Environmental Impact Assessment - Open Well Geothermal System
Étang Ruisseau Bay Ltée
Haut-Shippagan, NB
PID 20512224

Prepared for

Dr. André Mallet,
Étang Ruisseau Bay Ltée

Prepared by

ARC Geobac Group Inc.
380 Smythe
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ARC Geobac Group Ref: A-1104

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c) Principal

André Mallet,

d) Contact for

Victor Nowicki, M

President ARC Geo

arcgeo.bac@gmail.

506-476-7069

e) Property Owners i

Étang Ruisseau Bar Lte

EIA REGISTRATION
OPEN WELL GEOTHERMAL SYSTEM-L'ÉTANG RUISSEAU BAR LTÉE

1.0 PROPONENT

a) Name of proponent

L'Étang Ruisseau Bar Ltée.
President is André Mallet (oyster farm- Haut-Shippagan, NB)
(Figure 1)

b) Address

432 Chemin des Huîtres, Haut-Shippagan, NB E8S 2N7
André Mallet
amallet@bellaliant.com
506-336-4837

c) Principal contact

André Mallet, Ph.D, President

d) Contact for EIA

Victor Nowicki, M.Sc. P.Geo.
President ARC Geobac Group Inc.
arcgeobac@gmail.com
506-476-7069

e) Property Ownership

Étang Ruisseau Bar Ltée

2.0 PROJECT DESCRIPTION

a) Project name

Open Well Geothermal System – Étang Ruisseau Bay Ltée

b) Project Overview

Étang Ruisseau Bay Ltée is an oyster production facility, which grows oysters from seed to nursery size and full grown. The company also ships nursery size oysters to other facilities. The company grades oysters and also operates a grow-out facility.

The project is to construct an Open Well Geothermal System to provide an alternative heating source for the cold seawater used in the facility and taken from the adjacent bay.

The heat required is to raise the sea water to a 25 C temperature. This heat will be extracted from a deep well located on the property. This new well will send water to 2 heat exchangers in the building.

Once the heat has been extracted from the water, the water will be discharged to the same aquifer using tan existing on site well. The new deep well will be provide 400L/min (104 gpm) to 2 heat exchangers to heat the seawater process water entering the building and used for the production of oysters.

c) Purpose and Rationale

The oyster facility presently uses two 100 KW/hr boilers equipped with 3 plate exchangers to heat the water. The power consumption varies from a low of 5,000 KW/hr in January to a high of 60,000 KW/hr in April/May.

Converting to a geothermal heat source will reduce the power consumption. This will benefit global warming by cutting electrical consumption and will allow the facility to increase its output. The facility wishes to double its production of oyster seed, from its existing 50 million per year, over the next three years. This would allow a growing fish products markets to continue to grow in New Brunswick. The new heating system will allow this to happen with more viable economies of scale.

Other possible sources of power would include solar and/or wind. For the size of the property and the associated costs, neither option is considered viable.

The geothermal system is considered to be the most viable and economic, especially given the presence of an existing well on site which can be incorporated into the system, thus saving costs, through the availability of a good water source aquifer beneath the site.

Also, due to rising cost of power, doubling the production would less viable without the geothermal system.

c) Project Location

The PID of the site is 20152224. This is an existing facility, built in 2009 and has the address of 432, rue des Huîtres, in Haut-Shippagan, New Brunswick. **(Figure 1)**

As the building was constructed in 2009, this project is therefore a modification of the existing structure and infrastructure. **Figures 1 and 2** show the site location and location of the wells.

The equipment will be located inside the building in the utility room. **Figure 3** shows the site layout and infrastructure.

The well is located at coordinates 47-43-55.67 N 64-46-23.4.

d) Siting Considerations

The geothermal source well will be located at the northern edge of the property, as far as possible from the existing well (return well). The well will either 0.15 or 0.2m in diameter and be drilled to an approximate 500m depth using normal well drilling techniques.

This site was chosen to be north of the return well in order to reduce possibility for thermal interference. This is the most appropriate location for the new well. The construction of the well and the placement of the equipment in the building should have no ecological, cultural or archaeological impacts.

There are wetlands located nearby some distance from the building, i.e., some 100m to the north west and classified as a provincially significant wetland. The new well does not lie inside the 30m zone around the wetlands. **(see Figure 3)** No impacts to the wetlands are considered, as the well will be drawing water from a depth greater than 25m.

e) Physical Components

Site plan and layout is shown on **Figure 2** and **Figure 3**.

f) Construction Details

The new well will be located in the north west corner of the property, as per the attached **Figure 2**. The oyster facility already has a high capacity well that was drilled in 2009 and is located near the shore. The driller rated the well at 230 usgal/min.

