MARBASE

Environmental Registration

For

Marbase Cleanerfish Hatchery

December 09, 2019

MARBASE

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Executive Summary

This document has been prepared by Marbase Cleanerfish Ltd. ("Marbase Cleanerfish") for the Newfoundland and Labrador Department of Municipal Affairs and Environment as a Project Registration in accordance with the Environmental Protection Act. It addresses the construction and operation of a lumpfish hatchery in Marystown, NL to be located within the Marbase Integrated Aquaculture Service Hub (formerly the Marystown Shipyard).

The Marbase Cleanerfish Hatchery will provide lumpfish to Atlantic salmon farming operations where sea lice may be present and act as a stressor to the fish. By consuming the sea lice, the lumpfish act as a biological control. The development of this species as a "cleanerfish" has come about from their use in other parts of the world (Norway, Iceland, Great Britain) and in part as a result of the research and development work carried out at Memorial University's Ocean Science Centre.

This Registration provides a description of the proposed undertaking, including planning, design, construction and operations. The registration is supported by appended material to address details of planning and design as well as the production of baseline information on the existing environment, both biophysical and human.

The major features of the proposed facility include:

- Utilization of industrial zoned space within the Marbase Service Hub;
- Access to existing services; and
- Use of saltwater supplied from Mortier Bay.

A Construction Environmental Protection Plan will address site preparation, facility assembly, fabrication, services installation and project commissioning.

Applications for permits and approvals will be made in a timely manner to address regulatory requirements related to aquaculture operations, water quality, aquatic habitat protection, waste management (handling, treatment, recycling and disposal), employment equity, navigation waters use, water extraction and allocation, contingency planning and emergency preparedness.

The applicant has consulted with governments (municipal, provincial and federal), the public and interested stakeholders as a means to identify issues and concerns related to the proposed undertaking, with the intent to address these throughout the planning stages for the work. The concerns identified can and will be addressed through project design and planning, as well as through regulatory permitting.

Construction of the proposed facility is planned to commence upon receipt of all necessary permits and approvals. The current schedule is for site work to commence by May 2020 with completion forecast by November 2020. The capital cost of the undertaking is estimated at CDN $20 million.

At full operation, the proposed hatchery will be capable of annually producing 3.0 million fish from egg incubation through to juveniles at a market size of 25 - 40 grams each. While the hatchery will form a very important link in the finfish aquaculture service sector, the scale of operation should be placed in context. At full production the total yearly output will amount to approximately 75 tonnes of lumpfish, a very modest quantity when compared against the production of ~25,000 tonnes of salmon produced by farmers in Newfoundland.

This scale of operation is also reflected in the waste produced. The largest waste is the material extracted by filtering of seawater, both prior to its use in the hatchery rearing tanks, and when the outflow is filtered before release. The resulting “sludge” volume of 8,000 kg per month is relatively small compared to a commercial salmon hatchery. The Marbase Waste Management Plan will consider all opportunities to utilize this organic resource, possibly as a fertilizer in agriculture.

This undertaking represents a continuation and expansion of a service capability already present in the province and a final step in the conversion of university-led research into a viable commercial enterprise. The scope of the undertaking for examining environmental effects needs to reflect the status of this initiative as an evolutionary step rather than a new undertaking. Its scale also needs to be appreciated. The quantity of product is minor, especially in comparison to finfish production. The effects associated with deployment of lumpfish into sea cages have already been considered (see Grieg NL EIS 2018) and clearly this biological approach to a biological problem has a net environmental benefit.

The potential negative effects are minimal in scale and all can be addressed through existing regulatory mechanisms. The potential positive effects are impressive, especially for the finfish aquaculture industry and the potential elimination of pesticides. Business activity will contribute importantly to the community of Marystown, NL in terms of construction, ongoing operations, training, employment, as well as spin-off economic activity throughout the local economy.

1.0 Introduction

This document is a Project Registration as per the Newfoundland and Labrador Environmental Protection Act. The Proponent is Marbase Cleanerfish Ltd. ("Marbase Cleanerfish"). The company proposes an undertaking called the Marbase Cleanerfish Hatchery. This project includes the construction and operation of a lumpfish hatchery in Marystown, NL. The facility will be located at an existing industrial site (formerly the Marystown Shipyard) and utilize services available from the municipality, utilities and other third parties. A dedicated saltwater supply will be developed by Marbase Cleanerfish for the facility.

The Marbase Cleanerfish Hatchery will represent the commercialization of techniques and technologies developed at Memorial University's Ocean Science Centre and previously applied and adopted in many other jurisdictions (Powell et.al 2018). The facility will operate under the terms and conditions of an Aquaculture License to be issued by the province. The undertaking will adhere to industry standards, and will, through its Sustainable Development approach, operate at the highest environmental and quality standards.

This Project Registration is organized to comply with the Registration Format as laid out in guidance documentation (*See Environmental Assessment - A Guide to the Process, March 2017*).

In addition to the main text, supplementary information is presented in a set of appendices:

- Appendix A contains plans, drawings and illustrations of the existing site and building, as well as conceptual layout of the proposed facility.
- Appendix B presents the results of field sampling for water quality and related analyses related to the proposed saltwater supply.
- Appendix C contains the annotated table of contents for an Environmental Protection Plan.
- Appendix D contains a draft Waste Management Plan.
- Appendix E contains a draft Women's Employment Plan.
- Appendix F contains a report on Stakeholder Consultation and Issues Identification.

2.0 General Information

This section provides general background information on the Proponent, the name assigned to the undertaking and the reasoning behind the proposed project.

2.1 Proponent Contact Information

(i) Name of Corporate Body*:* Marbase Cleanerfish Ltd.

(ii) Address: 137 LeMarchant Road, St. John's
Newfoundland and Labrador A1C 2H3

(iii) Chief Executive Officer

Name*:*	Mr. Paul Antle
Official Title:	Chairman and CEO
Address:	137 LeMarchant Road, St. John's Newfoundland and Labrador A1C 2H3
Telephone No:	(709) 726-0336
E-mail Address:	pantle@plutoinvestments.ca

(iv) Principal Contact Person for purposes of environmental assessment

Name*:*	Mr. Paul Antle
Official Title:	Chairman and CEO
Address:	137 LeMarchant Road, St. John's Newfoundland and Labrador A1C 2H3
Telephone No:	(709) 726-0336
E-mail Address:	pantle@plutoinvestments.ca

2.2 Name of the Undertaking

Marbase Cleanerfish proposes to construct and operate a commercial lumpfish hatchery in Marystown, NL, to be located within the Marbase Integrated Aquaculture Service Hub (formerly the Marystown Shipyard).

The name of the undertaking is "**Marbase Cleanerfish Hatchery**".

2.3 Purpose/Rationale/Need for the Undertaking

The Marbase Cleanerfish Hatchery will provide "cleanerfish" to act as a natural, biological method of sea lice control for farmed Atlantic salmon. The undertaking represents an economic opportunity for the town of Marystown and will provide an important contributor to a viable, self-sustaining finfish aquaculture industry for the Province.

There is an existing cleanerfish research production system in place to serve the needs of fish farmers in the Province. The Ocean Science Centre at Memorial University accesses a supply of eggs each year, fertilizes the eggs, incubates them and raises the lumpfish to approximately 1 gram. These lumpfish are then transferred to the finfish producers who transport the fish to tank facilities in Belleoram, and to sites in Nova Scotia and New Brunswick. When the lumpfish achieve a size of 25 – 50 grams they are again transported, this time for distribution to sea cages along the south coast of the Province.

This current production system is highly constrained by the capacity Memorial's Ocean Sciences Centre facilities. It involves some challenging logistics as lumpfish have to be transported considerable distance, on at least two occasions, in each growth cycle. At present, the system is capable of producing a maximum of 1,500,000 lumpfish per year. Clearly, a dedicated commercial lumpfish facility is better suited to address the demands in the sector locally given the demand for cleanerfish and the objective of providing an efficient means for their production and marketing.

3.0 Description of the Undertaking

The Project includes the construction and operation of a hatchery for lumpfish. The facility will be constructed by renovating an existing building on the Marbase Service Hub property in Marystown. The hatchery area includes wharf frontage, a dedicated entrance, a large building and extensive parking/storage space.

At full production, the proposed hatchery will be capable of annually producing 3.0 million lumpfish from egg incubation through to juveniles at a market size of 25 - 40 grams each. A flow-through saltwater system will include treatment (temperature adjustment, filtration and purification) before and after use in the hatchery. Sales of lumpfish will be made at the facility boundary (dock side or truck loading bay).

3.1 Geographical Location

The Marbase Cleanerfish Hatchery site is within the boundaries of the former Marystown Shipyard property within the Town of Marystown. Appendix A includes a survey of the property. The hatchery is to be located in the Machine Shop/General Stores/Carpenters and Joiners Building, referred to now as the “Hatchery Building”.

There are two road access routes onto the Marbase Service Hub property, one off Ville Marie Drive and one directly to the Hatchery building located off Dock Road. Water access is also available from the dock face.

3.1.1 Community Setting

Marystown is the largest community on the Burin Peninsula with a population of approximately 5,000. The town has significant industrial infrastructure including a new industrial park, an offshore fabrication facility at Cow Head and the former Marystown Shipyard site. Grieg NL is currently constructing an Atlantic salmon hatchery in the community and intends to make Marystown the center of their aquaculture operations in Placentia Bay.

Marystown and the other communities on the Burin Peninsula have combined efforts to provide regional services such as community health services, fire protection, waste management, and to undertake regional economic initiatives such as tourism marketing through the Burin Peninsula Chamber of Commerce.

While the population of the Burin Peninsula has been decreasing over the past years, there is still ready access in the region to a trained and experienced work force, especially in trades, transportation and equipment operation (Grieg NL 2018, Table 4.7.2).

3.1.2 Site Description

The location of the Marbase Cleanerfish Hatchery is shown in Figure 1. An image of the marine setting (Mortier Bay) is shown in Figure 2, while Figure 3 shows the property comprising the Marbase Integrated Aquaculture Service Hub (formerly the Marystown Shipyard).

The south and west boundaries of the site are adjacent to the larger Marbase Service Hub. The east boundary is Mortier Bay. To the north of the site is the Transport Canada wharf and slipway, a decommissioned tank farm as well as residential dwellings.

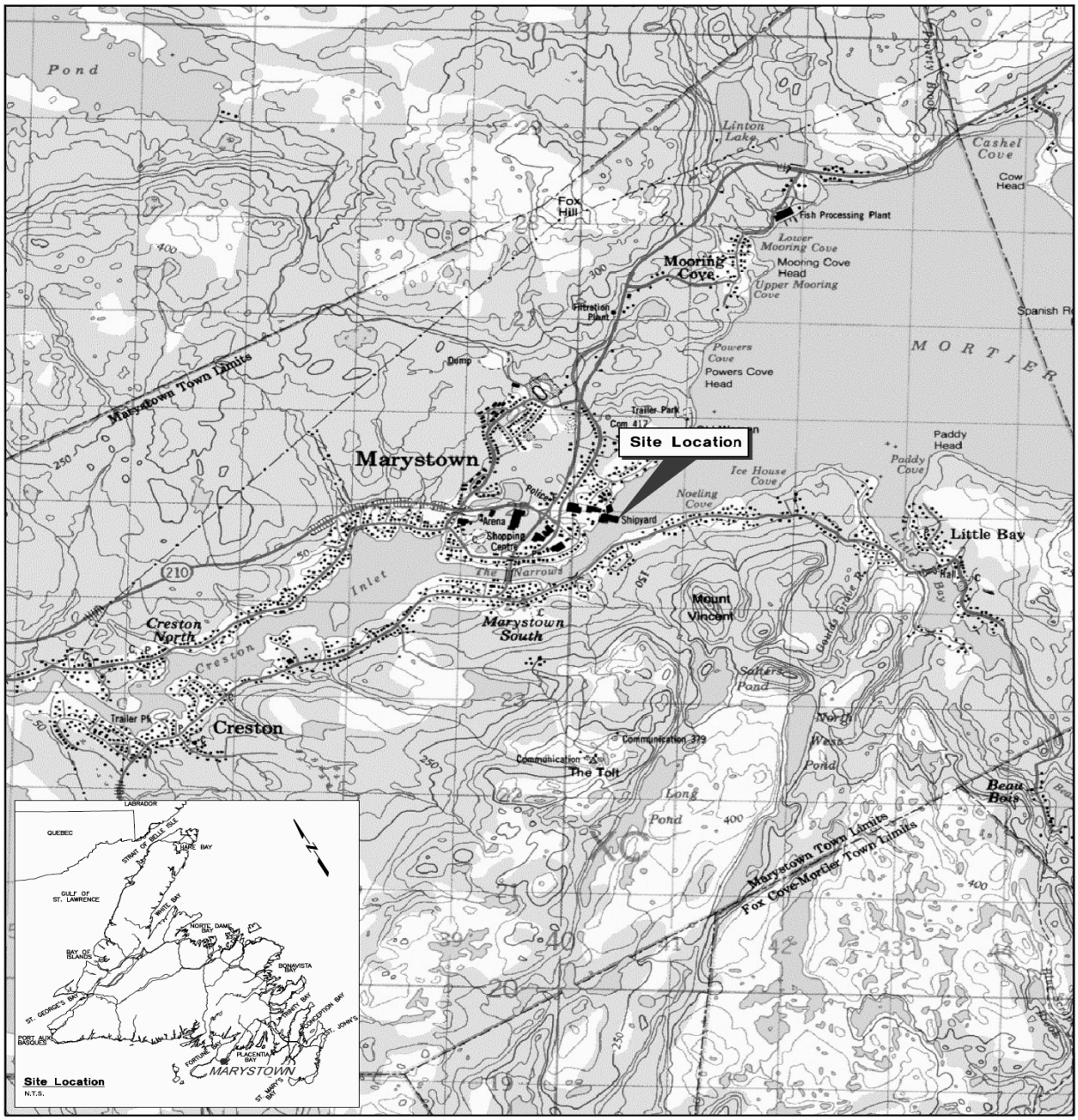


Figure 1 Marbase Cleanerfish Hatchery – Location in Newfoundland and Labrador

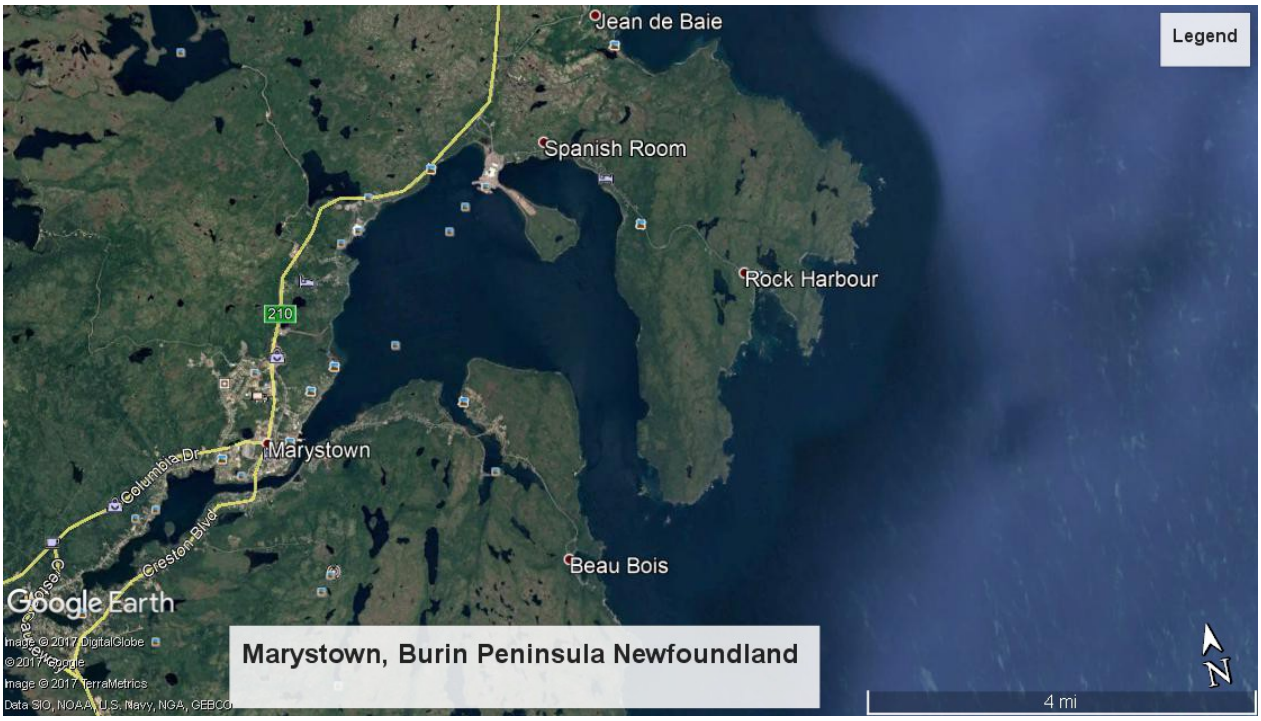


Figure 2 Marbase Cleanerfish Hatchery - Location in Marystown

Figure 3: Marbase Cleanerfish Hatchery- Location in Marbase Service Hub

3.1.3 Current and Historical Land Use.

The Marbase Service Hub property is zoned by the Town of Marystown as Industrial, however there has been little site activity in over fifteen (15) years, other than remediation and abatement being carried out for the Province in fulfilment of its environmental liability responsibilities.

For most of its life, the site has been referred to as the Marystown Shipyard. It was built by the federal and provincial governments in 1966 and operated initially by Canadian Vickers, under the name Newfoundland Marine Works Ltd. In 1979, the name was changed to Marystown Shipyard Ltd. (*https://en.wikipedia.org/wiki/Marystown#Shipyard*). The Site is in the Town of Marystown on the shores of Mortier Bay on the Burin Peninsula of Newfoundland (Figure 3). The property comprises approximately 9,400m^2 of fabrication area and has a water frontage of 330m (JWA, 2002a). During the period 1969 to 1998, fifty vessels were constructed at the shipyard (*http://shipbuildinghistory.com/canadayards/marystown.htm*).

The Site originally consisted of a small cove with steep sides (20m cliffs) and a tidal pool that received the outflow from a small stream. The location provided a relatively flat piece of land near sea-level. It appears to have been used prior to 1949, as evidenced by the presence of a building and road. During the 1950's the site was used as a wooden boat building facility complete with a sawmill. In the mid-1960's, dredging and infilling occurred, along with construction of the main shed. By 1976, additional site buildings had been constructed, including General Stores, Service building and Office building. From the late 1970's until 1991, the facility constructed, repaired and serviced a series of vessels, with as many as ten (in 1980) present on the Site at the same time.

