: PID 00906974 & 70003827 (2)

As discussed with the Department of Environment, it is the intent of the Village de Memramcook to start drilling (150 mm diameter) as soon as possible at the proposed test sites (see attached drawings for proposed locations) to determine preliminary yield and quality in each area. It is understood that the exploratory drilling may not be started until after approval of the Step One Application has been received from the NBDENV and it will be required to complete the EIA Registration Document.

At this time, the Village is in discussion with various residents to obtain permission to access their land to perform the preliminary exploratory drilling investigations. It is the intent to start the drilling of test holes in mid-August 2009.

If the newly constructed test holes are found to be successful (preliminary yield obtained by drilling equipment air lift tests and preliminary water sampling), it is understood that the complete EIA Registration Document will be required to proceed with the step drawdown testing, constant rate pumping and water sampling, in accordance with the Water Supply Source Assessment Guidelines (July 2004).

The following work schedule is proposed to establish the ground water profiles in each Ward (all in accordance with the Water Supply Source Assessment Guidelines (July 2004)):

- Preliminary drilling investigations and water sampling in each Ward: August 10 to August 21, 2009;
- EIA Registration Document (including submittal and reviewing process by NBDENV): August 24 to September 25, 2009;
- Preliminary Well Construction, step pumping tests and 48-72 hrs constant pumping tests at each successful test hole: September 28 to November 9, 2009;
- Step 2 EIA (including submittal and reviewing process by NBDENV): November 6 to November 30, 2009.
- Final Well Construction (based on results and approval of Step 2 EIA): December 1 to December 18, 2009.

The results of the 48-72 hrs constant rate pumping tests and water sampling will be used to establish the safe yield of each test well in order to determine the construction method of the future production well(s). During the development of the constant rate pumping tests, the water level fluctuations will be monitored via new monitoring wells for each proposed well. Upon completion of the hydraulic testing, a report will be prepared outlining the methods used, field data, final design drawings of the well, and relevant information used to provide conclusions and recommendations. The report will also include a discussion of long-term sustainable yields of the well(s) and impacts on surrounding water supplies, if any.

6) Discuss area hydrogeology as it relates to the project requirements:

The hydrogeology of each area is detailed in TerrAtlantic's Progress Report # 1 and #2 in Appendix B.

7) Identify any existing pollution or contamination hazards within a (minimum) 500 m radius of the proposed drill targets. If groundwater use problems (quantity or quality) have occurred in the past, then these should be identified. Historical land use that might pose a contamination hazard (i.e. tannery, industrial, disposal, etc.) should also be flagged.

As noted in Item 5) above, reconnaissance geophysical surveys were completed for each proposed drilling sites by Crandall's Hydrogeologist, Mr. John Hart in conjunction with Mr. Geoff R. E. Dickinson, M. Eng. P. Eng., P.E., Principal Hydrogeologist from TerrAtlantic Engineering Ltd. During the work, the sites were evaluated to ensure that no pollution or contamination hazards were found nearby the proposed drill targets.

Therefore, to the best of our knowledge, there are no indications of any existing pollution or contamination hazards within a 500 m radius of the proposed drill targets and no other well than the municipal wells are located within the 500 m well radius (for some of the proposed test holes in Ward No. 3).

However, it shall be noted that the exact location of each test hole on the subject properties will be determined following further discussions with each resident. At that time, the 500 m minimum radius will be re-evaluated for existing pollution or contamination hazards. If any are found, Crandall will notify the NBDENV.

The attached drawings in Appendix C are showing the outline of the 500 m radius. In addition, a copy of Schedule A.28 (Clean Water Act) is attached, identifying the delineated wellfield for the existing wells.

- 8) Identify any watercourse(s) (stream, brook, river, wetland, etc.) within 30 m of the proposed drill targets.

As shown on the attached drawings in Appendix C, the proposed drilling targets are not within 30 m of any Wetland and Watercourse according to the NBDNR and NBDENV delineation.

- 9) Identify site supervisory personnel involved in the source development (municipal officials, consultants and drillers).

Village de Memramcook:

Chief Administrative Officer - Pierre LaForest

Operators - Yvon Léger et Martin LeBlanc

Crandall Engineering Ltd:

Project Engineer - Pierre Plourde, P. Eng.

Project Manager - Mike Cormier, P. Eng.

TerrAtlantic Engineering Ltd.

Principal Hydrogeologist - Geoff R.E. Dickinson, M. Eng., P. Eng., FEC

Senior Hydrogeologist - John Hart, B. Sc.

