Environmental Impact Assessment

1.0 Applicant

Nutrento Inc.
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2.0 Project Description

a. **Project name:**

Nutrento Black Soldier Fly Larvae farm

PID: 10292563

b. Project Overview:

Nutrento seeks to upcycle pre-consumer food waste produced by a large industrial french fry producer, with plants in Florenceville and Grande Falls, using Black Soldier Fly Larvae (BSFL). The BSFL farm will raise larvae on potato waste and brewers spent grain. The end products of the farm will include protein meal, lipids (fat) and frass (larvae castings). Nutrento has a letter of intent from a New Brunswick based fish feed producer, located in St. Andrews, to purchase the BSFL protein to include as an ingredient in their fish feed.

Nutrento is currently operating an R&D Pilot plant at the Research and Productivity Council (RPC) in Fredericton, NB. Nutrento seeks to build a "Commercial Pilot Plant" in Centreville, New Brunswick. The commercial pilot plant will have a footprint of approximately 12,000 sq ft and receive up to 10 tonnes of potato waste per day. Approximately 12 months after starting production, assuming a successful commercial pilot, Nutrento intends to expand the farm and processing facility (the plant), to accept 100% of the food waste produced from the industrial french fry plants (100 tonnes per day).

c. Purpose:

Nutrento's mission is to play a meaningful role in building a global sustainable food system. By 2050, the global population is expected to be approximately 10 Billion people. The current food system is not able to sustainably feed today's population of approximately 8 Billion people. Nutrento will upcycle food waste to produce food, fat and frass for animal feed and fertilizer. Some important facts about the need:

- 77% of all arable land is used to produce feed for animals that we then consume - only 33% is used to produce food for humans
- 33%+ of all food produced on the planet is wasted, ending up in landfills, incinerators, or just lost
- BSFL farming has a very small footprint relative to the protein it produces due to the nature of larvae living in high densities and in vertically stacked rearing trays
- BSFL requires no additional water than is already present in the food waste
- 100% of the outputs of a BSFL farm are valuable products, protein, fat and frass

Problem	Solution
The global **fish meal** supply has reached a maximum - our oceans are experiencing declining fish populations	BSFL provide an excellent high quality protein for several animal species, including, fish, poultry, pigs and pets, offsetting the need for fish meal protein
Soy is a major source of protein in animal feeds - The need to plant soy is causing significant deforestation around the world	BSFL provide an excellent high quality protein for several animal species, including, fish, poultry, pigs and pets, offsetting the need for soy meal protein

Chemical fertilizers present an environmental hazard in their production and with runoff into rivers, lakes and oceans	BSFL frass is an excellent fertilizer and soil amendment - It is more readily absorbed into the solid, resulting in less chance of runoff - When runoff into rivers, lake and oceans occurs, the natural insect castings present much less hazard to the environment

The global french fry producer Nutrento has partnered with, has two plants in New Brunswick and 49 plants around the world. The company has very ambitious goals and objectives to help create a sustainable food system and significantly reduce their greenhouse gas footprint. Previously they were using food waste to produce biogas and feed for cattle. Nutrento presented to the company an environmental analysis that illustrated shifting the food waste to us, they would be improving their sustainability model by an order of magnitude. AS such, they have agreed to divert 100% of their food waste to Nutrento's BSFL farm.

d. Project Location:

Nutrento's plan would see the construction of a 12,000 sq ft facility on Rim Road, between Florenceville and Centreville (Hunters Corner), just off the Trans Canada Highway, eventually expanding to a 100,000 sq ft facility. The land in question is outlined in blue, in the image below. This is an industrial area. The three adjacent properties include a Highway Maintenance Depot, an Industrial Machine Shop and a Home Hardware.

e. Location Considerations:

The location was chosen for its close proximity to the source of food waste (Nutrento's feedstock). It is in an industrial area and not next to any wetlands according the GeoNB Map Viewer wetlands layer (https://geonb.snb.ca/geonb/).

