

**WATER SUPPLY SOURCE ASSESSMENT  
NEW MUNICIPAL WELL AND RELATED INFRASTRUCTURE  
EIA REGISTRATION DOCUMENT**

Prepared for:



Village of Alma  
8 School Street  
Alma, NB  
E4H 1L2

Prepared by:



Crandall Engineering Ltd., a Division of Englobe Corp.  
1077 St. George Blvd., Suite 400  
Moncton, N.B.  
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December 9, 2019  
Project No. 18073



**Environmental Impact Assessment Branch**  
**N.B. Department of Environment and Local Government**  
P. O. Box 6000  
Fredericton, NB  
E3B 5H1

**ATTENTION: Ms. Rachelle Voisine, B.Sc. - Project Coordinator**

Dear Madam:

**EIA Registration Document and WSSA Initial Application**  
**New Well Exploration**  
**Village of Alma, New Brunswick**

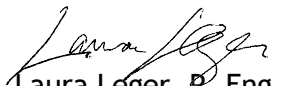
In regard to the above, Crandall Engineering Ltd., a Division of Englobe Corp. is pleased to provide the Department with the following copies of the EIA Registration Document for your review and comments, on behalf of our Client, the Village of Alma.

- One (1) electronic copy via e-mail
- One (1) hard copy via mail to yourself
- One (1) hard copy via mail to the Moncton Regional Office

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

Yours very truly,

**CRANDALL ENGINEERING LTD., A DIVISION OF ENGLOBE CORP.**

  
Laura Leger, P. Eng.  
Project Engineer

C. Mr. Pierre Plourde, P. Eng., Service Director - Municipal Engineering - Crandall Engineering Ltd.  
Department of Environment and Local Government, Moncton Regional Office

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**Village of Alma**

**EIA Registration Document**

Submitted to:

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

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## APPENDICES

- Appendix A:** Water Supply Source Assessment Initial Application, incl. Crandall Engineering Ltd., a Division of Englobe Corp. Drawing 18073-1P-C01 & C02
- Appendix B:** 1:25,000 Scale Map & Location Plan  
(Crandall Engineering Ltd., a Division of Englobe Corp. Drawing 18073-1P-C03)

**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 of Alma

**(ii) Address:** 8 School Street  
Alma, NB  
E4H 1L2

**(iii) Chief Executive Office:**

Name: Ms. Brenda Hoar  
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**(iv) Principal Contact Person for purposes of Environmental Impact Assessment:**

Name: Laura Leger, P. Eng.  
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**(v) Property Ownership:**

As noted in the Water Supply Source Assessment (WSSA) Initial Application prepared by Crandall Engineering Ltd., a Division of Englobe Corp. and included in Appendix A, based on the desktop analyses completed to date, several preliminary drilling zones have been identified. These zones are located on several different PIDs in Alma, New Brunswick. A field survey (geophysics) is required in order to confirm and prioritize the drill targets; however, at this stage, it is considered that the final drill targets could be located on one of several PIDs, as indicted in Table 1. Each of these zones has been shown on the enclosed drawing in Appendix A (WSSA Initial Application).

**Table 1: Preliminary Drilling Zones**

<b>Area</b>	<b>PIDs Impacted</b>
Zone #1	05008818
	00611509
Zone #2	00609107
	01048065
	00610766
	00610097
	00611111
Zone #3	05052345
	01048107
	05077912
	00611509
Zone #4	00609107
	00611244

The Village does not presently own these properties. However, the Village has been in communication with the landowners in Zones 2, 3, and 4, and has received permission from some landowners in each zone to complete preliminary investigations (geophysics).

Landowners in Zone 1 have not been contacted to date, as this zone is expected to be the lowest priority of the four (4) zones identified due to its difficult physical location along steep slopes, raising concerns about access to the site for drilling equipment, and the associated costs. However, the NBDELG's approval of test well drilling is requested for all four (4) zones.

Following the geophysics field survey, a formal agreement will be created if required, pending the receipt of favorable results, to proceed to physical construction including the construction of access road(s), preliminary test well drilling, etc.

Depending on the outcome of the test holes, permanent ownership of the land and/or easements may be acquired; or if the test holes are unsuccessful, the holes will be decommissioned as per NBDELG requirements.

## **2.0 THE UNDERTAKING**

### **(i) Name of the Undertaking:**

Water Supply Source Assessment - New Municipal Well and Related Infrastructure, Village of Alma.

### **(ii) Project Overview:**

The Village of Alma currently obtains its water supply from a single municipal groundwater well, located on Forest Drive. The water is disinfected in the well pumphouse before being directed to two (2) separate underground water reservoirs, then entering the water distribution system.

The existing well is not capable of meeting Alma's recurring high-water demand during peak tourism season (June - September); recent monitoring data shows that the Village of Alma's water consumption nearly doubles in the high-usage tourism season compared to the off season. To satisfy the high season water demand, it would be necessary for Alma's well to be pumped for approximately 16 hours per day, which is the maximum recommended daily pump time. Therefore, although the Village requires additional water storage to manage their peak flows, the addition of a water reservoir at the current well site is not feasible due to the existing well being at capacity.

Recent investigations have suggested that the high turbidity levels experienced in the Village can be linked to the extensive pumping from the single existing production well. Turbidity levels have been the cause of recurring boil water advisories in the Village. Therefore, in order to ensure a safe and reliable municipal water system for the Village of Alma, a second production well is required, ultimately reducing the risk of boil orders. The project will therefore include the following:

- Preliminary site assessment and geophysical survey to confirm final drilling sites.
- Construction of an access road to the drilling site(s), including clearing and grubbing operations where required and access road construction (use of imported sandstone or pit run material).
- Drilling of three (3) tests holes to determine the yield and water quality of the proposed site.
- If the test holes are found to be acceptable, the following work will be required:
  - Development of one (1) of the test holes and related works as required under the WSSA Guidelines, including use of the two (2) other test holes for observation.
  - Final well construction in accordance with WSSA guidelines.
  - Construction of new water reservoir.
  - Construction of permanent access road and water transmission main to the existing system.
  - It is noted that the actual permanent infrastructure required will depend on the final well location. For example, a new well in Zone 4 will require new PRV stations to reduce the water pressure in lower elevation areas of the Village, while a new well in Zones 2 or 3 may require a new booster station to pump the water to the higher elevations on School Street.
- If the test holes are not successful, it may be decided to move to another of the identified zones to drill additional test holes.