Well Drillers:

Eastern Well Drillers Ltd.

10) Attach a 1:10000 map and/or recent air photo clearly identifying the following:

- proposed drill targets
- domestic or production wells within a 500 m radius from the drill target
- any potential hazards identified in question 7.

The attached drawings in Appendix C show the most recent air photo overlain with available property information. The proposed test holes are clearly identified with the 500 m buffer zone around each test hole.

11) Attach a land use/ zoning map of the area (if any). Superimpose drill targets on this map.

The Memramcook zoning plan with the location of the well is shown in the attached drawing in Appendix D.

Mail or deliver, along with EIA Registration to:

Pierre Doucet, P.Eng.
Project Assessment Branch
NB Department of the Environment and Local
Marysville Place, 20 McGloin Street, 2nd Floor
Fredericton, New Brunswick
E3A 5T8

APPENDIX A - WATER SYSTEM DESIGN BRIEF - WATER
REQUIREMENTS 30 YEAR PROJECTION - RAPPORT DE DESIGN -
ÉTUDE EIE - SYSTÈME D'EAU POTABLE : PROJECTION SUR 30 ANS

CRANDALL ENGINEERING LTD.
MAY 25 2009 (Revised July 24, 2009)

**RAPPORT DE DESIGN - ÉTUDE EIE
SYSTÈME D'EAU POTABLE : PROJECTION SUR 30 ANS**

Préparé pour:
VILLAGE DE MEMRAMCOOK



Préparé par :
Crandall Engineering Ltée
1077 boul. St. George, Suite 400
Moncton, N.-B.
E1E 4C9



RAPPORT FINAL
Dossier No. 0820-1
Le 25 mai 2009 (révision du 24 juillet 2009)

SYSTÈME D'EAU POTABLE : PROJECTION SUR 30 ANS

Village de Memramcook

Présenté au:

VILLAGE DE MEMRAMCOOK
540 rue Centrale
Memramcook, N.-B.
E4K 3S6

Par:

CRANDALL ENGINEERING LTÉE
1077, boul. St. George, Suite 400
Moncton, N.-B.
E1E 4C9

RAPPORT FINAL
Dossier No. 0820-1
Le 25 mai 2009 (révision du 24 juillet 2009)

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ANNEXE D: ÉVALUATION PRÉLIMINAIRE DES CIBLES POTENTIELLES DE FORAGE
WATER SUPPLY STUDY, MEMRAMCOOK, PROGRESS REPORT #1 & #2
TERRATLANTIC ENGINEERING LTD.

ANNEXE E : LISTE DES PROPRIÉTAIRES PRÈS DES CIBLES DE FORAGE

SECTION 1 - INTRODUCTION

Le Village de Memramcook est situé dans le sud-est du Nouveau-Brunswick, approximativement 20 km de la cité de Moncton.

Le but premier du présent rapport est de déterminer les endroits possibles pour débiter la recherche d'eau potable pour desservir tous les quartiers (5 quartiers) du village. De plus, ce rapport offre au Village de Memramcook une projection de la demande en eau potable du village d'ici 30 ans.

Dans ce présent rapport, les résultats des calculs nécessaires à l'évaluation des débits actuels et futurs du village seront démontrés. Une carte du village comportant des éléments physiques, géologiques, hydrologiques et autres sera présentée afin d'identifier les sites propices à l'exploration pour le développement de puits d'eau.

La région étudiée est illustrée à l'Annexe A, dessin 0820-1P-C01.

SECTION 2 - ANALYSE THÉORIQUE DE LA POPULATION

Les données du dernier recensement de Statistiques Canada indiquent que la population du Village de Memramcook était de 4 638 personnes en 2006. De plus, entre les années 2001 et 2006, le taux de croissance dans le village était de **-0,34%** par année.

Par contre, en considérant le taux de croissance des régions voisines, soit la Ville de Dieppe (+4,84% par année), le Village de Dorchester (+3,46% par année) et la Ville de Sackville (+0,18% par année) et puisqu'on considère que l'apport d'un système d'eau municipal au village pourrait attirer les gens à s'établir dans la région, le taux de croissance utilisé dans ce rapport sera donc de **+1,00%** par année. Ce chiffre est typique dans les villages du sud-est du Nouveau-Brunswick et il permet d'avoir un design plus représentatif de la réalité sur la période au complet.

