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November 17, 2020

SIMCorp File #SW2020-036

Mr. Shawn Hamilton
Project Manager, Environmental Assessment Branch
Environmental Science and Protection
PO Box 6000
Fredericton, NB E5B 5H1

Dear Mr. Hamilton:

RE: Penobsquis Hatchery- Request for Well Decommissioning and Replacement

Sweeney International Management Corporation (Simcorp) on behalf of Kelly Cove Salmon Ltd (KCS) is providing the following information with respect to requesting to decommission an existing well that has poor water quality and drill an additional well or wells.

The well to be decommissioned is identified with the Well Tag ID of 11637 and is located on PID 00149617. As per the Well Drillers Report (91163700 – Appendix B attached) the work on this well was completed on August 23, 2000 and the report indicated an estimated safe yield of 450 igpm. This well is identified in the facility's Approval to Operate I-10358 (ATO) as Well 00-1 and the ATO limits the maximum pumping rate of this well to 745 litres per minute (165 igpm).

Kelly Cove Salmon Ltd. does not intend to change the water use requirements as stipulated in the most recent ATO I-10358, but would simply like to replace Well (00-1) with a new well (or wells) in order to continue it's effective and efficient hatchery operations at the Penobsquis facility.

I have attached some background information, with respect KCS's request, for your review.

If you have any questions or concerns with our request or on any information in the attached, please do not hesitate to contact me.

Sincerely,

A handwritten signature in cursive script that reads "David E. Hyslop".

David Hyslop, BSc., P.Eng.
Project Manager
SIMCorp
46 Milltown Blvd.
St. Stephen NB E3L 1G3
Phone: (506) 467-9014
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E-mail: dhyslop@simcorp.ca

Attch. Background Information: Penobsquis Hatchery Well Replacement

Background Information:

Penobsquis Hatchery Well Replacement

Kings County
Province of New Brunswick

November 2020

Prepared for:

Kelly Cove Salmon Ltd.

A Division of Cooke Aquaculture Inc.

Prepared by:

Sweeney International Marine Corp.

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1.0 THE PROPONENT

Cooke Aquaculture Inc. (CAI) is a vertically integrated aquaculture corporation based in Blacks Harbour, New Brunswick, Canada with salmon farming operations in Atlantic Canada, the United States, Chile and Scotland. The Cooke family's group of companies began with Cooke Aquaculture, which was established in 1985 as Kelly Cove Salmon (KCS) by Gifford, Michael and Glenn Cooke. Through KCS, CAI operates several land-based salmon hatcheries including the one at Penobsquis New Brunswick.

1.1 Proponent and Consultant Information

Contact Information for the Proponent and consultants are as follows:

Proponent

Kelly Cove Salmon Ltd. a Division of
Cooke Aquaculture Inc.

Proponent Contact:

Mr. Mitchell Dickie
Project Manager for Freshwater Systems

Address:

669 Main Street
Black Harbour, NB E5K 1K1

Phone: (506) 755-5282

Email: mitchell.dickie@cookeaqua.com

Project Consultant

Sweeney International Management Corp. (Simcorp)

Consultant Contact:

David Hyslop, BSc., P.Eng.
Project Manager

Address:

46 Milltown Blvd.
St. Stephen NB E3L 1G3

Phone: (506) 467-9014

Fax: (506) 467-9503

Email: dhyslop@simcorp.ca



2.0 THE UNDERTAKING

2.1 Name of Undertaking

Penobsquis Salmon Hatchery Well Replacement

2.2 Overview

Kelly Cove Salmon Limited (KCS) is proposing to no longer utilize Well 00-1 (well ID#:11637) due to its physical deterioration and poor water quality and requests to drill an additional well or wells to replace it.

2.3 Purpose/Need/Rationale for the Undertaking

The need/rationale to replace Well 00-1 is that it has physically deteriorated over the years and water quality is no longer suitable to use as a water source for the hatchery. KCS does not wish to use any more water than what is stipulated in the current ATO (I-10358 – Appendix A) but needs to replace the water that was supplied by this well.

2.4 Facility Location

The existing Penobsquis facility is located on Route 114 near Penobsquis, Kings County, NB. The facility is located approximately 19 km northeast of Sussex, NB (Figure 1). The facility location details are summarized in Table 1 and Figure 1, and an aerial view of the existing facility is illustrated in Figure 2.

Table 1 Property Location Information

| | |
|-----------------------------------|--|
| Site Name | Penobsquis Salmon Hatchery |
| Civic Address | 11842 Route 114, Penobsquis, NB |
| PID(s) | 00134486, 00149617, 00130955, 30053102,30091508,30088058 |
| Community | Penobsquis, NB |
| County | Kings County |
| 1:50 000 Topographic Map # | 21G14 Edition 3 UTM Zone 19T |
| Grid Reference | 45°46'42.78 N, 65°19'32.09" W |



2.5 Siting Considerations

The Penobsquis Hatchery has been in existence since 1994 and operated by KCS since 2010. KCS has given careful consideration into choosing an appropriate location to develop a new well. Based their consultations with a hydrogeologist (Appendix B) and from the local knowledge of the area, KCS has concluded that the northern portion of PID 30088058 would be a suitable location for drilling a new well(s). This parcel of land is owned by Cook Aquaculture Inc. and is located adjacent to the hatchery facility (Figures 3 and 4). From local knowledge this area has the potential for a good overlying gravel layer that could produce a better water quality than a deep bedrock well for reasons described in the hydrogeologist report attached in Appendix B.

2.5 Penobsquis Hatchery Facility

2.5.1 Facility Description

As described in the most recent ATO I-10358 (Appendix A), the facility consists of a hatchery building and three covered grow-out tank fields each employing recirculation technology. Water for the facility is typically supplied by two metered wells and a gravity fed spring source. The maximum water requirement for the facility is approximately 1,600 litres per minute (350 IGPM).

2.6 Operation and Maintenance

The Penobsquis Facility will continue to operate in compliance with the *Water Quality Regulation – Clean Environment Act*, as well as adheres to any municipal bylaws, other provincial acts and regulations, and federal acts and regulations. The facility adheres to the most recent Approval to Operate that is issued by NBDELG.

Maintenance of the facility is routinely carried out and mechanical repairs are done as required.