The shipyard facility includes a combination Syncrolift and side transfer system that provides access to the sea with sufficient water depth and channel width to accommodate vessel sizes up to 19.5m beam and 80m in length. (*http://www.noia.ca/Industry-Info/Regional-Infrastructure/Construction-Fabrication-Repair/).*

In late 1997, the Government of Newfoundland and Labrador transferred ownership of the Marystown Shipyard to Friede Goldman Marystown Ltd. (FGM - name later changed to Friede Goldman Newfoundland Ltd. – FGNL). As part of the transfer arrangement, the Newfoundland and Labrador Government provided FGM with an Environmental Indemnity to address historical environmental issues and/or contamination that existed on the site prior to the sale. In 2002, ownership of the Marystown Shipyard again changed with the purchase from FGNL by Peter Kiewit Sons Co. Ltd. (later changed to Peter Kiewit Infrastructure Co. - "Kiewit"). The purchase conditions included the assignment in March 27, 2002 of the 1997 Environmental Indemnity to the new owner.

Since 2002, limited industrial activity has occurred at the site. During the White Rose Project (2002-2005) the Syncrolift was used for loadout of steel structures from the Shipyard and for ship repair until 2004. Since 2004, the site has seen infrequent use except for some lifeboat inspections and the occasional welding project.

In September 2019 the site was sold to Marbase Marystown Inc. for the development of the Marbase Integrated Aquaculture Service Hub. The Government of Newfoundland and Labrador retained environmental liability for the site and has initiated a program to address residual environmental

concerns associated with contaminated soil and building materials (lead paint and asbestos-containing materials). The remediation and abatement programs are expected to be completed by March 2020, after which time Marbase Cleanerfish plans to commence hatchery construction.

3.1.4 Environmental Setting

The Marbase Cleanerfish Hatchery site is within an industrial brownfield site, with a history of heavy construction – ship building and repair, as well as large metal structure fabrication – including welding, sandblasting and painting. The land surface is predominantly concrete and asphalt. A series of site environmental investigations have been carried out, and extensive site remediation completed including soils and buildings. As a result, the area complies with standards for an industrial site.

The adjacent (near dock) marine environment is characterized by fine sediments that show evidence of some contamination. The waters of Mortier Bay receive sewage discharges at 38 nearshore locations; however, water quality appears to be acceptable in meeting marine water quality standards based on one suite of samples collected from the candidate hatchery saltwater intakes and outlet locations (Appendix B).

The marine waters adjacent to the hatchery site and within the area where the saltwater supply is to be located, are subject to intermittent fishing activity, limited to recreational scallop and cod fishing (CCRI 2010; also see Appendix F).

Mortier Bay has a maximum water depth of 100m, with a 60m deep sill at the narrow (850m wide) entrance to the Bay. The watershed drainage for Mortier Bay is relatively modest (in the order of 200km^2) so that freshwater inflow would be a small proportion of the total volume of water present in Mortier Bay. These features likely act to limit the extent of estuarine mixing and circulation. Portions of the enclosed Bay that are below the 60m sill level are likely depositional and probably dominantly comprise mud/fine sediment material. The seabed over much of the embayment is predominantly mud and gravel bottom (CHS 2008). In the vicinity of the Marbase Service Hub the bottom is characterized as completely mud.

3.2 Project Description

The undertaking will involve the refurbishment of an existing building (Figure 4, Figure 5) and its renovation into a hatchery (Figure 6). Appendix A includes drawings of the existing structure, as well as the plans for hatchery renovations and examples of hatchery equipment.

Figure 4: Hatchery Building Site looking North

Figure 5: Hatchery Building Site looking West

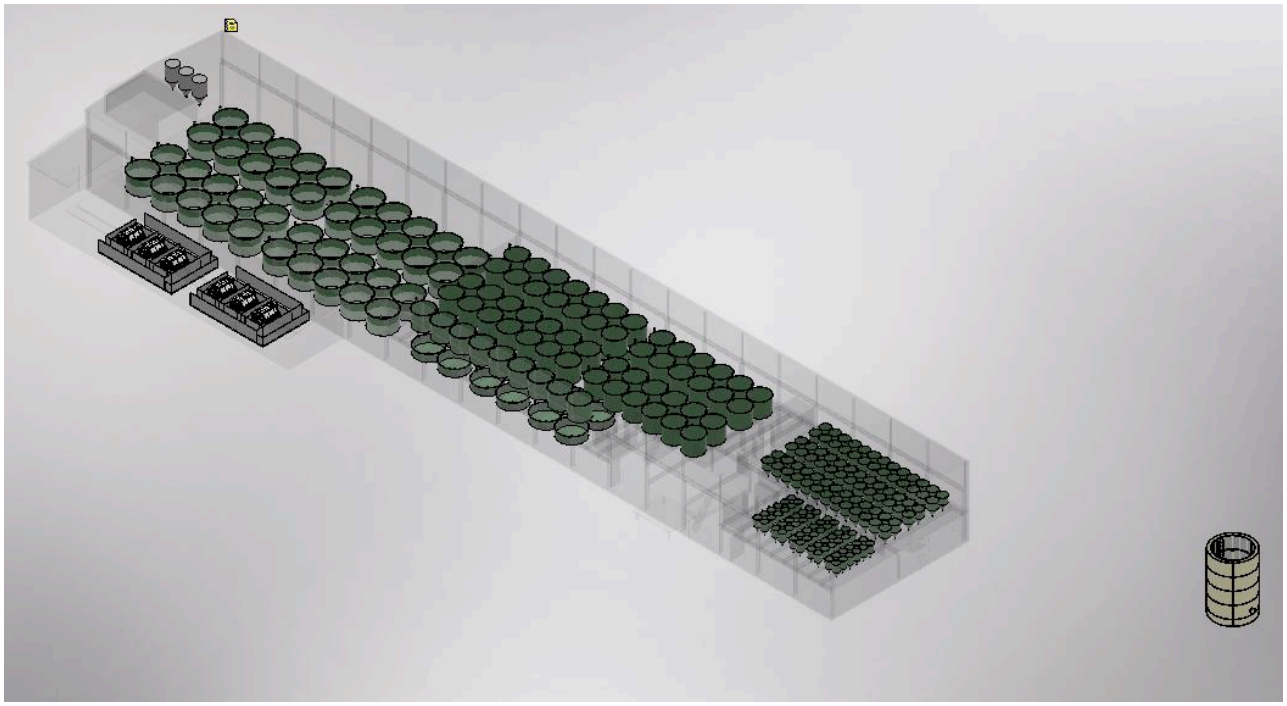


Figure 6: Hatchery Concept showing Tank Distribution.

The footprint of the hatchery will be confined generally to a 1 ha. section of the Marbase Service Hub. The saltwater supply will require a small pumphouse with intake and discharge pipes.

3.2.1 Services

Services are currently provided to the Marbase Service Hub and include road access, electric power and potable water. An existing approved site sewage treatment facility and marine outfall will serve the needs of the hatchery facility. The existing site surface water collection and drainage system includes operation of functional sumps and an oil-water separator. A diesel-powered emergency generator will be required on site to ensure uninterrupted electricity service for the hatchery.

3.3 Project Construction Phase

Given the presence of an existing serviced site with ready access, construction will be completed in six months. The major construction tasks are described below.

3.3.1 Site Preparation

The existing site will require repairs to the asphalt surface, dock face and surface drainage collection, as well as installation of an access gate and perimeter security fencing.

3.3.2 Building Refurbishment

An engineering assessment has found that the building is structurally sound and capable of supporting the anticipated loads from the hatchery operation, especially with respect to water tanks.

Building refurbishment activities will include insulation of walls and roofing, a new HVAC system, upgrading of floor drainage and sump, an office and minor laboratory facilities, a food pellet storage and handling area, and a hazardous materials storage area.

3.3.3 Saltwater Supply

External to the Hatchery building, a concrete foundation is required for the saltwater pumphouse and storage tank. The detailed routing of the intake piping on the seabed will be confirmed through examination of existing multi-beam acoustic surveys. Pipe sections and ballast will be stockpiled at the Marbase Service Hub dock. A marine contractor will employ a laydown barge to place the pipe and intake along the seabed.

The discharge pipe will extend below low water mark, while the intake pipes will extend to water depths of approximately 15m and 50m. The intakes will have screening to avoid impingement and entrainment of marine organisms. The installed pipes will be ballasted on the seabed. The intakes will be capable of supplying marine water to the hatchery complex on a continuing basis and at two temperatures. The discharge line adjacent to the hatchery will return water following treatment and filtration.

The intakes will be located clear of any contaminant sources (sewer and other outfalls, including the hatchery outfall). The hatchery discharge will be located near surface and proximate to the hatchery building and at a distance of 500m minimum from other intakes. The pipeline routes as well as the intake screening will need to address Federal Fisheries requirements related to fish habitat and fish protection. The water extraction and discharge will require the issuance of a Water Use Authorization from Water Resources Branch, provincial Department of Municipal Affairs and Environment. The pipeline sizing will be established as hatchery design advances.

3.3.4 Hatchery Installation

The tank arrays, saltwater circulation piping and water treatment equipment make up the core of the hatchery. A total of approximately 280 fiberglass tanks will be required, ranging in size from 0.55m^3 to 40m^3 capacity to accommodate the different sizes of growing fish. Each tank will be supplied with saltwater flow adequate to achieve a turnover rate of once per hour.

Water treatment systems to be installed include thermal control (incoming water), as well as UV disinfection and drum screens for filtration. Other installations will include aeration/oxygenation and oxygen monitoring sensors. Examples of this equipment are illustrated in Appendix A2.

3.3.5 Environmental Protection during Construction

Marbase Cleanerfish Hatchery is committed to minimizing its environmental footprint throughout the construction period. Potential negative environmental effects from site development and construction have been anticipated and best practice technology and methods will be used to reduce and avoid effects of construction on the environment.

There are a limited number of potential sources of pollutants during construction. The identified concerns include:

a. Airborne – exhaust emissions/noise from mobile and stationary equipment;
b. Fuel storage and handling;
c. Washdown and other surface water containing sediments and suspended material;
d. Stormwater runoff containing sediments and such pollutants as precipitate from vehicle exhaust, oil and lubricants; and
e. Solid waste- packaging, excess and scrap building material, and excavated material (removal of unsuitable material and excavation for foundations).

Waste management will be practiced from the start of construction and throughout operation of the Hatchery. Waste will be separated into non-hazardous and hazardous materials. All waste produced will be documented, stored appropriately and either salvaged, recycled or disposed of appropriately. Appendix D contains a draft Waste Management Plan for the Project.

3.3.6 Potential Resource Conflicts

No potential causes of resource conflicts have been identified for the construction of the proposed hatchery. There is potential for construction activities to interact with marine traffic and recreational fishing activities for short periods and restricted locations during installation and commissioning of the saltwater circulation system.

Marbase Cleanerfish plans to consult further with regulators (Fisheries and Oceans Canada - Habitat Protection; Transport Canada – Navigation Waters) as well as resource users in order to comply with regulatory requirements and to avoid any negative interactions.

3.4 Project Operation Phase

The Marbase Cleanerfish Hatchery will operate year-round as a permanent facility. Staff will be present on a twenty-four, seven-day a week schedule, however most activities will occur during the daylight shift. The stages from fertilized egg incubation to achieving marketable size lumpfish take nine months. Allowing for maintenance and cleanup activities, the facility will operate on a one year cycle.

Peaks of activity will occur when egg fertilization and incubation occur each Spring, and when lumpfish are sold.

During start-up of operations, Marbase Cleanerfish will rely on Memorial University's Ocean Science Centre and commercial fishers for the collection of fertile females to provide an adequate supply of eggs. In year one of production (2020), Marbase Cleanerfish will purchase of 500,000 juveniles from the Ocean Science Centre and raise these lumpfish to marketable size for sale in 2021.

In 2021, the hatchery will secure 40kg of eggs (1kg = 100,000 eggs), to start the full reproductive cycle. In this manner, by 2022, the hatchery will be capable of producing 3.0 million lumpfish from egg incubation annually. Note, during the early stages of operation some fish may be marketed at the 1gram size.

3.4.1 Description of Operation

During normal operations, water will be continuously pumped at a rate in the order of 60 m^3/min. into the saltwater holding tank and from there to the water treatment area. Drum filters will screen to 50 microns, then the water will be directed either to heating/cooling tanks or to header tanks where UV filtration will further disinfect the supply. Oxygen and gas control will be applied to remove nitrogen and ensure adequate aeration of the water before its introduction to the fish rearing tanks.

Return water will be passed through drum filters to remove waste material (feces, uneaten food) prior to discharge. In addition, UV treatment will be applied to the outflow to ensure destruction of all pathogens. The sludge removed by the drum filters will be handled in accordance with the Waste Management Plan.

Feed in the form of pellets sized to stages of fish growth, will be distributed daily. Water flow and water quality (temperature and oxygen content) will be monitored automatically but subject to frequent visual inspection. Daily checks will remove any mortalities ("morts") and direct them for appropriate disposal.

Facility operations will be subject to a number of regulatory requirements (see Section 4). A key monitor and regulator at all phases is the Aquaculture Branch, Department of Fisheries and Land Resources (DFLR). As part of the Aquaculture License Application process, the agency requires a series of plans (*https://www.fishaq.gov.nl.ca/licensing/pdf/Aquaculture_Policy_Procedures_Manual.pdf*) including a Fish Health Management Plan and a Biosecurity Plan. The Aquaculture Branch is currently in the process of updating its guidelines, and once available, Marbase Cleanerfish will prepare and submit the required information for regulatory and stakeholder review.
To illustrate the scope and extent of regulatory requirements, and as an indication of the measures

and precautions that will apply, a summary listing is provided below of the contents of the Fish Health Management Plan.

Fish Health Management Plan

The Fish Health Management Plan will address the following topics.

- Facility Design and Layout
  - Species to be raised.
  - Identify components by name and use (e.g. hatchery, nursery, laboratory, mechanical).
  - Identify shipping, receiving and parking areas.
  - Identify signage, fencing, access control.
  - Describe and label water source and system design criteria for (influent, effluent) water treatment and inflow/outflow screening.
  - Location of all tanks, raceways, egg incubation units (with proper identification for each unit).
- Production plans – hatchery capacity, broodstock/egg source, wharf usage, fish source, stock numbers, feed source/storage/disposal
- Disease Surveillance and reporting
  - Designated Veterinarian
  - Designated fish health technician
  - Designated Laboratories
  - Surveillance plan
  - Record keeping
- Emergency Measures Plan
  - Mass mortality management plan and SOPs
  - Disease Event/Outbreak contingency plan
- Biosecurity Plan (see below)
- Record Keeping
  - Mortalities
  - Chemotherapeutants usage
  - Personnel and responsibilities
  - Environmental conditions - water quality, temperature.
- Integrated Pest Management Plan
- Animal husbandry and welfare.

Biosecurity Plan

The key objective of this plan is to ensure the facility is not threatened by disease, nor does it pose a disease threat itself. The Biosecurity Plan will address the following topics.

- Facility Operation
  - The flow of people.
  - The flow of fish through the facility, including transfer of fish.
  - The flow of water direct from source(s), through the facility to receiving water body (include flow through tanks and water treatment).
  - Provisions for secure food storage – type of food (raw vs moist vs dry).
  - Tank handling activities (separate dip nets, cleaning).
  - Pest control plan (i.e. rodents).

  - Describe water treatment including filtration, settling, degassing, bio-filtration and water disinfection PPE
  - Describe water quality monitoring protocols - frequency, sampling points, techniques.
  - Describe PPE (employees, visitors) and disinfection, what is to be worn and where.
- Site Precautions and Procedures
  - Facility Monitoring and Reporting system – documentation (e.g. Sign in sheet – example page), records maintenance and access.
  - Procedures for interaction with delivery vehicles/vessels.
  - Procedures for clean-down between lots of fish.
  - Process to follow for moving (new or used) equipment into the Province.
  - Describe mortality handling, storage and disposal.
  - Cleaning and disinfection- describe frequency, location, triggers that activate cleaning and disinfection of clothing, gear (including visitors), vehicles.
  - Identify Cleaning and Disinfection products – include contact time and concentration (as well as test used to measure concentration).

3.4.2 Sources of Pollutants

There are a limited number of discharges associated with the Project. The flow- through saltwater represents the largest volume. The seawater will be treated to a standard that supports marine life and ensures the destruction of pathogens. Regular monitoring of water quality will ensure compliance with applicable regulatory criteria.

Mortalities (“morts”) will constitute a small volume of waste and will be placed in weak formic acid baths (silage) for subsequent handling as organic waste for potential composting.

Wash water and storm water will flow to an existing drainage system that is equipped with sumps and an oily water separator.

Air emissions will be minor. Vehicular traffic will be limited, as will on-site heavy equipment. All mobile equipment will be fitted with exhaust controls and subject to preventative maintenance.

An emergency diesel-powered electricity generator will be located on site. The unit will be selected to comply with emission standards and will be operated infrequently.

3.4.3 Waste Management

During operation the facility will produce a limited quantity of waste as described below:

- plastic feed bags;
- organic sludge; and
- domestic garbage.

Drum filters used to extract particulate matter will produce an organic sludge that, is 15% solids. On average, the hatchery will produce eight tonnes of sludge per month.

Appendix D contains the Draft Waste Management Plan for the facility.

3.4.4 Mortalities

Mortalities will be removed daily from growing tanks and placed in silage. A contingency plan will be developed to address an extreme situation where mass mortalities occur. The contingency plan will include provision for the most extreme event – total loss of all fish in the hatchery.

In the normal operation of the hatchery mortalities will vary with size, decreasing as the lumpfish grow. Overall, mortalities can be as high as 20%.

3.4.5 Potential Resource Conflicts

Given the location of the hatchery and the level of activity associated with its operation, there is minimal potential for resource conflicts. Road traffic will be limited to workers and occasional service vehicles (feed delivery, lumpfish transport). Marine traffic will be even less frequent and likely limited to the transfer of lumpfish for distribution to Placentia Bay sea cage operations. Adjacent marine traffic can include use of the Transport Canada wharf and slipway, however given the respective volumes and the available space, there should be few occasions where interference occurs.

The presence of the saltwater pipes and intake could limit the routing of recreational scallop dragging, however there should be no other interactions with other vessel traffic and fishing activities. Again, consultation will be carried out with local users to identify and address any concerns.

3.5 Project Occupations

Marbase Cleanerfish will make a positive contribution to the local economy in the following ways:

1. Provide employment for as many as 60 people during construction;
2. Provide employment for 20 full-time staff during operation;
3. Generate direct economic spinoff to local and provincial service and supply companies;
4. Induce direct and indirect economic spinoff benefits related to provision of amenities and services for Marbase management, employees, contractors, service providers and others associated with the company and the Marbase Hatchery.

Marbase Cleanerfish is committed to being part of the local community and is subject to labour agreements with two local unions. Hiring preference is first within the local unions, then the local community, the Burin Peninsula, the Province and beyond.

A team of experts drawn from within the Province as well as internationally have been collaborating to design the systems for this facility. Once construction is cleared to commence there will be further opportunities for local companies to participate in specific contracted tasks. Simultaneously, recruitment will commence for operations personnel so that they will be on staff during commissioning.

3.5.1 Construction

The project schedule calls for construction to start in April 2020, employing a dominantly local labour force of up to 60 people. The table below lists the number of workers by occupation during the six-month construction period.