Nutrento intends to hire Gemtek, an engineering consulting firm specializing in Geotechnical and Environmental services, to conduct a soil/site survey.

f. Construction details:

- The building will be a pre-fabricated steel structure on a concrete slab of 12,000 sq ft. Ceiling height will be approximately 21 feet
- Typical industrial design parameters will include high voltage (600V/3ph) electrical work with step down transformers for 480V, 240V and 120V
- An air handling system will provide for proper air volume exchanges of 2 air exchanges per hour
- Water requirements are low, given that 100% of food waste is consumed by the larvae and collected as a marketable product. Daily water usage estimate at 600 L/day by way of well service.
- Waste treatment requirements are also moderate with a need for some equipment washdowns. Daily septic usage estimated at 650 L/day, including organic waste material, potatoe waste and frass.

g. Farm/plant operations:

Plant operations will ramp up from 5 days per week to 7 days per week within approximately 6 months. Potato waste will be transported from across the Saint John River, in Florenceville-Bristol to Rim Road, 7.8 km.

Feedstock handling

Potato waste will be pumped into storage tanks totaling 30 hectolitres (hL). Potato waste is macerated and mixed with brewers spent grain, 90% potato waste to 10% spent grain to produce the larval feedstock.

Rearing

Feedstock is added to nursery trays and rearing trays. Hatchlings grow in a small tray for 7 days and are then transferred to a rearing tray to mature for another 7 days. Trays are stored on pallets approximately 2 metres tall.

Harvesting

Larvae are separated from the now dry frass by being passed through a drum sieve separator. Frass is collected into 1 tonne tote bags - Larvae are sent through a hot water blanching system to euthanize and clean the larvae.

Processing

-Larvae are dried in a batch air dryer - After drying, larvae are then passed through a screw press to remove the fat - Defatted BSFL meal is collected in 1 ton totes - Fat is collected in drums - Products are shelf stable at room temperature.

-This stage also ensures that no larvae will go past the larvae stage due to the dryer process which essentially euthanizes them.

- There is a controlled process where a percentage of the larvae, roughly 1% will be kept, and brought back into the breeding cycle to re-populate our Breeding area.

Logistics

Protein meal, fat and frass are stored in the warehouse space and then shipped to customers in totes and drums via transport trucks.

At full capacity for the commercial pilot plant (12,000 sq ft), we will employ approximately ten people. It is premature to provide an accurate estimate how many people will be employed at the 100,000 sq ft facility, but it is reasonable to multiply the employees by a factor of 10, therefore 100 people.

General washing waste will be handled by the septic system, any packaging materials will be sent to the appropriate recycling facility, and any other waste that cannot be recycled or sold will be sent though normal waste disposal methods ie: dumpster services

McCain Foods Ltd has agreed to take any excess waste water we produce

h. Expansion:

Nutrento's business plan and growth strategy will grow from the current 1000 sq ft R&D Pilot plant at RPC, to the currently planned 12,000 sq ft "Commercial Pilot" on Rim Road, Centreville. The intent is to then expand the commercial pilot to full scale production of 36,000 tonnes of potato waste per year with a 100,000 sq ft plant. The land identified on Rim Road is approximately 14.5 acres and will accommodate the 100,000 sq ft plant.

3.0 Description of the current environment

a. Physical and natural characteristics:

The land is located off the Trans Canada Highway in an industrial setting on Rim Road off Route 110. The three adjacent properties include a Highway Maintenance Depot, an Industrial Machine Shop and a Home Hardware.

The current land has been filled with soil and rock. An assessment by Gemtek will provide details of the current fill material and geo-characteristics.

b. Cultural characteristics:

The proposed Nutrento plant is consistent with the immediate adjacent businesses and also the broader local area of farming and food manufacturing.

c. Historical and Current Land Use:

The current land is an empty lot ready to be developed, with additional acreage able to be purchased for future development.

4.0 Identification Of Environmental Impacts

The area where the facility is planned has already been cleared of any tree life or vegetation, and not a part or obstructing any waterways. Therefore, there would be no external environmental impacts from Nutrento constructing the building on the proposed lot.

The production of the larvae does not produce liquid affluents but does produce solid affluents that are used as a product to sell externally as fertilizers.

Only standard wastewater will be produced through general methods of cleaning and would be handled by our general septic system. The potato waste from our provider does contain a significant amount of water, which is not required in our production, and actually a detriment to our production. Therefore, Nutrento will be separating most of the liquid from the potato waste and sending it back to McCain foods to add back into their normal method of processing this material.