Figure 2 Aerial View - Facility Location

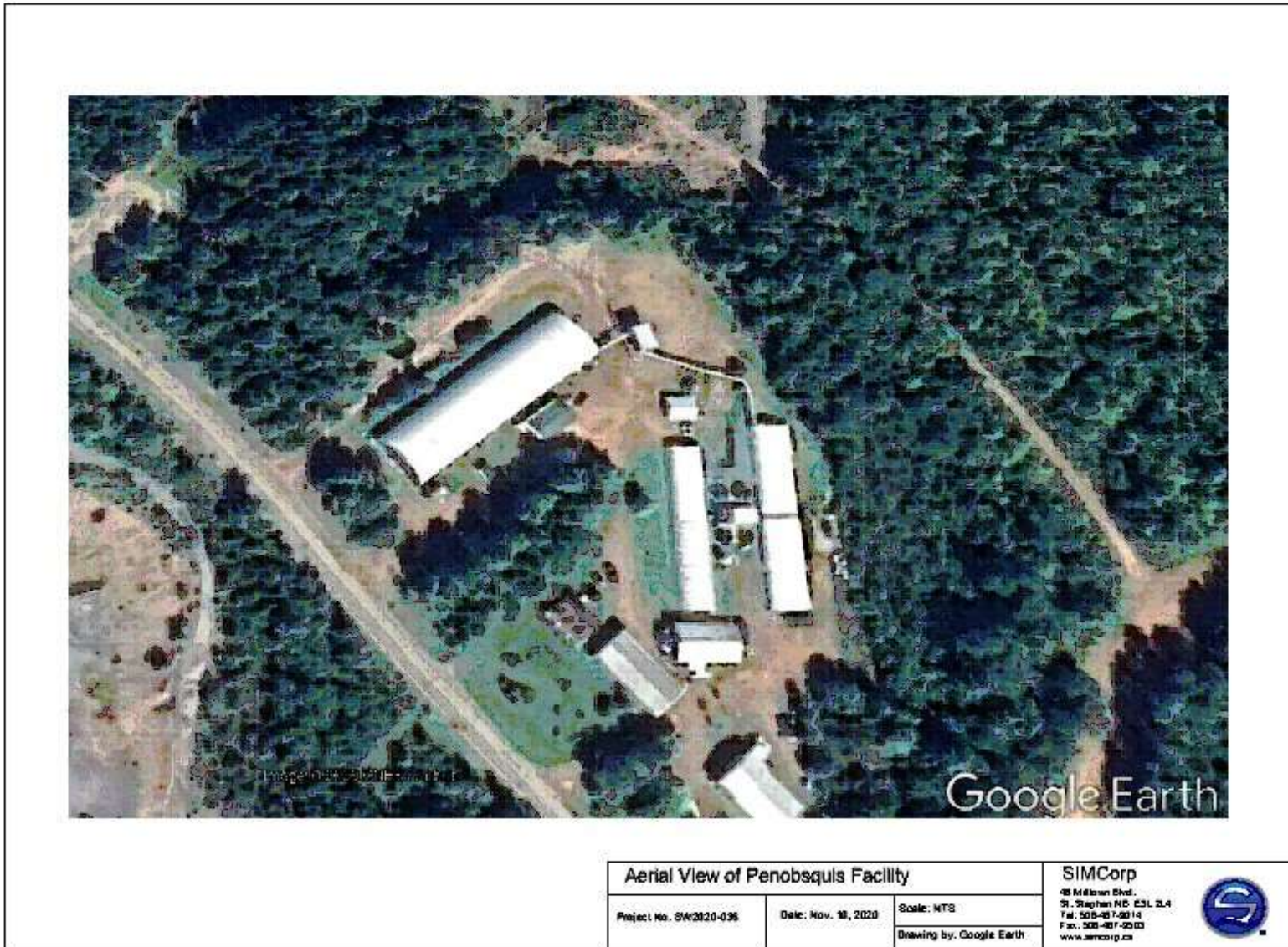




Figure 3 Proposed General Location for Drilling

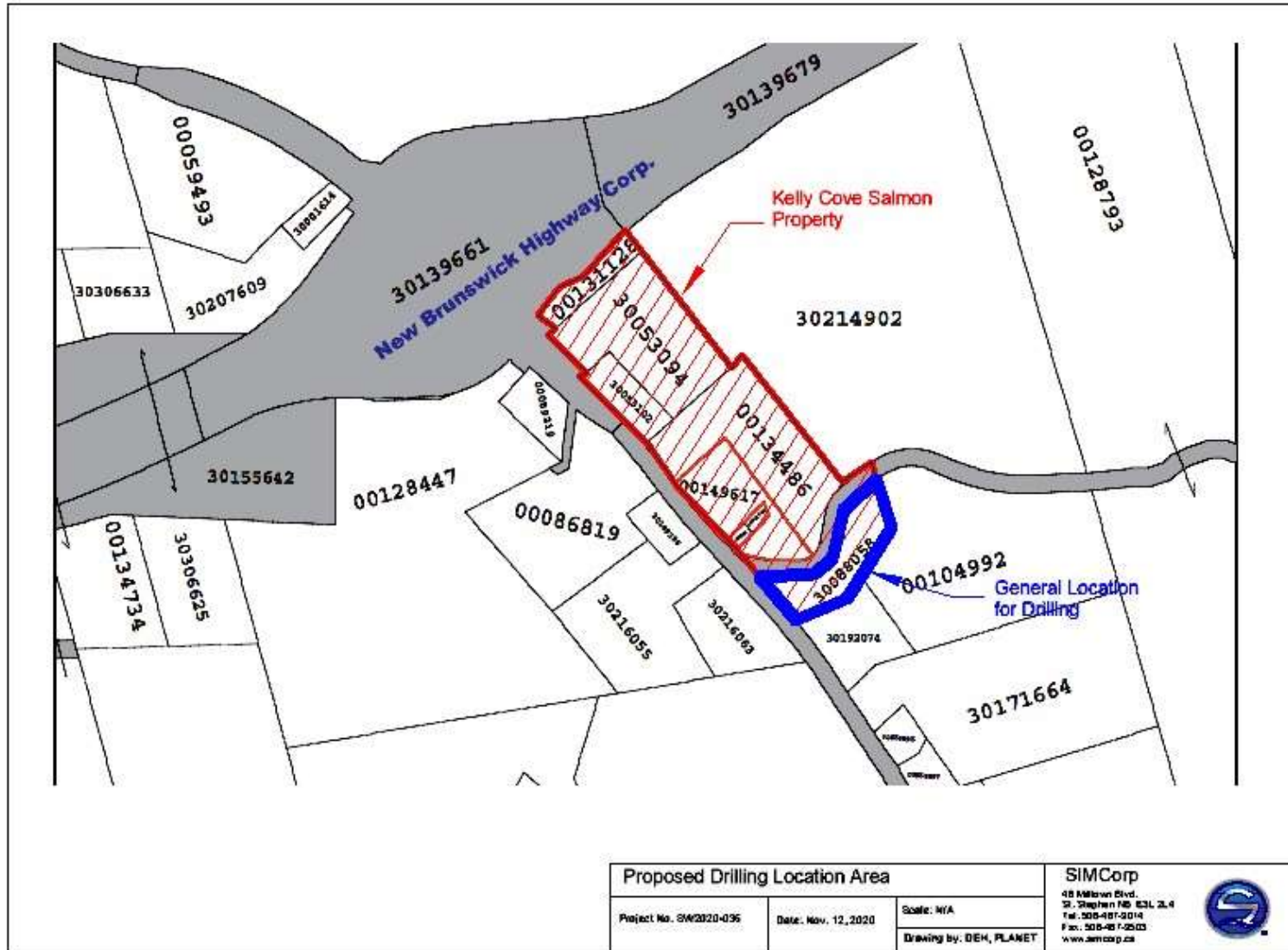
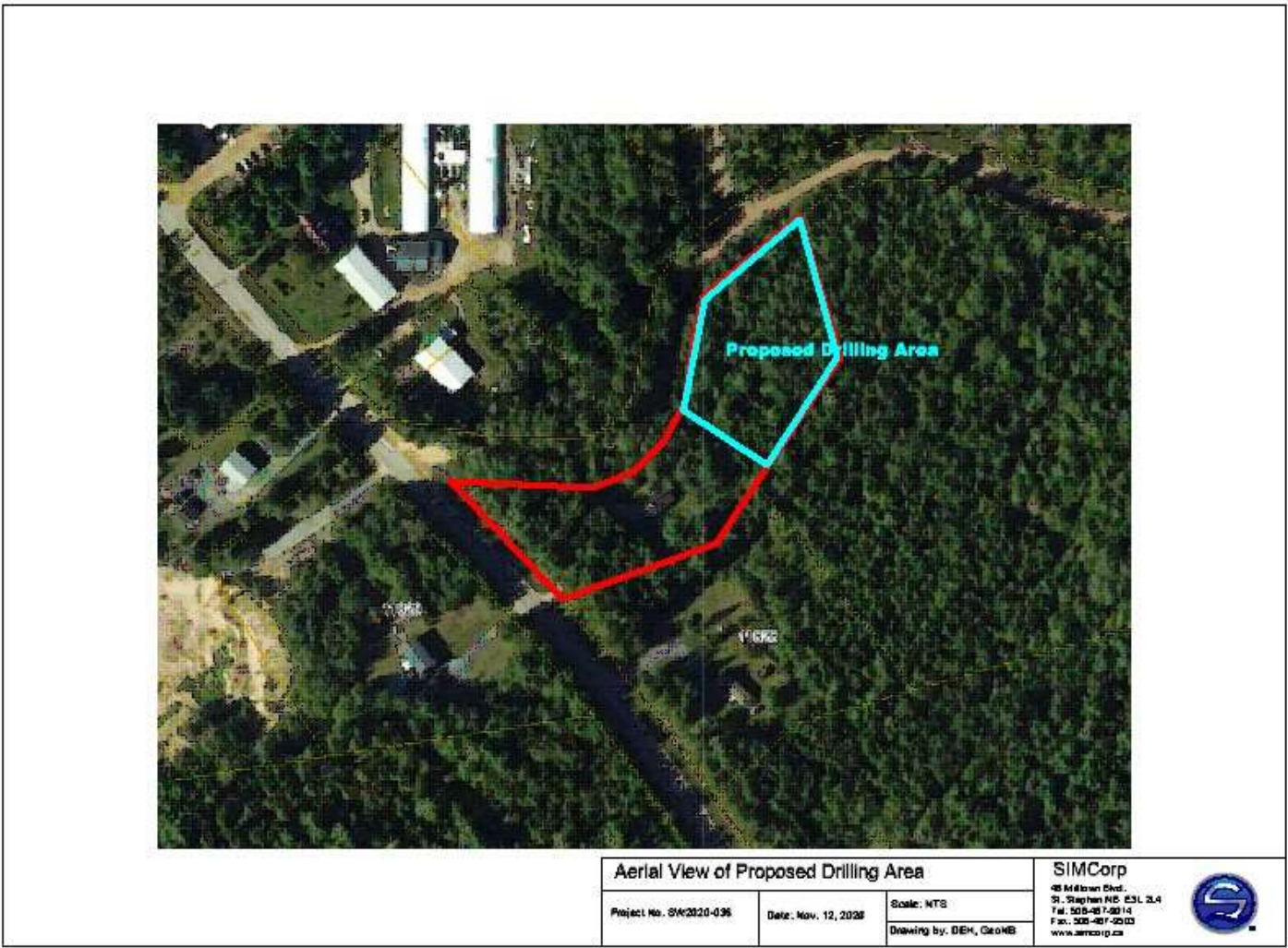




Figure 4 Aerial View of Drilling Area





2.7 Future Modifications, Extensions, or Abandonment

Although abandonment of the facility is not anticipated anytime soon, any modifications, of the facility will be addressed as per the terms and conditions of the Approval to Operate. These terms and conditions typically state that: “The Approval Holder shall apply in writing to the Director and receive approval for an amendment of this Approval before making any changes, including fish species, to the currently Approved Facility”. If there ever is requirement for a modification, extension or even abandonment of the facility the proponent will make application the Director of the Authorizations Branch of NBDELG.