Table 1: Construction Worker Requirements by NOC Categories

Construction Worker Requirements by NOC Categories		
Work Task	**Potential # Workers**	**National Occupation Classification***
Project Management and Supervision	2	0211 engineering manager/supervisor 0711 construction managers
Civil Works- external	16	7217 heavy duty equipment operators 0711 construction manager 7611 construction trades
Building re-construction	24	0711 construction manager/supervisor 7215 carpenters 7216 mechanical engineers 7219 installers 7213 pipefitters 7611 construction trades
Pumping, plumbing and intakes	12	7213 pipefitters 7251 plumbers 7611 plumber helper 2274 engineer officers water transport 2273 deck officers water transport 2212 geotech technicians 2231 civil engineer
Installation of tanks, water circulation and water treatment	8	7217 contractor/supervisor 7213 pipefitters
Total	62	
*https://noc.esdc.gc.ca/English/noc/QuickSearch.aspx?ver=06&val65=master%20mariner		

3.5.2 Operation

During operation the facility is estimated to employ 20 full-time staff and create 20-30 indirect jobs through contracted services. The distribution of full-time operations staff is listed in the table below.

Table 2: Operations workers by NOC Categories

Operations workers by NOC Categories		
Position	**Potential # Workers**	**National Occupational Classification***
Manager	1	8257
Assistant Manager	1	8257
Fish Culture Technician	9	2221
Water Quality Technician	1	2131
Fish Health Technician/Veterinarian	2	2221 3213
Administration	2	1411
Security	2	6651
Facility Maintenance	2	0721
Total	20	
* https://noc.esdc.gc.ca/English/noc/QuickSearch.aspx?ver=06&val65=master%20mariner		

3.5.3 Workforce, Contractors and Spinoff Activities

During construction, site activities will generally be carried out by contractors. Spinoff activities would include increased demand for vehicle fueling, vehicle servicing, hotel accommodations and restaurant services.

During Hatchery operations, new positions will be created in accordance with the Collective Agreements established with local unions. Short-term employment might be required during loading and shipment of lumpfish. Specialist services would also be contracted out, e.g. diving/ROV to monitor the saltwater pipeline.

3.5.4 Employment Equity

Marbase Cleanerfish will follow equitable employment practices and provide a workplace that values each employee while affording equal opportunities. A Women's Employment Plan now under development (Appendix E) will be finalized and submitted to government prior to initiation of Construction.

3.6 Alternatives Considered

Marbase Cleanerfish considered several alternatives in the process of developing the optimum project, i.e. one that is financially viable, utilizes proven but innovative technology, and addresses sustainability objectives in an environmentally responsible manner.

3.6.1 Location

The choice of Marystown was linked to the availability of a marine industrial facility, its geography to existing aquaculture operations, the presence of suitable infrastructure, an experienced workforce, a base of support services and the initiation of a large-scale finfish aquaculture operation in the region. Alternative locations would not have such a combination of positive features.

3.6.2 Cleanerfish Species

The choices for cleanerfish species include both lumpfish (*Cyclopterus lumpus*) and cunner (*Totogolabrus adspersus).* There are several other candidate fish species, but these do not occur naturally in the marine waters off Newfoundland and Labrador. In large measure as a result of research and development at Memorial University's Ocean Science Centre, the culture of lumpfish is the furthest advanced. The species has become the cleanerfish of choice for finfish aquaculture operations in Newfoundland and Labrador.

The cunner offers potential and could become a complement to lumpfish as cleanerfish, however further research and development is required to address a number of issues. Cunner eggs are quite small and represent a challenge for survival during incubation. The species is slow growing and would take considerable time to reach marketable size. Nevertheless, in the future this species might be added to the Marbase Cleanerfish Hatchery operations. If so, all appropriate environmental approvals would be sought and obtained before commencement.

3.6.3 Sea Lice Management

There are alternative strategies that can be employed to address sea lice infestations. These include exposing the farmed salmon to low concentrations of chemicals, including hydrogen peroxide. In European jurisdictions products such as hydrogen peroxide, deltamethrin, azamethiphos and abamectin benzoate have been used. The use of chemicals can be effective in some cases of high infestation however, the procedure can add stress to the salmon, reduce the time spent feeding, and can lose effectiveness over time (Duchene, 2017). Importantly as well, these alternatives will result in some release of chemicals into the marine environment.

Another alternative involves thermal systems (e.g. Thermolicer) that use brief (20 - 30 second) exposure to elevated temperatures. This forces the lice to detach from the skin but imposes a stress on the salmon and can lead to mortalities.

The use of cleanerfish produces prolonged reductions in sea lice presence in sea cages while imposing no stress on the farmed fish, all as a result of the natural feeding behavior of lumpfish. As

a biological approach to a biological problem, the use of lumpfish as a cleanerfish represents the preferred approach to sea lice control.

3.6.4 Hatchery Tank Water Supply

The hatchery will require a suitable growth medium – clean, good quality saltwater at optimal temperature. The basic operational choices are to recirculate water or to refurbish the seawater using a flow-through system. Both systems require extensive water purification and filtration equipment, along with continuous monitoring of water quality.

The recirculating approach relies on extensive temperature control (heating and cooling) and very extensive water quality treatment systems to provide optimal conditions for growth and maintenance of good health.

A flow-through system requires less energy consumption by locating intakes at different water depths (and temperatures). The mix of incoming water can be blended to produce the required tank temperatures, thereby reducing or eliminating energy demands for heating/cooling. While a flow-through system requires two sets of filtration and purification stages (one for inflow water and the other prior to discharge) this requirement is more than offset by the energy savings realized by utilizing ambient temperatures.

4 Authorizations Required /Approval of the Undertaking

The proposed project will require authorizations (permits and approvals) from the federal, provincial and municipal governments. The following table lists the approvals that may apply as the project develops.

Table 3: Authorizations and Permits Required for the Project

Authorizations and Permits Required for the Project		
Agency	**Division**	**Approval Form**
Transport Canada	Transport Canada	Canadian Navigation Waters Act approval
Fisheries and Oceans Canada	Fisheries Protection Program	Permit – Discharge Line
Fisheries and Oceans Canada	Fish and Fish Habitat Protection Program, Ecosystems Management Branch	Application for Project Review - Species at risk Habitat disruption Invasive species assessment
Department of Fisheries and Land Resources	Aquaculture Branch	Aquaculture License
Municipal Affairs and Environment	Assessment Division	Release of Undertaking
Municipal Affairs and Environment	Water Resource Division	Alterations to Body of Water
Municipal Affairs and Environment	Water Resource Division	Water use Authorization
Municipal Affairs and Environment	Pollution Prevention Division	Certificate of Approval for Industrial Facility or Processing Work may be required
Municipal Affairs and Environment	Pollution Prevention Division	Environmental Protection Plan - Construction
Services NL	Government Services	Waste Management Plan
Services NL	Government Services	Certificate of approval for storage of gasoline and related products to run emergency generator
Services NL	Government Services	Storage Tank Application
Services NL	Government Services	National Fire Code; National Building Code; Life Safety Codes
Services NL	Government Services	Building Accessibility
Department of Human Resources, Labour and Employment	Human Resources Labour and Employment	Occupational Health and Safety Compliance Standards
Town of Marystown	Planning and Development	Zoning Compliance confirmation; Development Permit

The development of this list was accomplished through engagement with the various relevant agencies and organizations. As part of this stakeholder engagement, Marbase Cleanerfish has developed a good understanding of the nature and timing of required approvals, as well as the steps needed to achieve a social license for the Lumpfish Hatchery Project.

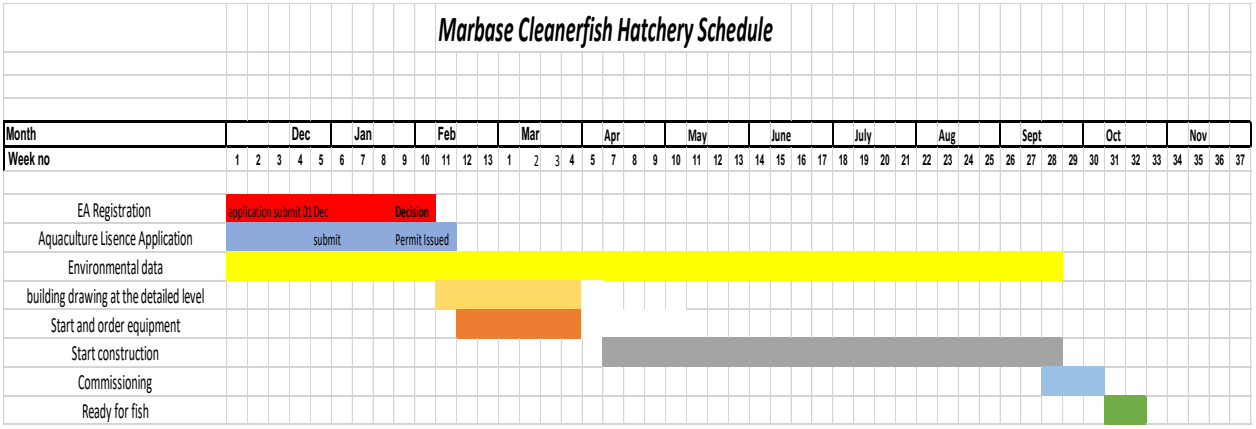
Appendix F provides a record of the consultations held to date, the identification of issues and concerns, and the approach to their resolution.

5 Schedule

The Marbase site is expected to be available for construction by April 2020. Preparatory activities are currently under way and linked to approval processes including release from the Environmental Assessment process and the issuance of an Aquaculture License.

Ongoing work includes hatchery design, financial modelling and market identification. The schedule for construction is keyed to the production of market-size lumpfish for sale in 2021. This will be achieved by the purchase of 500,000 juveniles from Memorial's Ocean Science Centre in the Fall of 2020, and their growth to marketable size for 2021. In 2021, the hatchery will secure 40kg of eggs (1kg = 100,000 eggs) to start the full cycle (fertilize, incubate, hatch and rear), resulting in the production of three million market size lumpfish by 2022.

Table 4: Marbase Cleanerfish Hatchery Schedule



6 Funding

The Project is estimated to have a capital cost of CDN $20 million.

This project is entirely funded by Marbase Cleanerfish Ltd.

December 9, 2019

Date

Signature of Chief Executive Officer

7 References

CCRI, 2010 Community Based Coastal Resources Inventory Newfoundland and Labrador NTS Map Series overlays prepared February 21, 2000 Map sheets 1-M/3 “Shellfish”, “Pelagics”, “Groundfish”.

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DFLR 2019 Aquaculture Policy and Procedures Manual, Fisheries and Land Resources Sept. 2019. 135 p.

Duchene, Lisa. 2017. “In sea lice fight, salmon farmers phasing out hydrogen peroxide”. 3 April 2017. Global Aquaculture Alliance (https://www.aquaculturealliance.org/advocate/sea-lice-fight-salmon-farmers-phasing-hydrogen-peroxide/).

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Powell, Adam,Jim W. Treasurer, Craig L. Pooley, Alex J. Keay, Richard Lloyd, Albert K. Imsland and Carlos Garcia de Leaniz,. 2018. Use of lumpfish for sea-lice control in salmon farming: challenges and opportunities. Reviews in Aquaculture (2018) 10, 683–702.

Town of Marystown Municipal Plan 2000-2012.

CHS, 2008. Chart 4587 Mortier Bay published by Canadian Hydrographic Service, Fisheries and Oceans Canada January 25, 2008 edition.

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http://shipbuildinghistory.com/canadayards/marystown.htm

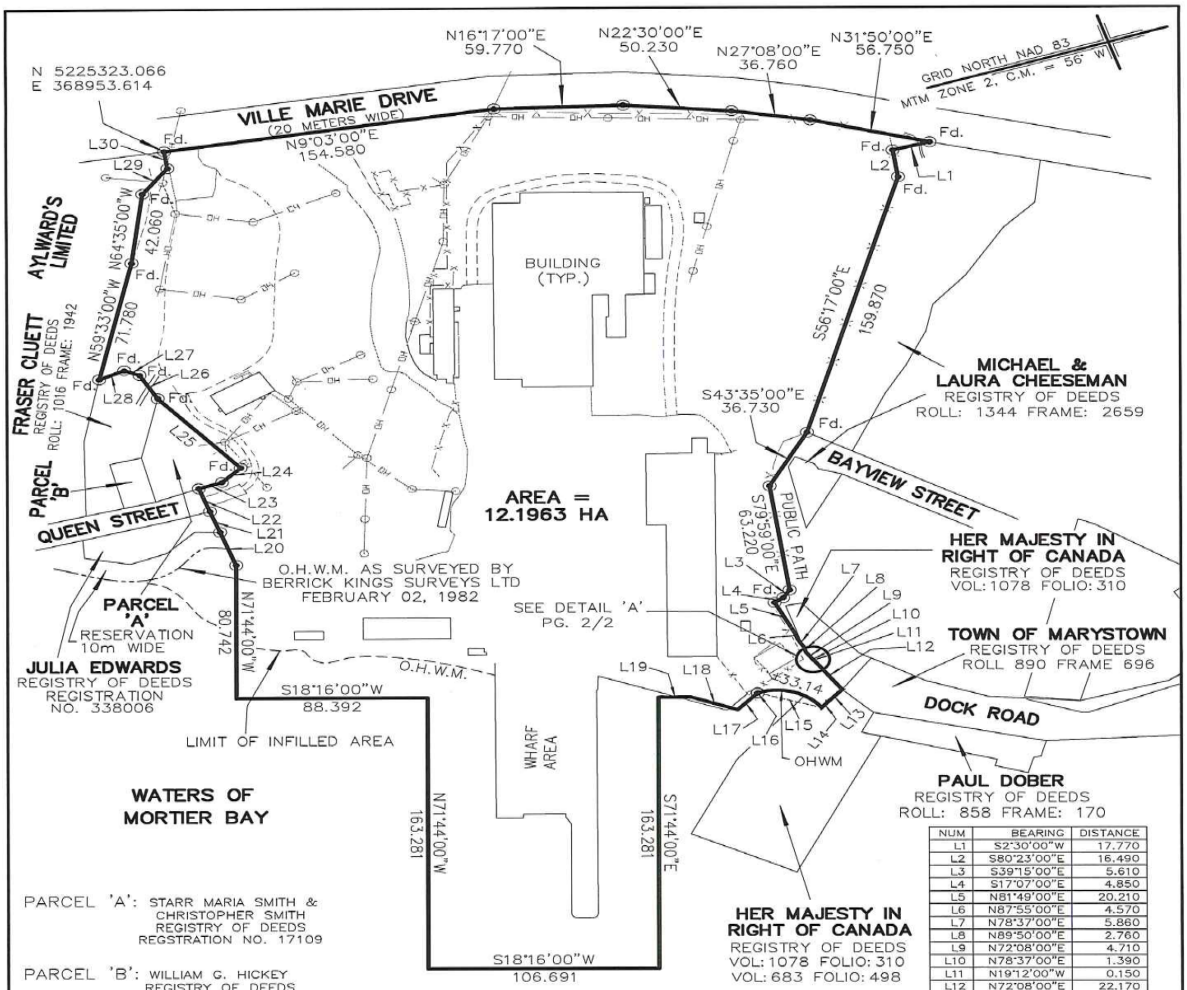
http://www.noia.ca/Industry-Info/Regional- Infrastructure/Construction-Fabrication-Repair/

https://www.fishaq.gov.nl.ca/licensing/pdf/Aquaculture_Policy_Procedures_Manual.pdf

https://www.aquaculturealliance.org/advocate/sea-lice-fight-salmon-farmers-phasing-hydrogen-peroxide/

Appendix A: Plans and Drawings

Appendix A1: Existing Structures



NUM	BEARING	DISTANCE
L1	S2°30'00"W	17.770
L2	S80°23'00"E	16.490
L3	S39°15'00"E	5.610
L4	S17°07'00"E	4.850
L5	N81°49'00"E	20.210
L6	N87°55'00"E	4.570
L7	N78°37'00"E	5.860
L8	N89°50'00"E	2.760
L9	N72°08'00"E	4.710
L10	N78°37'00"E	1.390
L11	N19°12'00"W	0.150
L12	N72°08'00"E	22.170
L13	S30°09'00"E	9.910
L14	S32°17'00"E	4.600
L15	S35°21'00"W	30.800
L16	S19°12'00"E	0.300
L17	S29°34'00"E	13.560
L18	S38°04'00"W	22.712
L19	S18°16'00"W	15.224
L20	S87°49'00"W	21.117
L21	S87°49'00"W	13.412
L22	S87°49'00"W	14.761
L23	N0°51'00"W	11.340
L24	N26°32'00"W	12.340
L25	S66°03'00"W	57.000
L26	S77°31'00"W	16.490
L27	S40°34'00"W	7.680
L28	S7°07'00"E	12.830
L29	N35°00'00"W	19.510
L30	N79°40'00"W	10.340

PARCEL 'A': STARR MARIA SMITH & CHRISTOPHER SMITH
REGISTRY OF DEEDS
REGSTRATION NO. 17109

PARCEL 'B': WILLIAM G. HICKEY
REGISTRY OF DEEDS
ROLL:968 FRAME:470

NOTES:

ALL DISTANCES ARE METRIC

O.H.W.M. — ORDINARY HIGH WATER MARK AS OBSERVED ON JUNE 22, 2016.

——×—— FENCE

⊙ CAPPED IRON BAR

Fd. EXISTING IRON BAR

○ IRON BAR

COORDINATE TABLE
NAD 83 CONTROL SURVEY DATABASE

STATION	NORTHING	EASTING
76G2536	5 224 958.597	368 499.871
95G5023	5 225 133.998	368 727.050

SCALE FACTOR 0.999945

IAN G. EDWARDS
NEWFOUNDLAND LAND SURVEYOR
PROVINCE OF NEWFOUNDLAND

EDWARDS AND ASSOCIATES LTD.
LAND SURVEYING, ENGINEERING, CONSULTING, INFORMATION MANAGEMENT
BOX 158, MARYSTOWN, NF, A0E 2M0, TEL 709-279-1990, FAX 709-279-2185

PROPERTY SURVEY

PETER KIEWIT SONS ULC

MARYSTOWN, NEWFOUNDLAND AND LABRADOR

SCALE: 1:3000	LANDGAZETTE # GQVVQ5	SURVEY BY: I.E.
DATE: JUNE 06, 2016	JOB NO. 6454	PG. 1/2

2.4.2 Outfit & Stores Building

Use
This building has a variety of purposes; general storage, machine / joinery / pipefitting / electrical shops.

Age
Originally constructed in 1967/68 with newer mezzanine additions

Condition
The Dillon report indicates the building to be in overall good structural condition.

Sections
The Outfit & Stores building consists of a Machine Shop, General Store, Electrical Shop, Joiners Shop and a Pipefitting Shop.

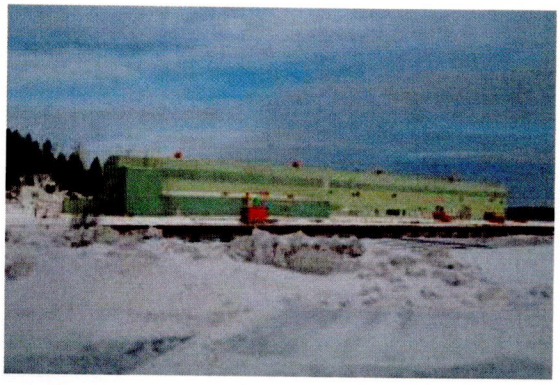
Pictures and floor areas can be found on the following two pages.