Ceci dit, la population actuelle de design (2009) sera la projection de la population de 2006 sur 3 ans, soit 4 779 résidents. De même, le nombre de résidents en 2039, soit à la fin de la **période de projection de 30 ans**, sera donc de **6 442**.

Pour les fins de ce rapport de design, les populations suivantes seront utilisées pour évaluer les besoins futurs :

- Population actuelle (2009) : **4 780 personnes**
- Population ultime (2039) : **6 450 personnes**

SECTION 3 - ANALYSE DES DÉBITS THÉORIQUES

Dans le cadre de cette étude, les débits actuels (2009) et ultimes (2039) seront déterminés en utilisant les populations élaborées dans la section précédente.

3.1 Débit quotidien moyen domestique

Basé sur la valeur du débit moyen par personne de 340 L/personne/jour, conforme aux critères de design du ministère de l'Environnement du Nouveau-Brunswick (en utilisant le manuel des lignes directrices des eaux usées pour le Canada atlantique), les débits quotidiens moyens domestiques actuels et ultimes sont les suivants:

Tableau 1 : Débits moyens domestiques

Débits moyens domestiques				
Année	Population	Population utilisée dans les calculs	Débit moyen domestique (L/jour)	Débit moyen domestique (Gimp/jour)
2009	4,779	4,780	1,625,200	357,494
2039	6,441	6,450	2,193,000	482,393

3.1.1 Débit de pointe domestique du village au complet

Les débits moyens sont des valeurs totales par jour. Toutefois, afin d'évaluer correctement les dimensions de la tuyauterie, les réservoirs en eau potable et les capacités pour les pompes aux sources d'eau, il faut évaluer les débits de pointe. En effet, à certains moments de la journée, la demande en eau potable sera beaucoup plus élevée que la valeur moyenne, pendant d'autres moments, le débit ne sera qu'une fraction de la valeur moyenne. Conforme aux normes du MENB (en utilisant le manuel des lignes directrices des eaux usées pour le Canada atlantique), le débit de pointe et le coefficient du débit de pointe sont basés sur les formules suivantes (Harman) :

$$Q(d) = \frac{pqM}{86,4}$$

- Q(d) : Débit de pointe domestique (L/s)
P : Population maximale en milliers
q : Débit quotidien moyen domestique (L/personne)
M : Facteur de pointe (calculé d'après la formule de Harman)

$$M = 1 + \frac{14}{4 + p^{0,5}} > 2.0$$

En utilisant la formule de Harman, le facteur de pointe (M) pour les débits domestiques est de **3,26 en 2009** et de **3,14 en 2039**. Puisque les facteurs de pointe obtenus sont supérieurs à 2.0, les valeurs respectives des facteurs de pointe sont utilisées dans les calculs de design pour le débit domestique de pointe.

D'après les formules ci-dessus, les débits de pointe domestiques actuels et ultimes sont les suivants :

Tableau 2 : Débits de pointe domestiques

Débits de pointe domestiques				
Année	Facteur de pointe (M)	Débit de pointe (L/s)	Débit de pointe (L/jour)	Débit de pointe (Gimp/jour)
2009	3.26	61.38	5,303,121	1,166,524
2039	3.14	79.72	6,887,722	1,515,087

3.2 Débits commerciaux du village au complet

Le Village de Memramcook compte un bon nombre de commerces qui influencent la demande totale en eau potable. La liste complète des commerces du village est présentée à l'Annexe B du présent document. Les commerces ont été divisés dans différentes catégories, tel que noté ci-dessous. Les débits utilisés sont conformes aux critères de design du ministère de l'Environnement du N.-B. (en utilisant le manuel des lignes directrices des eaux usées pour le Canada atlantique). Il est à noter que certains commerces possèdent présentement un compteur d'eau. Les données des compteurs d'eau seront utilisées dans ces cas pour avoir des débits plus représentatifs des valeurs d'utilisation présente.

Commerces :

Les commerces du Village de Memramcook ont été évalués en fonction de leur nombre d'employés. Toutefois, lorsque le nombre d'employés n'était pas disponible, une valeur moyenne de 5 personnes par commerce fut utilisée. Il est à noter que la demande des utilisateurs dans les commerces n'est pas évaluée dans le calcul suivant mais sera démontrée dans les sections futures :

Total de 47 commerces différents (sans compter les commerces avec un compteur d'eau qui seront évalués séparément) pour un total d'approximativement 418 employés.

- Total de 283 employés × 100 L/personne/jour = 28 300 L/jour

Restaurants :

Total de 8 restaurants différents (sans compter les restaurants avec un compteur d'eau qui seront évalués séparément) avec approximativement 133 sièges et 19 employés.