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

The work proposed herein is required to evaluate a potential for, and to secure a new water source in the Village of Alma. This will ensure a safe and reliable municipal water system. If the new well is deemed sufficient, it will act as an additional water source for the Village in order to meet the recurring high-season water demands.

The Village of Alma relies heavily on the tourism industry and the nearby Fundy National Park to support its local economy, with many of the local businesses being operated on a seasonal basis from May through September. For the past many years, the Village's water system has

been subject to recurring boil water advisories multiple times per year, negatively impacting local businesses and overall economy of the region.

In developing the proposed concept, an option that was considered was to connect the Village to the Fundy National Park water system. However, based on the preliminary review, this option was not considered to be feasible for several reasons:

1. Fundy National Park is primarily a seasonal operation. The majority of the system is shut down in the winter months, and the operational staff is greatly reduced.
2. The site conditions are not conducive to making the connection, due to the amount of new infrastructure and restoration required (long watermain and PRV station[s] due to major elevation differences), as well as the need to directional drill under the River.

Furthermore, a “do-nothing” approach is not acceptable in this case since the Village of Alma’s existing water system is at capacity, the Village does not have a true backup water source and the water storage reservoirs lack the capacity to successfully manage high water demands during peak season. A daily pump time of 16 hours is necessary to meet high season water demands, which is equal to the maximum recommended daily pump time. The amount of pumping has been linked to high turbidity levels in the system, and ultimately the recurring boil water advisories in the community.

Therefore, a second production well and reservoir are required to provide access to a safe, dependable water system, improving the Village’s public image, providing a dependable water supply to residents and local businesses, and supporting the primary industry of the region - tourism.

**(iv) Project Location:**

As identified in Section 1 (v), the proposed work could be carried out on several different properties in Alma, New Brunswick (Table 1). Four potential drilling zones have been identified based on preliminary desktop analyses, which will be confirmed and prioritized following on-site geophysics work.

The proposed locations are shown on Drawing 18073-1P-C01 of the Water Supply Source Assessment Initial Application prepared by Crandall Engineering Ltd., a Division of Englobe Corp., (Appendix A of this document). The drawing is showing the preliminary location of each of the proposed test well drilling zones over an existing aerial photograph. It is to be noted that the exact location of the well and related infrastructure will be determined depending on the final well location.

The Village of Alma is located in south-east New Brunswick, approximately 55 km south of Moncton and roughly 140 km south-east of Fredericton. It is located in the county of Albert and is part of the parish of Alma.

Test holes will be drilled following the EIA document submission, the exact location of these test holes will be refined after field surveys (geophysics).

The latitude and longitude of the center of each of the identified zones are as follows (approximately, to be confirmed by Geophysics):



- Zone 1 - Latitude: 45.60443088, Longitude: -64.92810966
- Zone 2 - Latitude: 45.60691342, Longitude: -64.94041659
- Zone 3 - Latitude: 45.60717443, Longitude: -64.93513710
- Zone 4 - Latitude: 45.61264274, Longitude: -64.94603332

A 1:25,000 scale map showing the proposed site in reference to the existing features is also included in Appendix B.

**(v) Siting Considerations:**

GENERAL SITING CONSIDERATIONS

A desktop analysis has been completed, which has identified four (4) potential drilling zones as previously indicated. This review has been based on existing aerial imagery, lidar data, and geological mapping, as well as the proximity of each site to existing water system components and vehicle access points.

Non-intrusive site investigations and reconnaissance geophysical surveys will be required to finalize the test well drilling sites. Landowners potentially impacted by the planned on-site surveys have been contacted, and a meeting was held to discuss the plans for the project and obtain the landowners permission to carry out the non-intrusive surveys on their land. Once permission has been received from all required landowners, the site reconnaissance and geophysical surveys will be completed.

Although the geophysical work is pending, a preliminary site visit was carried out to each zone using existing public access points, and no signs of pollution or contamination hazards were noted. A search of the available provincial records indicated a former underground petroleum tank and a remediation site (both appear to be related to a former garage site) roughly 400m from Zone #2; however, these are anticipated to be downgradient from any well developed in this zone.

As shown on the attached drawings and indicated in the attached WSSA Initial Application (Appendix A), there are some watercourses in the vicinity of the test well drilling zones, but no mapped wetlands based on GeoNB's delineation. However, the final test well drilling targets will be established following on-site reconnaissance and geophysical surveys.

For additional information on the geology and hydrogeology of the area, please refer to the WSSA Initial Application in Appendix A of this document.

It shall be noted that the exact route for future piping and other related infrastructure to the existing system will be determined once the final well location has been established.

OTHER LOCATION CONSIDERED:

The locations proposed for on-site investigations were derived from the results of the desktop analyses. Preliminary non-intrusive site investigations and geophysical surveys will be performed by Crandall's Hydrogeology advisor, Mr. John Hart, B.Sc. to confirm the final drilling targets.

## ZONING

The land within the preliminary drilling areas is zoned as follows:

Zone #1: “RA Rural Area”

Zone #2: “C Commercial” and “RT Residential Tourist”

Zone #3: “R1 Single-Unit Dwelling” and “RA Rural Area”

Zone #4: “RT Residential Tourist”

In all cases, public utilities are a permitted land use in accordance with the 2018 Village of Alma Rural Plan By-Law. In the case of Target 2, although it is partially within the “Commercial” Zone, there are no major commercial developments. The Village will consider zoning implications if a successful water source is found.

