

EIA REGISTRATION SUBMISSION

**ON Behalf of
Centre naval du Nouveau-Brunswick/New
Brunswick Naval Centre**

Prepared for:

**Centre naval du Nouveau-Brunswick/
New Brunswick Naval Center Inc.
2220, rue Gérard-Friolet Street
Bas-Caraquet, NB E1W 1B7**

Prepared by:

**ARC Geobac Group inc.
380 Smythe Street
Fredericton, NB E3B 3E4
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December 15, 2014

EIA REGISTRATION SUBMISSION

ON BEHALF OF ON NEW BRUNSWICK NAVAL CTNRE INC.

BAS-CARAQUET, NB

PID: 20352456

TABLE OF CONTENTS

1.0	THE PROPONENT	1
	(i) Name of Proponent.....	1
	(ii) Address of Proponent	1
	(iii) Chief Executive Officer	1
	(iv) Principal Contact Person	1
	(v) Property Ownership.....	1
2.0	THE UNDERTAKING.....	2
	(i) Name of the Undertaking.....	2
	(ii) Project Overview	2
	(iii) Purpose/Rationale/Need for the Undertaking	2
	(iv) Project Location.....	3
	(v) Siting Considerations.....	3
	(vi) Physical Components and Dimensions of the Project	4
	(vii) Construction Details	5
	(viii) Operation and Maintenance Details	6
	(ix) Future Modifications, Extensions, or Abandonment	7
	(x) Project-Related Documents	7

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TABLE OF CONTENTS

3.0	DESCRIPTION OF THE EXISTING ENVIRONMENT	7
	(i) Physical and Natural Features.....	7
	(ii) Cultural Features	9
	(iii) Existing and Historic Land Uses.....	9
4.0	SUMMARY OF ENVIRONMENTAL IMPACTS	9
5.0	SUMMARY OF PROPOSED MITIGATION	9
6.0	PUBLIC INVOLVEMENT	10
7.0	APPROVAL OF THE UNDERTAKINGS	10
8.	FUNDING	10
9.	SIGNATURE.....	10

1.0 THE PROPONENT

(i) Name of Proponent

Centre naval du Nouveau-Brunswick/New Brunswick Naval Centre Inc.

(ii) Address of Proponent

2220 rue Gérard-Friolet, Bas-Caraquet, NB E1W 5W6

(iii) Chief Executive Officer

Michel R. Beaudry

(iv) Principal Contact Person for Purposes of Environmental Impact Assessment

Victor Nowicki, M.Sc., P.Geo., E.P., FGC, FEC (Hon)

Telephone: 506-451-1991

Email: geobacnb@nbnet.nb.ca

(v) Property Ownership

Same as Proponent

2.0 THE UNDERTAKING

(i) Name of the Undertaking

Open Well Geothermal System – New Brunswick Naval Centre Inc.

(ii) Project Overview

“New Brunswick Naval Centre Inc.” proposes to construct an open well geothermal heating system for: 1) a proposed building at 2253 rue Industrielle, Bas-Caraquet, N.B. The system will consist of one Source Well drilled to a depth an approximate depth of 50 m, with a capacity of 227 L/min (60 usgpm) and a Return Well, drilled to a similar depth to receive the return water. The Return Well will be located at an approximate distance of 40m from the Source Well. The Source Well will deliver its water flow to heat exchangers located in the building via underground piping. Discharge water will also be delivered to the Return Well via underground piping.

(iii) Purpose Rationale/Need for the Undertaking

Electrical heating costs form a considerable portion of operating overhead for buildings. Installing a geothermal heating system will: 1) reduce the overhead heating and cooling costs; 2) save energy, and 3) reduce the carbon footprint of

the Centre Naval building. The property is of sufficient size (1.3 ha) to allow the installation of an open well geothermal system.

(iv) Project Location

The building to be serviced with the geothermal heat is located in the Parc Industrielle in Bas-Caraquet, NB. The property PID is 20352456 and is located directly on rue Industrielle. **(See Figures 1 and 2, Appendix A)** The building is accessed directly from rue Industrielle via an access road.

The street address is 2253 rue Industrielle, Bas-Caraquet, NB.

(v) Siting Considerations

The property is flat and located near the boat launch and harbour in Bas-Caraquet. The property is sufficiently large and appropriate for the proposed use. There were no alternative locations considered. The site lies in the industrial park, on a cleared lot containing an existing concrete pad. There were no ecological or cultural considerations evident. No wetlands or streams are located on the property or between the property and the shore.

