

Public Notice – Administrative Application Posted

These documents have been submitted with respect to an administrative aquaculture licence / lease application. The information in these documents is provided as part of the routine disclosure of information by the Department of Fisheries and Aquaculture (the “Department”). Some information may be redacted as business confidential information or personal information.

These documents were provided to the Department by the applicant (with the exception of the attached Schedule “A” which was generated by the Department). The Department is not responsible for the content of these documents, including, but not limited to, the accuracy, reliability, or currency of the information contained within.

Applicant: Ecology Action Centre	Type of Application: Renewal (Institutional)
Application File Number: AQ#1458	Species: Kelp (sugar) (<i>Saccharina latissima</i>) Oarweed (<i>Laminaria digitata</i>) Dulse (<i>Palmaria palmata</i>) Laver (northern pink) (<i>Porphyra amplissima</i>) Laver (pare patch) (<i>Porphyra leucosticta</i>) Laver (winter) (<i>Porphyra linearis</i>) Nori (red) (<i>Porphyra miniata</i>) Laver (purple) (<i>Porphyra purpurea</i>) Laver (purple) (<i>Porphyra umbilicalis</i>)
Location: Mahone Bay, Lunenburg County	Method of Cultivation: Land-based hatchery and nursery
Application Received On: May 31, 2024	

To learn more about the aquaculture lease and license application process, please visit <https://novascotia.ca/fish/aquaculture/licensing-leasing/Aqua-Licensing-and-Leasing-Overview.pdf>

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Office Use Only
Received via Email May 31, 2024
[Redacted]

Aquaculture Renewal Application

Licence/Lease No: 1458

Licence/lease holder:

Applicant: Ecology Action Centre Contact Person: Shannon Arnold

Nova Scotia Registry of Joint Stocks Number: 1259958

Revenue Canada Business Number: [Redacted]

Telephone No. (Work): 902 3294668 (Home): _____ (Cell): [Redacted]

Fax No.: _____ E-mail: sarnold@ecologyaction.ca

Mailing Address: 2705 Fern Lane, Halifax, NS

Postal Code: B3K 4L3

Civic Address: 2705 Fern Lane, Halifax, NS

NOTE - the site of the licence is 82 Indian Point Rd, Mahone Bay, Lunenburg County, PID 60231664 with site dimensions of 1600 sq ft

Postal Code: B3K 4L3

Application Materials

A complete application includes the following:

- Renewal fee (payable to Minister of Finance) according to Section 77 of the Aquaculture Licence and Lease Regulations for Nova Scotia made under Section 64, Chapter 25 of the Acts of 1996, *the Fisheries and Coastal Resources Act*
- Application Form
- Development Plan according to application
- Copy of up-to-date Shareholder’s Register which sets out the shareholdings of the company (if applicable)

Public Notice and Disclosure

As part of the process for deciding on an aquaculture application, the Nova Scotia Department of Fisheries and Aquaculture (“Fisheries and Aquaculture”) will disclose application information to other government bodies, including, if applicable, the Nova Scotia Aquaculture Review Board for use at an adjudicative hearing relating to the application.

Submit completed applications to:

Nova Scotia Department of Fisheries and Aquaculture, Aquaculture Division
1575 Lake Road, Shelburne, NS B0T 1W0
E-mail: aquaculture@novascotia.ca



Office Use Only

In accordance with departmental policy, which seeks to promote public involvement in the process for deciding on aquaculture applications, Fisheries and Aquaculture may disclose application information – not including, however, personal or business confidential information – on the departmental website.

Privacy Statement

The personal and business confidential information collected as part of an aquaculture application will only be used or disclosed by Fisheries and Aquaculture for the purpose of deciding on the application.

All application information collected is subject to the Freedom of Information and Protection of Privacy Act (“FOIPOP”) and will only be used or disclosed in accordance with FOIPOP.

By signing and submitting this form, I acknowledge that I have read, understand, and accept the above statements regarding the collection, use, and disclosure of the information provided on this form.