Building Description	
Number of Storeys	2
Ground Floor Area	35,318 sf
Second Floor Area	18,583 sf
Clear Height & Area Breakdown	

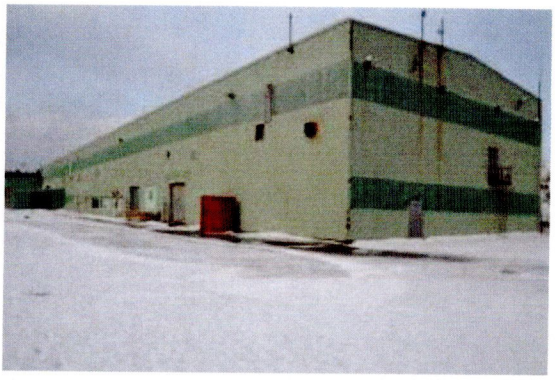
	Height by Section (feet)	Area by Section (sq.ft.)
Outfit	38	12,835
Joiners Shop	15	6,080
General Stores	15	12,160
Machine Shop	23	2,470
Mezzanine	23	15,483
2-Storey Storage	14	1,260
Quonset Hut	14	3,613

Foundation	Poured reinforced concrete foundation walls and footings.
Frame	Heavy steel frame construction, with heavy steel crane wails and supports.
Exterior Walls	Pre-painted, vertical metal siding on steel frame.
Roof	Built-up composite on metal roof panels on steel frame over heavy steel trusses.
Cranes	1x 1T crane in the Mezzanine, a 1T crane in the Machine Shop and a 5T crane in the Outfit Shop.

Photographs of Subject Building



Outfit and Stores Building Exterior



Outfit and Stores Building Exterior

Outfit and Stores Building Interior

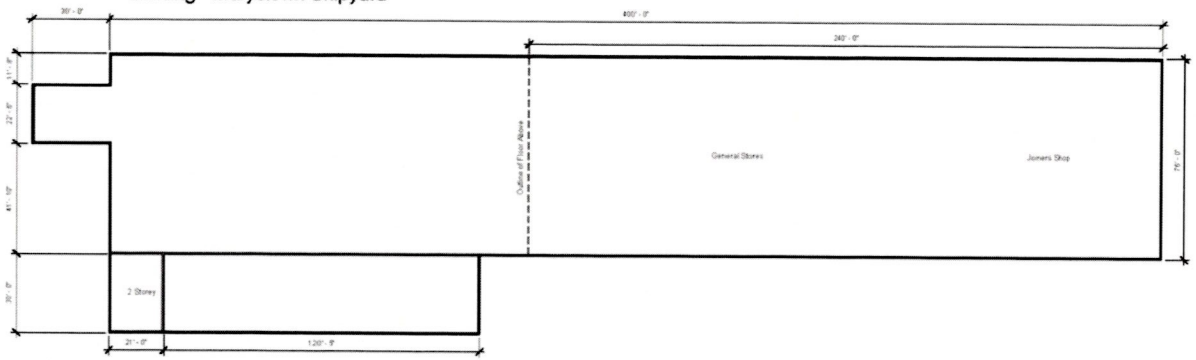
Outfit and Stores Building Interior

Outfit and Stores Building Interior

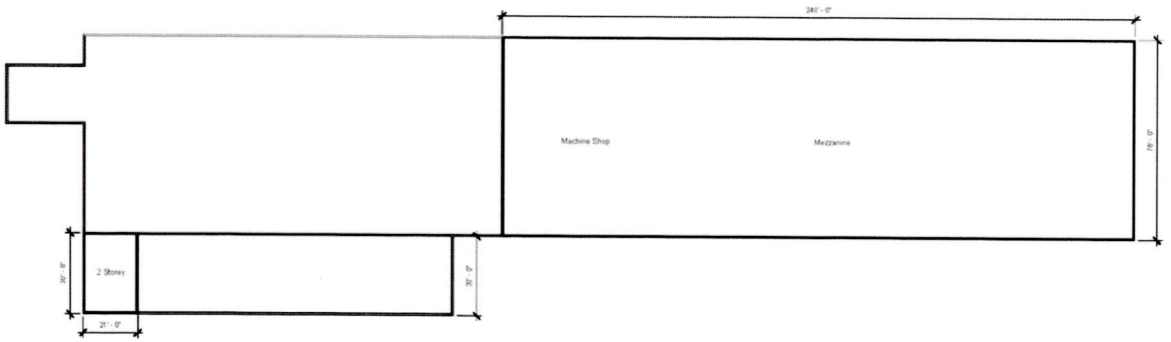
Outfit and Stores Building Interior

Floor Plan

Ground Level - Outfit & Stores
Building - Marystown Shipyard



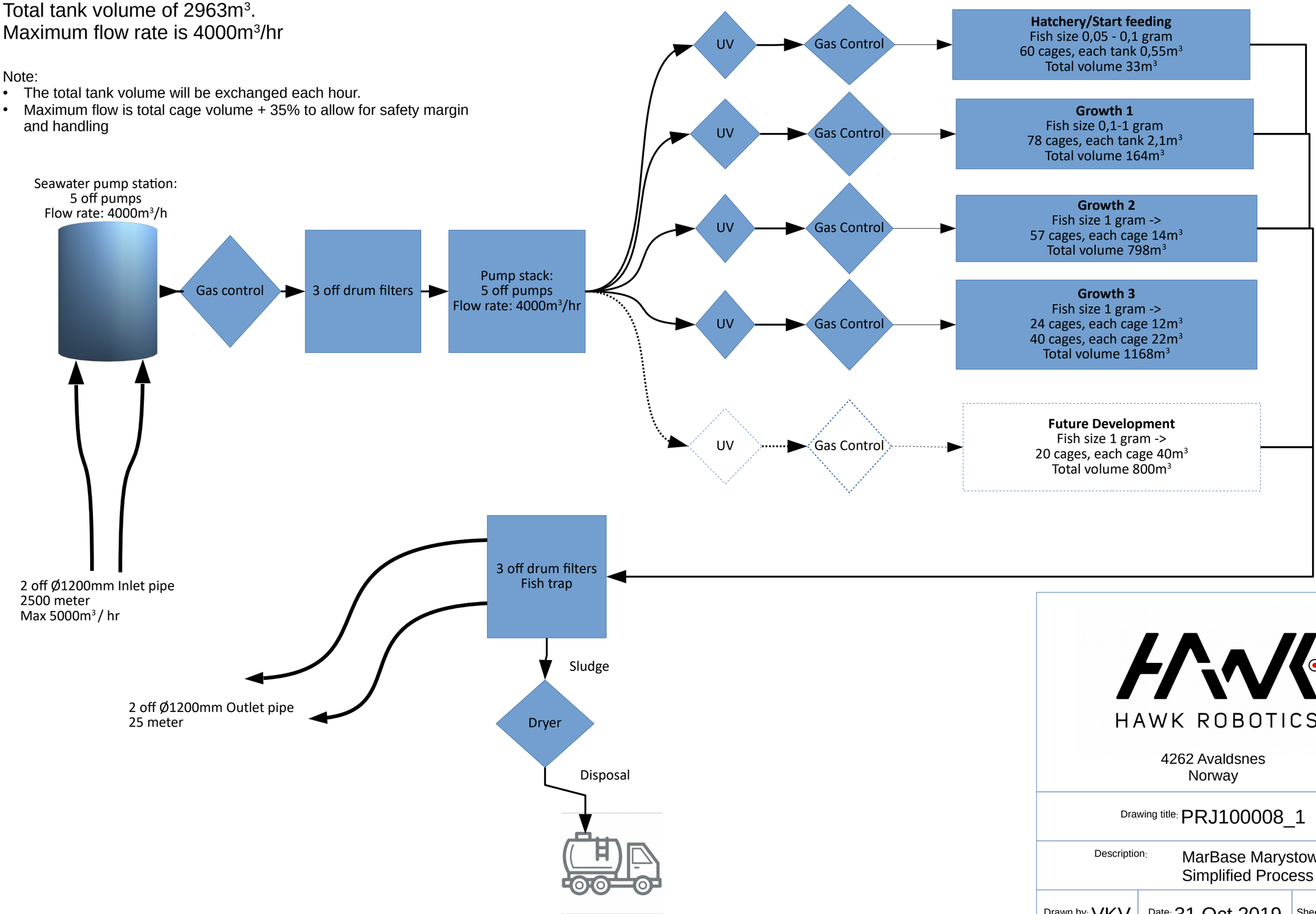
Second Level



Appendix A2: Hatchery

Scaled for 1 500 000 - 3 000 000 individuals.
Total tank volume of 2963m³.
Maximum flow rate is 4000m³/hr

Note:
- The total tank volume will be exchanged each hour.
- Maximum flow is total cage volume + 35% to allow for safety margin and handling

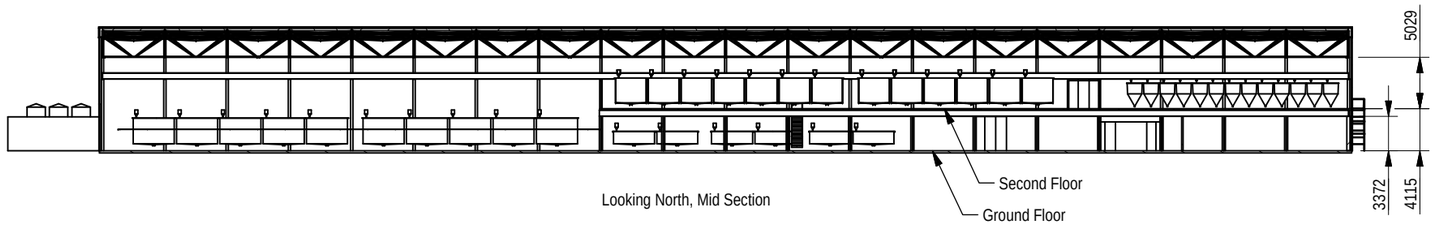


HAWK ROBOTICS

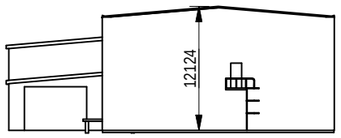
4262 Avaldsnes
Norway

Drawing title: PRJ100008_1		
Description: MarBase Marystown Simplified Process diagram		
Drawn by: VKV	Date: 31 Oct 2019	Sheet: 1 off 1

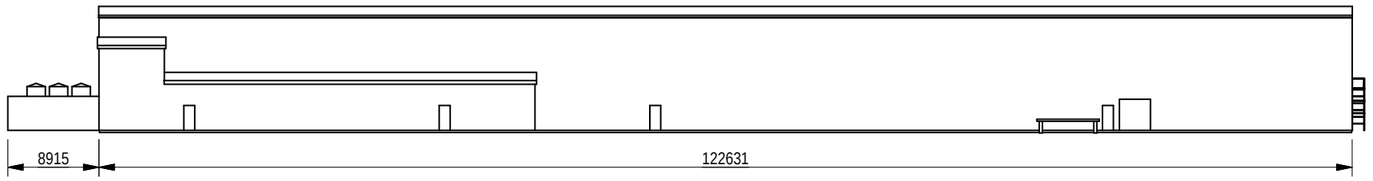
	Number of tanks	Volume each tank in m3	Total m3
Hatchery/Start feeding	60	0.55	33
Growth 1	78	2.1	163.8
Growth 2	57	14	798
Growth 3	24	12	288
Growth 3	40	22	880
Future Development	20	40	800
		Total	2962.8
	Safety margin %	Total	Max flow rate
	35	2962.8	3999.78