## WETLANDS

As shown on the attached drawing in Appendix A, the proposed drilling target is not within 30 m of any wetlands according to GeoNB’s delineation.

### **(vi) Physical Components and Dimensions of the Project:**

## LAND REQUIREMENTS

A map showing the location of each proposed potential drilling zone and a color aerial photograph is attached as part of the WSSA Initial Application Submittal (Appendix A). Depending on which site is selected following the geophysical investigations, it is anticipated that related infrastructure will be constructed such as a new pump house, watermains, and reservoir. A new well at Zone 4 would also require several Pressure Reducing Valve (PRV) stations along School Street to reduce the water pressures in the lower elevation portions of the Village, while a new well in Zones 1, 2, or 3 would likely require a booster station to service the upper reaches of School Street.

It shall be noted that the total area required on each property will only be known once the final test hole locations have been established and the hydraulic test results are available. If the test hole does not provide sufficient yield, it will be decommissioned in accordance with the NBDELG guidelines.

If acceptable yield is found, it is anticipated that the following infrastructure will be installed:

- New water pumphouse at new well, including related infrastructure, permanent access road, electrical service to site, etc.
- New watermain from the well to the existing water system.
- New watermain on Brittany Court, Falcon Ridge Road, Hilltop Lane and to the end of School Street.
- New water reservoir to properly manage peak flows.
- PRV Stations or booster station depending on final well location.

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

- Construction of access roads for drilling equipment (clearing and grubbing and installation of sandstone or pit run sub-base material);
- Drilling of the test holes and environmental protection during drilling and pump testing, in accordance with the NBDELG guidelines.

The total area of each subject property on which this work may take place is as follows:

**Table 2: Area of Properties**

PIDs Impacted	Total Area of PID (Ha)	Zone
00609107	51.0	Zone #2 Zone #4
00610097	0.4	Zone #2
00610766	0.2	Zone #2
00611111	0.7	Zone #2
00611244	17.6	Zone #4
00611509	24.2	Zone #3 Zone #1
01048065	0.4	Zone #2
01048107	1.4	Zone #3
05008818	46.5	Zone #1
05052345	0.6	Zone #3
05077912	1.2	Zone #3

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

#### PHYSICAL COMPONENTS AND INFRASTRUCTURE

If successful yield is found, the construction of the well will be completed in accordance with the NBDELG guidelines. In addition to the well, the following components and infrastructure will be required:

- a. Water transmission main and access road:** The installation of a new water transmission main and access road will be required from the newly drilled well to the existing water system (exact location to be determined depending on final well location). This will be done by conventional open trench excavation. Also, new water mains shall be installed on Brittany Court, Falcon Ridge Road, Hilltop Lane and the North end of School Street.
- b. New water pumphouse:** The construction of a water pump house building will be required. The new building will be used to house the mechanical and electrical components required to operate the well. At this time, the capacity of the well pump is not known but will be determined after the preliminary yield is defined. The new water pump house building, approximately  $\pm 16$  m<sup>2</sup> in size, will be located near the

- production well (s). The exact size of the water pump house building will be determined during the design stage.
- c. **New reservoir:** A new reservoir is anticipated, to provide additional water storage in the Village, to manage the peak flow water demands.
  - d. **New PRV Stations or Booster Station:** Due to the elevation differences in the Village, it is anticipated that a new well at Zone 4 would also require several Pressure Reducing Valve (PRV) stations along School Street to reduce the water pressures in the lower elevation portions of the Village, while a new well in Zones 1, 2, or 3 would likely require a booster station to service the upper end of the School Street area.

#### ADDITIONAL DETAILS

In addition to the new major physical features, construction is expected to include the following:

- a. **Lighting and impervious surfaces:** There will be no lighting on the site, except for exterior building lights (1 light per building). New impervious surfaces will be limited to the rooftops of the new structures (pumphouse, reservoir).
- b. **Off-site facilities:** Off-site facilities will not be required under this water study.
- c. **Construction activities:** Various activities will be required as part of the project. During the construction of the access roads, imported material will be hauled to the site. As a result, an increase in vehicular traffic will be experienced during this period. In addition, various material and equipment will be delivered to the site from time to time.

#### **(vii) Construction Details:**

As soon as the EIA Registration Document and WSSA Initial Application are approved, the drilling of the test holes will be immediately undertaken.

It is estimated that, from the start of the tender period to full commissioning of the upgraded facility, it will require roughly 30 working weeks, pending receipt of approval to proceed under the EIA Registration. In order to achieve this, the following schedule is proposed (assuming that the comprehensive EIA Study is not required):

**Table 3: Preliminary Project Schedule**

COMPONENT	APPROX. DURATION	ANTICIPATED COMPLETION
1. EIA Registration, WSSA Initial Application and Review	4 weeks	December 20, 2019
2. Geophysics	2 weeks	November 29, 2019
3. Construction of Access Road	2 weeks	January 24, 2020
4. Preliminary Drilling. Preliminary Well Construction and Pump Testing	5 weeks	February 28, 2020

COMPONENT	APPROX. DURATION	ANTICIPATED COMPLETION
5. WSSA Hydrogeological Study and NBDELG Reviewing Process	4 weeks	March 27, 2020
6. Engineering Design (Tender Ready Package, Complete Project)	6 weeks	March 31, 2020
7. Design Reviews and Approvals	3 weeks	April 18, 2020
8. Final Well Construction	2 weeks	May 2, 2020
9. Tender Period (Access Road, Piping, and Water Pumping Station)	3 weeks	May 23, 2020
10. Construction of Access Road and Piping	6 weeks	July 4, 2020
11. Construction of New Watermain (Brittany Court, Falcon Ridge Road, Hilltop Lane and the North end of School Street)	8 weeks	August 29, 2020
12. Water Pumping Station and Water Reservoir	12 weeks	November 21, 2020
13. Commissioning of New Well and Infrastructure	1 weeks	November 30, 2020

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 and construction of structures: Excavators, dozers, dump trucks, concrete trucks, compaction equipment.
- Well Drilling: Well Drilling Equipment, pumps, and generators.