2.8 Accidents and Malfunctions

Activities related to well drilling will be designed and implemented in accordance with applicable Acts, regulations, guidelines, codes and standards. Accidental events may occur whether they are related to drilling activities or in the daily operations of the facility. Kelly Cove Salmon Ltd. has an Integrated Contingency Plan (ICP) which includes an: Oil Spill Prevention Control and Countermeasures (SPCC) Plan; Hazardous Matter Spill Prevention Control and Cleanup Plan; and a Facility Emergency Response Plan.

3.0 DESCRIPTION OF EXISTING ENVIRONMENT

3.1 Atmospheric Environment

3.1.1 Weather and Climate

The Project is located in the Anagance Ecodistrict of the Valley Lowlands Ecoregion. (NBDNR, 2007). The area the Anagance Ecodistrict encompasses is 164,814 ha and has an average elevation above sea level of 124 m. The average May to September precipitation of this eco-district is 425-450 mm.

Local temperature and precipitation data were obtained from the Sussex meteorological station (45°43'00.00N, 65°32'00.00W) located within 25 km of the proposed Project. For the period from 1981-2010, the mean annual temperature was 6.1°C, with a mean daily maximum of 11.7°C and a mean daily minimum of 0.5°C. January and February were the coldest months (-8.5°C and -6.8°C, respectively), while the warmest months were July and August (19.2 °C and 18.8°C, respectively)

From 1981-2010, mean annual snowfall was 243.8 cm and rainfall were 1,169.9 mm (EC, 2019). Most snowfall is received in January and March (64.5 cm and 49.7 cm, respectively), while the



months with greatest rainfall were May and October (100.3 mm and 106.3 mm, respectively) (Environment Canada, 2019).

3.1.2 Air Quality

NBDELG monitors air quality at seven stations throughout the province. Measured parameters include ground-level ozone (O₃), particulate matter (PM_{2.5}), and nitrogen dioxide (NO₂), and these values are used to calculate a score on the Air Quality Health Index (AQHI) (EC, 2018b). The AQHI is a scale from 1-10+, in which scores represent the following health risk categories: Low (1-3), Moderate (4-6), High (7-10), and Very High (10+). The closest AQHI monitoring stations are in Saint John and Moncton, approximately 85 km south and 70 km north of the site respectively. The AQHI at this site is usually low (1-3) at all times of the year (Environment Canada, 2020).

3.1.3 Ambient Sound Quality

As the Penobsquis Hatchery has been operating since 1994, and the only change to ambient sound quality will be short-term and limited to drilling related activities.

3.2 Aquatic Environment

3.2.1 Wetlands and Wellfield Protection Areas

The Regulated Wetlands Map (<http://geonb.snb.ca/wetlands/>) shows no wetland areas that are regulated under the Watercourse and Wetland Alteration Program within proximity of the facility location (Figure 5).

The facility location and the general location that is being considered for drilling a new well (PID 30088058) is located outside of the Springdale protected Wellfield Management zones (Figure 6).



Figure 5 Wetlands

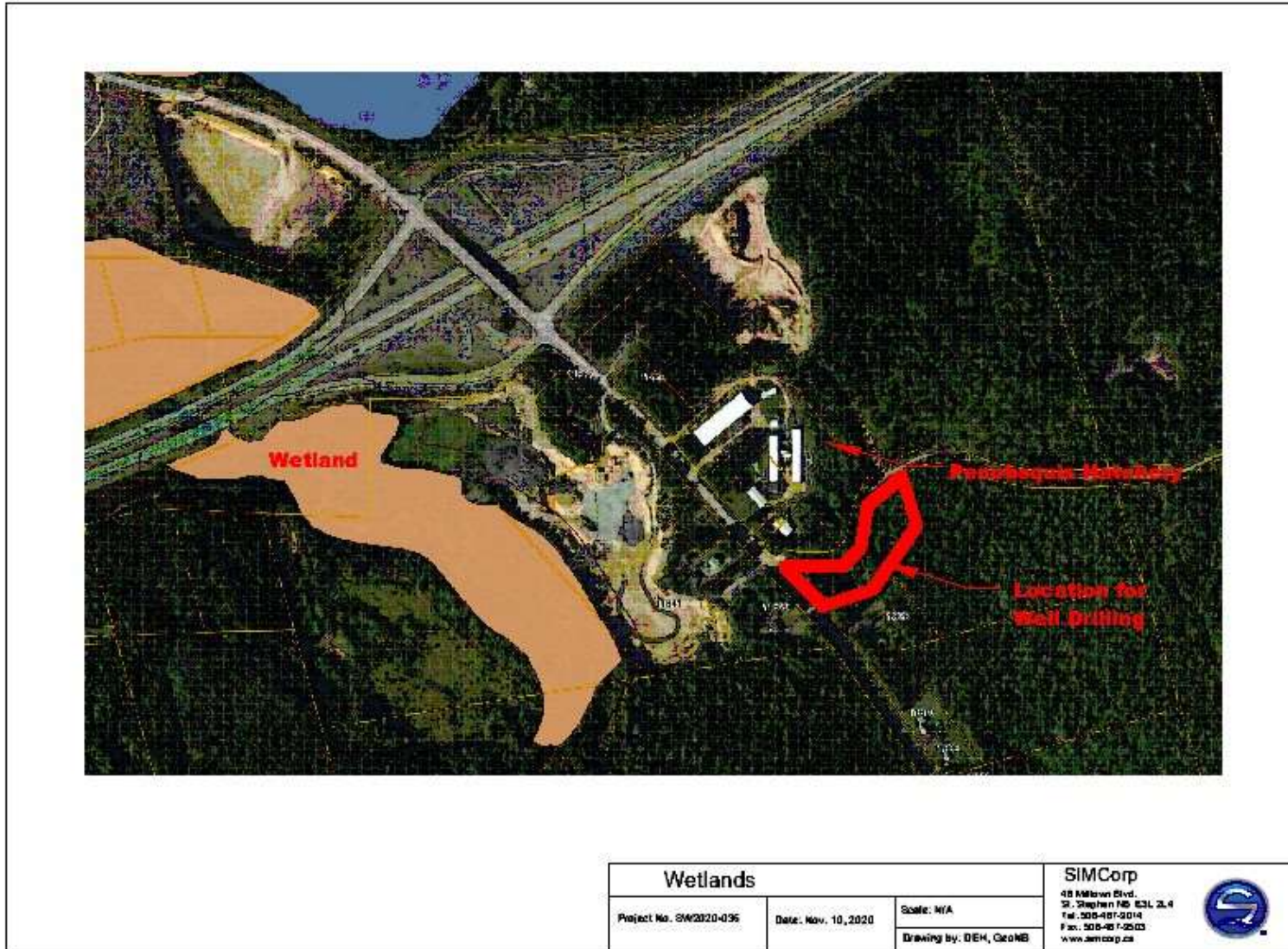
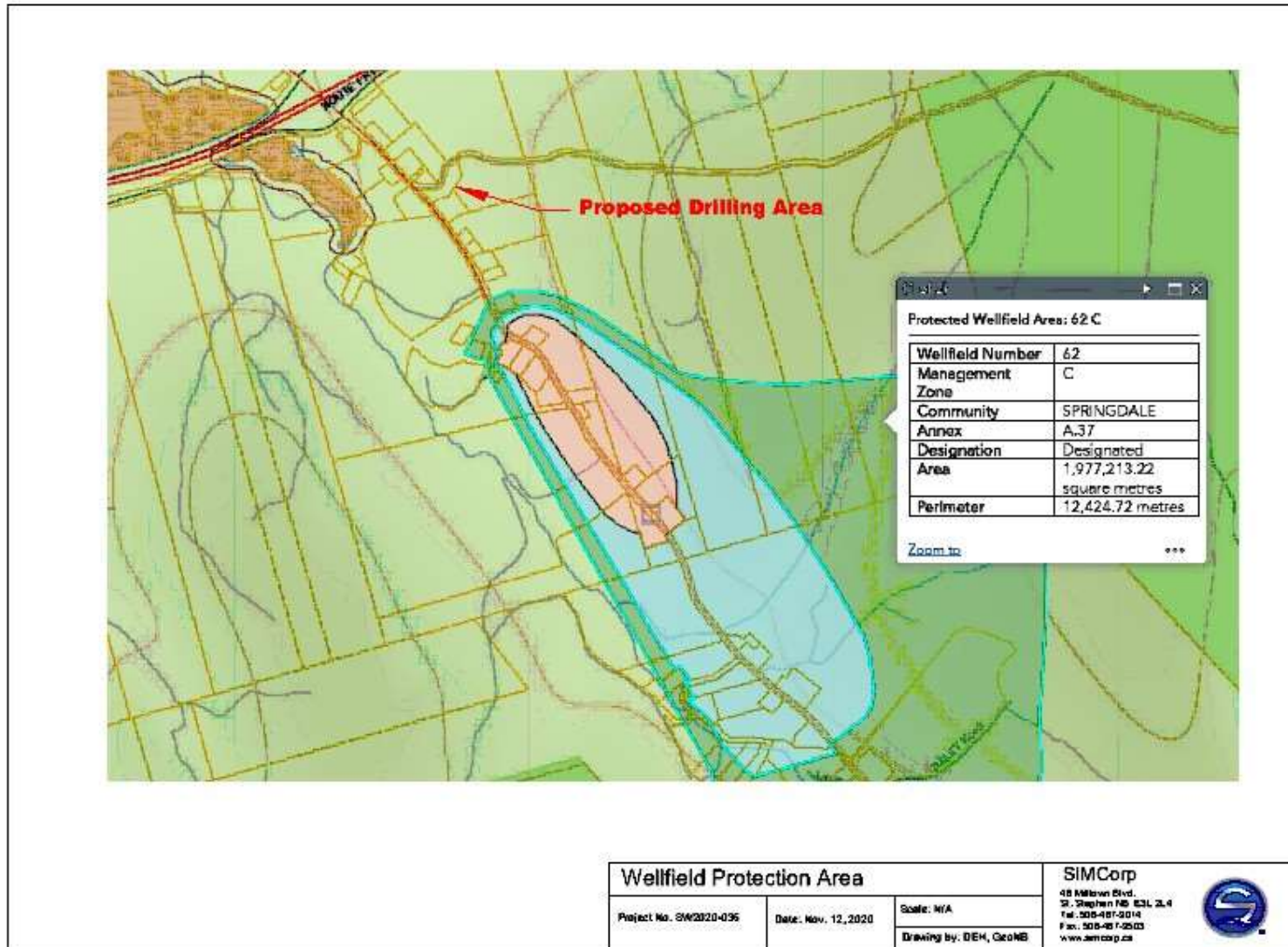