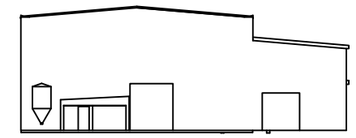
Looking North, Mid Section



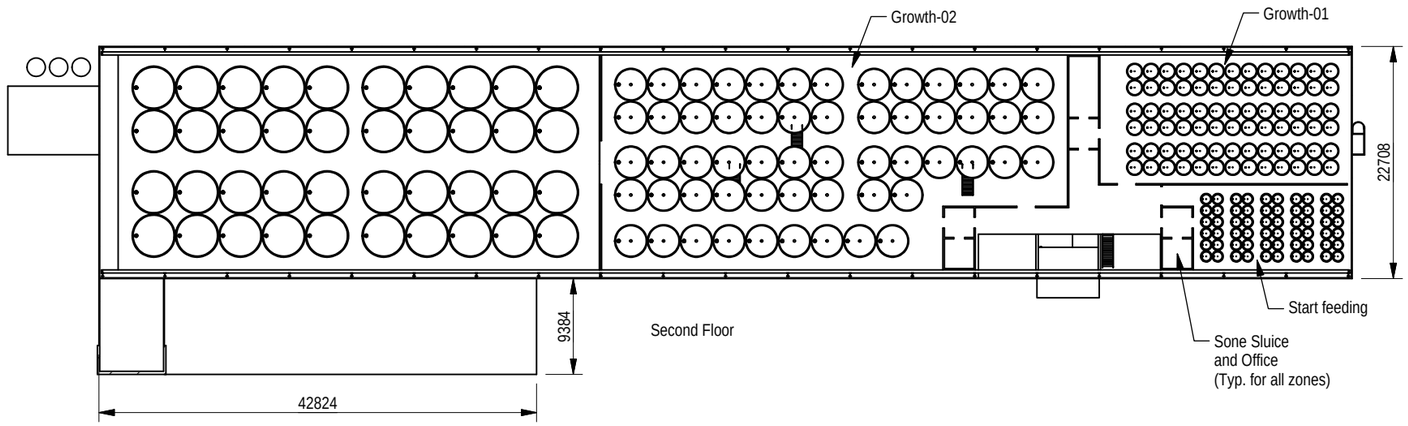
Looking West



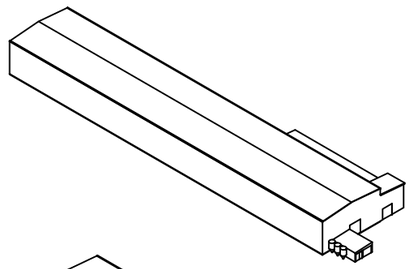
Looking North

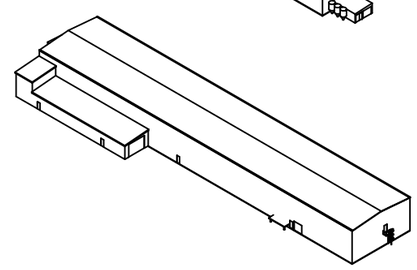


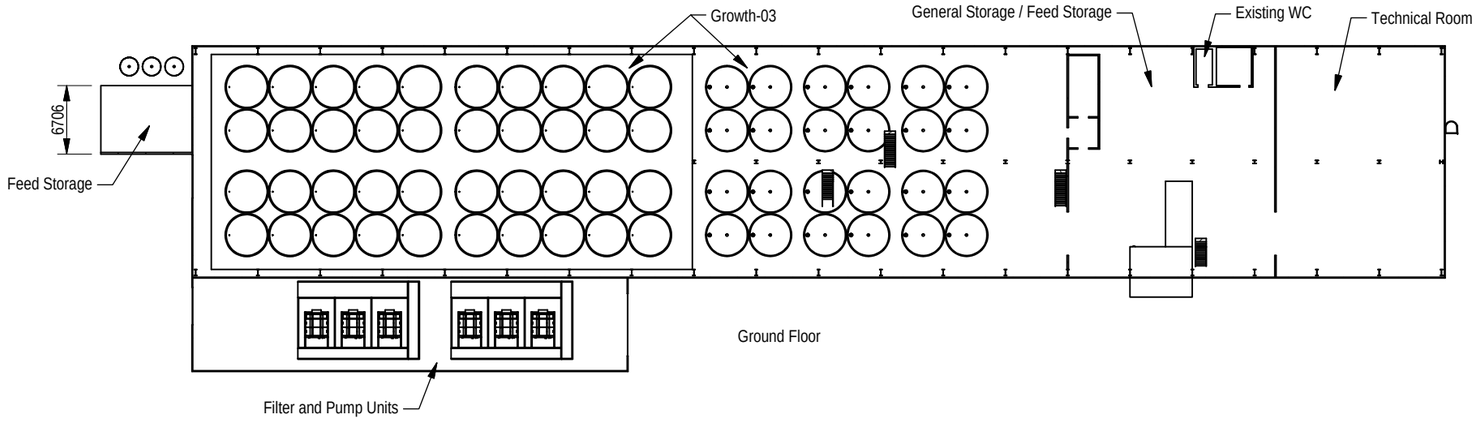
Looking East



Second Floor







Ground Floor

HAWK ROBOTICS

Drawn by	Checked by	Approved by
FVI 04.11.2019		

Mass	State
0,0 kg	For Comments

Title
Marbase Marystown - Lumpfish

Description
Plant General Arrangement

Material	Drawing No	Rev	Sheet
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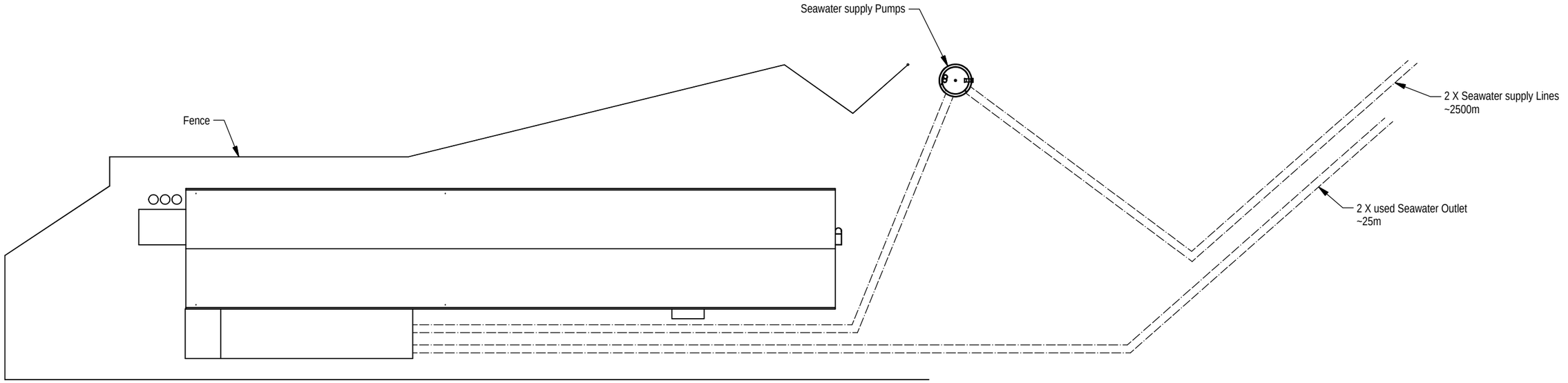
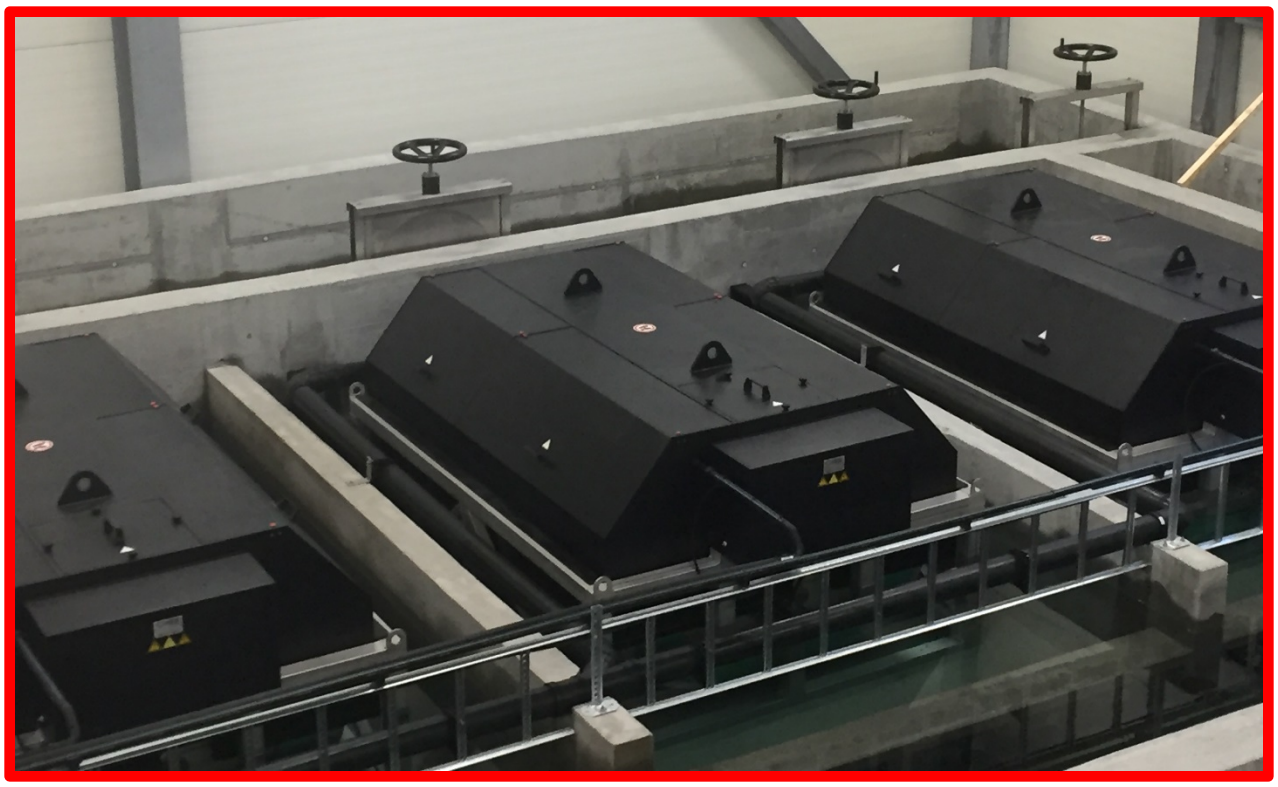


HAWK ROBOTICS	Drawn by FVI 04.11.2019	Checked by	Approved by
	Mass 0,0 kg	State For Comments	

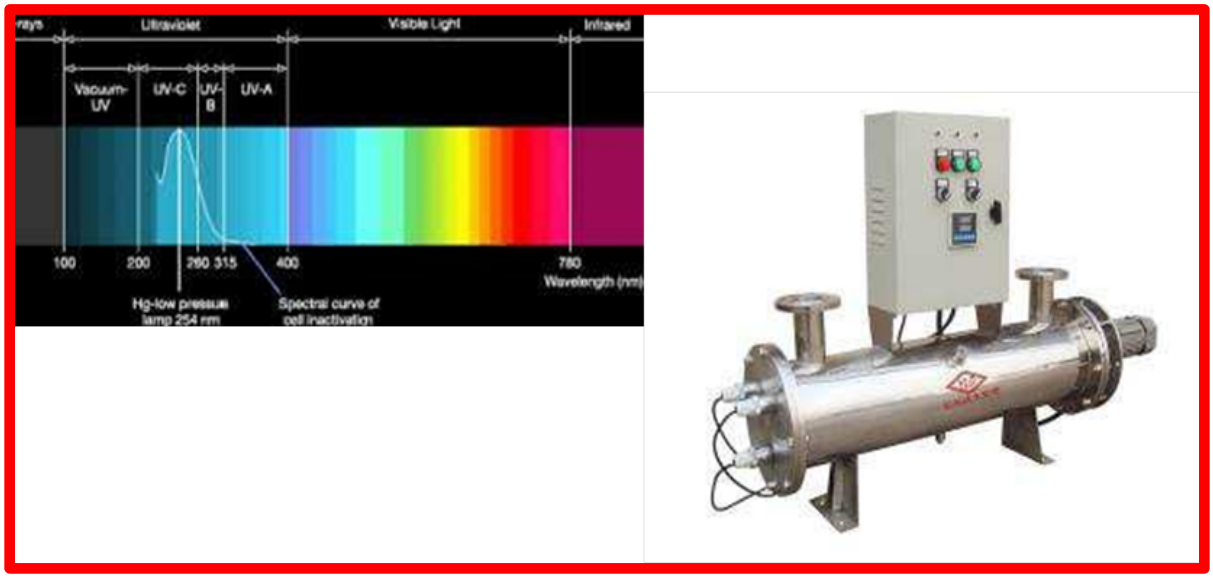
Title
Marbase Marystown - Lumpfish

Description
Plant General Arrangement

Material	Drawing No	Rev	Sheet
	100047	01	2 / 2



Typical Drum Filters for Water Treatment.



Typical Ultra Violet (UV) System for Water Treatment

Appendix B: Water Supply

Marbase Cleanerfish Hatchery

Field Program

Marine Intakes

November 25, 2019

Bevin LeDrew, LES Ltd.

709 689 2002

bevinledrew@gmail.com

Background

Marbase Cleanerfish Ltd. plans to construct and operate a Lumpfish Hatchery at the Marbase Aquaculture Service Hub in Marystown, NL. The hatchery will require two marine intake lines, as well as a single outfall. The intakes will need to be capable of supplying marine water to the hatchery complex on a continuing basis. A discharge line adjacent to the hatchery will return water (following treatment and filtration). The pipelines sizing will be established as hatchery design advances.

The intakes will be placed to access water at different temperatures and salinities. One intake will be located in shallow water in the order of 10-20m depth while the other will be at 50-80m. The intakes will need to be located clear of any contaminant sources (other outfalls, including the hatchery discharge). The hatchery outfall would be located near surface and proximate to the hatchery building and at a distance of 500m minimum from other intakes. The pipeline routes as well as the intake screening will need to address Federal Fisheries requirements related to fish habitat and fish protection. The water extraction and discharge will require the issuance of a Water Use Authorization from Water Resources Branch, provincial Department of Municipal Affairs and Environment.

Candidate outfall and intake locations were identified based on the available information and design criteria (Figure 1and 2). Outfall locations were located for water depths of 15 and 50m. Each candidate intake site is distant from the Marbase Hatchery site, but fairly close together.

Objective

Identify the closest suitable locations for hatchery marine water supply intakes.

Conduct a field and analytical program to characterize water and seabed features at two candidate intakes (15m, 50m depth).

Program Definition

Suitable intake water will be clean marine water at acceptable levels of temperature, salinity and oxygen year-round. The intake water should be free of potential pathogens and pollutants and have acceptable levels of nutrients and solids (total and dissolved).

Additionally, the field program should be capable of collecting information required to support an Aquaculture Licence application as well as an Environmental Assessment Registration.

Data Requirements

The field program centered on two candidate locations – the 15 m depth and the 50m depth intakes. Most sampling was to focus on the near bottom at each site, however one parameter (temperature) needed to be understood for the water column above each location.

Oceanography

Physical Parameters at survey locations include -

- water column temperature (near-surface to near-bottom); and
- Ancillary data on salinity (conductivity- CTD) and dissolved oxygen.

Geotechnical

Seabed substrate grain size analysis was to be determined at candidate intake locations.

Water Quality

The water quality parameters selected for analysis were based on NL Environmental Control Water and Sewage Regulations, as well as consultation with the analysis lab, regulators and client needs.

During the sampling effort, water samples were to be collected at each site (near-surface, mid-depth and near-bottom) for each candidate intake site, as well as at one depth (mid-water) proximate to the hatchery site (outfall location).

Pathogens

Near-bottom water samples (one suite at each candidate intake site) were to be collected to provide testing for the following pathogens:

- Vibrio salmonicida
- Vibrio anguillarium.
- Aeromonas salmonicida
- VHS
- Noda Virus
- Loma salmonae

A total of two samples (plus any QA requirements for blanks, duplicates) were required.

Other data Needs

All sampling was to include information on date/time, location/water depth, field methods. Sampling was to be coordinated with the contracted analysis lab to ensure adherence to packaging, labelling, chain of custody and related requirements, as well as to arrange timely delivery for required analyses.

Quality Management procedures were to include use of duplicate samples, as well as blanks (as identified by the analytical labs).

Program Execution

Program Manager was Stephen Green, a professional oceanographer with extensive marine and offshore experience. Field support was supplied by Edwards Associates, an engineering and professional services firm headquartered in Marystown with field technicians available as well as a suitable vessel and access to sampling equipment and winches.

Laboratory analyses was provided by Avalon Laboratories. They managed the handling of all collected samples, including provision of collection/labelling/handling/transport protocols, as well as the distribution of specialist analyses to sub-contracted laboratories.

Pathogen testing was sub-contracted by Avalon Laboratories to Kennebec BioSciences-USA-- http://www.kennebecbio.com/ . Grain size analysis was provided by RPC.

Schedule and Timing

The field program focused on providing adequate information to support selection of candidate intake sites, as well as the information requirements to support an Aquaculture Lisence application and an Environmental Assessment Registration.

The target date for sample collection was Oct. 30-31, 2019.

Results

The field program was conducted on November 03, 2019. Collected samples were delivered to the analysis Laboratory the same day. On Monday Nov. 04 Avalon Laboratories commenced analysis of samples and couriered other samples to sub-contracted labs (pathogen and grain size). A field report from the Program Manager was completed on Nov. 21, 2019. This report includes a chronology of data collection as well as all analytical lab results and Quality Management reports.

Sampling locations were georeferenced as :

- S-15 Shallow Intake at 47^0 10' 27" N by 55^0 7" 41" W
- S-50- Deep Intake at $47^0$10' 48" N by 55^0 7' 23" W
- Outfall at 47^0 9' 55" N by 55^0 8' 52" W.

A summary of key results is presented below.

Water Quality – Biological

The samples collected from both the "shallow" (15m) and the "deep" (50m) water sites showed no evidence of the subject pathogens. Additionally, with the exception of the surface sample from the candidate outfall location, the samples demonstrated low-to-undetectable values for coliform bacteria. This may be evidence of effective sewage treatment (and dispersal) for the proximate outfalls.

Analysis	**Units**	**Shallow Intake**		**Deep Intake**			**Outfall**
		2m	**13m**	**2m**	**25m**	**45m**	**5m**
Bacteria							
Total coliforms	MPN/100 ml.	<1.8	<1.8	2.0	<1.8	<1.8	33
Faecal coliforms	MPN/100 ml.	<1.8	<1.8	2.0	<1.8	<1.8	<1.8
E. coli	MPN/100 ml.	<1.8	<1.8	2.0	<1.8	<1.8	<1.8
Total bacterial count	CFU/ml.	n/a	< 1	n/a	n/a	<1	n/a
Pathogens							
Aeromonas salmonicida		n/a	negative	n/a	n/a	negative	n/a
NNV- all genotypes		n/a	negative	n/a	n/a	negative	n/a
Loma salmonea		n/a	negative	n/a	n/a	negative	n/a
VHS		n/a	negative	n/a	n/a	negative	n/a
n/a – not sampled.							

Water Characterization – Physical

A set of two casts were taken at each of the three sampling sites, and a consistent pattern was displayed for each pair of casts, giving confidence in the results as reported. A summary of results is presented in the table below.

Candidate Site	Depth m.	Temp. ^{0}C		Salinity 0/00		Dissolved Oxygen
		cast 1	cast 2	cast 1	cast 2	
Shallow Intake	0	8.85	8.84	30.8	30.8	10.94[a]
	10	9.07	9.08	31.2	31.2	
	15	8.48	8.52	31.6	31.5	10.94[b]
Deep Intake	0	8.45	8.50	30.2	30.3	11.11[a]
	15	8.15	8.06	31.5	31.5	
	30	6.39	6.47	31.8	31.8	10.95[c]
	45	5.26	5.22	32.0	32.0	11.58
Outfall	0	8.80	8.81	28.6	28.8	
	10	9.07	9.06	31.2	31.2	10.98[d]
Note: Salinity calculated from conductivity/temperature readings. a= 2m depth: b=13m depth: c = 25m depth; d = 5m depth						

At all three stations, surface conditions to 2m water depth indicated the influence of air temperature as well as freshwater runoff, especially at the outfall location where conductivity (salinity) was approximately 10% lower than at deeper strata. The two intake sites showed evidence of a thermocline and a halocline at 12m water depth. All bottom water sampled was at or over 30 parts per thousand (ppt).

At the two candidate intake locations, bottom water temperature was noticeably different: 8.5 ^{0}C at the shallow (15m) intake, compared with 5.2 ^{0}C at the deep (45m) intake.

Salinity was not greatly different at the two intake sites, showing similar profiles. Surface values at both sites were similar - 30.8 ppt. and 30.2 ppt. The bottom values were slightly elevated - 31.6 ppt at the shallow (15m) site compared to 32.0 ppt.at the deep (45m) site.

The outfall site proximate to the Hatchery had a slightly lower salinity at surface (28.6 ppt). At a depth of 10m the salinity was 31.2 ppt.

Dissolved oxygen levels were similar and relatively high (11 mg/l) at both sites, reflecting a saturated condition at the ambient temperature.

Water Quality – Chemical

The table below summarizes the analysis results. For clarity, results are reported in the units that are listed in Schedule A, Water and Sewer Effluent Regulations (i.e. converted to mg/l even where the analysis was reported as µg/l).

Parameter*	**Site 1 – Deep Water**			**Site 2 Shallow Water**		**Site 3 Outfall**	**Schedule A Regulations***
	0m	25m	45m	0m	10m	5m	
Ammonia (as N)	0.08	<0.02	0.1	0.18	0.23	0.02	20
BOD	<6	<6	<6	<6	<6	20	21
Chlorine (total)	<0.03	<0.03	0.03	0.03	0.03	<0.03	1
pH	7.73	7.69	7.72	7.78	7.73	7.78	
TDS	32461	33062	33152	32433	32917	32481	1000**
TSS	17	21	10	8	22	3	30**
Nitrate (asN)	<2.37	<2.37	<2.37	<2.37	<2.37	<2.37	10
0-phosphate	<25	<25	<25	<25	<25	<25	1
Total cyanide	0.007	0.009	0.007	0.008	0.008	0.009	0.025
Sulfide	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	0.5
Hex..chromium	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	0.05***
Triv. chromium	<3	<3	<3	<3	<3	<3	1***
Total O&G	<2	5	<2	3	3	4	15
Phenolics	0.14	0.14	0.13	0.11	0.17	0.14	0.1
Boron	20.2	19.5	15.6	16.3	17.0	17.2	5
Iron	0.043	0.042	0.052	0.043	0.041	0.037	10***
Nickel	0.0009	0.0008	0.010	0.006	0.0056	0.0003	0.5***
Copper	0.002	0.001	0.002	0.001	0.001	0.0015	0.3***
Zinc	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.5***
Arsenic	0.0028	0.0029	0.0028	<0.0028	<0.0028	0.0026	0.5***
Selenium	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	0.01
Silver	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	0.05***
Cadmium	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.05***
Barium	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	5***
Mercury	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.005***
Lead	<0.0003	<0.0003	<0.0003	0.0003	0.0003	<0.0003	0.2***

*Water and Sewer Effluent Regulations – Schedule A. Note all parameters (except pH) reported as mg./l.
** " *If water is being abstracted from a water course, used, treated and subsequently returned to the same water course, these solids data mean that the effluent should not contain more than 1000 or 30 milligrams per litre more than was in the water originally abstracted*."
*** For all metals *"the maximum content is the amount in excess of the background level as determined upstream of the discharge".*

There are several values reported for the analysed water samples that appear to exceed the limits shown in Schedule A. Note however that, for water returned to the same source from which the influent was extracted, the listed TSS and TDS limits as well as metals values represent the permissible increment over background.

Sediment Character

The sediment samples collected validated the information shown on the available marine charts (CHS Chart 4587). Samples from both sites were predominantly gravel (75% for shallow site; 70% deep site), while fines were predominantly sands, with silt and clay comprising minor portions of the recovered material.

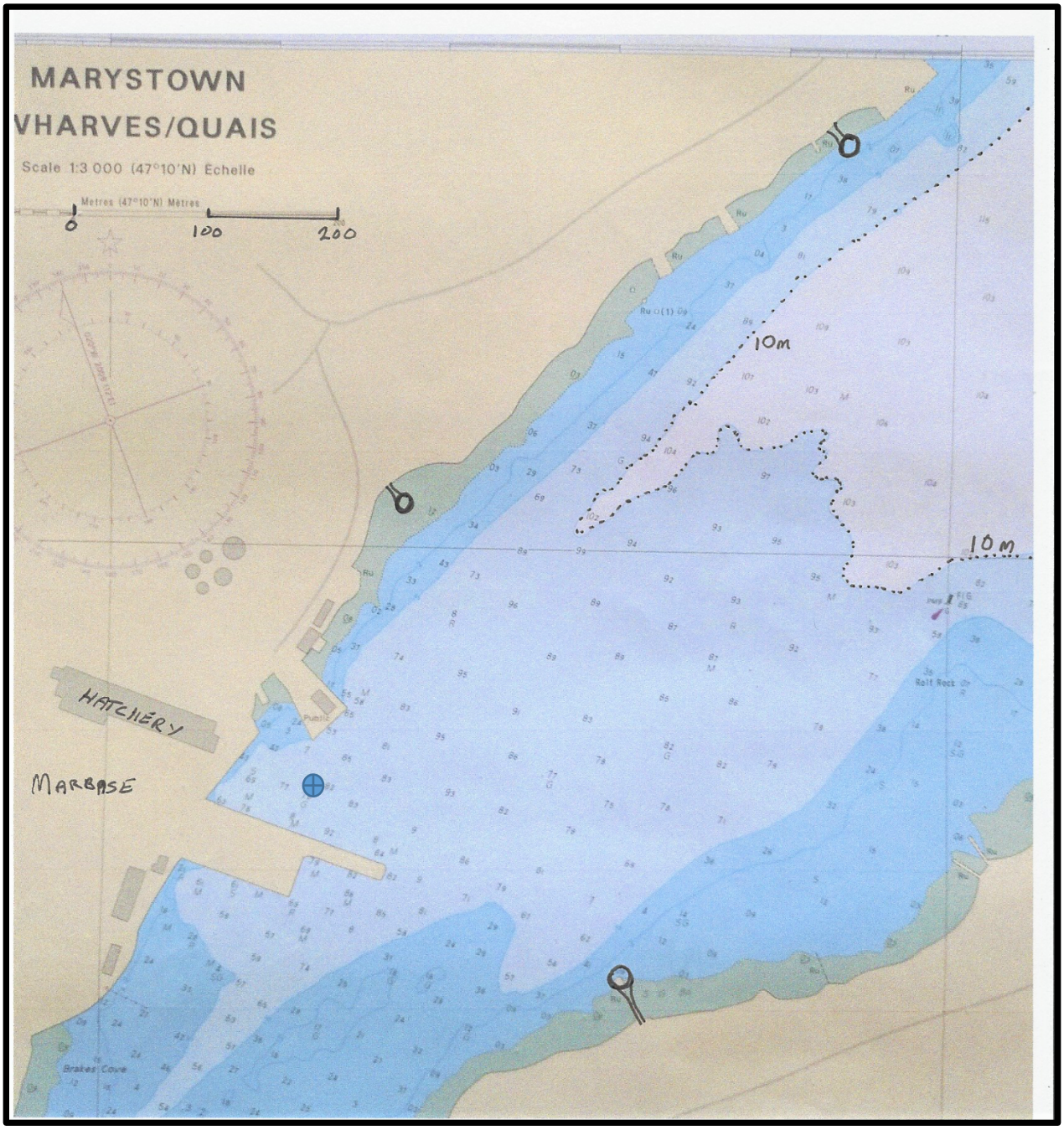


Figure 1. Bathymetry and Outfalls in the area of the Marbase Site (with Outfall sampling location indicated- -).