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 includes, 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 on nearby streams.
- 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.
- Petroleum hydrocarbons from possible leaks, spills or accidents from construction equipment and vehicles. This will be minimized by requiring the Contractor to have spill kits on site and to conduct daily inspections of his equipment.

Contractors will be required to follow the EMP, which will be developed if a successful well is found, and will be included in the specifications for the construction of the pumphouse and related infrastructure. No refueling or maintenance of vehicles will occur within 30 m of a watercourse.

All waste 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:

1. Mobilization and installation of environmental protection devices.
2. Clearing and grubbing.
3. Construction of access road (imported sandstone/pit run material).
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. If unsuccessful:
  - Abandonment of test holes as per NBDELG guidelines and removal of casing.
  - Clean-up, property restoration and demobilization.
7. If successful:
  - Enlargement of one (1) test hole (remining two [2] test holes to be used as observation wells).
  - Step pumping test and constant rate pumping test including installation of environmental protection devices as required for selected pumping rate.
  - Clean-up, property restoration and demobilization.

As noted above, some clearing and grubbing activities will be required for the construction of the temporary access road. 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 where possible, or disposed of off-site by the Contractor. Trees will be returned to the Owners or will be disposed of by the Contractor.

In the event that the well is successful and the hydrogeological assessment reveals a sufficient yield, the new well will be connected to the Village's water system and the associated infrastructure will be constructed (refer to Section 2 (vi)). This work will be done by a qualified contractor to be selected through a public tendering process in accordance with the requirements of the Crown Construction Contracts Act. The specific contractors who will be involved, sources of materials, etc., cannot be confirmed until the tendering and contract award process has been carried out. Imported materials will include, where "imported" is interpreted to mean "brought in from off the construction site":

- Imported common fill and topsoil;
- Imported bedding for pipes;
- Imported granular material for structure foundations, permanent access road and roadway restoration within the pipe trench;
- Imported asphalt for roadway restoration;

- Imported construction materials for watermain installation (pipes, hydrants, valves, etc.);
- Imported construction materials for buildings: steel, concrete, etc.; and,
- Imported equipment for pumping and monitoring the water system.

It is noted that it will be a requirement that components that will come into contact with drinking water be certified to NSF Standard 61. Furthermore, AWWA standards will be followed as appropriate.

**(viii) Operation and Maintenance Details:**

The water pumped from this future well will be directed to the new Pumphouse where chlorine will be added for disinfection. The water then be directed to the reservoir and distribution system. The stop and start signal will be controlled by the water level in the existing or new Municipal Reservoirs (depending on final well location, to be determined during design). The daily water production of this new well, motor size and other components are unknown at this time and will be determined following the completion of the Hydrogeological Study and detailed design.

Normal operation and maintenance will include:

- Overall water pump house and water system maintenance.
- Chlorine equipment maintenance.
- Mechanical and electrical maintenance.
- Water sampling in accordance with the NBDELG and NBDOH.

It is to be noted that, generally, water pump houses do not require extensive operation and maintenance.

The power will be brought on site by the existing and/or new hydro transmission lines, depending on the final well location. Power costs for the Water Pumphouse are estimated to be approximately \$5,000.00 per year based on the initial use and present NB Power rates.

The water pumphouse and related infrastructure will be operated and maintained by the Village maintenance personnel (water system operator).

**(ix) Future Modification, Extensions, or Abandonment:**

Not applicable.

**(x) Project-Related Documents**

The following project related documents are appended:

- The Water Supply Source Assessment Initial Application prepared by Crandall Engineering Ltd., a Division of Englobe Corp. (Appendix A).

### **3.0 DESCRIPTION OF THE EXISTING ENVIRONMENT**

#### **(i) Physical and Natural Features:**

As noted in the previous Sections, the proposed drilling areas are not within 30 m of a Wetland according to GeoNB's delineation, although there are some watercourses in the vicinity of the proposed zones. It is anticipated that the final drilling target will be located outside of the 30m buffer zone of watercourses.

The complete description of the geology and hydrogeology of the area are available in the WSSA Initial Application in Appendix A of this document. Additional soils information will be obtained following the preliminary investigations during the drilling of test holes.

#### Site Topography, General Surface Drainage Regime and Watercourses:

The approximate elevations at the proposed test location will be determined following geophysics. Therefore, the average gradient may be adjusted at that time. From the aerial photographs and topographical mapping, the site drains down towards School Street.

As previously mentioned, the number of private wells located within 500 m of the test holes will depend on the final location of the drilling target. Based on the well logs available online from the NBDELG, it is anticipated that:

- Two (2) residential wells may fall inside the 500-m radius of Zone 1
- Eleven (11) residential wells may fall inside the 500-m radius of Zone 2
- Nine (9) residential wells may fall inside the 500-m radius of Zone 3
- Three (3) residential wells may fall inside the 500-m radius of Zone 4

However, it is anticipated that if the new well is successful, many of these residential wells would no longer be needed once the new well is on-line and the homes are serviced by the municipal water system.

The existing wellfield protection zones are shown on the site plan in Appendix B. As shown, the current Zone C extends into the area identified as the potential drilling zone #3.

#### **(ii) Cultural Features:**

There are no known major recreational or tourism activities in the immediate vicinity of any of the proposed drilling sites, nor any known heritage features. Zones 1 and 4 are located in relatively remote areas, while Zones 2 and 3 are closer to the established portion of the Village but are still mainly undeveloped.