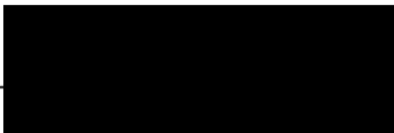
Signature of Applicant



Date

May 31, 2024

Signature of Nova Scotia Department of Fisheries and Aquaculture Designate



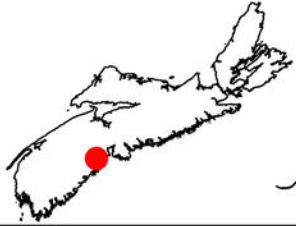
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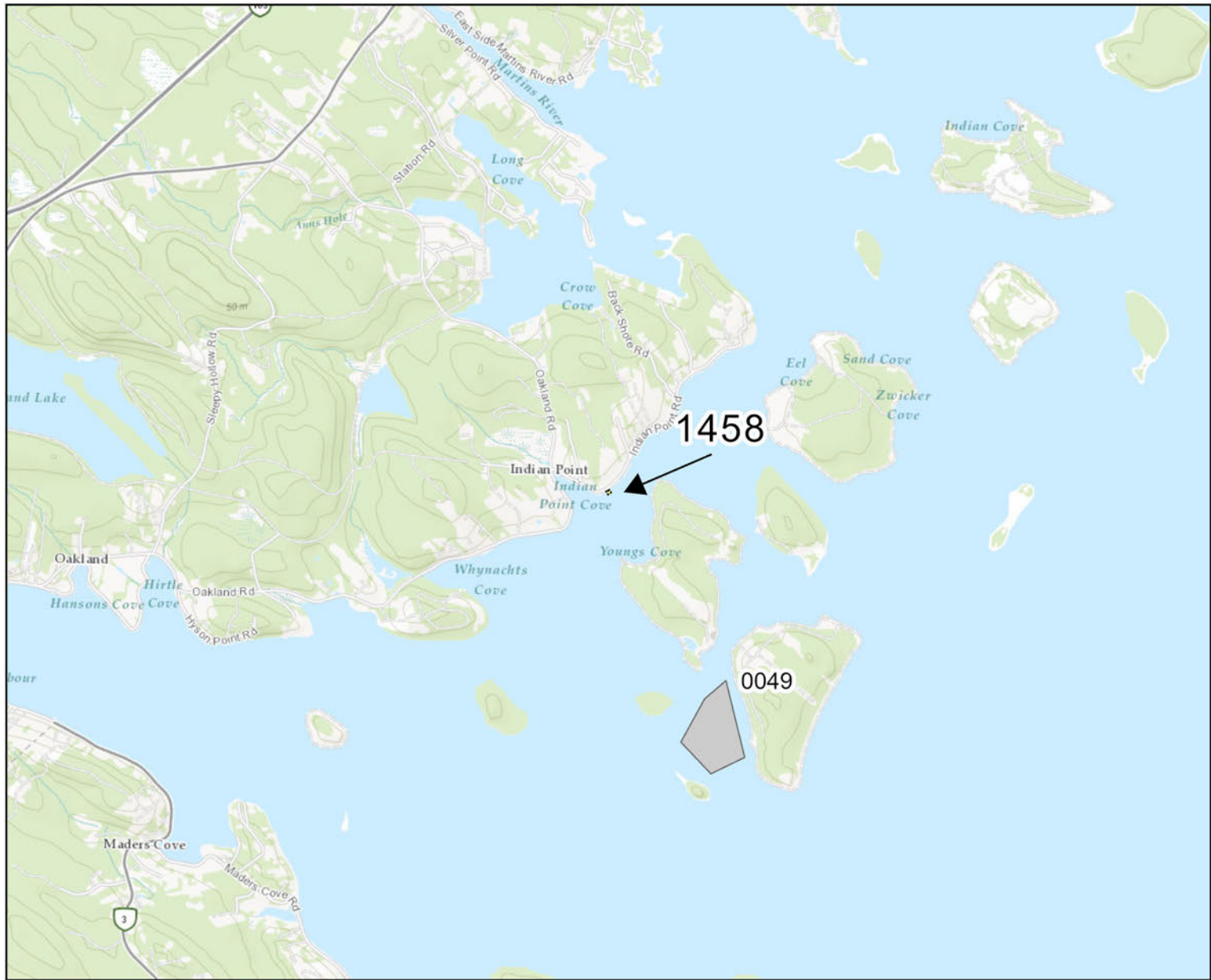
SCHEDULE A



Aquaculture Site 1458

Latitude	Longitude
44° 27' 23.192"	-64° 18' 57.430"

DATUM NAD 83 CSRS UTM Zone 20
The above coordinates are not from a legal survey



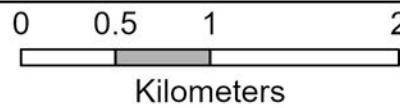
Licence Holder
Ecology Action Centre

County
Lunenburg

Species Type
Marine Plant

 Proposed Application
 Other Land Based Facility

 Issued Marine Lease



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Disclaimer

This map should not be used for navigation or for other purposes if it is intended for general reference use only.