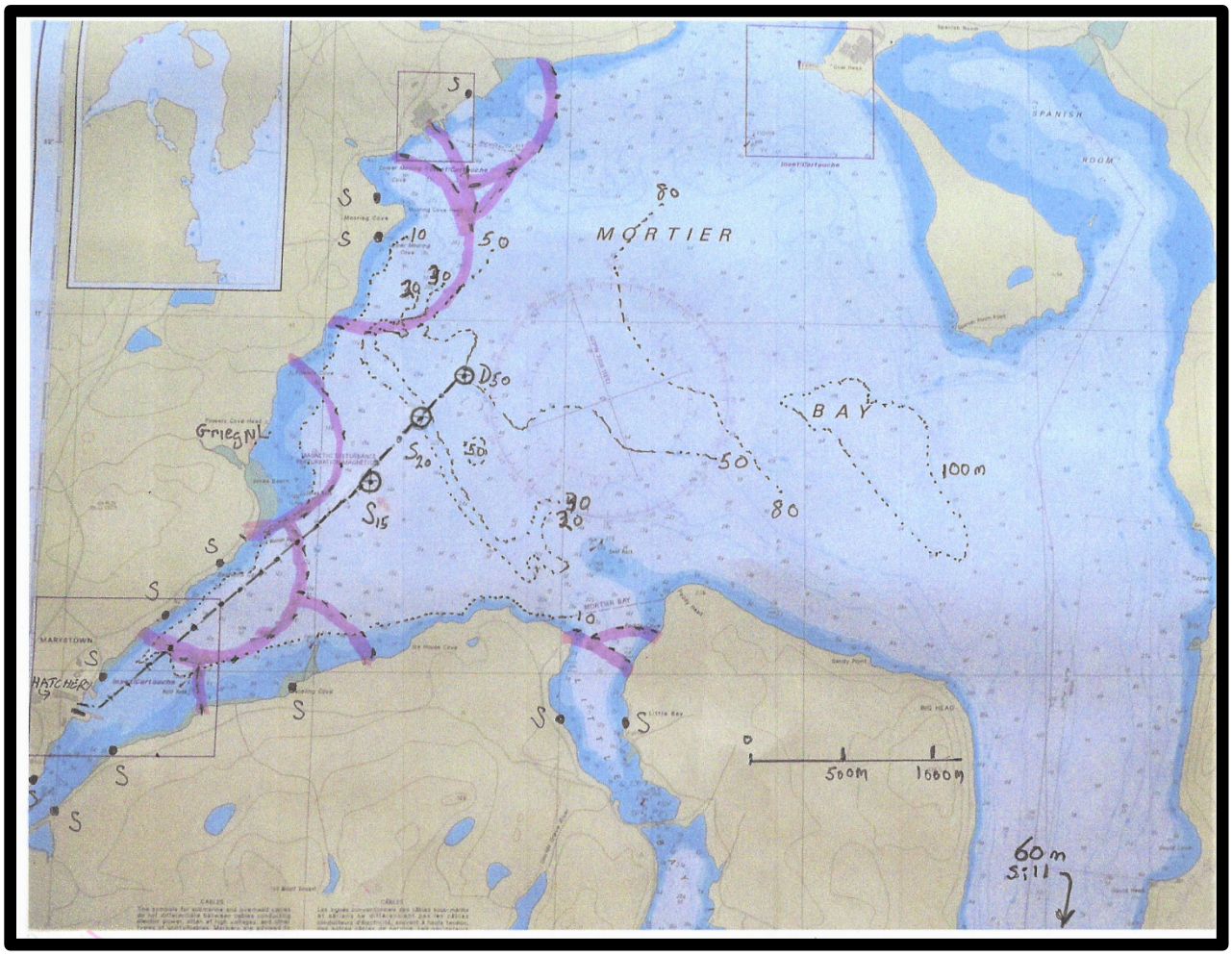


Figure 2. Mortier Bay Bathymetry and Existing Outfalls (with 500m buffer zones) and candidate outfall locations (S 15, D50) and pipeline routing.

Appendix C: Environmental Protection Plan

Marbase Cleanerfish Ltd.

Project Environmental Protection Plan

Annotated Outline

November 30, 2019

Preface

Distribution List – *Documents approved recipients of the EPP*

Maintenance of the EPP – Provides a record of d*ocuments changes made by date and source.*

Revision Request Initiation Form- *Any user is encouraged to submit suggestions for changes and improvements to the EPP. A form is provided to assist those providing suggestions.*

Revision Control Record – Identifies and r*ecords changes by date, source, and indicates approval of changed text.*

1.0 Introduction

1.1 Environmental Health and Safety Management System – *describes the Marbase Cleanerfish Ltd. policy on EH&S.*

1.1.1 Roles and Responsibilities- *Describes the management responsibility and accountability for implementation of EH&S policy*

1.2 Purpose of the EPP –

Describes the EPP as a stand-alone document that targets the responsible company staff including front line workers, occupational health and safety staff, environmental staff. The role of the document with respect to government environmental surveillance staff is also referenced.
The scope of the EPP is designated as addressing specific project phases - construction and operation and maintenance.

1.3 Owners Policy –

Establishes a link between the EPP and the corporate policy on Sustainability.

1.4 Organization of the EPP

Provides an overview of the sections of the document, and instructions for users.

Describes the contents of the EPP, including:

- *proponent's environmental policies;*
- *environmental compliance monitoring;*
- *environmental protection measures;*
- *mitigation measures;*
- *permit application and approval planning;*
- *contingency planning for accidental and unplanned events;*
- *statutory requirements; and*
- *revision procedures and contact lists.*

1.5 Development and Implementation of the EPP

Provides advice on the use of the EPP as a guide to taking appropriate environmental protection actions and points out the series of task-specific Protection Measures.

1.5.1 Site Specific Approach to EPP Development

Describes the geographic- specific information that is utilized to direct EPP actions at each specified site.

1.6 Environmental Orientation

Describes the employee orientation that is to be provided to all new employees as part of their orientation.

1.7 Project Description

Provides a brief overview summary of the scope of the project, with a focus on the activities carried out to produce and market a quality product.

2.0 Environmental Concerns

2.1 Construction Activity Environmental Concerns

Lists the environmental interactions associated with this Project Phase, and the potential for unplanned events that could produce negative environmental effects.

2.2 Operation and Maintenance Environmental Concerns

Lists the environmental interactions associated with this Project Phase, and the potential for unplanned events that could produce negative environmental effects.

3.0 Environmental Protection Procedures

3.1 Introduction

Describes the template to be applied in describing the required measures to be employed with respect to identifiable Project activities.

3.2 Storage, Transportation, Transfer, Handling and Disposal of Fuel and Other Hazardous Substances

3.3 Storage, Transportation, Handling and Dispensing of Fish Feed

3.4 Sludge Disposal

3.5 Storage, Transportation, Handling and Disposal of Solid Waste

3.6 Equipment Use and Maintenance

3.7 Noise Control

3.8 Dust Control

3.9 Protection of the Marine Environment

5.2 Permits and Authorizations

R*efers to an Appendix which holds copies of all permits and authorizations, as well as terms and conditions and compliance records.*

6.0 Contact List

Provides a listing of corporate personnel, contractors, external resources, regulators, emergency contacts, and other advisory resources.

6.1 Emergency Numbers

6.2 Advisory and Other Contact Numbers

7.0 Resource Material

7.1 Key Reference Material

Identifies and, as appropriate includes as appendices, various guidelines and resource material relevant to environmental protection measures, mitigation and monitoring.

Appendices

Includes a variety of resource material as identified in construction of the EPP including – permits and conditions, contact lists, advisory resources, emergency contacts, relevant literature,

Appendix D: Waste Management Plan

Marbase Cleanerfish Ltd.

Waste Management Plan

Draft

November 30, 2019

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List of Tables

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Marbase Cleanerfish Ltd.

Waste Management Plan

Document Number:

Rev. 00

Prepared by : Department

Title

Name

Signature

Approved by:

Department

Title

Name

Signature

Document Revision Record

Issue Date	Revision #	Prepared by	Approved by	Issue Purpose

1.0 Purpose

Marbase Cleanerfish Ltd. has developed this Waste Management Plan to describe the principles, procedures and management of the waste generated at the Marbase Cleanerfish Hatchery in Marystown, Newfoundland and Labrador. This plan has been developed to ensure waste is handled properly, reduced and reused where possible. The plan outlines measures to manage and mitigate waste generation as well as resource consumption during Marbase Cleanerfish Hatchery construction and operations. This plan is part of the Marbase Cleanerfish Ltd. environmental management system that has been established to support the Marbase Ltd. Sustainability Policy and Commitment.

The Marbase Cleanerfish Ltd. Waste Management Plan is intended for use by all Marbase Cleanerfish Hatchery. employees, including line managers with direct responsibility for waste management.

This plan also provides guidance and instructions for Marbase Cleanerfish Ltd. contractors and suppliers who will be required to comply with this plan, and to ensure their waste management plans are in conformance with this document. During project construction, the General Contractor will contractually require all sub-contractors to comply with the waste reduction strategy set forth in this document. A copy of this Waste Management Program will accompany all Sub-contractor Agreements and require sub-contractor compliance.

Regulators can be expected to use this plan as a reference document in monitoring the company's performance and compliance.

Finally, this Waste Management Plan is available to the interested public as one demonstration of the Marbase Cleanerfish Ltd. commitment to environmental sustainability.

2.0 Regulatory Context

Aquaculture activities at the Marbase Cleanerfish Hatchery will generate a limited variety of wastes. Several federal, provincial and regional organizations are involved in aquaculture waste management as regulators and financial stakeholders. Marbase Cleanerfish Ltd. has reviewed and intends to follow guidelines and recommendations as developed by the Department of Fisheries and Land Resources (DFLR) in their *Aquaculture Waste Management Action Plan* (DFLR 2016) as well as the Newfoundland Aquaculture Industry Association's (NAIA) *Salmonid Aquaculture Waste Management Contingency Plan* (NAIA 2017a [draft version]). With action plans focused on priorities such as fish discards, mortalities and emergency preparedness, as well as adhering to the guiding principles such as an emphasis on biosecurity and market potential, Marbase Cleanerfish Ltd.is committed to aquaculture waste management.

Other applicable legislation that applies to Marbase Cleanerfish Ltd. waste management includes:

Government of Canada

Fisheries Act – Aquaculture Activity Regulations (AAR; GC 2018)- Sanitation Regulations

Transportation of Dangerous Goods Act

Province of Newfoundland and Labrador

Transportation of Dangerous Goods Act

Public Health Act Sanitation Regulations

Environmental Control Water and Sewage Regulations 2003 (OLC 2009)

Occupational Health and Safety Regulations (OLC 2012).

Provincial Animal Health Care Plan

Marbase Cleanerfish Ltd. will operate in conformance with the requirements of the Workplace Hazardous Materials Information System (WHMIS).

This Marbase Cleanerfish Ltd. Waste Management Plan should be read in the context of other, related plans, including the Marbase Cleanerfish Ltd.:

- Fish Health Plan
- Spill Response Plan
- Emergency Response Plan, and
- Environmental Protection Plan.

3.0 Waste Management Goals

Marbase Cleanerfish Ltd. will prioritize waste management options that are sustainable and will divert aquaculture waste from rural landfills and instead place an emphasis on value and market potential of this material.

Wherever possible, Marbase Cleanerfish Ltd. will reduce, reuse, recycle or recover materials.

All waste management practices will adhere to strict biosecurity protocols to reduce the risk of transmission of infectious disease.

Marbase Cleanerfish Ltd. will reduce greenhouse gases by utilizing local waste management facilities where feasible to decrease travel and by utilizing fish by-products instead of sending these materials to landfills.

4.0 Waste Prevention Planning

Marbase Cleanerfish Ltd. will, to the extent possible, recycle or reuse the following material:

- Newspaper
- corrugated cardboard
- white and coloured office paper
- plastic as well as glass bottles and jars
- metal cans

Marbase Cleanerfish Ltd. will operate in compliance with Burin Peninsula Waste Management Landfill Bans, i.e., no landfill disposal of tires, appliances, yard waste, mandatory recyclables, hazardous waste, batteries, fluorescent tubes, and large metal items.

Both during Project construction and operation, Marbase Cleanerfish Ltd. will ensure that all contractors and suppliers meet company requirements for waste management practices.

During construction, the waste reduction requirements shall be implemented and executed as follows:

- Salvageable materials will be diverted from disposal where feasible.
- There will be a designated area reserved for bins for reusable material and dumpsters labelled for industrial waste and domestic waste to be received.
- Before proceeding with any removal of materials, Supervisors will inspect containers for compliance.
- Hazardous waste will be managed by a licensed hazardous waste disposal contractor.

4.1 Plan Amendments and Updates

Revisions and updates to the Marbase Cleanerfish Ltd. Waste Management Plan will be in accordance with an approved process,and signed off by the responsible Senior Manager. Suggestions for changes can be made by any participant in the Waste Management Plan but are to be approved prior to issuance of amendments or updates to the plan.

Amendments and Updates will be issued on an as-needed basis. Users of the Plan should ensure they have on hand the most updated version of the document.

5.0 Waste Types

The construction and operation of the Marbase Cleanerfish Hatchery will generate a variety of wastes including organics (i.e. land debris, wood, mortalities) and general inorganic waste (i.e. feed bags). Wastes can also include obsolete or contaminated/ hazardous waste (i.e. sewage, diseased stock, chemicals, petroleum products).

Any materials not currently listed in this document but identified during construction and/or operations will be assessed for proper disposal procedures and the Marbase Cleanerfish Ltd. Waste Management Plan will be updated.

5.1 Organics

There are several sources of organic waste that will be generated by Marbase Cleanerfish Ltd. (Table 1) and organic wastes will constitute the largest volume of waste generated during operations. Minimal organic waste will be generated during the construction phase.

During operations, fish feces and uneaten feed are organics that will be captured in filtration equipment and pressed to remove saltwater. Another source of organic waste is mortalities of the stock due to general losses or from removal (culling) of stock for reasons such as poor growth performance. Mortalities can also be a result of a depopulation order (i.e. a reportable disease), disease, or an environmental event. Mortalities will be treated according to best practice techniques and under the guidance and recommendation of the federal, provincial as well as regional regulators.

5.2 Inorganic Waste

The majority of inorganic waste generated by Marbase Cleanerfish Hatchery will consist of plastics, mostly feed bags. A compactor will reduce the volume of plastic waste materials before disposal.

Table 1. Waste types and management practices for Marbase Cleanerfish Ltd. Marbase Cleanerfish Hatchery Project (Construction and Operation Phase).

Waste Classification	Waste Type	Waste Form	Waste Stream	Waste Destination
Organic	Land clearing debris	Solid	Reuse	Reuse on site
	Feces	Solid	Composting	BPWMC [a] or another approved purchaser
	Feed	Solid	Composting	BPWMC or another approved purchaser
	Regular Mortalities Mass Mortality (without reportable disease)	Liquid	Fertilizer or feed additive	BPWMC or another approved purchaser
	Regular Mortalities Mass Mortality (with reportable disease)	Liquid	Rendering	Barry Group Inc. or another approved purchaser
	Sewage sludge	Liquid	On-site sewage treatment plant	BPWMC
	Clean dimensional wood and wood pallets (equipment and feed delivery)	Solid	Reuse on site/recycle or BPWMC for composting	Recycled or BPWMC
	Plywood and/or particle board	Solid	Reuse or landfill	Recycle or BPWMC
	Employee food waste	Solid	Composting or landfill	BPWMC
	Paper and cardboard products	Solid	Recycle if facilities exist, composting or landfill	BPWMC or approved facility
	Feed bags	Solid	Landfill	BPWMC or approved waste facility
Inorganic	Expired & excess piping	Solid	Landfill	BPWMC or approved waste facility
	Plastic components	Solid	Reuse or landfill	Reuse on-site or BPWMC
	Metals	Solid	Recycle	Recycle at approved metals recycling location
	Bottles and cans	Solid	Recycle	MMSB [b]

Waste Classification	Waste Type	Waste Form	Waste Stream	Waste Destination
	Fuels (petroleum)	Liquid	Hazardous disposal	Approved hazardous waste facility
	Glycol (antifreeze)	Liquid	Hazardous disposal	Approved hazardous waste facility
	Oil, lubricants and oily waste	Liquid & Solid	Hazardous disposal	Approved hazardous waste facility
	Paints	Liquid	Reuse, recycle or hazardous disposal	Approved recycling or hazardous waste facility
Chemicals	Resins	Liquid & Solid	Reuse or hazardous disposal	Reuse or approved hazardous waste facility
	Acetone	Liquid	Reuse or hazardous disposal	Reuse or approved hazardous waste facility
	Cleaning and disinfecting	Liquid	Landfill or hazardous disposal	BPWMC or approved hazardous waste facility
	Anaesthetics	Liquid & Solid	Hazardous disposal and/or treated in HATCHERY system	Approved Hazardous waste facility and/or treated in HATCHERY system

[a] Burin Peninsula Waste Management Corporation
[b] Multi-Materials Stewardship Board

5.3 Contaminated or Hazardous Waste

Human waste (sewage) will be generated at the Marbase Cleanerfish Hatchery by employees. The Marbase sewage treatment plan meets the codes and requirements of the Sanitation Regulations under the *Public Health Act*. On occasion, the system may require removal of accumulated sludge. A contractor will remove the material and transport it for disposal, e.g. at the Burin Peninsula Waste Management site.