It is proposed that this become the Return Well and a new Source Well be drilled to the north west.

The present well provides a flow rate of 0.6m^3/min (360 min constant rate test by owner at 600L/min). Corbo Engineering (design consultant) gave 0.42 m^3/min (112 usgal/min) as required for the open well system.

The new well will be drilled as a conventional rotary drilled well with approximately 15m of steel casing at the ground surface. Total depth of the well will be +/- 50m at a drilled diameter of 0.15 or 0.2m. A PVC water line will be laid to the building from the well. Once through the heat exchangers the water will be returned to the aquifer via the existing 0.15m diameter well.

Two new small additions to the building will be constructed, one along the north face (rear of the building) while the other will be located along the south face of the building. **(Figure 3)**

g) Operation and Maintenance

Water will be pumped from the source well, delivered to the heat exchangers at a variable rate depending on heat demand from November to May. Water is flow through with discharge water flowing directly from the exchangers to the return well. Routine maintenance of the heat exchange plates will take place. Timing for such will be developed as the system operates and from visually assessing the plates.

Both wells will be regularly monitored for temperature and salinity. Water quality samples taken during the testing phase will allow potential chemical and/or bacterial fouling to be predicted and thus maintenance plans developed.

Heat Pump System

Pumps will be capable of delivering 120 gpm to the heat exchangers, and will deliver water on a continuous basis to the heat exchangers as required.

Geo heat systems can operate for many years with little maintenance. The requirements for use will depend upon the production and sales of the oysters.

Power for the geo-well system will come from NBEPC.

h) Documents related to Undertaking

Attached are documents related to the site and/or project.
These include Aquaculture Permits and licence.

- Department of Agriculture, Aquaculture and Fisheries Application for Renewal of Aquaculture Licence **Feb 2019**
- Permis D'Aquaculture Commerciale

3.0 EXISTING ENVIRONMENT

a) Physical and Natural Features

The site has a gentle slope to the sea and lies 2 metres above sea level. It is bounded by a rock wall along the shoreline. As the site is immediate to the sea, surface drainage is towards the south and west and the sea. There are no water courses on site. Wetlands, which lie nearby are shown on **Figure 4**. As the site abuts directly on the shoreline, there are no features between the rock barrier of the site and the beach area adjacent to the bay.

Site Geology

The existing well log provides the geology beneath the site. It consists of a thin 6 ft layer of surficial material (soil) underlain by sandstone units. The initial unit beneath the surficial material is weathered to a depth of 45 ft where more competent sandstone units are present. These sandstone units are present to 95ft where the sandstone unit became intercalated with thin shale bands. This unit continued to the full depth of the well at 115 ft. (well log attached)

Groundwater

The existing well is rated at approximately 120 gpm (short term test). This will need to be verified with a long term pump test. The high permeability of the underlying sandstone aquifers indicate that the well will be sufficient to provide the required flow for the undertaking.

Environmental Issues

No environmental issues are identified that could adversely affect the proposed works.

Private and Municipal wells

The nearest private well lies some 200m to the north west. Beyond that, other wells lie 900m to the north. None of these wells will be affected by the undertaking. No municipal wells lie within 2km of the site.

Air Quality

No air quality issues are identified associated with the site. Noise levels are at average levels as no large equipment operates on site beyond what would be expected for a facility of this type. Also, the site lies several hundred metres from other buildings. No noise issues have been identified in the last 9 years of operation.

Species at Risk

No known species at risk are associated with the site. As the site is fully utilized little area is available for potential habitat for species at risk.

Critical and Sensitive habitat

The site is small and fully developed with full time operation, no known habitats of this type are known.

Cultural Features

Recreation and Tourism sites do not lie within 500m of the property. Traditional uses by First Nations have not been documented at the site. Heritage, historic sites and/or buildings are not present on site or nearby.

Historic and Existing Land Uses

All land adjacent to the site is privately owned except for the access road.
The land is undeveloped and mostly wooded except for wetland and swampy area to the north east and west of the site.

The site was developed in 2009 as an oyster grow-out facility. At that time and before that the land around the site was and still is undeveloped.

No contamination is present on site and the land previously was not known to be contaminated.