#### **(iii) Existing and Historic Land Uses:**

Zones 1 and 4 are located in remote wooded areas with no immediately adjacent developed land. Zones 2 and 3 are closer to the Village's core. To the best of our knowledge, there are no pesticides or fertilizers being used on the land, nor is there any livestock grazing or livestock housing found within these areas.



The drawing in Appendix A shows the subject properties with a 500 meters radius from the proposed test hole zones. From the aerial photograph, it can be observed that the adjacent properties are not heavily developed.

As noted in the WSSA Initial Application (see Appendix A), from the preliminary desktop analyses completed to date, we do not anticipate any water quality concerns due to the surrounding land use, but this will be confirmed during the preliminary drilling investigations.

There is no indication that there were previous developments on this site that may have been of cultural or historic interest.

#### **4.0 SUMMARY OF ENVIRONMENTAL IMPACTS**

At this time, the construction work will be limited to clearing and grubbing activities to access the identified drilling target(s), the construction of access roads using imported sandstone, drilling of test holes, enlargement of successful test holes and property restoration. If a successful well would be found, the project's scope of work would be expanded to include the final well construction, connection to the system, and related infrastructure, which will depend on the final well location.

There is presently no flood mapping in this area, based on GeoNB mapping. However, the proposed areas are all well above sea level, with elevations ranging between roughly +30m and +160m geodetic. Thus, is anticipated floods and flood levels will not be a concern.

It is anticipated that the proposed work will have little effect on the surrounding environmental features. As noted in the previous section, the proposed drilling targets are not within 30 m of any mapped wetland according to GeoNB's delineation. There are watercourses in the area, however the final test well drilling targets will be determined following the on-site geophysical and reconnaissance surveys. The main 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.

It is noted that if a test well is developed in the area of Zone #3, work will be required within Zone C of the wellfield protected area of the existing municipal well, including:

- Clearing and grubbing for the new access road and well site, +/- 15 m wide;
- Construction of new access road and water transmission main within clearing limits;
- Drilling of test holes, pump testing, and final well construction;
- Construction of new well pumphouse.

An application will be made for exemption under the Wellfield Protected Area Designation Order if required, and any requirements stipulated will be adhered to.

#### **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 equipment.
- A set-back of 30 meters from wetlands will be respected. A WAWA permit application will be submitted if construction is required within the 30m buffer zone of a watercourse.
- 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. Any spills will be reported to the DELG Moncton Regional Office during business hours or to the Canadian Coast Guard's 24-hour reporting system after-hours.
- If the preliminary investigations and Hydrogeological Assessment are successful, an Environmental Management Plan (EMP) will be developed and submitted prior to major construction work (watermain installation, construction of permanent access road, water pumphouse modifications, etc.). The EMP will be included in the project specifications, and it will be required that the Contractor follow the EMP requirements.

## **6.0 PUBLIC INVOLVEMENT**

As noted in Section 1 (v), the Village will proceed with formal easements and / or land acquisition as appropriate, depending on the results of the geophysics and preliminary drilling.

Following the preliminary drilling investigations and constant rate pump testing, any landowners affected outside the identified properties will be contacted. At that time, the Village will prepare an overall public notice to inform the general public and any stakeholders of the details of the project.

## **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 NBDELG.
- Approval of the Initial Application and Hydrogeological Study under the NBDELG Water Supply Source Assessment.
- For the construction of the well, the contractor will be required to obtain the drilling permit from the NBDELG before undertaking the drilling operations.
- WAWA Permit if required.
- Certificate of Approval to Construct from the NBDELG for the work involved with connecting the new well to the system, and construction of the new pumphouse and reservoir.
- Approval to Operate as provided by the NBDELG once the facility has been completed and is being operated by the Village.

## 8.0 FUNDING

The Village has secured funding to complete the initial phase of the project, up to the completion of the detailed design phase, under the Integrated Bilateral Agreement for the Investing in Canada Infrastructure Program. It is anticipated that additional funding will be requested for the construction of the final connections and related infrastructure if the initial phase results in a viable well being secured.

## 9.0 SIGNATURE

December 12, 2019  
Date

Brenda Hoar  
Ms. Brenda Hoar  
Clerk/Administrator  
Village of Alma

**APPENDIX A:**

**Water Supply Source Assessment Initial Application, incl.  
Crandall Engineering Ltd., a Division of Englobe Corp.  
Drawings 18073-1P-C01 & C02**

# Water Supply Source Assessment Initial Application

Please provide the following information:

- 1) Name of proponent: Village of Alma.
  
- 2) Location of drill targets (including property PID) and purpose of the proposed water supply:

Based on preliminary work completed to date (desktop analyses only), preliminary drill targets could be located on several different PIDs in Alma, New Brunswick. However, because a field survey (geophysics) is required in order to confirm the drill targets, it is considered that the final drill targets could be located on several PIDs, as follows. Please note that the Target zones identified are not prioritized; the prioritization will be done following geophysics work.

Drilling Target	PIDs Impacted
Zone #1	05008818
	00611509
Zone #2	00609107
	01048065
	00610766
	00610097
	00611111
Zone #3	05052345
	01048107
	05077912
	00611509
Zone #4	00609107
	00611244

The Village of Alma’s municipal water supply is currently fed by a single municipal well, which lacks capacity to meet its demands. The Village does not have a backup water source and the existing reservoirs lack the capacity to properly manage peak flow demands during the high-usage tourist season. Based on 2018 and 2019 data, the demand during high season (June - September) was roughly double that of the low season, and it is necessary to pump the well for +/- 16 hours per day, at the high-end limit of the recommended daily pump time. The water system has been prone to recurring boil water advisories for many years due to high turbidity levels, having a negative impact on public perception, local businesses and tourism in the region. It is believed that the turbidity levels are caused by excessive pumping of the single production well.