- 133 sièges \times 225 L/siège/jour = 29 925 L/jour
- 19 employés \times 100 L/employé/jour = 1 900 L/jour
- **Total restaurants = 31 825 L/jour**

Restaurants avec compteur d'eau :

- **Sassy's Dinner & Take-out** : 322,986 L/année (71 047 Gimp/année). Restaurant ouvert approximativement 50 semaines/année et 4 jours / semaine : 1 615 L/jour.
- **Restaurant "Au vieux collègue"** : inclus dans la section des débits institutionnels pour l'Institut.
- **Restaurant du Foyer Saint Thomas** : inclus dans la section des débits institutionnels pour le Foyer Saint Thomas.
- **Total restaurants avec compteur d'eau = 1 615 L/jour**

Total restaurants et restaurant avec compteur : 31 825 + 1 615 = 33 440 L/jour.

3.2.1 Utilisation des commerces

Il est nécessaire d'évaluer la nature de certains commerces pour avoir une bonne approximation du débit en fonction de leurs demandes et utilisations. Les commerces suivants ont été évalués séparément conforme aux critères de design du ministère de l'Environnement du N.-B. (en utilisant le manuel des lignes directrices des eaux usées pour le Canada atlantique). Il est à noter que le nombre de personnes qui travaillent dans ces commerces a été inclus dans les calculs précédents (sauf pour l'hébergement, tel que noté ci-dessous) et que dans certains cas des compteurs d'eau sont installés et les valeurs seront utilisées pour avoir des débits plus représentatifs des valeurs d'utilisation présente.

Hébergements :

- **La Solitude** : 23 chambres \times 340 L/chambre/jour et 5 employés \times 100 L/employé par jour = 8 320 L/jour
- **Centre de Villégiature** : inclus dans la section des débits institutionnels pour l'Institut.
- **Débit total : 8 320 L/jour**

Autres :

- **Y.L.C. Entreprise (Ultramar et Buanderie)** (données du compteur d'eau) : 1 486 040 L/année (326 883 Gimp/année) = 4,071 L/jour

- **Garderie :**
 - Débit total de 5 enfants \times 115 L/enfant/jour = 575 L/jour
- **Salle d'assemblée au Centre de villégiature de Memramcook :** inclus dans la section des débits institutionnels pour l'Institut.
- **Salons de beauté :**
 - Débit total de 8 sièges \times 200 L/siège/jour = 1 600 L/jour
- **Terrain de golf** (n'incluant pas l'arrosage du terrain) - Données du compteur d'eau : 196 118 L/année (43 140 Glmp/année). Terrain ouvert approximativement 22 semaines/année et 7 jours / semaine : 1 274 L/jour.
- **Édifice Municipal** (données du compteur d'eau) : 219 990 L/année (48 391 Glmp/année). Édifice ouvert approximativement 50 semaines/année et 5 jours / semaine : 880 L/jour.
- **Caserne des pompiers** (données du compteur d'eau) : 68 296 L/ année (15 023 Glmp/année). La caserne est utilisée approximativement 50 semaines/année et 2 jours / semaine : 683 L/jour.
- **Ferme Beauchamp** (données du compteur d'eau) : 5 095 894 L/année (1 120 940 Glmp/année). La ferme est utilisée approximativement 365 jours/année : 13 962 L/jour.
- **Parc de La Vallée de Memramcook** : 85 sièges \times 100 L/jour/sièges = 8,500 L/jour.
- **Total autres : 31,545 L/Jour**

3.2.2 Débits totaux commerciaux

En utilisant les valeurs des débits développés dans les sections précédentes, les débits moyens totaux des commerces sont :

- Commerces : 28 300 L/jour
- Restaurants : 33 440 L/jour
- Hébergements : 8 320 L/jour
- Autres : 31 545 L/jour
- **Débits moyens totaux commerciaux : 101,605 L/jour en 2009**

En utilisant un taux de croissance de 1.0% pour les commerces sur une période de 30 ans, le débit moyen total projeté est de **136 948 L/jour en 2039**.

3.2.3 Débits de pointe commerciaux

Les débits commerciaux sont évalués en fonction de chaque type de commerce, conforme aux critères de design du ministère de l'Environnement du N.-B. (en utilisant le manuel des lignes directrices des eaux usées pour le Canada atlantique). Les facteurs de pointe pour chaque commerce sont présentés dans le tableau de la section 3.5.