4.0 IDENTIFICATION OF ENVIRONMENTAL IMPACTS

Adverse Impacts

No adverse impacts to the existing environment on site or adjacent to the site are identified.

The only potential impact would be to cause salt water intrusion into the aquifer at 30-35m depth.

Positive Impacts

The reduction in the use of electrical power for heating is considered a positive impact for the project.

5.0 SUMMARY OF PROPOSED MITIGATION

Impact Avoidance

Salt water intrusion potential can be avoided by:

- correct placement of the source well;
- reducing water pumpage and/or using two source wells with half the pumpage flow Impact Reduction.

Salt water intrusion would be redressed over the short term by simply stopping use of

the well. Salt water intrusion has taken place in Shippagan in regards to the municipal wells. When the wells were closed for a period of time the salt retracted back towards the sea. The geology is the same at the site as for Shippagan. Consequently, it is likely the same effect would be produced by ceasing to use the well.

6.0 PUBLIC CONSULTATION

First Nations

No First Nations Reserve land lies within 30km of the site. The First Nations would be informed of the undertaking as DELG forwards the EIA to the Environmental co-ordinators for each First Nation.

Local Residents

No permanent residences lie within 500m of the site and the site has been in operation for 9 years without any impacts to adjacent properties. Given this, public consultation would take place by meeting with the nearest residents and /or informing them by letter of the undertaking. The latter would likely be used as the nearest building is a little used cottage as are some of the other buildings in the area that lie close to the site.

The letter would describe the undertaking, and ask for any concerns or requests for further information. A summary report would be put together outlining any responses from local residents and/or First Nations.

Date of Submission: June 17/2019

Signature of Chief Executive Officer André Paulet

ANDRÉ PAULET, President

Fifteen (15) copies of the completed registration form with attachments (maps, plans, etc) may be sent by mail or courier with a covering letter or hand-delivered to:

Director, Sciences and Planning Division
Project Assessment Branch
Department of the Environment and Local Government
20 McGloin Street, Fredericton, New Brunswick E3A 5T8
or Email: EIA-EIE@gnb.ca

A1104.

Figure 1 - Location of Etang Ruisseau Bar property


Figure 2 New Source Well
New Source Well
Dug well
Observation well
Existing well
(New Return Well)