Therefore, the addition of a second municipal well is required, to reduce the pumping time of the current well. This will also provide a backup source in the event that either well becomes unusable.

3) **Required water quantity (in m<sup>3</sup>/day) and/or required pumping rate.**

The desired water quantity of the new well(s) is 545 - 820 m<sup>3</sup>/day (100 - 150 USgpm). If this quantity is found, it will provide the necessary capacity in the water supply system for the high usage tourism season.

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

The Village of Alma has one (1) municipal production well. In developing the proposed concept, an option that was considered was to connect the Village to the Fundy National Park water system. However, based on the preliminary review, this option was not considered to be feasible for several reasons:

- a) Fundy National Park is primarily a seasonal operation. The majority of the system is shut down in the winter months, and the operational staff is greatly reduced.
- b) The site conditions are not conducive to making the connection, due to the amount of new infrastructure and restoration required (long watermain and PRV station[s] due to major elevation differences), as well as the need to directional drill under the River.

5) **Discuss area hydrogeology as it relates to the project requirements.**

**Zone #1:**

This proposed drill target is located some 500 m east of the present operating well along a northeasterly linear that parallels a mapped fault zone about 600 m to the east and the western contact between Carboniferous sedimentary rocks of the Hopewell Cape Formation and the Neoproterozoic rocks of the Bennet Brook Formation. Zone 1 is underlain by the Boss Point Formation which is also present at the existing wells site. The Boss Point Formation includes buff to grey weathering fine to coarse grained sandstone, quartz pebble sandstone and conglomerate. Numerous high yield water wells have been developed in this rock formation in New Brunswick. The suspected difference between this site and the existing well site is the surface linear that parallels a mapped fault zone, the potential for fracturing along the linear and higher fracture permeabilities which results in higher well yields. The site is remote with minor potential for contamination. The orientation of the linear, northeast, will allow for a field survey with an EM-16 Geonics geophysical instrument to located bedrock structures if they are present.

**Zone #2:**

This target is located west of the intersection of Highways No 114 and No 915. The mapped geology shows a narrow band of sedimentary rock (200 m) of the Hopewell Cape Formation, Mabou Group has been mapped here. This Formation comprises red to brown pebble to cobble conglomerate, medium to coarse grained sandstone with minor red mudstone. Due to the narrow zone any yield will be low unless recharge to the aquifer comes from the adjacent rocks of the Boss Point Formation to the east or the Bennet Brook Formation to the west. A search of the Department's records has not revealed known contamination concerns in the immediate area; however, due to development along Highway No 114 potential for contamination should be kept in mind. The Geonics EM-16 unit cannot be used at this location due to the presence of infrastructure.

**Zone #3:**

This Target is located near the end of Forest Drive and is underlain by the Boss Point Formation described above. There is little evidence of a bedrock structure in this area and infrastructure such as hydro lines may limit the use of the EM-16 to identify fractures or faults in the underlying bedrock. However, it is possible that higher permeabilities along structures could be present in the Boss Point Formation near the point where the topographic slope changes from the highs to the east and the lows in the valley. The site is close to existing infrastructure such as electrical and pipeline connection should any well contain sufficient water that warrants development.

**Zone #4:**

This target is located north of School Street in an area underlain by basalt, dacite, felsite and flow banded rhyolite of the Bennet Brook Formation along a northwesterly trending stream. The location will have low primary permeabilities due to the underlying rock type unless bedrock structures are present. The Lidar image for this site does not show any major features but given the orientation (northwest) of the brook which is parallel to the Big Salmon River found to the west, there continues to be some possibility for higher than normal yields expected for this rock type. A geophysical survey will be completed in this area; however the orientation of the survey line will be less than desirable due to the signal direction from Cutler Maine.

Geophysical work is required to identify the most promising location for new test wells and prioritize the above targets.

**6) Outline the proposed hydrogeological testing and work schedule.**

It is the intent of the Village of Alma to start drilling as soon as possible at the proposed test site(s) to determine the preliminary yield and quality (see attached drawing for the preliminary proposed location). It is anticipated that one (1) test well and two (2) observation wells will be drilled in accordance with the WSSA Requirements.

It is understood that the exploratory drilling may not be started until after approval of the EIA Registration Document and Initial Application has been received from the NBDELG.

The Village is in the process of receiving permission from the affected landowners to conduct non-intrusive field surveys on the proposed properties. The Village will proceed with formal agreements if the field surveys yield favorable results.

The complete schedule of the work is presented in the EIA Registration Document in Section 2 (vii). The following is the proposed schedule for the preliminary drilling investigation to establish the ground water profile (in accordance with the Water Supply Source Assessment Guidelines (April 2017)):

- Submittal of EIA Registration Document and WSSA Initial Application (including submittal and review process by NBDELG);
- Field Survey (Geophysics);
- Landowner agreements/land acquisition;

- Construction of Access Road;
- Preliminary drilling investigations and water sampling;
- Preliminary Well Construction, Step Pumping Test and 72-hour Constant Rate Pumping Test;
- WSSA Hydrogeological Assessment Report (including submittal and review process by NBDELG);
- Final Well Construction (based on results and approval of Hydrogeological Report).

Based on the existing well construction and available hydrogeology, the proposed target depth below ground surface for the test wells (150 and/or 200 mm diameter) is 30 to 160 m, depending on the final test well location, to determine preliminary yield and quality.

If the newly constructed test well is found to be successful, step drawdown testing and a constant rate pumping test will be undertaken, in accordance with the Water Supply Source Assessment Guidelines (April 2017), including required sampling. This is proposed to be completed by the end of January 2020.

The results of the 72-hour constant rate pumping test will be used to establish the safe yield of the test well in order to determine the construction method of the future production well. During the constant rate test, water level fluctuations will be monitored in the new observation wells. Upon completion of the hydraulic testing, a report will be prepared in accordance with the Water Supply Source Assessment Guidelines (April 2017), 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 and impacts on surrounding water supplies, if any.