Date: 2022-10-24

Created By: MK

SCHEDULE A



Aquaculture Site

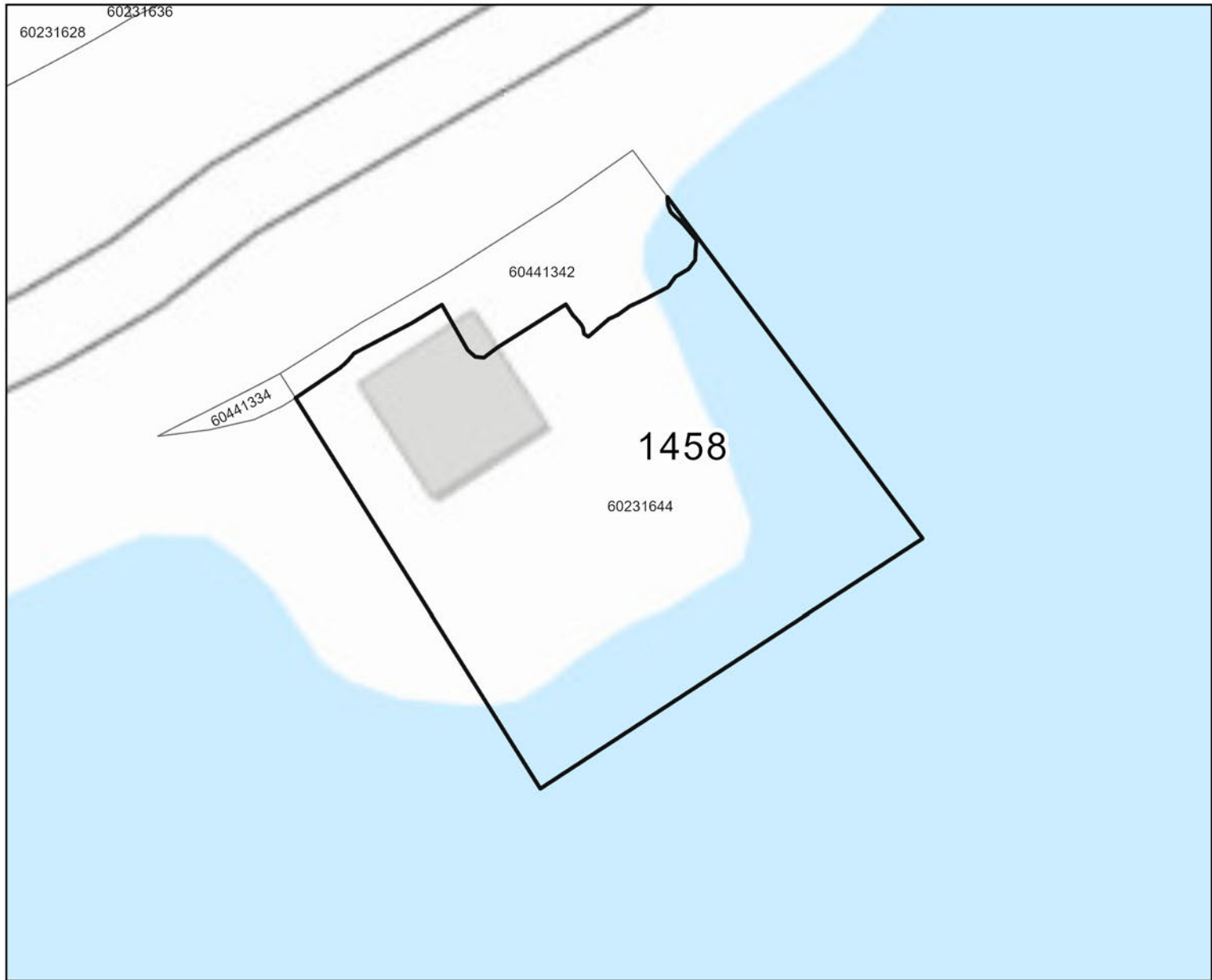
1458

Latitude Longitude

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Licence Holder

Ecology Action Centre

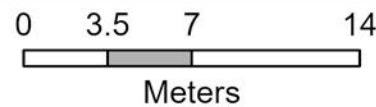
County

Lunenburg

Species Type

Marine Plant

- Proposed Application
- Property Boundary



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Disclaimer

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Date: 2022-10-24

Created By: MK

Renewal Development Plan for Land Based Aquaculture Institutional Licence AQ 1458