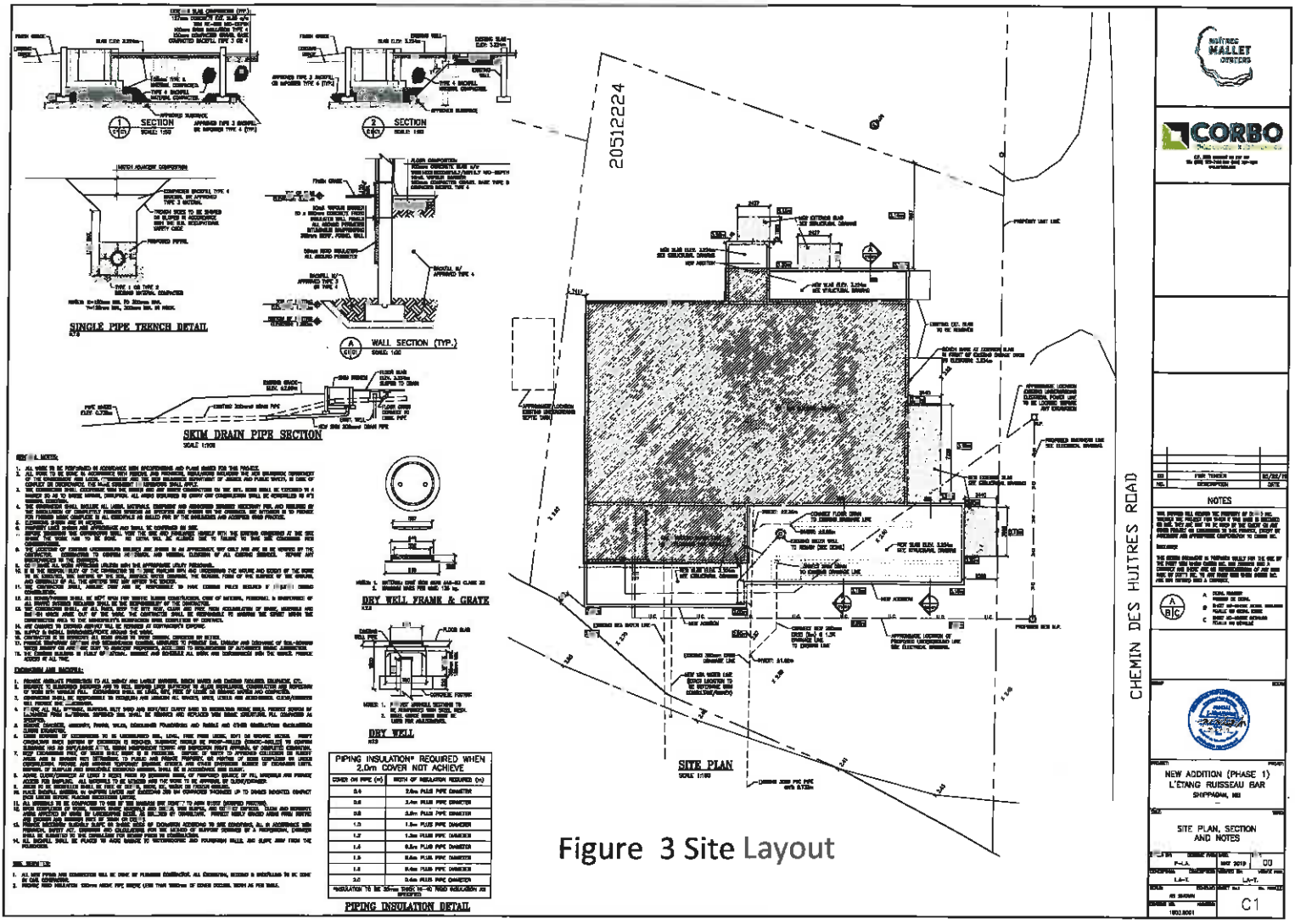
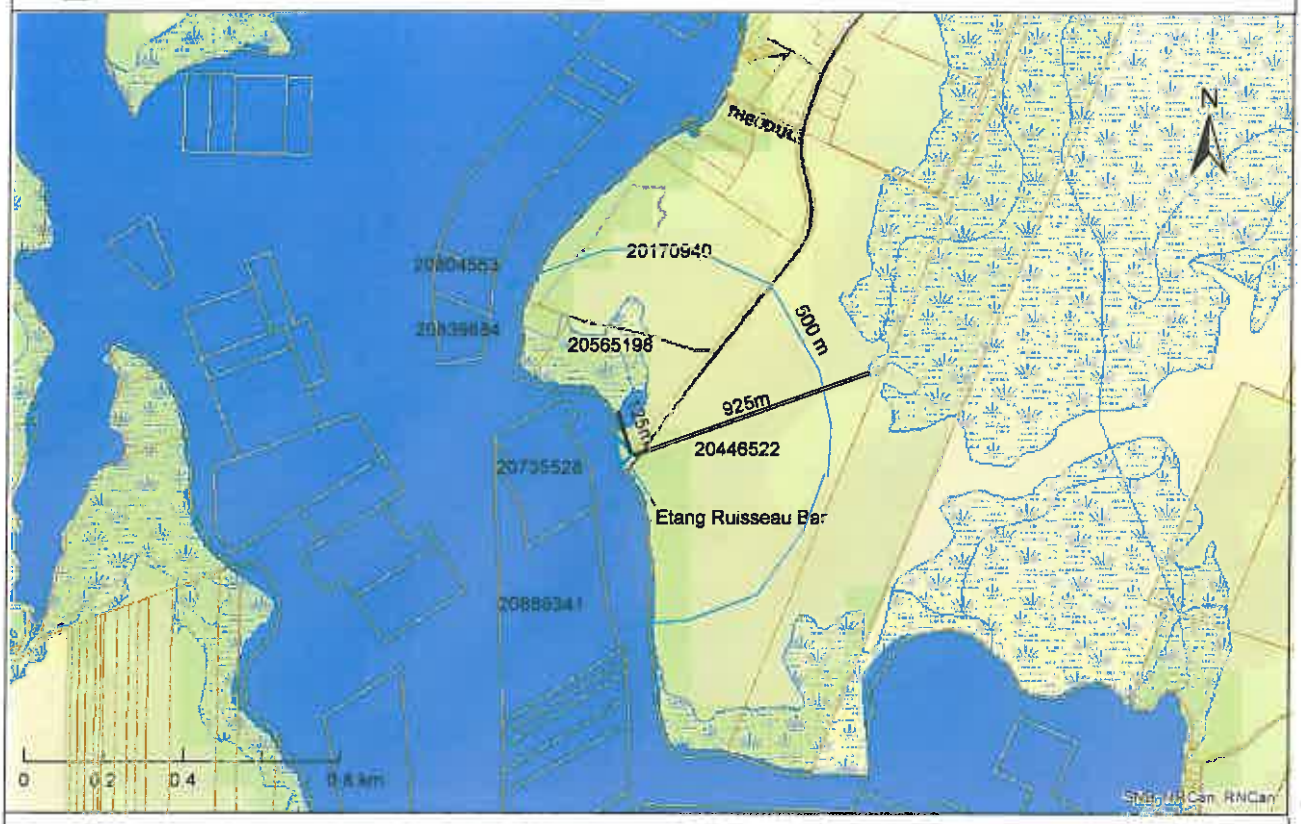