Figure 6 Wellfield Protection Area





3.2.2 Watercourses/Surface and Groundwater Resources

As described in the most recent ATO (Appendix A) the water for the facility is supplied by two metered wells and a gravity fed spring source. The maximum water requirement for the facility is approximately 1,600 litres per minute (350 IGPM). These two wells are located as per the diagram supplied in Appendix B with the spring denoted as UK-6. There is a well (UK-5) located on the CAI owned property (PID 30088058) that was at one time used for the dwelling on the property, but this dwelling is now using the municipal water supply, as is the majority of the properties in the area (pers. comm. RSC-8 Building Inspector, Nov. 14, 2020).

3.3 Terrestrial Environment

Drilling activities will be designed to have minimal effects on the current terrestrial environment. Mitigation measures will include, but are not limited to:

- Scheduling activities to minimize potential impacts to the environment and any associated with erosion (i.e., avoid activities during intense storm events).
- Retain existing vegetation when possible.
- Minimize the lengths and steepness of slopes, where possible.
- Installation of effective erosion and sediment control measures before starting work to prevent sediment from entering a water body.
- Regular inspection and maintenance of erosion and sediment control measures and structures.
- Repairs to erosion and sediment control measures and structures if damage occurs.
- Equipment used to be mechanically sound and not leaking fuel, hydraulic fluid, or lubricants.
- Any debris generated during drilling be disposed of in an environmentally friendly manner.
- Any spills or leaks that occur will be reported to the appropriate regulatory authorities as soon as possible.
- Refueling, oiling, and maintenance of equipment will be completed in specifically designated areas.
- Servicing of equipment will be completed offsite by a licensed mechanic.



3.4 Socio-Economic Environment

The number of employees fluctuates at the facility and currently there are 8 individuals employed, which includes the site manager. When required, additional staff are hired to handle peak periods of production.

The existing hatchery has been in operation since 1994 and, for its operation to continue, it is essential to provide suitable quality and quantities of water to the facility.

4.0 CONCLUSION

This document has been prepared on behalf of Kelly Cove Salmon Ltd. as a brief overview of the Penobsquis Hatchery with respect to the intentions to decommission the metered well 00-1 and drill a new well or wells that would provide suitable quantity and quality of water to the facility.

Appendices

Appendix A



APPROVAL TO OPERATE

I-10358

Pursuant to paragraph 8(1) of the *Water Quality Regulation - Clean Environment Act*, this Approval to Operate is hereby issued to:

Kelly Cove Salmon Ltd.
for the operation of the
Penobsquis Salmon Hatchery

Description of Source: **A land based aquaculture recirculation facility consisting of a hatchery building and three covered tank fields for culturing Atlantic salmon to the smolt stage.**

Source Classification: **Fees for Industrial Approvals Regulation - Clean Water Act** **Class 6**

Parcel Identifier: **00149617, 00130955, 30091508, 30053102, 00134486**

Mailing Address: **93 Oak Haven Road
Oak Haven, NB E3L 3S7**

Conditions of Approval: **See attached Schedule "A" of this Approval**

Supersedes Approval: **I-8568**

Valid From: **December 01, 2018**

Valid To: **November 30, 2020**

Recommended by: 

Issued by: 
for the Minister of Environment and Local Government

November 30, 2018
Date

SCHEDULE "A"

DESCRIPTION AND LOCATION OF SOURCE

Kelly Cove Salmon Ltd. located near Penobsquis in Kings County operate an aquaculture facility consisting of a hatchery building and three covered grow-out tank fields each employing recirculation technology. Water for the facility is supplied by two metered wells and a gravity fed spring source. The maximum water requirement for the facility is approximately 1,600 litres per minute (350 IGPM). Waste water is concentrated within each of the tank fields with drum filters prior to being directed to a central effluent treatment building where a flocculant and polymer are added to coagulate the fine particulate which is then removed with a belt filter and stored in a concrete septic tank. Treated water is directed to a spring fed stream which flows north of the property into Crocket's Corner Pond.

The operation of this facility located near Penobsquis, Kings county and referenced by parcel identifiers 00134486, 00149617, 00130955 30053102 and 30091508 is hereby approved subject to the following:

DEFINITIONS

"after hours" means the hours when the Department's offices are closed. These include statutory holidays, weekends, and the hours before 8:15 a.m. and after 4:30 p.m. from Monday to Friday.

"Approval Holder" means the person or entity to whom the Approval is issued, as named on the first page (certificate) of the Approval.

"Chemical" means antibacterial and antibiotic agents, therapeutants, pesticides, herbicides, anesthetics, feed additives, hormones, veterinary biologics, biotechnology products, disinfectants, water treatment agents, fertilizers, paint products, organic solvents, anti-foulant products, petroleum products, liquid and gaseous fuels, sealants, lubricants, flocculants, and any other hazardous, toxic, or potentially harmful substance.

"Department" means the New Brunswick Department of Environment and Local Government.

"Director" means the Director of the Authorizations Branch of the Department and includes any person designated to act on the Director's behalf.

"Environmental Emergency" means a situation where there has been or will be a release, discharge, or deposit of a contaminant or contaminants to the atmosphere, soil, surface water, and/or groundwater environments of such a magnitude or duration that it could cause significant harm to the environment or put the health of the public at risk.

"Inspector" means an Inspector designated under the *Clean Air Act*, the *Clean Environment Act*, or the *Clean Water Act*.

"Facility" means all property, real or personal, utilized in the operation or maintenance of the source.

"Minister" means the Minister of Environment and Local Government and includes any person designated to act on the Minister's behalf.

"normal business hours" means the hours when the Department's offices are open. These include the period between 8:15 a.m. and 4:30 p.m. from Monday to Friday excluding statutory holidays.

"statutory holiday" means New Year's Day, Family Day, Good Friday, Easter Monday, Victoria Day, Canada Day, New Brunswick Day, Labour Day, Thanksgiving Day, Remembrance Day, Christmas Day and Boxing Day. If the Statutory Holiday falls on a Sunday, the following day shall be considered as the Statutory Holiday.

EMERGENCY REPORTING

1. Immediately following the discovery of an environmental emergency, a designate representing the Approval Holder shall notify the Department in the following manner:

During normal business hours, telephone the Department's applicable Regional Office **until personal contact is made** (i.e. no voice mail messages will be accepted) and provide all information known about the environmental emergency. The telephone number for the six Regional Offices within the Department are provided in the table below:

After hours, telephone the Regional Emergency Centre **until personal contact is made** and provide as much information that is known about the environmental emergency. The telephone number for the **Regional Emergency Centre is 1-800-565-1633**.

2. Within 24-hours of the time of initial notification, a faxed copy of a **Preliminary Emergency Report** shall be filed by a designate representing the Approval Holder to the applicable Regional Office within the Department and the Department's Central Office using the fax numbers provided below. The Preliminary Emergency Report shall clearly communicate as much information that is available at the time about the environmental emergency.

Within five (5) days of the time of initial notification, a **Detailed Emergency Report** shall be filed by the Approval Holder to the applicable Regional Office within the Department and the Department's Central Office using the fax numbers provided below:

| Office Location | Phone | Fax |
|-----------------------------|----------------|----------------|
| Bathurst Regional Office | (506) 547-2092 | (506) 547-7655 |
| Miramichi Regional Office | (506) 778-6032 | (506) 778-6796 |
| Moncton Regional Office | (506) 856-2374 | (506) 856-2370 |
| Saint John Regional Office | (506) 658-2558 | (506) 658-3046 |
| Fredericton Regional Office | (506) 444-5149 | (506) 453-2893 |
| Grand Falls Regional Office | (506) 473-7744 | (506) 475-2510 |
| Central Office | --- | (506) 453-2390 |

The **Detailed Emergency Report** shall include, as minimum, the following:

- i) a description of the problem that occurred;
- ii) a description of the impact that occurred;
- iii) a description of what was done to minimize the impact; and
- iv) a description of what was done to prevent recurrence of the problem.