The Ville de Bas-Caraquet is aware of this project. The Ville du Bas-Caraquet has no objection to the proposed property development and open well system and the project is acceptable under existing zoning.

(vi) Physical Components and Dimensions of the Project

A site plan, drawn by Corbo Engineering, Caraquet, is presented attached (**Appendix B**), which shows the layout of the property, location of the existing concrete pad; and new building to be served with the proposed location of the geothermal system wells. The property is 1.3 ha in area, is elongated and laid out in a north south direction. The system is located approximately 150m from the shoreline.

The Source Well will be placed east of the building at an approximate distance of 7.5 m. The required flow for the Source Well is 227 L/min. At this time, it is expected that the required flows can be obtained on the property. Both residential and commercial/institutional wells are constructed in these same types of deposits in the general area and usually have flows greater than 227 L/min.

Once the water has passed through the heat exchangers it will be directed via underground piping to a Return Well located between the Source Well and the shoreline, at approximate distances of 40 m from the Source Well. The Return Well will be drilled to similar depths as the Source Well. Final design of the Return Well will be based upon the geological information obtained during the Source Well drilling exercise. The final location for each well will be chosen in the field by the hydrogeologist, after viewing the site and discussing the location with the owner and driller.

The construction and installation of the two geothermal wells will not impact on the site or area. The most impact will be realized from the trenching required to place the 3.2 cm diameter discharge polypipe from the well to the building. Other than this, no impacts are anticipated. Standard well drilling techniques will be employed for this work. Site operations and activities will not be affected by either the construction or operation of the well system. Adjacent properties are serviced by the Ville du Bas-Caraquet municipal water supply. The municipal well is located 1.4 km to the west of the proposed undertaking and does not lie in the wellfield protection area.

(vii) Construction Details

A commercial drilling contractor will be used to construct the wells. Following cleaning and development of the well, a 24 hour pump test will be conducted to establish a yield for the Source Well. If the required flow is available the well will then be designed and constructed once permitting has been completed. At this time it is anticipated that a greater than 10 to 20 m length of casing may be required from the ground surface if caving or swelling formations are encountered. Should caving formations be encountered while drilling, the well design may be modified to install a liner casing to the required depth(s).

With the Source Well constructed, design for the Return Well will be completed. The drill depths are not yet known but is anticipated to be from 30 and 45 m. The drill depth will be adjusted based upon the estimated recharge capacity and

the geological continuity of the bedrock formations across the site and information from the Source Well.

The wells will be connected to the heat exchanger system via buried underground polypipe. The heat exchangers will be located in the rear section of the building.

(viii) Operation and Maintenance Details

Once installed, the heat pump system and operation will be thermostatically controlled. No operational requirements apply to the system other than stated. Maintenance will consist of routine inspection of the heat exchangers for proper function. Filter replacement and periodic plate exchanger replacement are all that is anticipated in the way of maintenance in the building. The Return Well will be monitored for adequate recharge flow on a periodic basis. It is expected that every 5 years, redevelopment or cleaning of the recharge well may be required.

The daily pumpage from the Source Well is estimated at 227 L/min. This amount will vary somewhat and may likely decrease due to reduced use of heating during evening and night time as the building would be closed. Once the thermostat determines the need for heating the well, the pump will operate continuously until heat demand is met, at which time the pump will stop.

The system life expectancy is 50 years for the wells and piping systems. The well pump will likely require servicing and/or replacement every 10 to 15 years. The heat exchangers will likely require replacement every 20 to 25 years.

(ix) Future Modifications, Extensions, or Abandonment

The proposed system will serve the heating needs for the present and reasonably foreseeable future. It is not anticipated at this time that the geowell system will be expanded or extended. When abandonment is required, the wells will be filled with appropriate sealing type materials as per standard techniques.

(x) Project Related Documents

None

3.0 DESCRIPTION OF THE EXISTING ENVIRONMENT

(i) Physical and Natural Features

The site is flat and located on industrial land. The site is drained by direct overland flow to roadside ditches located along perimeter of the property and around other properties. Overall drainage is towards the north and the seashore from the south.

No watercourses or wetlands are noted on site. There appears to be a wet area adjacent to shore, although this does not appear to be a salt marsh but rather formed due to the placement of rip rap for shore protection.