- 7) **Identify any existing pollution or contamination hazards within a minimum radius of 500 m from the proposed drill targets. Historical land use that might pose a contamination hazard (i.e. tannery, industrial, waste disposal, etc.) should also be discussed.**

To the best of our knowledge, there are no visible indications of any existing pollution or contamination hazards within a 500 m radius of the proposed drill targets. A search of the available provincial records indicated a former underground petroleum tank and a remediation site (both appear to be related to a former garage site) roughly 400m from Zone #2; however, these are anticipated to be downgradient from any well developed in this zone. Depending on the final location of the well, several residential wells may be within the 500 m radius.

However, it shall be noted that the exact location of the test holes will be determined following the field survey and geophysics. 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 NBDELG.

The attached drawing indicates the area encompassed by the 500 m radius. Existing well sites recorded on the NB Online Well Log System have been shown for reference.



- 8) **Identify any groundwater use problems (quantity or quality) that have occurred in the area.**

As previously indicated, the Village's water system has been prone to recurring boil water advisories because of high turbidity levels, believed to be caused by excessive pumping of the single existing production well.

However, preliminary indications of the geology and hydrogeology in the proposed test well area, suggest the potential of a successful water supply in this area.

- 9) **Identify any watercourse(s) (stream, brook, river, wetland, etc.) within 60 m of the proposed drill targets.**

Zone #1: Flat Brook

Zone #2: Cleveland Brook

Zone #3: All streams, brooks and wetlands in the vicinity of the proposed drilling target are father than 60 m away from the site

Zone #4: All streams, brooks and wetlands in the vicinity of the proposed drilling target are father than 60 m away from the site

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

**Village of Alma:**

Clerk / Treasurer - Brenda Hoar

**Crandall Engineering Ltd, a Division of Englobe Corp. and Englobe Corp.:**

Project Engineer - Laura Leger, P. Eng.

Senior Hydrogeologist - John Hart, B. Sc.

Senior Hydrogeologist - Sonny Sundaram, Ph. D, P. Geo.

**Well Drillers:**

To be selected through a "by invitation" bid process.

- 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 a 500 m radius from the drill target(s)
- any potential hazards identified in question 7.

The attached drawing 18073-1P-C01 includes a recent air photo overlain with available property information. The proposed drill target areas are clearly identified; however, since the final target is to be confirmed by the field survey, all of the PIDs in the above table are being considered. The 500 m buffer zone around each drill target, adjacent

brooks and existing wells within a 500 m radius of the drill targets (location of domestic wells are approximate) are shown on the drawing.

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

The attached drawing 18073-1P-C02 includes the current zoning map with the proposed drilling areas superimposed. The proposed areas are zoned as follows:

Zone #1: This target is in the “RA Rural Area” Zone.

Zone #2: This target is in the “C Commercial” and “RT Residential Tourist” Zones.

Zone #3: This target is in the “R1 Single-Unit Dwelling” and “RA Rural Area” Zones .

Zone #4: This target is in the “RT Residential Tourist” Zone.

In all cases, public utilities are a permitted land use in accordance with the 2018 Village of Alma Rural Plan By-Law. In the case of Zone 2, although it is partially within the “Commercial” Zone, there are no major commercial developments. The Village will consider zoning implications if a successful water source is found.

- 13) **Contingency plan for open loop earth energy systems (see Section 2.3).**

N/A.

Submit WSSA Initial Application:  
c/o Manager  
Department of Environment and Local Government  
Environmental Assessment Section  
Tel: (506) 444-5382  
Fax: (506) 453-2627

Mailing Address:  
P.O. Box 6000  
Fredericton, New Brunswick  
E3B 5H1

Physical Address:  
20 McGloin Street, Marysville Place  
Fredericton, New Brunswick  
E3A 5T8



NOTES

- PROV. SIGNIFICANT WETLAND
- PSW 30m BUFFER
- REGULATED WETLAND
- RWM 30m BUFFER
- PROPOSED DRILLING ZONES (APPROX. LOCATION)
- EXISTING WELLS
- WELLFIELD PROTECTION ZONE "A"
- WELLFIELD PROTECTION ZONE "B"
- WELLFIELD PROTECTION ZONE "C"
- CROWN LANDS
- FEDERAL PARK PROTECTED AREA
- PROTECTED NATURAL AREAS

0.0	NOV 13/19	ISSUED FOR EIA REGISTRATION	TWA	LEL
NO.	DATE	REVISIONS	BY	APPR.



**PRELIMINARY ONLY**  
 NOT TO BE USED FOR CONSTRUCTION

PROJECT TITLE  
**VILLAGE OF ALMA  
 NEW WELL EXPLORATION**

ALMA N.B.  
 DRAWING TITLE  
**PROPOSED  
 TEST WELL ZONES**

Scale 50m 0 100m (1:5000 FULL SCALE)	Drawn By	Design By
	TWA	LEL
	Checked By	Cado Check
	LEL	TWA
Sheet		1 of 3

File Name  
18073-1P-C01.DWG

Drawing No.  
**18073-1P-C01**

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NOTES

- Legend**
- R1 Single-Unit Dwelling Zone
  - RT Residential Tourist Zone
  - C Commercial Zone
  - ER Environmental Zone
  - RA Rural Area Zone
  - ID Integrated Development Zone

- Wellhead Protection Boundaries**
- Zone A
  - Zone B
  - Zone C

0.0	NOV 13/19	ISSUED FOR EIA REGISTRATION	DO	LEL
NO.	DATE	REVISIONS	BY	APPR.



PROJECT TITLE

**VILLAGE OF ALMA  
NEW WELL EXPLORATION**

ALMA N.B.