GENERAL INFORMATION

3. The issuance of this Approval does not relieve the Approval Holder from compliance with other by-laws, federal or provincial Acts and Regulations, or any guidelines issued pursuant to Regulations.
4. The Approval Holder shall ensure that a copy of the Approval, including all attached Schedules, is maintained onsite at all times. A copy of the Approval must also be posted in a prominent and accessible location.

TERMS AND CONDITIONS

GENERAL CONDITIONS

5. The Approval Holder shall operate the Facility in accordance with the most recent version of the *Environmental Management Program for Land Based Finfish Aquaculture in New Brunswick* issued by the Department.
6. The Approval Holder shall make application to the Minister for the development of additional water supplies for this Facility.
7. **A minimum of 30 days prior** to any modifications to the Facility (i.e. change of species reared, etc.), the Approval Holder shall submit an application to the Director.

8. The Approval Holder shall *immediately* notify the Minister in writing of any change in its name or address.
9. A **minimum of 60 days prior** to the expiration of this Approval, the Approval Holder shall submit a written application to the Director.

SITE MANAGEMENT

10. The Approval Holder shall ensure that all water withdrawals, including those from ground, surface or pipeline sources are equipped with flow meters.
11. The Approval Holder shall ensure the maximum pumping rate for well 00-1(well ID#:11637) does not exceed 745 litres per minute and the maximum pumping rate for well 00-3 (well ID #:17928) does not exceed 197 litres per minute.
12. The Approval Holder shall ensure that the flow meters on wells 00-1 and 00-3 and the unnamed spring on PID 15160708 are operational and maintained at all times.

WASTE MANAGEMENT PLAN

13. The Approval Holder shall ensure that all wastes generated throughout the operation and maintenance of the facility are managed and disposed of in accordance with the procedures and practices detailed in the Waste Management Plan in the attached SCHEDULE "C", or in a manner deemed acceptable by an Inspector, or as otherwise directed by the Department.
14. The Approval Holder shall remove sludge from the settling pit and/or septic tank at least once per year and make arrangements for disposal in a manner which is acceptable to an Inspector. Additional cleanout(s) of sludge from the settling pond may be required should any monitoring results indicate a failure to achieve the limits specified within this Approval.

CHEMICAL STORAGE AND HANDLING

15. The Approval Holder shall ensure that all chemicals are stored in a manner such that any spill is contained and not released to the environment.

TESTING AND MONITORING


16. The Approval Holder shall establish a monitoring program in accordance to the most recent version of the *Environmental Management Program for Land Based Finfish Aquaculture in New Brunswick* issued by the Department and summarized in SCHEDULE "B".

DISCHARGE LIMITS

17. The Approval Holder shall ensure that the level of total phosphorus is in accordance with the most recent version of the *Environmental Management Program for Land Based Finfish Aquaculture in New Brunswick*.

REPORTING

18. **Within 15 days of the end of each month**, the Approval Holder shall submit to the Department a record of water withdrawal from all sources including well 00-01, well 00-03, and the unnamed spring on PID 15160708.
19. **Prior to December 31 of each year**, the Approval Holder shall submit an Annual Report in accordance with Appendix 2 of the most recent version of the document titled *Environmental Management Program for Land Based Finfish Aquaculture in New Brunswick*, issued by the Department. The report shall provide the following information for the calendar year:
 - a) Approval Holder and site name;
 - b) Average weight, bi-weekly biomass, feed fed and % protein and phosphorus content of feeds;
 - c) Average weekly effluent flow (litres per minute);
 - d) Environmental Monitoring Program results received from an accredited laboratory and self-monitoring;
 - e) Date of last clean out of septic, settling pit or settling pond;
 - f) Results of any effluent treatment system inspection reports;
 - g) A copy of reports as a result of any audits conducted; and
 - h) Comment on planned production plan for upcoming year.

Prepared by: 
Mitchell Clark
Approvals Coordinator



Reviewed by: _____
Mark Glynn, P.Eng.
Manager, Permitting South
Authorizations Branch

SCHEDULE "B"

MONITORING AND SAMPLING PLAN

Level 1

| <u>Station*</u> | <u>Parameters**</u> | <u>Analysis</u> | <u>Time Period</u> | <u>Frequency</u> | <u>Method</u> |
|-----------------|---|-----------------|--------------------|------------------|---------------|
| 1-3 | TP _L and TN Temp, DO and pH | Lab Self | June 1-Nov 15 | Monthly | Grab Meter |
| 6 | Flow and Temp | Self | Jan1-Dec 31 | Monthly | Meter |

Level 2

| <u>Station*</u> | <u>Parameters**</u> | <u>Analysis</u> | <u>Method</u> |
|-----------------|--|-----------------|---------------|
| 1 | TP _L and TN Temp, DO and pH | Lab Self | Grab Meter |
| 2-3 | TP _L TN, TAN and COD Temp, DO and pH | Lab Self | Grab Meter |
| 4-5 | TSS and TP _L | Lab | Grab |
| 6 | Flow and Temp | Self | Meter |

***Stations**

1. Unnamed stream - 10 metres upstream from the point of final effluent discharge.
2. Effluent - prior to outfall into the unnamed stream.
3. Unnamed stream - 100 metres downstream from the point of final effluent discharge.
4. Prior to solids filtration
5. After solids filtration
6. Well 00-1 (ID#: 11637) and Well 00-3 (ID#: 17928)

****Parameters**

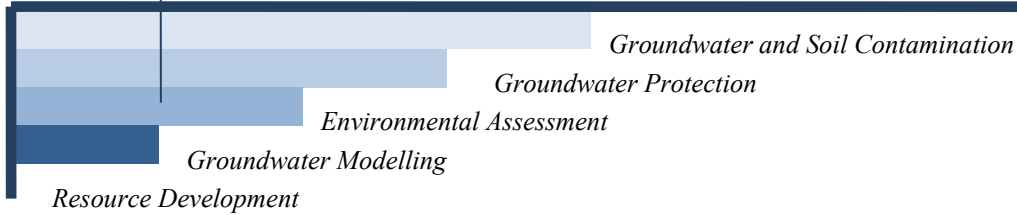
- TP_L - Total Phosphorus (low level) reported in milligrams per litre.
 TN - Total Nitrogen
 DO - Dissolved Oxygen
 Temp - Temperature (degrees Celsius)

SCHEDULE "C"

See attached Waste Management Plan

Appendix B

CRAIG HYDROGEOLOGIC INC.



October 21, 2020.

Sarah Preston
Kelly Cove Salmon
sarah.preston@cookeaqu.com

Re: Penobsquis Hatchery Well Summary and Recommendations.

Dear Ms. Preston:

In response to the question with regard to potential well locations at the Penobsquis Hatchery I am providing the following information. I have reviewed local well logs, geology and other available hydrogeologic information relating to the general area of the site.

Two well logs were located for what appear to be onsite wells and copies are attached for your records. In addition, a well location figure from a 2006 Gemtec assessment report was located and a copy is also attached for your records.

The local geology can be described as unconsolidated recent gravels and clay layers overlying sedimentary bedrock of the Late Devonian to Carboniferous age Conglomerates, sandstones, and shales. The bedrock geology is relatively complex and local sedimentary rock deposits contain evaporitic deposits including potash, salt and gypsum. Gypsum deposits are mapped as at or near surface just north west of the site. Gypsum is composed of $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ and is readily soluble, commonly creating elevated concentrations of sulfate in groundwater. These deposits have an impact on the bedrock aquifer. Bedrock wells associated with these types of rock deposits tend to produce water with elevated sulfate and/or sodium and chloride. While the yield of the bedrock wells in the area is variable, there are some high yield wells developed in the bedrock in the local area.

Craig HydroGeoLogic Inc.

140 Meadow Cove Road. Dipper Harbour, NB E5J 2S9
Telephone 506-659-3064 Email dcraig@craighydrogeologic.ca
<http://www.craighydrogeologic.ca/>

Some shallow wells and springs have been developed as water sources in the local area. These water sources utilize the unconsolidated, recent gravels as aquifers. These gravel aquifers are of limited aerial extent and, while conductive, seem to produce limited volumes of water. Based on the local well logs, some wells have been drilled into the upper fractured layer of the bedrock, producing a large portion of their yield from the overlying gravels.

The bedrock aquifer seems to offer potentially higher yielding wells; however, such wells will probably be impacted by the bedrock gypsum deposits and have elevated concentrations of sulfate. The local gravel deposits can provide water of better quality in relation to sulfate; however, the yield of each potential gravel well is predicted to be less than a high yielding bedrock well.

On the Hatchery property bedrock wells can probably be located at any location that has good access for the drill rig and is located with advantages relative to the existing infrastructure. The characteristics of the individual wells will depend on site specific conditions that cannot be accurately predicted. No well, drilled relatively deep into the bedrock, can be expected not to be impacted by elevated sulfate due to the local gypsum. If such a well were drilled, it would have to be considered a low probability outcome.