Figure 3 Site Layout

Figure 4 Land Use



Scale/Échelle: 1:14,222 **Date: 6/17/2019**

20446522 20170940 20565198 Gauthier J.P. & L. M.

20839684 20804563 Off shore lic. Gauthier J.P. & L. M. & NB Fisheries

20735528 20889342 Off shore lic. Etang Ruisseau Bar & NB Fisheries

Figure 4 Land Use - Etang Ruisseau Bar

PERMIS D'AQUACULTURE COMMERCIALE

New Nouveau Brunswick

Numéro de permis: **IS-0001**

Date d'expiration: **Le 31 mars 2019**

Le présent **PERMIS D'AQUACULTURE COMMERCIALE** est délivré en vertu du paragraphe 8(1) de la *Loi sur l'aquaculture*, Lois du Nouveau-Brunswick, 2011, chapitre 112, telle que modifiée (la Loi) à:

L'ÉTANG RUISSEAU BAR LIMITÉE

pour le site aquacole terrestre n° IS-0001 situé à Haut-Shippagan, dans la paroisse de Shippagan, comté de Gloucester pour la culture de mollusques. Ce permis est assujetti aux dispositions de la *Loi*, et du *Règlement général – Loi sur l'aquaculture*, Règlement du Nouveau-Brunswick 91-158 ainsi qu'à ses modifications et aux conditions établies à l'annexe "A" ci-jointe.

Entre en vigueur le 1er avril 2014

Lori O'Brien
Registraire de l'aquaculture

Ministère de l'Agriculture, de l'Aquaculture et des Pêches C.P. 6000, Fredericton, N.-B., E3B 5H1
Téléphone:(506) 453-5229 Télécopieur:(506) 453-5210

ANNEXE A
MODALITÉS ET CONDITIONS D'EXPLOITATION
PERMIS D'AQUACULTURE COMMERCIALE
Site aquacole terrestre - culture des mollusques
Numéro de permis: IS-0001

1. Le présent permis d'aquaculture commerciale est délivré au nom de **L'ÉTANG RUISSEAU BAR LIMITÉE** ci-après appelé le "titulaire du permis".

2. Le titulaire du permis est autorisé par les présentes à exercer des activités aquacoles sur le site aquacole terrestre n° IS-0001 situé à Haut-Shippagan lequel site figure sur un croquis se trouvant dans les dossiers de registraire de l'aquaculture.

3. Si le titulaire du permis cesse d'être propriétaire ou preneur à bail du site visé par le permis, le présent permis sera en application du paragraphe 29(1)(e) de la *Loi sur l'aquaculture* et sera considéré révoqué.

4. Les espèces approuvées pour la culture sont le pétoncle géant (*Placopecten magellanicus*), l'huître européenne (*Ostrea edulis*), l'huître américaine (*Crassostrea virginica*), la mye (*Mya arenaria*), la mactre d'Amérique (*Spisula solidissima*) et le pétoncle de baie (*Argopecten irradians*).

5. Le titulaire du permis tient à couvert et indemne le ministre de l'Agriculture, de l'Aquaculture et des Pêches ou ses représentants de toute action en justice liée à l'exercice de ses fonctions en vertu des dispositions de la *Loi sur l'aquaculture,* 2011, Chapitre 112 et du *Règlement général - Loi sur l'aquaculture* (R.N.B. 91-158).

6. Le personnel du ministère de l'Agriculture, de l'Aquaculture et des Pêches ou ses représentants, doivent avoir accès au site visé par le permis, à l'exploitation et aux installations connexes, lorsque cela est nécessaire de temps à autre.