DRAWING TITLE

**OVERALL SITE  
PLAN & ZONING**

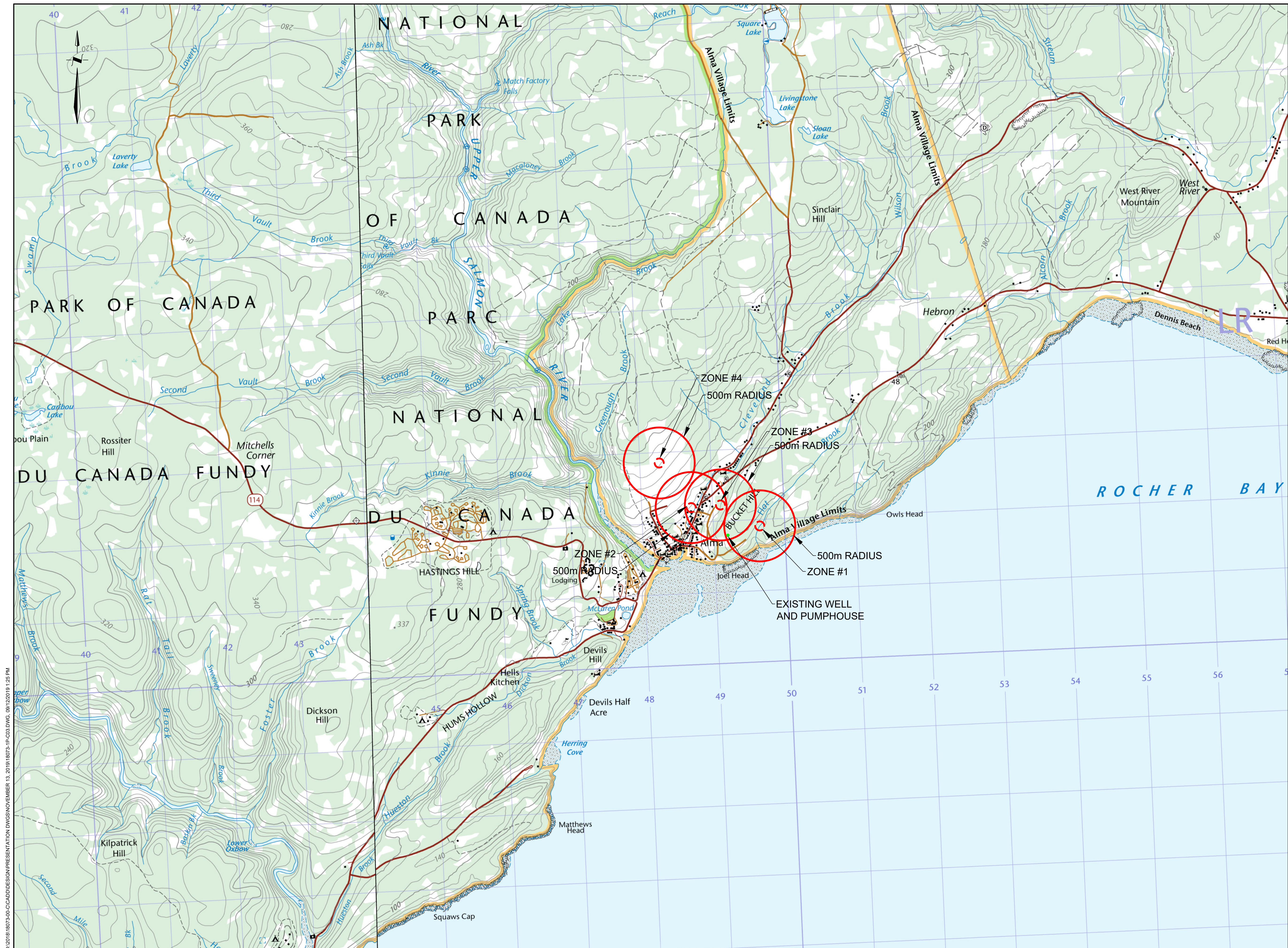
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		Checked By	LEL	Cadd Check	TWA
			Sheet	2 of 3	

File Name: 18073-1P-C02.DWG

Drawing No.: 18073-1P-C02

**APPENDIX B:**

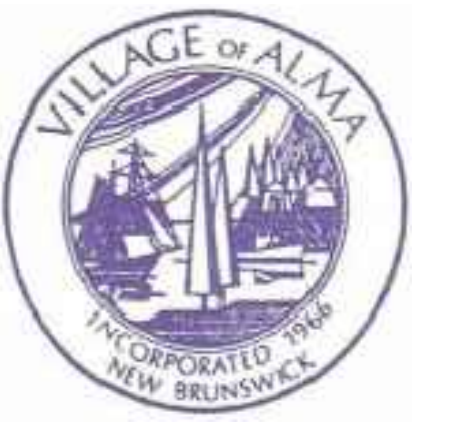
**1:25,000 Scale Map & Location Plan  
(Crandall Engineering Ltd., a Division of Englobe Corp.  
Drawing 18073-1P-C03)**



© 2018/18073-00-CADD/DESIGN/PRESENTATION DWGS NOVEMBER 13, 2018/18073-1P-C03.DWG, 08/12/2018 1:25 PM

NOTES

NO.	DATE	ISSUED FOR EIA REGISTRATION	DO	LEL
		REVISIONS	BY	APPR.



**PRELIMINARY ONLY**  
DATE PLOTTED: 08/12/2018  
NOT TO BE USED FOR CONSTRUCTION

PROJECT TITLE  
**VILLAGE OF ALMA  
 NEW WELL EXPLORATION**

ALMA N.B.  
 DRAWING TITLE  
**OVERALL LOCATION PLAN**

Scale	Drawn By	Design By
250m 0 500m (1:25,000 FULL SCALE)	DO	DO
	Checked By	Cadd Check
	LEL	TWA
	Sheet	3 of 3

File Name  
 18073-1P-C03.DWG

Drawing No.  
**18073-1P-C03**