Should Marbase Cleanerfish Ltd. have a disease event that results in fish mortality or an ordered depopulation of fish, the stock that has died must be disposed of under direction of the Canadian Food Inspection Agency (CFIA). Marbase Cleanerfish Ltd. will adhere to these regulations and guidelines for disposal.

Only a small amount of chemicals will be used and disposed of by Marbase Cleanerfish Hatchery. These chemicals will include petroleum products such as oils, fuels and greases. Chemicals such as cleaning and disinfecting products will also be used but are food grade and are not considered hazardous.

6.0 Waste Management

Marbase Cleanerfish Ltd. is committed to reducing the number of fish mortalities. As part of best practice, control techniques including the following will be implemented:

- Stress during procedures such as transportation, sampling and inspections as well as mortality removal will be minimized.
- In addition to the Provincial Animal Health Plan, Marbase Cleanerfish Ltd. will implement, in consultation with Provincial and private veterinarians, a Health Plan to ensure any health or welfare problems with the fish will be addressed promptly.
- Records of inspections, mortalities, as well as likely causes of mortalities will be maintained and submitted to the regulatory agencies as required and maintained within Marbase Cleanerfish Ltd. records.
- Daily removal and disposal of any dead or moribund fish to prevent risk of disease spread or attraction of predators.

To reduce plastic waste as a result of feed bags, Marbase Cleanerfish Ltd. intends to purchase fish feed in bulk (pallet loads) to be delivered to silos at the Marbase Cleanerfish Hatchery. This bulk transport will reduce the use of plastic bags and ultimately reduce the waste generated. Attempts will be made to source biodegradable feed bag containers and to minimize these purchases. Alternatively, recycling will be used should this be available. All of these measures will take precedence over disposal. Other waste plastic generated will be reused or repurposed if possible before disposal at an approved waste management facility.

Recycling of materials will be undertaken whenever possible instead of sending materials to landfills. This will also include recycling the organic material such as the fish mortalities as well as feces and uneaten feed from the Marbase Cleanerfish Hatchery by utilizing these materials in industries that generate fertilizers and compost.

6.1 Waste Collection and Disposal

Marbase Cleanerfish Ltd. is committed to working with the federal, provincial and regional organizations that govern waste management in Newfoundland's aquaculture industry. Therefore, the Marbase Cleanerfish Ltd. waste collection and disposal plan will be based on these principles and regulations while meeting the company goals and striving to meet Best Practice Management techniques.

6.1.1 Fish Feces, Feed and BOD matter

Fish feces and uneaten fish feed in the Marbase Cleanerfish Hatchery will be separated from the production system water in the settling filter. Specialized media in the settling filter improves this settling process. To improve waste transport efficiency, the solid waste (sludge) will have the moisture extracted down to 15% solids and 85% water prior to being transported to a storage facility. The sludge produced from the culture of the fish in the Hatchery will be stored in an approved holding facility. A nutrient-rich product, this sludge will be collected on a routine schedule by the Burin Peninsula Waste Management Corporation (BPWMC) for use in their composting facility.

6.1.2 Stock Mortalities and Culls

A practice that is common and proven both nationally and internationally for finfish mortalities and culls is ensilaging. The resulting product is often used for agriculture, as a feed additive or used as a source of energy in systems such as anaerobic digesters. Marbase Cleanerfish Ltd. recognizes the benefits of ensilaging mortalities and culls as a best practice to reduce the risk of infectious disease transmission as well as for optimizing the use of this product in other industries (agriculture, renewable energy sector). This process inactivates bacteria and viruses including the virus that causes infectious salmon anemia (ISA) (Dixon et al. 2012) and has been proven effective and adopted in many finfish farming jurisdictions in Norway, Chile and Scotland (NAIA 2017b).

Fish mortalities at the Marbase Cleanerfish Hatchery will be monitored and collected daily from tanks. The fish (depending on size) will be placed into a grinder that chops the mortalities into small pieces while a dose dispenser ("doser") adds formic acid to produce a slurry with a pH of 4.5 or lower. The slurry is held in a storage tank on-site at the hatchery facility until sufficient quantities are acquired to justify transport. Marbase Cleanerfish Ltd. prefers, where possible to use local companies that are interested in this product. Candidate users include Newfoundland owned Marine Bio-refinery and Shell-Ex (http://www.shell-ex.com/). These companies may utilize this product as a commercial fertilizer or animal feed additive.

Should mortalities or depopulation be ordered due to a reportable disease and hence cannot be harvested and processed, the mortalities will be ensilaged using the same process as regular mortalities. Disposal of mortalities that are a result of a reportable disease will be under the direction of CFIA. Currently, in Newfoundland, the only approved facilities to receive ensilage from mortalities with a reportable fish disease is the Barry Group Incorporated in Burgeo. The Barry Group operates a rendering facility that produces fishmeal from the ensilage. Marbase Cleanerfish Ltd. will work with CFIA to determine the appropriate facility for disposal in this instance. In the UK, ensilage is not designated as with or without a reportable disease since the process inactivates bacteria and viruses including the virus that causes infectious salmon anemia (ISA) (Dixon et al. 2012).

6.1.3 Sanitary Waste

All sanitary waste from the Marbase Cleanerfish Hatchery (toilets, sinks, showers, etc.) will conform to the Environmental Control Water and Sewage Regulations 2003 (OLC 2009), and will be collected by the existing onsite sanitary system, an "all-in-one" packaged sewage treatment plant that is a stand-alone plant. It is designed to accept raw sewage and produce a high-quality effluent without the need for auxiliary equipment or tankage. Aerobic treatment is via a rotating biological contactor. Lamella plates are used to provide primary and final settlement of sludges. Sludge storage is provided within the unit and removed by a qualified waste management firm such as BPWMC for disposal when full. BPWMC will either compost this material if possible or dispose at local landfill facilities.

6.1.4 Other Organics

Other organic waste generated by operations such as wood pallets, paper and cardboard and food waste generated at the hatchery will be collected and stored at a select location in approved containers for disposal by BPWMC. Where possible, material will be reused or recycled before collected by BPWMC and used as part of their composting facility.

Currently, the Multi-Materials Stewardship Board (MMSB) does not recycle paper or cardboard on the Burin Peninsula; however, BPWMC can use it in their composting facility if operational. Paper products will be separated and collected by BPWMC for composting. Marbase Cleanerfish Ltd. will also encourage employees to separate their food waste so organics can be composted instead of transported to local landfills.

6.1.5 Inorganic Waste

The majority of inorganic waste generated at the Marbase Cleanerfish Hatchery will be the plastic feed bags. The volume and size of this feed dictates that Marbase Cleanerfish Ltd. purchase it in 25 kg plastic bags. There are currently no recycling facilities on the Burin Peninsula that can process the plastic feed bags. Until such facilities exist, Marbase Cleanerfish Ltd. will have to dispose of this waste through BPWMC in a landfill.

Recycling of employee domestic waste such as plastic packaging, beverage containers and the like will be encouraged where appropriate. Material that cannot be recycled will be disposed as with other inorganic waste through BPWMC.

6.1.6 Chemical Waste

Chemicals such as formic acid and hazardous compounds such as oil and fuels will be used during operations and subsequent waste will be generated. Marbase Cleanerfish Ltd. recognizes the hazards these materials can impart on the environment and fish stocks (both wild and farmed). As such, Marbase Cleanerfish Ltd. will ensure that these waste materials are stored and disposed of according to the requirements of Workplace Hazardous Materials Information System (WHMIS) as well as the Transportation of Dangerous Goods/Regulations (TDG) as suggested in the *Guidance Document: Best Management Practices for the storage of waste dangerous goods/hazardous waste (WDG/HW) at business sites* from the Department of Environment and Conservation Pollution Prevention Division (GNL 2015).

Hazardous waste generated at the hatchery will be stored in containers clearly labelled according to WHMIS and TDG requirements. These containers will be appropriate for holding the material and will be in good condition as well as free of rust and cracks. A designated storage area as prescribed by Occupational Health and Safety Regulation, 2012 [OLC 2012, s.59] will be used for waste storage with a sign clearly indicating “Hazardous Waste – Authorized Personnel Only”. Waste will be stored until quantities are sufficient to justify transportation for disposal. The waste anaesthetic water generated during procedures such as vaccination and sampling will be disposed according to local regulations.

Marbase Cleanerfish Ltd. intends to utilize companies within Newfoundland and Labrador that specialize in, and are approved for, handling and disposing of hazardous waste. In the case

of a leak or spill during petroleum storage and handling, the Environmental Emergencies 24-Hour Report Line will be notified at 1-800-563-9089. Marbase Cleanerfish Ltd. will also have an Emergency Response Plan in place and a Response Organization contract.

Any vaccine or diluent requiring disposal, as well as biomedical waste such as needles will be handled according to biomedical waste disposal guidelines and municipal regulations. Vaccines will be prescribed and administered by a qualified veterinarian.

7.0 Education, Monitoring and Reporting

All Marbase Cleanerfish Ltd. staff, as well as third-party service contractors, will be provided with a copy of the Marbase Cleanerfish Ltd. Waste Management Plan in conjunction with on-site training on waste management. This training will focus on Marbase Cleanerfish Ltd. goals and ensure they are understood and followed.

If there is suspicion of a significant fish disease, or should mass mortalities occur this must be reported to the Aquatic Animal Health Division, CFIA and DFLR Based on the recommendations of these regulatory agencies and stakeholders, Marbase Cleanerfish Ltd. will be required to conduct investigations and submit detailed documentation on the event.

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Appendix E: Women's Employment Plan

Marbase Cleanerfish Ltd.
Lumpfish Hatchery, Marystown

Women's Employment Plan

1.0 Introduction

Marbase Cleanerfish Ltd. is a Newfoundland and Labrador registered company which plans to construct and operate a Lumpfish Hatchery as part of an aquaculture service hub to be located on the site of the former Marystown Shipyard property. The facility will be contained within an existing building at the former shipyard and will be a land-based operation using seawater from Mortier Bay and municipal services from the Town, utilities and other third parties.

Lumpfish (*Cyclopterus lumpus*), a native species, are utilized in the aquaculture industry as "cleanerfish". When placed together with salmon in a sea cage, lumpfish graze on sea lice that can occur on growing salmon. This biological form of pest control can replace more intrusive and less effective strategies, and is an accepted, regulated and ongoing practice in the Province and internationally. Currently in this region, lumpfish are being provided to aquaculture operations as cleanerfish in limited numbers (and small sizes) through the Department of Ocean Sciences Research Production Program, Memorial University. The Marbase Cleanerfish Hatchery represents the next logical step in the commercialization of this capability.

Wild lumpfish (pre-spawning eggs) will be obtained from local commercial fishers in cooperation with an ongoing program at the Dr. Joe Brown Aquatic Research Building (MUN). At the hatchery, fertilized eggs will be incubated and, upon hatching, larvae will be reared in a sequence of tanks until reaching marketable size (25-40g) for sale to local finfish aquaculture operators. The planning time frame for hatchery operations is fifteen years.

The population of the Burin Peninsula has been decreasing over the past years, primarily due to lack of employment opportunities. Aquaculture and associated businesses represent an opportunity for training, employment and either staying or returning to the region. The Marbase Cleanerfish Hatchery itself is anticipated to require an operational workforce of 15 – 20 individuals, the short term renovation/construction phase will a larger number of people and trades.

2. 0 Marbase Cleanerfish Ltd. Commitment to Diversity

Marbase Cleanerfish Ltd. is committed to being an equal opportunity employer and company policies and practices will support this commitment in relation to recruitment, training, advancement and retention. The company senior management team will appoint a member of the team to be responsible for diversity, including the successful implementation of a company Women's Employment Plan.

Marbase Cleanerfish Ltd. will develop and implement a Women's Employment Plan (WEP) as the project planning proceeds. The intent of a Women's Employment Plan is to "assist companies by helping to establish proactive policies, practices, and lines of accountability aimed at creating inclusive workplaces free from harassment and discrimination. In projects requiring contractors, sub-contractors and unions, it is crucial that shared responsibilities and clear lines of communication are established to ensure adherence to the company's WEP. "(From the template for Women's Employment Plans provided by the Office for the Status of Women, November 2019).

The company will take proactive measures to ensure that women are aware of the potential training and employment opportunities associated with the hatchery project (See Section 4.0). Successful mechanisms to attract and retain women in non-traditional work have been developed in the province and women are now participating in technical, administrative and management roles in the aquaculture industry both in the province and on the Burin Peninsula itself.

3.0 Project Timeframe and Workforce Estimates

The project is scheduled to begin in Spring 2020. Construction of the hatchery is estimated to take 6 months. Wharf repairs will be initiated during this time period. The hatchery is expected to commence operations in the Fall of 2020 and will operate for fifteen years or more.

Construction related employment is estimated at 50 – 60 people (Table 1 and Table 1A) and operations employment at 20 positions (Table 2 and Table 2A). Indirect jobs will likely be primarily in the associated services and material supply businesses, both existing and anticipated to support the growing aquaculture industry around the Burin Peninsula.

Table 1: Estimated Full-time Contractor-Hired (CH) or Direct Employee (DE) Hires, Construction Phase, by Occupation/NOC

Work Task	**Potential # Workers**	**National Occupation Classification***
Project Management and Supervision	2	0211 engineering manager/supervisor 0711 construction managers
Civil Works - external	16	7217 heavy duty equipment operators 0711 construction manager 7611 construction trades
Building reconstruction	24	0711 construction manager/supervisor 7215 carpenters 7216 mechanical engineers 7219 installers 7213 pipefitters 7611 construction trades
Pumping, plumbing and intakes	12	7213 pipefitters 7251 plumbers 7611 plumber helpers 2274 engineer officers water transport 2273 deck officers water transport 2212 geotech technicians 2231 civil engineer
Installation of tanks, water circulation and water treatment	8	7217 contractor/supervisor 7213 pipefitters
Total	62	

*https://noc.esdc.gc.ca/English/noc/QuickSearch.aspx?ver=06&val65=master%20mariner

Table 1A: Employment Targets by Occupational Group – Construction Phase					
Occupation (NOC)	**FT/PT/Seasonal**	**# of Employees**	**Target Female (%)**	**Direct Hire (DH) or Contractor (CT)**	**Estimated Timeframe**
Project Management	Seasonal		50	CT	0.5 yr.
0211 engineering manager/supervisor 2231 civil engineer		2 1			
Administration				CT	
Supervisors of Skilled Trades	Seasonal		50	CT	0.5 yr.
0711 construction managers 7217 contractor/supervisor		2 6			
Semi-Professionals, Technicians	Seasonal		30	CT	0.5 yr.
2274 engineer officers water transport 2273 deck officers water transport 2212 geotech technicians		2 2 1			
Skilled Trades	Seasonal		30	CT	0.5 yr.
7217 heavy duty equipment operators 7611 construction trades 7215 carpenters 7216 mechanical engineers 7219 installers 7213 pipefitters 7251 plumbers		4 10 4 4 6 8 8			
Manual Workers/Labourers					
Apprentices	Seasonal		50	CT	0.5 yr.
7611 plumber helpers		2			

Table 2: Estimated Full-time (FT), Contractor-Hired (CH) or Direct Employee (DE) for the Operations Phase by Occupation//NOC				
Occupation	**NOC**	**Duration of Work**	**Number of Employees**	**CH/DE**
Project Management	8257	**Indeterminant, full time**	**2**	**DE**
Supervisors Skilled Trades			**0**	
Professionals	3213	**Indeterminant, full time**	**1**	**DE**
Semi-Professionals and Technicians	2221 3213	**Indeterminant, full time**	**10**	**DE**
Skilled Trades	1411 2131	**Indeterminant, full time**	**3**	**DE**
Manual Workers	0721 6651	**Indeterminant, full time**	**4**	**DE**

Table 2A: Employment Targets by Occupational Group – Operations Phase					
Occupation (NOC)	**FT/PT/Seasonal**	**# of Employees**	**Target Female (%)**	**Direct Hire (DH) or Contractor (CT)**	**Estimated Timeframe**
Project Management	FT	2	50	DH	Ind.
Administration	FT	1	100	DH	Ind.
Supervisors of Skilled Trades		0			
Semi-Professionals, Technicians	FT	10	60	DH	Ind.
Skilled Trades	FT	3	30	DH	Ind.
Manual Workers/Labourers		4	50	CT	Annually
Apprentices					

4.0 Recruitment and Employment Practices

Experience in other projects and industries in the province have identified several measures that enhance the recruitment and retention of women in a workplace.

Marbase Cleanerfish Ltd. will review the various suggested measures in consultation with organizations supporting women in science, trades and technical occupations (such as Office to Advance Women Apprentices (OAWA) and Women in Resource Development Corporation (WRDC), AESL) as well as education and training institutions and determine measures relevant to the scale and nature of the hatchery project.

Marbase Cleanerfish Ltd. will make ongoing efforts to develop and maintain an inclusive workplace culture.

5.0 Communication

Marbase Cleanerfish Ltd. will work with stakeholder organizations and institutions to ensure awareness of project related opportunities. Experience in other projects and industries has identified several measures that are effective in reaching women.

The Newfoundland and Labrador Aquaculture Industry Association (NAIA), individual companies and the Marine Institute have had and continue various initiatives to ensure training, employment and business opportunities offered by the industry are communicated throughout the province. Marbase Cleanerfish Ltd. has already initiated public communication about the project through media and a workshop in Marystown, the site of the proposed lumpfish hatchery.

6.0 Monitoring

Marbase Cleanerfish Ltd. will work closely with its main contractor(s)/sub-contractors during contract negotiation and implementation to ensure compliance with the Women's Employment Plan. The company will include quantitative and qualitative information about the WEP in an annual report to the Office of the Status of Women and pertinent stakeholders (Appendix A).

Appendix A: Employment Tracking Summary

Skilled Crafts and Trades Occupations										
Time Period: From _____ To: _____					**Journeyperson**		**Apprentice**		**Total Females**	
					Total Workers: Male and Female		**Female**			
Trade	Total	Supervision Name Hire	Name Hire	Union Referral	Name	Union	Name	Union	Total (Number)	Total %
Carpenter										
Electrician										
Heavy Equipment Operator										
….										
Total										
Manual Workers										
Labourers										
Warehouse Worker										
…										
Total										
Administrative/Sales/Service Occupations										
Clerical Worker										
Security Guard										
….										
Total										
Total (Overall)										

Name Hire Efforts	
Trade	**Notes**

Source: Using Balance To Build: Supporting Gender Diversity in Newfoundland and Labrador Construction Trades, 1990-2017

Appendix C: Women's Employment Plan – Quarterly Tracking Report – A, Numbers of Workers

Quarterly Report								
Company Name: _____								
Project Name: _____ Location: _____								
Contact: _____								
Time Period: From _____ To: _____								
Occupations/Job Classification	**National Occupational Code (NOC)**	**Female Representation**	**Total Employees**		**Level Of Trade**			
					Journeyperson		**Apprentice**	
		Number (%)	**M**	**F**	**M**	**F**	**M**	**F**
Management								
……								
Administrative								
…..								
Business/Finance Professionals								
…								
Technicians/Semi-Professionals								
….								
Supervisor/Skilled Trades								
….								
Skilled Trades								
….								
Manual Workers								
…								
Natural and Applied Science Professionals								
……								
Total								

Appendix C: Women's Employment Plan – Quarterly Tracking Report – B, Person Hours

Quarterly Report								
Company Name: _____								
Project Name: _____ Location: _____								
Contact: _____								
Time Period: From _____ To: _____								
Occupations/Job Classification	**National Occupational Code (NOC)**	**Female Representation (Person Hours)**	**Total Employees**		**Level Of Trade**			
					Journeyperson		**Apprentice**	
		Person Hours (%)	**M**	**F**	**M**	**F**	**M**	**F**
Management								
……								
Administrative								
…..								
Business/Finance Professionals								
…								
Technicians/Semi-Professionals								
….								
Supervisor/Skilled Trades								
….								
Skilled Trades								
….								
Manual Workers								
…								
Natural and Applied Science Professionals								
……								
Total								

Appendix F: Stakeholder Consultation and Issues Identification

Stakeholder Consultation and Issues Identification

As part of project planning, representatives of Marbase Cleanerfish Ltd. consulted with agencies and individuals who could both identify issues and concerns, and also supply information and advice that could be helpful.