SECTION 1: PROJECT OVERVIEW

The Ecology Action Centre is seeking a renewal of our institutional license for our small-scale seaweed seedling nursery. The Ecology Action Centre is an environmental charity, founded in 1971. The organization has decades of experience supporting small start-ups, community demonstration projects, product development in agriculture and seafood sectors, as well as experience navigating regulatory environments. This seaweed nursery is supported by funding from a registered philanthropic foundation.

The land-based seedling production facility to which this institutional licence will apply is part of a larger project aiming to support the development of small-scale seaweed aquaculture opportunities in Nova Scotia.

The work is focused on public fishery enhancement and research for the benefit of everyone. All project work will be available for the public and sector.

The seedlings are grown in 109 L (29 gallon) aquariums that are self-contained, stand alone, and have internal water circulation (this is not a flow through system). The nursery will have a maximum of 12 aquariums with a focus on two kelp species – sugar kelp (*Saccarhina latissima*) and horsetail kelp (*Laminaria digitata*).

The Ecology Action Centre will be leasing space for the seedling nursery from Indian Point Marine Farms Ltd. inside their building which once housed their mussel processing facility that has since shut down product. It is located at 82 Indian Point Rd, Mahone Bay.

The systems have basic water, air circulation, and grow lights. The water is internally circulated through aeration pumps and UV sterilization pumps in the aquarium and chilled to a consistent temperature of 10 degrees Celsius (°C) during seedling growth. The kelp sporing and seedling line grow out will typically take place September through December. There may be a second annual seedling production effort in the spring dependent on reproductive tissue availability. The nursery phase is typically 6 – 8 weeks for seedlings to grow large enough to be placed in ocean environments.

The Ecology Action Centre has built a network of partnerships with other research institutions, seafarmers, aquaculture businesses, and extension service providers to enhance the opportunities for research at the land-based nursery. The nursery is focused on optimizing quality seedling production at a cost-effective and outside of laboratory setting. Research continues on all aspects of the seedling production including nutrient and light optimization, induction of sorus tissue production in the lab, sporing techniques, and gametophyte use. The land-based seedling production and research will be accessible to the public and those interested in entering the sector.

SECTION 2: TECHNICAL VIABILITY

2.1 Institutional plan

Species and strain

The on-land seedling nursery focuses on growing kelp seedling lines following a process of sporing from wild harvested sorus tissue of sugar kelp (*Saccharhina latissima*) and horsetail kelp (*Laminaria digitata*). The site may also research the ability to grow seedlings of local species of dulse (*Palmaria palmata*) and nori (*Pyropia sp.*) as a secondary research objective.

Stock source

The sorus tissue will be locally collected from wild kelp harvested within a 50 km radius of the on-land seedling nursery. The primary source location is Hell Point near Kingsburg (Figure 1). The primary method of sorus tissue collection is done by collecting fresh, storm cast kelp with sorus tissue on shore. Snorkeling and hand cutting may also be used as a method of collection. This is done with little disturbance to the kelp beds as the tissue collected on shore has already been naturally removed from the bed. In water collection involves hand cutting small sections of individual kelp fronds that have reproductive tissue while leaving the required frond length and holdfast intact. Only 10-20 cuttings at a time are needed to produce thousands of seedlings.

Figure 1. Collection area – waters off Hell Point, Kingsburg

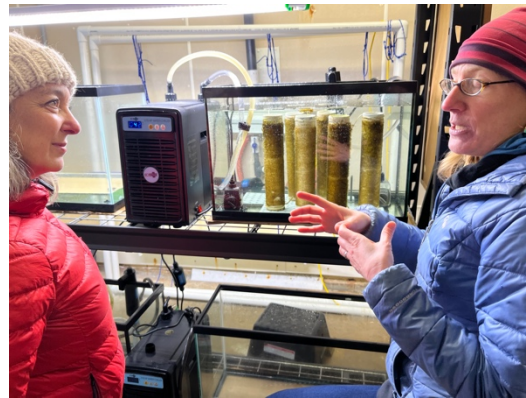


Maximum site biomass

The site will grow seedlings in aquaria that each hold 109 L (29 gal) of seawater. There will be six aquaria at any one time holding up to 10 spools that serve as substrate for seedling growth (Figure 2, 3, 4). The total biomass of seedlings produced per cohort would not reach 1 kg of biomass.