The potential of the local gravel and shallow or upper bedrock deposits would have to be specifically evaluated at the site and adjacent locations to estimate potential yields. The water quality would be expected to be better with regard to sulfate and salt. It should be kept in mind that when the well driller drilled the existing bedrock wells on site, they drilled to depth. That is, they did not intersect any shallow source of water in the gravels or upper bedrock that they felt was worth developing relative to the overall needs of the project. The two well logs from the site shown only limited thickness of gravel overlying the bedrock in the existing bedrock wells.

In summary, bedrock wells can probably be drilled anywhere on site, keeping in mind that they should be spaced out to minimize interference. Bedrock wells will probably produce elevated concentrations of sulfate, sodium, chloride and have relatively high conductivities for fresh water. The potential for obtaining a suitable supply of better-quality water from the overlying gravels on

site would require test drilling. Further evaluation would be required to potentially site overburden wells.

Should you have any questions with regard to the above, or wish to discuss, please call me at your convenience.

Yours Truly

A handwritten signature in blue ink, appearing to read "Doug G.", written in a cursive style.

Douglas Craig, M.Sc., P. Geo.
Hydrogeologist

Well Driller's Report

Date printed 10/15/2020

| | | | |
|-----------------------|---------------------|--------------|----------------|
| Drilled by | E.R. STEEVES LTD. | | |
| Well Use | Work Type | Drill Method | Work Completed |
| Drinking Water, Other | New Well (NEW WELL) | | 08/23/2000 |

| Casing Information | | Casing above ground | | | Drive Shoe Used? |
|--------------------|-------------|---------------------|------|------|------------------|
| Well Log | Casing Type | Diameter | From | End | Slotted? |
| 91163700 | Steel | 8 inch | 0ft | 81ft | |

| Aquifer Test/Yield | | | | | | | |
|------------------------------------|---------------------------|--------------|----------|-------------------------|----------------------|---------------|--------|
| Method | Initial Water Level (BTC) | Pumping Rate | Duration | Final Water Level (BTC) | Estimated Safe Yield | Flowing Well? | Rate |
| Air | 0ft | 0 igpm | 0hr | 0ft | 450 igpm | No | 0 igpm |
| <i>(BTC - Below top of casing)</i> | | | | | | | |

| | | | |
|---|----------------------|--------------|-----------------------------|
| Well Grouting There is no Grout information. | Drilling Fluids Used | Disinfectant | Pump Installed |
| | None | N/A | N/A |
| | | Qty 0 ig | Intake Setting (BTC) 0ft |

| Driller's Log | | | | |
|---------------|-------|-------|--------|-----------------|
| Well Log | From | End | Colour | Rock Type |
| 91163700 | 0ft | 30ft | Brown | Sand and Gravel |
| 91163700 | 30ft | 51ft | Red | Clay and Mud |
| 91163700 | 51ft | 178ft | Red | Shale |
| 91163700 | 178ft | 325ft | Grey | Sandstone |

Overall Well Depth
325ft
 Bedrock Level
51ft

| Water Bearing Fracture Zone | | |
|-----------------------------|-------|--------|
| Well Log | Depth | Rate |
| 91163700 | 100ft | 5 igpm |

| Setbacks |
|----------------------------------|
| There is no Setback information. |

Driller's Comments

THIS WAS PAID BY THE OWNER (BY CHEQUE) NOT BY DOT.
 Well Log Record created by Conversion on November 22, 2002.

Well Driller's Report

Date printed 10/15/2020

| | | | |
|--|-----------|--------------|----------------|
| Drilled by Clearwater Well Drilling Inc. | | | |
| Well Use | Work Type | Drill Method | Work Completed |
| Drinking Water, Domestic | New Well | Rotary | 11/11/2004 |

| Casing Information | | Casing above ground | | | Drive Shoe Used? |
|--------------------|-------------|---------------------|------|------|------------------|
| Well Log | Casing Type | Diameter | From | End | Slotted? |
| 11629 | Steel | 6 inch | 0ft | 30ft | |

| Aquifer Test/Yield | | | | | | | |
|--------------------|--|--------------|----------|-------------------------|----------------------|---------------|--------|
| Method | Initial Water Level (BTC) | Pumping Rate | Duration | Final Water Level (BTC) | Estimated Safe Yield | Flowing Well? | Rate |
| Air | 10ft <small>(BTC - Below top of casing)</small> | 12 igpm | 1hr | 10ft | 12.09 igpm | No | 0 igpm |

| |
|--------------------------------|
| Well Grouting |
| There is no Grout information. |

| | | |
|----------------------|----------------|----------------------|
| Drilling Fluids Used | Disinfectant | Pump Installed |
| None | Bleach (Javex) | Submersible |
| | Qty 0 ig | Intake Setting (BTC) |
| | | 150ft |

| Driller's Log | | | | |
|---------------|------|-------|--------|-----------|
| Well Log | From | End | Colour | Rock Type |
| 11629 | 0ft | 26ft | Brown | Till |
| 11629 | 26ft | 210ft | Grey | Slate |

Overall Well Depth
210ft
Bedrock Level
26ft

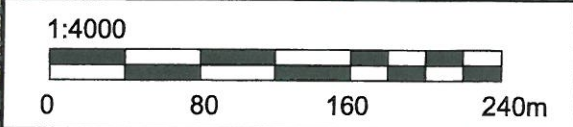
| Water Bearing Fracture Zone | | |
|-----------------------------|-------|--------|
| Well Log | Depth | Rate |
| 11629 | 90ft | 5 igpm |
| 11629 | 115ft | 5 igpm |
| 11629 | 130ft | 2 igpm |

| Setbacks | | |
|----------|----------|--------------|
| Well Log | Distance | Setback From |
| 11629 | 55ft | Septic Tank |
| 11629 | 75ft | Leach Field |



LEGEND

- WELL LOCATION
- GROUNDWATER FLOW DIRECTION AND GRADIENT (APPROX.)



Project
 WATER SUPPLY SOURCE ASSESSMENT
 AQUA FISH FARMS LIMITED

Drawing
 SITE PLAN



| | | | | |
|------------------|-------------------|----------------------|-------------------------|-------------------|
| Drawn By AGSD | Date OCT, 2006 | File No. 43960101 | Drawing No. FIGURE 2 | Revision No. 0 |
|------------------|-------------------|----------------------|-------------------------|-------------------|

| Well | ID | 18hr safe Pumping Max | Extrapolated 24 hr Pumping Max |
|------|-------|-----------------------|--------------------------------|
| oo-1 | 11637 | 220 IGPM 995 lpm | 197 IGPM 754 lpm |
| oo-3 | 17928 | 58 IGPM 263 lpm | 43.4 IGPM 197 lpm. |

Water Supply Source Assessment

WSSA Initial Application

Penobsquis Hatchery- Well Replacement and Decommissioning

This Initial Application is supplemental to a document “Background Information, Penobsquis Hatchery Well Replacement, November 2020” that has been prepared and submitted by Sweeney International Marine Corp. Some of the Figures provided in that document will be referenced in this Initial Application.

1) *Name of proponent:* Kelly Cove Salmon Ltd. a Division of Cooke Aquaculture Inc., 669 Main Street, Blacks Harbour, NB, E5K 1K2, Principal Contact: Mr. Mitchell Dickie, 506-755-5282.

2) *Location of Drill Targets (including property PID and purpose of the proposed water supply:* The drill targets will be located on PID 30088058 and will be determined by local topography and accessibility. When the precise drilling target locations are determined, an updated figure will be forwarded to the Department. It is anticipated based on location and topographic situation that the gravel deposits on this PID should potentially be thicker with better water quality than that available from the underlying bedrock deposits. Once the proposed test wells have been drilled a further updated testing proposal will be forwarded to the Department for review prior to pump testing.

The water is required for the operation of the Penobsquis Salmon Hatchery (Approval to Operate I-10358) Kelly Cove Salmon Ltd. An existing well (00-1) has high dissolved sulfate which is not desirable in the process water for the hatchery. In addition, the well is reported to have suffered some degree of borehole collapse. Due to the physical location of the well, a drill rig cannot access it for rehabilitation. This combination of factors has resulted in a desire to replace well 00-1 with a new groundwater source located within the site boundaries.

3) *Required water quantity (in m³/day) and/or required pumping rate:* The maximum water requirement for the hatchery is approximately 1,600 liters per minute (350 igpm or 2,304 m³/day) which is provided by a combination of two bedrock wells and a surface water spring arising from the gravel layer at the upper boundary of the site (Figure 1). Currently well 00-1 has an approved pumping rate of 745 liters per minute (164 igpm or 1,073 m³/day) and well 00-3 has an approved pumping rate of 197 Liters per minute (43.3 igpm or 284 m³/day). The remainder of the water is made up from the spring. It is proposed that well 00-1 be abandoned due to poor water quality. The new proposed well(s) would have the production capacity necessary to replace the water from well 00-1 or approximately 745 liters per minute.