The underlying soils are generally composed of a silty sandy loams with varying amounts of gravel and pieces of broken rock. Thickness of overburden varies but is generally in the range of 3 to 10 m. The underlying bedrock, which is not exposed on site or nearby, is comprised of alternating sequences of sandstones, shales, claystones and occasional conglomerates.

There are no adverse environmental conditions identified for the property.

There are no private wells or septic systems on site or nearby as the Industrial Park is serviced by water and sewerage from the Municipalite de Bas-Caraquet. A review of available well log within 1.0 km of the site reveals that wells vary in depth from 18ft to 323ft with flows ranging from 2 igpm to 300 ipgm. Generally speaking depths below 100ft provide over 100 ipgm.

Ambient air and noise levels are as expected for an industrial park.

There were no environmentally significant factors identified for this project.

The site is occupied industrial land and no species at risk are identified.

(ii) Cultural Features

None

(iii) Existing and Historic Land Uses

The industrial park was created from previously wooded land. Historically, the land had been vegetated but not developed or used commercially. No First Nations reserves or lands are located on or near the site.

The subject property is located in the Bas-Caraquet Industrial Park. Both vacant industrial lots and developed lots surround the subject property. (See maps attached)

4.0 SUMMARY OF ENVIRONMENTAL IMPACTS

There are no environmental impacts identified for this project itself. During construction accidental spillage of drilling hydraulic fluids (drill rigs) could result. These however are considered of minor volume and would be immediately contained and cleaned up by the contractor as part of his contract.

5.0 SUMMARY OF PROPOSED MITIGATION

None required.

6.0 PUBLIC INVOLVEMENT

None required. The public are not located immediate to the site and no impacts to the public are envisaged.

7.0 APPROVAL OF THE UNDERTAKING

Building Permit has been applied for.

Water Supply Source Assessment (DELG form attached)

8. FUNDING


The project is self funded.

9.0 SIGNATURE

See signature page attached following.

9.0 SIGNATURE

9/12/2014
Date


Signature of Chief
Executive Officer

10.0 SUBMISSION INSTRUCTIONS

Complete electronic copies of registration documents (CD or E-mail) are preferred. (Note that 6 hard (paper) copies of the complete submission must also be provided). Any maps, plans, documents, or drawings submitted electronically should either be in PDF format or be readable by standard word processing software. Electronic submissions are subject to the following restrictions: a) no zipped files, b) no executable (*.exe) files. Anti-virus filters on the government server will not allow such files to be sent or received. Other restrictions to E-mail attachments may be applied from time to time.

Alternatively, twenty (20) hard copies or CDs of the registration (including all maps, plans, surveys, reports, etc.) can be mailed or delivered to the Director, Sustainable Development, Planning & Impact Evaluation Branch.

In either case, if GIS data was used to create any of the maps or drawings included in the submission, please include the digital data file(s) with the submission (e.g. Shapefile, Coverage or DXF format), in addition to the PDF or word processing files.

The appropriate fee as described on page (ii) of this document must accompany the registration.

Address for hand delivery, or courier:

Director, Sustainable Development, Planning & Impact Evaluation Branch
Department of Environment and Local Government
20 McGloin Street, 3rd Floor
Fredericton, NB E3B 5H1

Mailing Address:

Sustainable Development, Planning & Impact Evaluation Branch
Department of Environment and Local Government
20 McGloin Street
PO Box 6000
Fredericton, NB E3B 5H1

Telephone: (506) 444-5382, Fax: (506) 453-2627

E-mail: eia-eie@gnb.ca

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APPENDIX A

FIGURES

Figure 1: Source and Return Well Locations

- Wells - Non Drinking



Scale/Echelle: 1:4000

Date: 12/15/14

Printed by/Imprimé par:

Même si cette carte n'est peut-être pas libre de toute erreur ou omission, toutes les précautions ont été prises pour en assurer la meilleure qualité possible. Cette carte est une représentation graphique d'éléments naturels ou artificiels et donne seulement une approximation de la taille, de la configuration et de l'endroit de ces éléments. Elle n'a pas pour but d'être utilisée pour les descriptions juridiques ou le calcul des dimensions ou de la superficie exacte. SNB n'offre aucune garantie explicite ou implicite quant à l'exactitude de l'information présentée; les clients acceptent pleinement les risques liés à l'utilisation d'une partie ou de l'ensemble de cette information.