Figures 2, 3, 4 showing 29 gal aquarium set up with chiller and recirculating pump, UV filter and circulating; spools and twine substrate seedlings will grow on in aquarium; seedling growth at 5 weeks and aquarium set up; visible is the two tank system per cohort of seedlings with one of a pair of tanks holding the seedling spools and seawater, pumps etc at time.



Maximum fertilizer input

Seed production in the aquarium will use filtered (to 0.1 micro), natural seawater treated with a UV filter to remove as many other algae as possible, zooplankton, and phytoplankton species that could compete with the kelp sporophytes, as well as the addition of F/2 Nutrient

Media. F/2 is used at a strength of 700 ml F/2 in 20 gal (75 L) of seawater and contains the following:

- Deionized water 1,000 mL (total) (1 L)
- NaNO₃ 2,800 mg (2.8g)
- Na₂ glycerophosphate 400 mg (0.4 g)
- Thiamine-HCl (Vit. B1) 4 mg (.004g)
- Tris Buffer 4,000 mg (4g) (tris(hydroxymethyl)amino-methane; 2-amino-2[hydroxymethyl]1,3-propanediol)

Maximum tank density

The volume of one tank is 0.109m³ with less than 1 kg of seedling mass with all spools combined.

Maximum total tank volume

The nursery could support up to 12 aquaria of 109 L each (a volume of 0.109m³). In each seedling cycle, only half the aquaria have spools growing in them at any one time. The two-tank system is used to facilitate cleaning and weekly water changes with the spools shifted from one tank to the other each week. Therefore, 6 tanks would contain seawater at any one time. For sake of maximum calculation, if we have a maximum of 12 tanks, the total tank volume could reach 1.408m³.

Initial stocking date

The stocking time is dependent on the wild kelp reproductive cycle and availability of sorus tissue for collection. The primary time for sorus tissue development and collection for the seedling nursery is mid – September through the end of October. There could be several cohorts of seedling spools started during period with growth of seedlings in aquaria for 6 – 8 weeks at a time. There may be a secondary cycle of reproductive tissue production in spring that could also be harvested for a cycle of seedling production.

Expected production period

Production time of seedlings ready for out-planting in the ocean environment is typically 6-8 weeks growing in the aquarium.

Use of plants following activities on site

If seedling production is successful, seedlings will be planted out on aquaculture Site 0049, which is licenced and leased to Indian Point Marine Farms Ltd. The seedlings will be monitored in the water for viability and to test for quality of seaweed produced.

2.2 Location

The seaweed seedling production nursery has been located at 82 Indian Point Rd (Property Identification Number 60231 644), inside the existing building owned by Indian Point marine Farms Ltd. (Figures 3 & 4). The licence applicant, Ecology Action Centre, is renting space from Indian Point Marine Farms Ltd. inside the plant for the nursery aquaria to be set up in. The plant building is in Gold River Watershed (watershed 10).

Figure 3. Site location, 82 Indian Point Rd, Mahone Bay



2.3 Water source

The water source for the nursery aquaria is directly outside the plant and will be drawn from Indian Point Marine Farms Ltd. existing water intake hose 60 m from the shore. The salinity of the water ranges from 2.8 - 3.0 ‰ (28 – 30 ppt) and the sea surface temperature varies throughout the year between 3 – 19 °C. The water intake for the seedlings will be during Fall and Spring when the water temperature is between 9 and 15 °C. The existing water intake and discharge system is not being altered for this project (Figure 4) and Indian Point Marine Farms Ltd. holds all required permits and approvals needed and have been in good standing for many decades of business operation.

The nursery aquaria do not flow – through (see 2.6 System for specifics). The aquaria have weekly water changes with seawater drawn, filtered, and held in cisterns. Fresh seawater is also used for cleaning equipment. Weekly intake would be about 1000L of seawater at a maximum.