7. Le présent permis peut être révoqué si le titulaire du permis néglige d'acquérir ou d'observer toute approbation, autorisation, ou permis qui peuvent être exigés selon la *Loi sur l'assainissement de l'eau*, la *Loi sur l'assainissement de l'environnement*, la *Loi sur la protection des eaux navigables*, la *Loi* (fédérale) *sur la pêche* ou la *Loi sur les terres et forêts de la couronne*, la *Loi sur la pêche sportive et la chasse*, la *Loi sur le traitement des poissons et fruits de mer*, la *Loi sur la santé publique* et tout autre loi qui s'applique.

8. Le titulaire du permis doit payer les frais du permis par le 1er avril de chaque année.

9. Le titulaire du permis doit aviser immédiatement, par écrit, le ministère de l'Agriculture, de l'Aquaculture et des Pêches de tout changement au conseil d'administration ou aux propriétaires de l'installation.

10. Le présent permis d'aquaculture commerciale remplace et annule tous les permis déjà délivrés sur le site aquacole terrestre n° IS-0001.

New Nouveau Brunswick

DEPARTMENT OF AGRICULTURE, AQUACULTURE AND FISHERIES
APPLICATION FOR **RENEWAL** OF AQUACULTURE LICENCE

MINISTÈRE DE L'AGRICULTURE, DE L'AQUACULTURE ET DES PÊCHES
DEMANDE POUR LE **RENOUVELLEMENT** D'UN PERMIS D'AQUACULTURE

File number		IS-0001	Numéro de dossier	
Name on licence		André Mallet	Nom sur le permis	
Contact person	Title	M.	Titre	Personne contacte
	Name	André Mallet	Nom	
	language	FRA	Langue	
Address		111, rue Pointe-Brûlée - C.P. 3332 Shippagan, NB E8S 3H9	Adresse	
Telephone (Business/work)		506-336-4837	Téléphone (travail)	
Telephone (Home)		[redacted]	Téléphone (domicile)	
Cellular		[redacted]	Cellulaire	
Fax			Télécopieur	
Email		amallet@bellaliant.com	Courriel	
Location of site		Haut-Shippagan	Emplacement du site	
Class of licence		Commercial	Classe du permis	
Property Identification Number (PID)		20512224	Numéro d'identification de la propriété (NID)	
Species		American oyster, Bar clam, Bay scallop, Deep-Sea scallop, European oyster, Soft shell clam	Espèces	
Expiry date		3/31/2019	Date d'expiration	
Type of operation		☐ U-fish / Étang de pêche ☒ Hatchery / Écloserie ☐ Retail / Vente au détail ☐ Other (specify) / Autre (préciser)	Type d'opération	
Water source information		☐ Naturel spring (gravity) / Source naturelle (gravité) ☐ Naturel spring (pumped) / Source naturelle (pompée) ☐ Artesian well / Puits artésien ☐ Surface water (ex : stream / Eau de surface (ex : ruisseau)	Origine des eaux d'alimentation	
Water flow (litre/min.)			Débit d'eau (litre/min.)	
Type of system		☒ Flow through / Circuit ouvert ☐ Reuse / Réutillisation ☐ Reucirculation / Recirculation	Type d'installation	
Type of structure		☐ Pond / Étang ☐ Raceway / Bassin allongé ☐ Fish tank / Bassin ☒ Other (specify) / Autre (préciser) Building	Type de structure	

I hereby apply to renew my aquaculture licence. I have verified and corrected the above information. I enclose $20.00 for the payment of the renewal fee.
(NOTE: if you are leasing the property, provide a copy of the lease)

Par la présente, je demande le renouvellement de mon permis d'aquaculture. J'ai vérifié et corrigé l'information ci-dessus. J'inclus mon paiement de 20,00 $ pour payer les frais de renouvellement.
(NOTE : si vous êtes locataire du site, joindre une copie du bail)

SIGNATURE

04-février-2019
DATE

Make your cheque or money order payable to the Minister of Finance and mail along with your application to:
Department of Agriculture, Aquaculture and Fisheries
22 St-Peter Blvd East, Caraquet NB E1W 1B6

Libeller le chèque ou mandat poste au Ministre des Finances et poster avec votre demande au :
Ministère de l'Agriculture, de l'Aquaculture et des Pêches
22, boul. St. Pierre Est, Caraquet, N.-B. E1W 1B6