In total, forty individuals representing twenty organizations were contacted. While this does not represent all possible stakeholders, it is felt that the effort provides a fair representation of the issues and concerns that will need to be addressed during planning, construction and operation of the proposed Marbase Cleanerfish Hatchery.

In most cases, individuals were contacted by e-mail or telephone, provided with a summary description of the Project (Attachment 1) and meetings scheduled where it was advisable. Table 1 summarizes the stakeholders contacted, identifies (in broad terms) their mandate and lists the nature of interaction (email, telephone, meetings).

Table 1. List of Stakeholders Contacted – October-November 2019.

Stakeholder	Mandate, Issues and concerns	Status, Notes
Department of Municipal Affairs and Environment (DMAE) Environmental Assessment Division	Oversee compliance with the EA Process; provides advice on adherence to the process.	Email, meeting, telecons. Circulated Summary Project Description (PD). Received Formal notice of need to register for EA
DMAE Pollution Prevention Division	Oversees compliance with Environmental Protection Act; requires a Waste Management Plan	Email, PD, telecom
DMAE Climate Change Branch	Addresses means to reduce carbon loading and seeks to have proponents address effects of anticipated climate change on projects.	Email, PD
DMAE Water Resources Management Division	Ensures protection of water resource and addresses allocative decisions. Requires permits for water extraction and for structures to control water.	Email, PD, meeting.
Department of Fisheries and Land Resources (DFLR) Fisheries and Aquaculture Branch	Regulator for aquaculture operations in NL. Lisences operations; requires annual renewal and reporting. Applicants are required to engage in public consultation and report on results.	Email, PD,series of telecons; meeting in Grand Falls-Winsor. Telecom- send PD.
DFLR Forestry and Wildlife Branch	Responsible for resource protection and management of forest resources and wildlife.	Email, PD.
DFLR Lands Branch	Administers land Deeds, leases.	Email, PD
Service NL	Ensure application of regional and municipal governance.	E-mails, PD. Advised of local permit requirements.

Local Governance and Planning Division		
Tourism, Culture, Industry and Innovation Provincial Archaeology Office	Preservation and protection of historic and cultural resources.	Emails, PD..
Office of the Status of Women.	Encourages the development of Womens Employment Plans,and assists with advice.	Email PD, advice on organization, contents of WEP.
Health and Community Services	Addresses health issues at the community level.	Email, PD, identified concerns related to fish consumption.
Impact Assessment Agency of Canada	Administers Federal Assessment Process. .	Formal statement received Oct. 28. Project does not require Federal Registration.
Environment and Climate Change Canada	Addresses implementation of Federal policy on Climate Change.	Email, PD
Fisheries and Oceans Canada	Responsible for protection of fish and fish habitat, fisheries management.	Email, PD, meetings – St. John's, Marystown. Issues - SAR, AIS, habitat disruption, fishing activity.
Health Canada	National health program delivery.	Email, PD
Transport Canada	Navigation Waters Protection	Email, PD
Town of Marystown	Administer community services, resources.	Email,PD, meeting
Little Bay Harbour Authority	Operation and maintenance of a small craft harbour for use by fishers and recreational boat users.	Telephone, PD.
Burin Peninsula Waste Management Authority	Facility to receive wastes from the region; responsible for waste stream separation and waste diversion; operation and monitoring of landfill.	Email, PD, site meeting.
Newfoundland Aquaculture Industry Association	Supporting the growth of the industry, and the development of operating practices and standards	Email, PD, meeting.

Table 2 – Issues and Concerns Identified through Stakeholder Engagement.

Issue/concern		Source	Relevance to the Undertaking.	Resolution
1	Waste Management	Government-Regulator, Proponent	Limited quantities and types of wastes will be generated during construction or operations; some wastes will have potential for alternate usage, e.g. organics.	Waste Management Plan development; agreement with Regional Waste Authority.
2	Climate Change	Government, Proponent	Reduce carbon emissions to a minimum throughout the project lifecycle.	Use low emissions technology; audit performance
3a	Resource Use - Water	Government Regulator	Limited requirement for freshwater; will be provided via access to the existing municipal system; no groundwater wells. Marine – Concern to avoid fish entrainment/ impingement.	Permits required for water extraction. Design of intake screening. .
3b	Water Quality Protection	Government Regulator, Proponent	Screening and purification of influent and effluent; monitoring to meet specifications.	Water quality monitoring on site
4	Historic Resources	Government Regulator	The hatchery is to be built on an existing industrial site, no disturbance is anticipated.	No issue
5	Gender Balance and Equity Issues	Government, Proponent	Fair recruitment, training, promotion practices required for construction and operation project phases.	Women's Employment Plan to be developed, including consideration of equity issues.
6	Fisheries Protection Program	Government Regulator	DFO has a program to address issues, reach resolution and authorize works in water, subject to monitoring and mitigation.	Prepare an Application for Project Review.
6a	Species at Risk	Government Regulator	Lumpfish are a species of concern.	Incorporate species status into harvesting plans for broodstock.
6b	Aquatic Invasive Species	Government Regulator	AIS are a concern in Placentia Bay. No actions should be taken that could introduce species or extend their distribution.	Observe all identified precautions.
6c	Fish Harvesting	Government Regulatory, resource users	Consultation with fishers and boaters required to identify activity in the area of water pipelines and resolve any potential disruption.	Consultation program with fishers, boaters, associations and representative organizations.
6d	Marine Traffic	Government Regulator, marine users.	Consultation with marine users as for 6c.	Submit request under Navigable Waters Act.
7	Human Health, Community Health	Government, Proponent	Identify means to reduce negative and enhance positive human and community health factors.	Address concerns that are within scope of the undertaking.
8	Training, Employment and Economic Activity	Area Residents, Proponent	Project hiring and purchases are opportunities to deliver employment and economic benefits to the local community.	Adopt fair practices that seek to encourage local benefits.

Table 2 provides a summary listing of the issues identified and the approach to their resolution.

The scale and location of the undertaking result in the identification of a limited number of environmental and socio-economic issues, all of which can be addressed and resolved within the framework of existing corporate practices and regulatory processes. The following discussion relates to the identified issues that will require attention as project planning continues.

Issue #1 - Waste management

Marbase Cleanerfish Ltd. will develop and seek approval for a Waste Management Plan.

The proposed hatchery will be capable of annually producing 3.0 million fish from egg incubation through to market size (25g-40g.). While the hatchery will form a very important link in the finfish aquaculture service sector, this production should be placed in context. At full production, a total of 75 tonnes of product will be placed on the market. This compares, for example with the anticipated total output from salmon production operations in Placentia Bay where an estimated 27,390 tonnes (gutted weight) annually will be produced. The Greig NL Atlantic salmon hatchery now under construction will produce in the order of 5000 tonnes of live fish to stock sea cages.

The scale of operation is also reflected in the wastes produced. The largest waste is the material filtered from both the inflow water, prior to its use in the tanks, and the outflow water prior to its return to the bay. The sludge produced, at 15% solids content, amounts to 8 tonnes per month.

The Marbase Waste Management Plan (Appendix D) will seek to identify opportunities to utilize this organic resource, perhaps as a fertilizer in agriculture.

Issue #2 Climate Change

By using an existing industrial site and building, the potential for carbon loading is greatly reduced. By employing modern equipment with emission control devices operating optimally, carbon emissions will be minimized.

During operations, the facility will use newbuild equipment and operate it in accordance with warranty requirements. As well, during detailed design, Marbase will seek out opportunities to reduce energy demand, and to identify alternate energy sources.

Issue # 3 Water Consumption and Water Quality Protection

There is not likely to be competing users for the saltwater requirements of the project, so allocative decisions are not likely to be required. Suitable intake locations are available that are a minimum distance of 500m from existing outfalls in Mortier Bay that are currently releasing to the marine environment.

The main concern will be with respect to the water quality of discharge water. Given the two-stage treatment of hatchery water, it will be practical to meet applicable regulatory values (e.g. Provincial Water and Sewer Effluent Regulations). Monitoring will be ongoing in order to assure the quality of hatchery water, both as influent to the hatchery, as well as at upon its return to the bay. Appendix B provides baseline information on water quality at candidate intake locations.

Issue #5 Gender Balance and Equity

Marbase Cleanerfish Ltd. will develop and implement a Women's Employment Plan that includes broader issues of workplace diversity and equity. Appendix E provides an outline of the document to be produced prior to commencement of construction.

Issue # 6 Fisheries Protection

The saltwater lines have the potential to interact with some forms of fishing – mobile gear such as scallop rakes. Consultations to date indicate that there is little information available specific to Mortier Bay and the location of the pipeline routes. DFO Fisheries Management were able to describe the various forms of commercial and recreational fishing that characterize the region but did not have data specific to Mortier Bay. Based on anecdotal knowledge it was indicated that recreational cod and scallop fishing could occur in the area. The Little Bay Harbour Authority indicated that there is a fair amount of small boat traffic in Mortier Bay, but most recreational fishing occurs further out the bay. Some lobster traps are reported as set along the western side of the approach to Mortier Bay. The Community-based Coastal Resource Inventory (CCRI) maps (NTS map 1 M/3 sheets printed Feb.21 2000) show no pelagic or groundfish harvesting activity in Mortier Bay.

From the Grieg EIS, the commercial landings database of DFO is used to present information about the fisheries harvest locations in Placentia Bay. The database shows one harvest location (Fig. 4.21 p. 216) at the mouth of Mortier Bay, but otherwise none within the bay proper. The data for fixed gear distribution (2010-2015) shows (Fig. 4.25 B, p. 222) gear present at the mouth and East side of Mortier Bay, but not in the area of the project. Snow crab gear for the same period is shown (fig. 4.33) as present on the East side of Mortier Bay only. Again, no gear locations are shown within the project area. Sea scallops (Fig. 4.39) commercial harvest locations (2010-2015) show no harvest areas near Mortier Bay.

No landings are reported for Mortier Bay, presumably because of the lack of a fish processing facility in the area. The dismantled OCI plant site retains a cold storage unit, but this does not appear to be a landing site for harvested fish.

The available data on core and non-core vessel registrations in Placentia Bay does not separate Mortier Bay communities from others in the area. The area that includes Parkers Cove, Baine Hr., Rushoon, Oderin, Red Hr., Jean de Baie, Little Bay, Fox Cove, Mortier, Port au Bras and Burin is reported (as of 2018) as containing 67 vessels (50 at< 35'; 11 at > 35'). This compares with a total of 534 for Placentia Bay (426 at < 35'; 108 at >35')

It will be useful to consult with the community fisheries committee, local fishers and union representatives to identify and address any potential overlaps in fishing activity and the marine features of the proposed undertaking, however it appears that any issues can be addressed and resolved through the DFO and Transport Canada regulatory processes.

Issue #7 Human and Community Health

One stakeholder indicated a need to consider both the potential positive and potential negative effects of the project plan on the health of the general population. These could include, but would not be limited to, direct health impacts related to the consumption of fish; as well as indirect impacts such as sustainability (fuel, products, transport, packaging, disposal, energy and water use), pollution, contamination, food handling, housing, social services, education, land usage, construction activity, health service provision and community viability. Further, the reviewer identified the need to consider how these effects may vary within the population (e.g. different communities, socioeconomic groups, genders, age categories, etc.). It was also noted that consideration should focus on the potential effects of the project on workers' and their families' health. It was suggested as well that the proponent consider alternative ways in which the project can be developed in order to minimize the potential negative impacts and maximize the potential positive impacts on population health.

It is unclear how the project will have a direct effect on the consumption of fish in the Province, (or how an increase in fish consumption would result in a negative effect).

It is difficult to understand how the stated concern lies within the scope of this project. The product – lumpfish will be sold to finfish aquaculturists as a cleanerfish in sea cages. The lumpfish themselves would not be marketed for human consumption, but (as a component of biosecurity) would be harvested along with the salmon in the seacages.

The scope of this undertaking is bounded at the point of sale. (The issues associated with the use of lumpfish as cleanerfish versus alternative methods is addressed extensively in the Grieg NL Placentia Bay Aquaculture EIS).

The effect of this project will be for fish producers to see reduced mortalities and improved product quality. In a very indirect manner, this improved production efficiency might affect fish consumption patterns in the Province, however it is not credible to address such a speculative

and indirect effect within the bounds of the proposed undertaking and its environmental assessment.

The need to be attentive to the health and safety of Project employees is worthy of careful attention and Marbace Cleanerfish Ltd. will implement a Health, Safety and Environment Policy and programs as one means to assure employee safety both in the workplace and at home.

Issue #8 Training, Employment and Economic Activity

Marbase Cleanerfish Ltd. will have a small, but well educated and trained staff to support hatchery operations. Hiring will focus on local residents and adherence to the principles of equity and diversity in the workplace (see Appendix E). Training will be a continuing ingredient of every employee's engagement, and opportunities will be sought to cooperate with training institutions where mutual benefits can be realized.

Attachment 1

Project Summary Description

Marbase Cleanerfish Ltd.

Marystown Lumpfish Hatchery

Marbase Cleanerfish Ltd. is a Newfoundland and Labrador registered company which plans to construct and operate a Lumpfish Hatchery as part of an aquaculture service hub to be located on the site of the former Marystown Shipyard property. This service activity is consistent with the zoning for the industrial site within the Town of Marystown. The Lumpfish Hatchery is required to be registered in accordance with the Newfoundland and Labrador Environmental Protection Act – Environmental Assessment Regulations.

Lumpfish (*Cyclopterus lumpus*), a native species, are utilized in the aquaculture industry as "cleanerfish". When placed together in a sea cage, lumpfish graze on sea lice that represent a stressor on growing salmon. This biological form of pest control can replace more intrusive and less effective strategies, and is an accepted, regulated and ongoing practice in the Province and internationally. Currently in this region, lumpfish are being provided as cleanerfish in limited numbers (and small sizes) through the Department of Ocean Sciences Research Production Program, Memorial University. The Marbase lumpfish hatchery represents the next logical step in the commercialization of this capability.

The scope of the proposed Undertaking includes the construction and operation of a land-based lumpfish hatchery, with services provided from the municipality, utilities and other third parties. The facility will be contained within an existing site building at the former shipyard to control light and temperature exposure, and to ensure biosecurity.

Wild lumpfish (pre-spawning eggs) will be obtained from local commercial fishers in cooperation with an ongoing program at the Dr. Joe Brown Aquatic Research Building (MUN). At the hatchery, fertilized eggs will be incubated and, upon hatching, larvae will be reared in a sequence of tanks until reaching marketable size (25-50g) for sale to local finfish aquaculture operators. Eventually a domesticated broodstock will be developed by Marbase Cleanerfish Ltd. to provide an assured and reliable supply of fertilized eggs.

Dedicated features of the facility include a salt water supply drawn from and discharging to Mortier Bay. Water treatment will include temperature adjustment, ultra-violet and screen filtration, purification and aeration. The operation will produce a modest quantity of wastes, including organic sludge, filtrate, feed bags and occasional mortalities. A Waste Management Plan that is consistent with applicable regulations and guidelines will be developed and implemented to achieve recycling and reuse (especially of organic wastes) wherever feasible. The hatchery facility will include secure feed storage, water quality analysis laboratory, biosecurity, monitoring/alarm systems, and in-house emergency electricity generation.

The hatchery will annually produce 3 million fish once full operation is achieved, with potential expansion to 5 million, depending on demand and production capacity.

The hatchery will operate under the terms and conditions of an Aquaculture License issued by the Province, will adhere to industry standards, and will, through its Sustainable Development approach, operate at the highest environmental and quality standards.

The project schedule calls for construction to start in April, 2020, employing a dominantly local labor force of up to 60 people. Once in operation, it is hoped to achieve first sales in 2021. During operation the facility will employ 10-20 full-time staff and create 20-30 indirect jobs through contracted services.

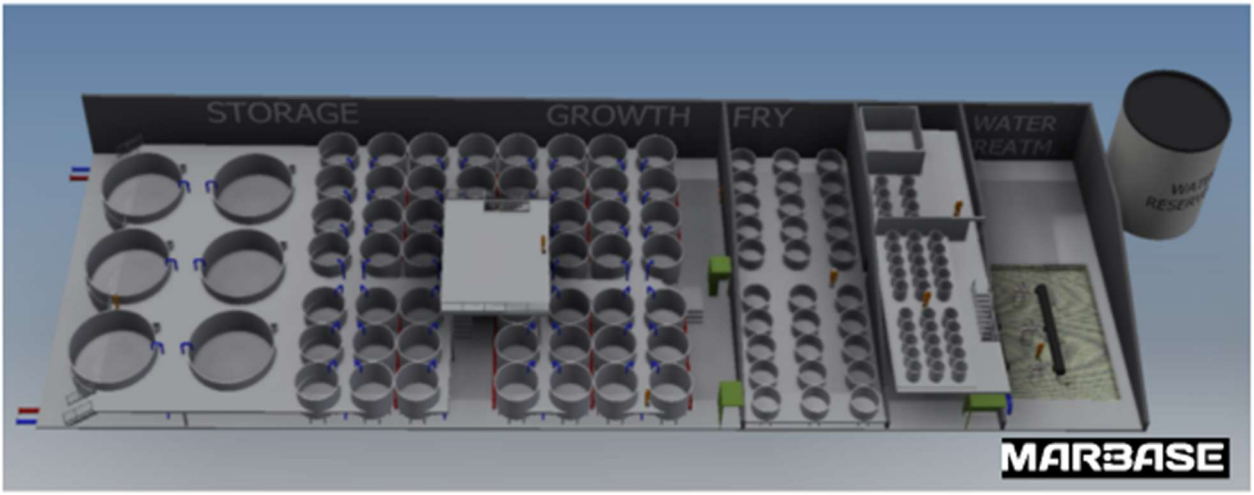
October 24th, 2019

Marbase Cleanerfish Ltd.

Marystown Lumpfish Hatchery

Artist Concept Marbase Site

Early Illustration of Planned Facility



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