Figure 4. Existing Indian Point Marine Farms Ltd. Plant, seedling aquaria is located inside. Arrow indicates the existing seawater intake pipe



Figure 5 and 6. Seawater is filtered through 5.0, 1.0, and 0.1 micro filters before being placed in the aquarium that is a closed recirculating system with chiller and UV filter on each tank



2.4 Water discharge

The water used in the nursery aquarium will be discharged through the existing in – plant discharge system that releases seawater back into the bay through the discharge pipe 50 m from shore. The seawater discharged from the nursery aquarium is clean seawater. It has been filtered to 0.1 micron and sterilized with UV. Any nutrients added to the seawater have been taken up by the seedlings before the seawater is discharged from tanks. The existing discharge system will not be altered, and Indian Point Marine Farms Ltd. holds all required permits and approvals needed and have been in good standing for many decades of business operation.

Figure 6. Existing water discharge grate outflow pipe runs below plant



and

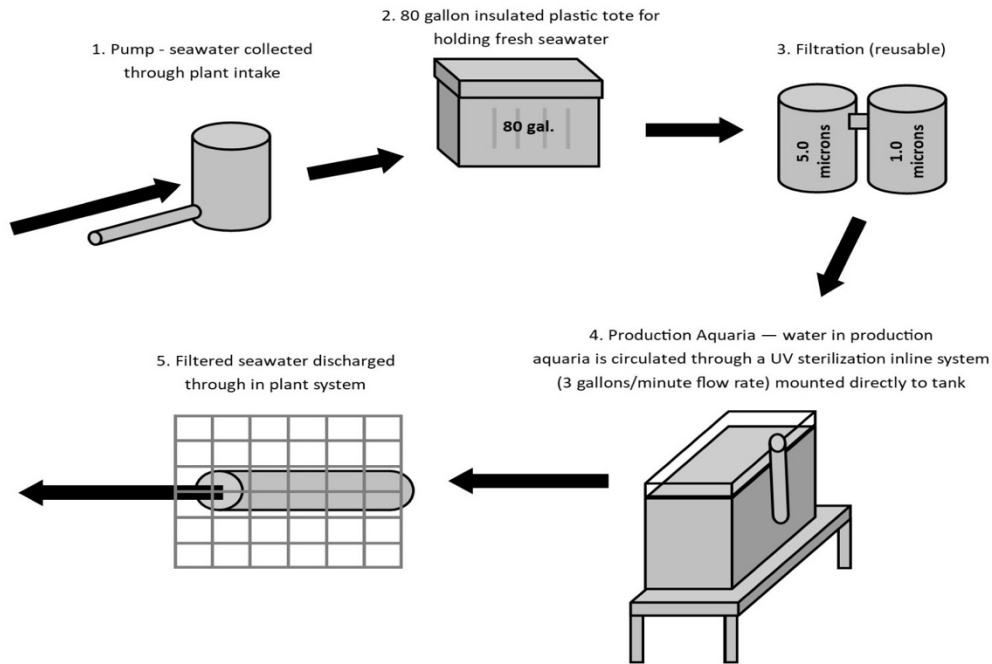
2.5 Infrastructure

The project applying for the institutional licence renewal will be inside an existing plant facility with an existing wharf. Use of the building space, wharf, existing electrical, water intake (hose in Figure 4) and outtake (in-floor outflow grate in Figure 6), and other fixtures and infrastructure required for the project are accessed by the applicant, Ecology Action Centre, through a rental agreement with Indian Point Marine Farms Ltd.

2.6 System

Figure 7 is a basic schematic showing the flow of water in the system. Seawater for the aquaria is drawn from the bay directly outside Indian Point Marine Farms Ltd. plant through the existing water intake hose. The seawater is stored in a clean plastic holding tank. The seawater is then run through three levels of water filtration – 5.0, 1.0, and 0.1 microns – on its way into the aquarium. The filtration aims to remove particulates and algae, zooplankton, and any other plant or animals that could outcompete or eat the kelp spores and seedlings. Once in the aquaria, the seawater is then circulated at a flow rate of 3 gallons/minute through the UV sterilization light tube for a minimum of # hours before seedling spools are introduced into the water. UV sterilization will denude any free – floating organism to help reduce any introduction of other algae or zooplankton that may outcompete or eat the microscopic seaweed seedlings. The aquaria use an external chiller with circulation pumps out of the aquarium through the chiller and back into the aquarium to maintain the seawater at 10°C. The water is changed in the aquarium once a week to ensure fresh seawater with the required nutrients for growing is available to the kelp seedlings.