While this map may not be free from error or omission, care has been taken to ensure the best possible quality. This map is graphical representation of natural and man made features which approximates the size, configuration and location of the features. This map is not intended to be used for legal descriptions or to calculate exact dimensions or area. SNB makes no representations or warranties, either expressed or implied, as to the accuracy of the information presented and the client assumes the entire risk as to the use of any or all information.

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APPENDIX B

CORBO ENGINEERING PLAN



Centre naval du Nouveau-Brunswick
New Brunswick Naval Center



Corbo
CORBO CONSULTING INC.
1500 RUE DE LA SAISON 2000
MONTRÉAL, QUÉBEC H3L 1K1
TEL: 514-771-7700 FAX: 514-771-7701

NO.	REVISED FOR	DATE
00	ISSUED FOR TENDER	11/11/20

NOTES

THE OWNER WILL REMAIN THE PROPERTY OF CORBO CONSULTING INC. ALL RIGHTS ARE RESERVED BY CORBO CONSULTING INC. NO PART OF THIS DOCUMENT IS TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, WITHOUT THE WRITTEN PERMISSION OF CORBO CONSULTING INC.

REVISIONS

A. NUMBER OF SETS
B. TITLES ON EACH DRAWING
C. FULLY DEVELOPED

DATE: 11/11/20

SCALE: AS SHOWN

SHEET NO. 11 OF 11

PROJECT NO. C1

PROJECT NAME: CHANTIER CNA (PHASE 2)

CLIENT: BAS-CARAJET

PROJ. NO.: 2014-0012

DATE: 11/11/20

SCALE: AS SHOWN

SHEET NO. 11 OF 11

PROJECT NAME: CHANTIER CNA (PHASE 2)

CLIENT: BAS-CARAJET

PROJ. NO.: 2014-0012

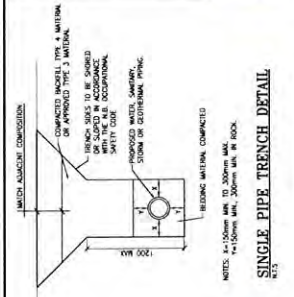
DATE: 11/11/20

SCALE: AS SHOWN

SHEET NO. 11 OF 11

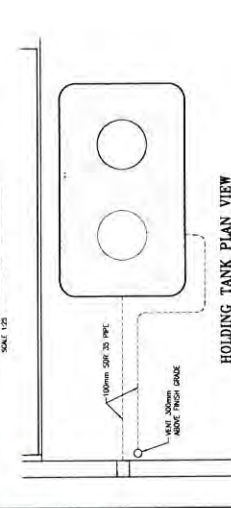
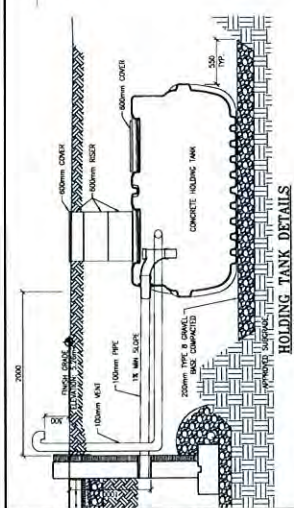
PROJECT NAME: CHANTIER CNA (PHASE 2)

CLIENT: BAS-CARAJET



PIPE TYPE	WIDTH OF INSULATION REQUIRED (mm)
0.8" 2.0m FLAG PIPE DIAMETER	100
1.0" 2.0m FLAG PIPE DIAMETER	100
1.2" 1.8m FLAG PIPE DIAMETER	100
1.5" 1.5m FLAG PIPE DIAMETER	100
1.8" 1.2m FLAG PIPE DIAMETER	100
2.0" 0.9m FLAG PIPE DIAMETER	100
2.2" 0.6m FLAG PIPE DIAMETER	100

PIPING INSULATION* REQUIRED WHEN 2.0m COVER NOT ACHIEVE



DESCRIPTION OF THE WORK

THE WORK UNDER THIS CONTRACT SHALL CONSIST OF THE FOLLOWING CONSTRUCTION:

1. TRENCHING & INSTALLING FOR GEOTHERMAL, ELECTRICAL AND ALL MECHANICAL WORK REFER TO THE RELATING DRAWINGS FOR DIMENSIONS & LOCATING GROUND, EXCAVATION, BACKFILLING, SURFPLY AND INSTALLATION OF GRANULAR MATERIALS TO GRADUALS TO THEIR ORIGINAL CONDITION OR BETTER, RETURN AND SURFACE OF ANY MATERIAL ON SITE THAT INTERFERES WITH THE WORK.