4) *List alternate water supply sources in area (including municipal systems):* The nearest municipal system (Penobsquis) is adjacent to the site; however, it does not have sufficient capacity to supply the site total requirements. On site groundwater wells represent the safest and most economical of the potential water sources.

5) *Discuss area hydrogeology as it relates to the project requirements:* The local geology can be described as unconsolidated recent gravels and clay layers overlying sedimentary bedrock of the Late Devonian to Carboniferous age conglomerates, sandstones, and shales. The bedrock geology is relatively complex and local sedimentary rock deposits contain evaporitic deposits including potash, salt, and gypsum. Gypsum deposits are mapped as at or near surface just north west of the site. Gypsum is composed of CaSO₄ · 2H₂O and is readily soluble, commonly creating elevated concentrations of sulfate in groundwater. These deposits have an impact on the bedrock aquifer. Bedrock wells associated with these types of rock deposits tend to produce water with elevated sulfate and/or sodium and chloride. While the yield of the bedrock wells in the area is variable, there are some high yield wells developed in the bedrock in the local area.

Some shallow wells and springs have been developed as water sources in the local area. These water sources utilize the unconsolidated, recent gravels as aquifers. These gravel aquifers are of limited aerial extent and, while conductive, seem to produce limited volumes of water. Based on the local well logs, some wells have been drilled into the upper fractured layer of the bedrock, probably producing a significant portion of their yield from the overlying gravels, and potentially having better water quality.

The bedrock aquifer seems to offer potentially higher yielding wells; however, such wells will probably be impacted by the bedrock gypsum deposits and have elevated concentrations of sulfate. The local gravel deposits can provide water of better quality in relation to sulfate; however, the yield of each potential gravel well is predicted to be less than a high yielding bedrock well.

Geology and Hydrogeology: A well log search was conducted using the NB Environment and Local Government well log database for wells constructed within a 750-meter radius of PID 30088058. The well log search provided 14 well logs.

The surficial overburden at the site described as sand or gravel of variable thickness with some till. Based on the well logs, the overburden in the area ranges in thickness from 4.6 to approximately 29.0 meters (15 to 95 feet). Significant accumulations (> 5 meters thickness) of sand or gravel are present in the general area and the overburden/upper bedrock was used for the ground water supply in 10 wells in the data set of well logs returned in the well log search for the specific area of the proposed development. The remainder of the well logs represented wells that sourced groundwater from the deeper bedrock aquifer.

NB Environment Well Log Database: The review of the NB Environment well log database for wells constructed within a 750-meter radius of PID 30088058 provided the following information relating to the local groundwater aquifer (Table 1). A total of 14 well logs were returned in the database search.

Table 1: 750 Meters Search Radius

| Well Depth (feet) | Estimated Yield (igpm) | Depth to Bedrock (feet) | Casing Length (feet) |
|----------------------|---------------------------|----------------------------|-------------------------|
| Average: 140.8 | Average: 82.1 | Average: 51.2 | Average: 74.1 |
| Median: 133 | Median: 22.5 | Median: 51 | Median: 71 |
| Minimum: 40 | Minimum: 2 | Minimum: 15 | Minimum: 40 |
| Maximum: 325 | Maximum: 450 | Maximum: 95 | Maximum: 116 |

As can be seen from the above information the 14 well logs found in the database for wells in this area have an average depth of 140.8 feet with an estimated average yield of approximately 82.1 igpm. The average estimated yield of 82.1 igpm and the observed median yield of 22.50 igpm are significantly in excess of the typical domestic well instantaneous needs of approximately 3 igpm. The minimum yield observed was 2 igpm in a 175 foot deep well. The maximum yield observed in the well logs was 450 igpm which was observed in a well which was 325 feet in depth. This well log corresponds to the well at the hatchery which will be abandoned. In general terms, the existing wells in this area have what can be considered to be above average yields. Based on the results of the well log database search it appears that a new groundwater supply source can be developed for the hatchery.

Two municipal wells for Penobscot are located approximately 600 meters southeast of the site along Highway 114. The municipal groundwater protection areas for the municipal wells are shown in Figure 6 in the Background Information document which has already been submitted. The municipal wells are 140 and 200 feet (42.7 and 60.9 meters) in depth with approved yields of 100 and 80 igpm (654.6 and 523.7 m³/day) respectively. The proposed new water wells for the hatchery will initially target a similar portion of the gravel/bedrock aquifer in hopes of obtaining better overall water quality. It is not expected; however, that the proposed new water taking will significantly interfere with the existing municipal wells due to the separation distance. The potential magnitude of any such interference will be assessed during the WSSA testing.

Table 2

NBDWQG = New Brunswick Drinking Water Quality Guideline

NBDOE Groundwater Chemistry Database

| Parameter | ALK_T (mg/L) | Al (mg/L) | As (µg/L) | B (mg/L) | Ba (mg/L) | Br (mg/L) | COND (µSIE/cm) | Ca (mg/L) | Cd (µg/L) |
|---------------|--------------|--------------|---------------|----------------|----------------|------------|----------------|------------|----------------|
| | 124 | 0.025 | 1.5 | 0.892 | 0.022 | 0.1 | 473 | 1.35 | 0.5 |
| | 153 | 0.094 | 1.5 | 1.1 | 0.029 | 0.1 | 606 | 1.93 | 0.5 |
| | 73.8 | 0.025 | 1 | 0.2 | 0.01 | 0.1 | 227 | 14.9 | 0.5 |
| | 14.7 | 0.025 | 1.5 | 0.018 | 0.01 | 0.152 | 60.5 | 3.41 | 0.5 |
| Mean | 91.4 | 0.042 | 1.4 | 0.553 | 0.018 | 0.1 | 342 | 5.4 | 0.5 |
| NBDWQG | | | <10 | <5.0 | <1.0 | | | | <5.0 |

| Parameter | Cl (mg/L) | Cr (µg/L) | Cu (µg/L) | E_coli P/A (P/A) | F (mg/L) | Fe (mg/L) | HARD (mg/L) | K (mg/L) | Mg (mg/L) |
|---------------|----------------|---------------|-----------------|------------------|----------------|----------------|-------------|-------------|-------------|
| | 58.2 | 10 | 10 | Ab | 2.5 | 0.312 | 3.99 | 4.62 | 0.15 |
| | 81.6 | 10 | 10 | Ab | 4.18 | 1.06 | 5.96 | 4.3 | 0.28 |
| | 10.5 | 10 | 10 | Ab | 0.236 | 0.05 | 49.1 | 5.53 | 2.9 |
| | 3.78 | 10 | 29 | Ab | 0.1 | 0.103 | 12.8 | 1.61 | 1.03 |
| Mean | 38.5 | 10 | 15 | | 1.75 | 0.381 | 18.0 | 4.02 | 1.09 |
| NBDWQG | <250 | <50 | <1000 | | <1.5 | <0.3 | | | |

Table 2

NBDWQG = New Brunswick Drinking Water Quality Guideline

NBDOE Groundwater Chemistry Database

| Parameter | Mn (mg/L) | NO2 (mg/L) | NO3 (mg/L) | NOX (mg/L) | Na (mg/L) | PH (pH) | Pb (µg/L) | SO4 (mg/L) | Sb (µg/L) |
|---------------|-----------------|---------------|---------------|---------------|----------------|-----------------|---------------|----------------|-------------|
| | 0.009 | 0.05 | 0.05 | 0.05 | 100 | 8.86 | 1 | 15.5 | 1 |
| | 0.04 | 0.05 | 0.05 | 0.05 | 124 | 9.17 | 1 | 16.9 | 1 |
| | 0.042 | 0.05 | 0 | 0.05 | 26.3 | 8.14 | 1 | 25.4 | 1 |
| | 0.018 | 0.05 | 0.05 | 0.05 | 5.03 | 7.25 | 1 | 5.37 | 1 |
| Mean | 0.027 | 0.05 | 0.04 | 0.05 | 63.83 | 8.36 | 1.0 | 15.79 | 1.00 |
| NBDWQG | <0.05 | <10 | <10 | <10 | <200 | 7.0-10.5 | <10 | <500 | 6 |

| Parameter | Se (µg/L) | TC-P/A (P/A) | TURB (NTU) | TI (µg/L) | U (µg/L) | Zn (µg/L) | TDS (mg/L) |
|---------------|------------|--------------|----------------|-----------|---------------|-----------------|----------------|
| | 1.5 | Pr | 4.43 | 1 | 0.5 | 5 | 257 |
| | 1.5 | Pr | 18 | 1 | 0.5 | 5 | 327 |
| | 1 | Ab | 0 | 1 | | 10 | |
| | 1.5 | Ab | 0 | 1 | 0.5 | 44 | 30 |
| Mean | 1.4 | | 5.6 | 1 | 0.5 | 16 | 204 |
| NBDWQG | | | <1.0 | | <20 | <5000 | <500 |

NB Environment Well Water Chemistry Database: A search of the NB Environment well chemistry database was conducted for a radius of 750 meters around PID 30088058. The precise locations of the wells from which the ground water chemistry was obtained are not available due to right to privacy considerations for the property owners. The results from the data available in the NB Environment database are provided in Table 2 which follows. A total of four sample records were provided for inorganic chemistry as a result of the database search. The average value of the measured result and the New Brunswick Drinking Water Quality Guideline (NBDWQG) are included in the table for the purpose of comparison. Any parameter which exceeds the New Brunswick Drinking Water Quality Guideline concentration is bolded and shaded for ease of recognition in the data table.