Figure 7. Seawater flow system in and out of propagation aquarium and treatment



2.7 Containment

The project will only be using locally sourced native species of seaweed within a 50 km radius of the seaweed seedling nursery – sugar kelp (*Saccarhina Latissima*), horsetail kelp (*Laminaria digitata*) dulse (*Palmaria palmata*), and nori (*Pyropia sp.*).

2.8 Site history

The Indian Point Marine Farms Ltd. was established in 1985 and over the years grew to process mussels from 5 aquaculture site leases at this plant site. The plant building will now house this small seaweed nursery project.

2.9 Technical ability

The project's senior manager, Shannon Arnold, holds a Master of Environmental Studies that focused on the economics, markets and seaweed farm development in coastal

communities as well as policies regulating seaweed farming globally. She worked for 8 years in the Philippines' seaweed farming industry with experience in seedling development, farm techniques, as well as policy and business development throughout Asia on seaweed and coastal fisheries. Shannon is the Associate Director of Marine Programs at the Ecology Action Centre.

The project's hatchery and farm technician, [REDACTED] holds a Bachelor of Science in Biology with a specialization in Environmental Biology. She worked for 1.5 years in Prince Edward Island's aquaculture industry with experience in rearing larval halibut, egg and larval development, and basic aquaculture husbandry. She was hired following the fall 2023 reproductive tissue cycle and has since gained experience in the kelp seedling nursery.

The work is also supported by a full time project manager, [REDACTED], and part time outreach coordinator, [REDACTED] both with extensive project management and community development expertise. The broader marine program staff at the Ecology Action Centre hold degrees in ecology, fisheries science, and marine management and policy.

[REDACTED], owner of Indian Point Marine Farms Ltd. and leaseholder of marine Site #0049 is acting as an advisor to the project. [REDACTED] has more than 40 years of aquaculture experience. The project will also contract expert phycologists and technical consultants where necessary.

2.10 Compliance history

The on-land nursery under this licence has had no issues with compliance to date. The plant and aquaculture operations of Indian Point Marine Farms Ltd., where our project will operate out of have not had any history of non-compliance.

Section 3: Financial Viability

3.1 Financial ability

[REDACTED]

3.2 Potential economic impact

The Ecology Action Centre seedling nursery aims to contribute directly to the growth of the marine plant aquaculture sector of Nova Scotia in a number of ways. The seedlings produced are available for grow out on commercial farms. We are one of only a few productive kelp seedling nurseries in the region. The nursery directly employs 1.5 full time equivalent staff and is part of a larger project that employs a further 2-3 full time staff focused on research, outreach, capacity building in the sector, and market development of the marine plant sector. The project has contracted with a number of researchers and consultants from across the region. The nursery sources supplies from local hardware, aquarium, fisheries, and other retail stores and contracts with local electricians and plumbers as needed. The education and capacity building aspects of the project demonstrates the nursery and supports local sector development by training would be farmers, nursery operators, and product developers interested in entering the sector. Our open house days at

the nursery and broader project work is directly bringing people to the nursery area to spend and helping to create a paying market for aquaculture grown seaweed across the region.

The research work undertaken at the nursery is for the benefit of the whole sector and has included but is not limited to: low-cost nursery design options for producing quality seedlings from local kelp; differing techniques for treatment of sorus tissue, sporophyte settling, substrates options, and grow out optimization.

All work of the project will be publicly available for others in the industry to build on. We aim to demonstrate and refine techniques that can be replicated in rural, coastal contexts of Nova Scotia and accessible with low capital entry costs.

The Ecology Action Centre has been involved in advocating for the improvement of aquaculture regulations and policy in Nova Scotia for over a decade and will also be working with the province to advance 'right-sized' policy and guidelines for small scale seaweed farming that ensure strong environmental protections while enabling more entrants into this growing aquaculture sector.

3.3 Adverse economic impacts

N/A

Section 4: OTHER USERS OF AREA SURROUNDING THE PROPOSED AQUACULTURAL OPERATION

4.1 Canadian Navigable Waters Act (CNWA) approval

This is not applicable to the on-land nursery project. It will have no impact on ocean-based shellfish farming sites nearby.