GENERAL NOTES

1. ALL WORK TO BE PERFORMED IN ACCORDANCE WITH SPECIFICATIONS AND P-PLANS ISSUED FOR THIS PROJECT.
2. REGULATIONS AS SET BY LOCAL AUTHORIZED HAVING JURISDICTION, IN CASE OF CONFLICT OR DISCREPANCY, THE MORE STRINGENT SHALL PREVAIL.
3. THE CONTRACTOR SHALL COORDINATE HIS WORK WITH THE PROJECT MANAGER AND/OR ALL OTHER SUB-CONTRACTORS. COMPARE WITH THE OWNER AND ALL OTHER CONTRACTORS ON THE SITE. WORK SHALL BE SCHEDULED TO PROCEED IN ACCORDANCE WITH THE PROJECT PROGRAM AND ALL OTHER CONTRACTORS ON THE SITE. WORK SHALL BE SCHEDULED TO PROCEED IN ACCORDANCE WITH THE PROJECT PROGRAM AND ALL OTHER CONTRACTORS ON THE SITE.
4. THE CONTRACTOR SHALL INCLUDE ALL LABOR MATERIALS, EQUIPMENT AND ASSOCIATED SERVICES NECESSARY FOR AND REQUIRED BY THE PROJECT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE LOCAL AUTHORITY AND SHALL BE CALLED FOR BY THE DOCUMENTS AND ACCEPTED GOOD PRACTICES.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE LOCAL AUTHORITY AND SHALL BE CALLED FOR BY THE DOCUMENTS AND ACCEPTED GOOD PRACTICES.
6. BEFORE TRENCHING THE CONTRACTOR SHALL TEST THE SITE AND FURNISH RESULTS WITH THE EXISTING CONDITIONS AND ALL CONSIDERATIONS FROM THIS TO BE SHOWN TO THE OWNER AND ALL OTHER CONTRACTORS ON THE SITE.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE LOCAL AUTHORITY AND SHALL BE CALLED FOR BY THE DOCUMENTS AND ACCEPTED GOOD PRACTICES.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE LOCAL AUTHORITY AND SHALL BE CALLED FOR BY THE DOCUMENTS AND ACCEPTED GOOD PRACTICES.
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10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE LOCAL AUTHORITY AND SHALL BE CALLED FOR BY THE DOCUMENTS AND ACCEPTED GOOD PRACTICES.
11. ALL WORKS/TRENCHES SHALL BE KEPT OPEN FOR TRAFFIC DURING CONSTRUCTION. COST OF MATERIAL, PERSONNEL & MAINTENANCE OF TRAFFIC SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE LOCAL AUTHORITY AND SHALL BE CALLED FOR BY THE DOCUMENTS AND ACCEPTED GOOD PRACTICES.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE LOCAL AUTHORITY AND SHALL BE CALLED FOR BY THE DOCUMENTS AND ACCEPTED GOOD PRACTICES.
13. ANY DAMAGES TO EXISTING ASPHALT WILL BE REPAIRED AT CONTRACTOR'S EXPENSE.
14. SUPPLY & INSTALL GRANULAR MATERIALS AND ALL LABOR MATERIALS, EQUIPMENT AND ASSOCIATED SERVICES NECESSARY FOR AND REQUIRED BY THE PROJECT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE LOCAL AUTHORITY AND SHALL BE CALLED FOR BY THE DOCUMENTS AND ACCEPTED GOOD PRACTICES.
15. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE LOCAL AUTHORITY AND SHALL BE CALLED FOR BY THE DOCUMENTS AND ACCEPTED GOOD PRACTICES.
16. CONTRACTOR IS TO RENOVATE ALL WORK AREAS TO THEIR ORIGINAL CONDITION OR BETTER.

EXCAVATION AND BACKFILL

1. PROVIDE ADEQUATE PROTECTION TO ALL SURVEY AND LOCATED MARKERS, BENCH MARKS AND EXISTING FACILITIES, EQUIPMENT, ETC.
2. SIZE, DEPTH AND LOCATION OF EXISTING UTILITIES AND STRUCTURES AS INDICATED ARE FOR GUIDANCE ONLY. COMPLETENESS AND ACCURACY OF ALL UTILITIES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
3. PROVIDE ADEQUATE PROTECTION TO ALL SURVEY AND LOCATED MARKERS, BENCH MARKS AND EXISTING FACILITIES, EQUIPMENT, ETC.
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