Out of the four groundwater chemistry sample results available, two had elevated concentrations of fluoride (2.5 and 4.18 mg/L) compared to the New Brunswick Drinking Water Guideline of 1.5 mg/L. Fluoride occurs naturally in minerals and soils. According to the Guidelines for Canadian Drinking Water Quality, sixth edition, 1996, the optimum concentration of fluoride in drinking water for the reduction of dental caries is 1.0 mg per liter.

Elevated concentrations of iron and manganese are common in many groundwater aquifers in New Brunswick and some elevated concentrations are present in this bedrock aquifer in this general location. Out of the four chemistry sample results available, two exceeded the guideline for iron and no sample exceeded the guideline for manganese. Such elevated concentrations are generally due to natural conditions within the aquifer. The New Brunswick Drinking Water Guidelines for iron and manganese are aesthetic objectives, not based on health considerations. Iron and manganese can cause staining of plumbing fixtures and laundry and may be associated with smells imparted to the water. Iron and manganese can usually be readily removed by commercial water softeners at the hardness observed in this water.

A total of two out of the four chemistry records available had elevated turbidity present in the samples. The elevated levels of turbidity may be related to the relative newness of the wells and they may not have had sufficient time, or use, to clear naturally. The water samples in the database are provided from the water well testing certificates which are provided by the well drilled

immediately after the well has been drilled. As a result, the vast majority of the analytical results come from new wells. Most new wells clear naturally with time and use. At levels in excess of 5 NTUs turbidity may become noticeable to consumers and therefore, objectionable. The turbidity may be the result of elevated concentrations of iron and or manganese or the presence of particulate in the water. In either case, turbidity can be treated by water softeners and/or particulate filters.

Microbiological Results: A total of four sample results were available in the data set for E. coli analysis. Out of these results, no well had any detections of E. coli. A total of four sample results were available for total coliform analysis and out of these four results, two wells had detections of total coliform. Total coliforms are natural soil bacteria and are commonly present in well water systems, particularly associated with elevated turbidities. Such detections are usually easily treated by shock chlorination of the wells and associated plumbing systems.

In general terms the groundwater chemistries found in the NBDELG database are not unusual for this area and reflect natural aquifer conditions. The elevated levels of turbidity observed in some of the wells were probably related to the newness of the wells. All other parameters measured, other than those discussed above, had concentrations below the New Brunswick Drinking Water Quality Guidelines.

6) *Outline proposed hydrogeological testing and work schedule:* The intent is to proceed as soon as possible following approval of the Initial Application, with well drilling and testing to occur as soon as possible during early 2021.

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, disposal, etc.) should also be discussed:* There are no known existing pollution or contamination hazards within 500 meters of the proposed drill target area. The geochemical characteristics of the local bedrock deposits are discussed above.

8) *Identify any groundwater use problems (quantity or quality) that have occurred in the area.* The geochemical characteristics of the local bedrock deposits are discussed above

9) *Identify any watercourse(s) (stream, brook, river, wetland, etc.) within 60 m of the proposed drill targets.* Please see attached drawing, there are no surface watercourses within 60 meters of the proposed drill target areas. There is a designated wetland west of the property; however, it is much greater than 60 meters distant from the proposed well locations.

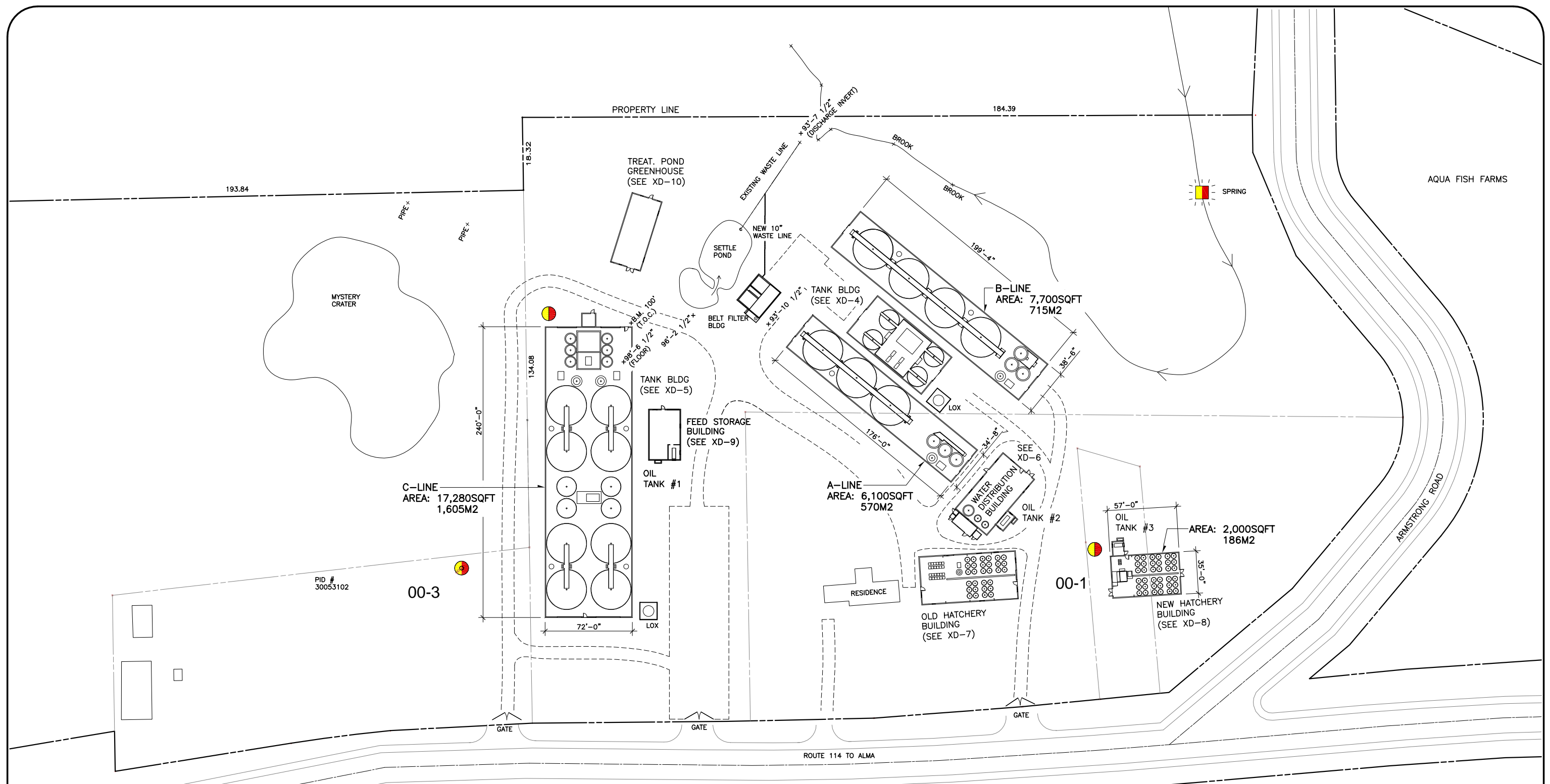
10) *Identify site supervisory personnel involved in the source development (municipal officials, consultants and drillers:* Mr. Doug Craig (Craig Hydrogeologic Inc., 506-659-3064), Mr. Mike Steeves (E.R. Steeves Well Drilling, 506-636-0734), and Mr. Mitchell Dickie (Kelly Cove Salmon Ltd., 506-755-5282).

- 11) *Attach a 1:10000 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.*

Please see attached drawing.

12) *Attach a land use/zoning map of the area (if any). Superimpose drill targets on this map:* Not Applicable.

13) *Contingency plan for open loop earth energy systems:* Not Applicable



1 AQUA FISH FARMS SITE PLAN

SCALE 1" TO 80'-0" 11"x17"
 SCALE 1" TO 40'-0" 22"x 34"

- 2 ADDED PROPERTY LINES
10/07/15
- 1 REVISED BUILDING LOCATION
10/06/27

PRINTED ON: 10/06/27

FOR TENDER

| | |
|---|-----------------------|
| PROJECT AQUA FISH WASTE | SUB C8-31 |
| CLIENT COOKE AQUACULTURE | DATE 10/03/15 |
| TITLE AQUA FISH FARMS SITE PLAN | FILE - |
| | DRAWN OSD/MCL |
| | CHECKED - |
| | REV. DATE 10/07/15 |
| | REV. 2 |

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Hatchery IA Figure



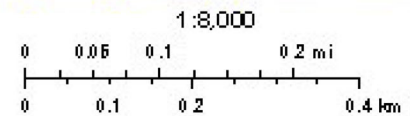
2020-12-03, 2:07:04 p.m.

parcels

Large Scale / Grande échelle

Property Assessment

Potential Existing Well



Service New Brunswick / Service Nouveau Brunswick, Department of

GeoNB

This map is a graphical representation which approximates the size, configuration and location of features. This map is not intended to be used for legal descriptions or to calculate exact dimensions or area.