There is no medium to large noise emitters in association with these production facilities. The only exterior mechanical units would be the HVAC systems, which only produce the standard amount of noise as any other roof top commercially mounted systems.

Internally there is some odor that is emitted during the rearing phase, this is where the larvae are contained within their feed containers and feed on the combination of potato waste and spent brewers' grain. The odor emitted is no different than at the potato and craft brewery production facilities.

An impact on the environment to be monitored and the risk of insects escaping to the outside, either by their own means, or by putting waste and dust in the garbage. It will be necessary to take measures to control and minimize these risks.

The larvae have no functioning mouth pieces and neither the larvae nor in the form of flies are conditioned to our climate and would not survive even if they could escape from our facility. They are also anti-pathogenic.

5.0 Summary of Proposed Mitigation Measures

a. Avoidance of impacts

In regard to odours and the potential production of ammonia during the rearing phase, adequate HVAC and ventilation systems will be in place to handle if any ammonia levels exist. As stated previously the only odor normally omitted is the same scent as in craft beer production and french fry production, and only contained within the reading room specifically.

Wet food received from either the potato factory and/or the brewery will be immediately consumed in house and added to the rearing process, and any excess feed will be placed in storage containers and chilled for proper storage.

Again, as previously mentioned the water used on the potato waste side would be returned to McCains to add back into their normal wastewater treatment and any other water waste in the Nutrento facility would be the same as any residential home and handled by the standard septic system.

In regards to the risk of larvae escaping to the outside environment by their own means, or by way of inclusion into the garbage; the risk here is very minimal to zero due to the steps we will have in place for the breeding, nursery, and rearing rooms. Each of the Nursery and breeding rooms are sealed off due to specific humidity and temperature controls required. Larvae would not have access to crawl outside of their containments and ultimately the sealed rooms. Although if this did happen, the temperature, humidity and other environments outside of these rooms would not allow for the larvae to survive, only for a minimal duration. The same is true for the referring rooms. There is also the added step of microwaving and blanching the larvae, this is a euthanization and drying step in the processing phase, in which it is impossible for any larvae to escape this phase. All larvae would no longer have the ability to craw.

b. Reduced impact

Emissions of very fine dust particles that happen in the normal course of business, or some that are caused when harvesting the dried Frass (fertilizer) cannot be avoided. However, they can be collected/controlled by way of a standard dust collector system, and also through the ventilation system that would contain Hepa filters.

N95 masks will be worn by employees if handling any cleaning, staining, sanitizing chemicals.

The flooring will be a solid concrete floor that will be covered with an epoxy covering to allow for easier and more sanitized cleaning.

Certain rooms like the Nursery, breeding, and rearing rooms will be surrounded by insulated food grade wall panels, inclusive of the inclosed ceiling. These panels are scrubbable, sprayable for ease of cleaning and have a high containment level for any liquid or dust.

Traps, mostly sticky in nature, will be placed around all access areas to each of the rooms where larvae are present if some larvae do escape their surroundings; they would be captured by the traps.

Specific temperature and humidity levels will be maintained to ensure that the larvae do not "run". Running is known with the BSFL, but it only happens when the substrate is too wet or too dry, hence why Nutrento will be heavily controlling these elements by way of a specifically designed Hvac system.

Specific clothing coverings will be required within certain rooms, and hand, eye, and footwear cleaning stations will be present at each station within the facility.

Anti-Mold paint will be applied to any drywall that is exposed within the production facility.

All areas of the production facility will be restricted to qualified employees only.

6.0 Public and First Nations Participation

Nutrento is in the process of contacting an officer from the Aboriginal Affairs Secretariat to assist the project proponent to identify if any First Nations organizations should be notified of the project. All First Nations reported by the officer will be contacted and informed by written letter for reference.

The municipality has also been contacted and aware of the project.

Commercial neighbors of the property will also be contacted.

The nearest residential address is approximately 2,600 feet away from our site location. We can contact these residents in the same manor as the commercial neighbors with the EIA department deems it necessary to do so. Please advise.

The written letters will indicate the details of the project, the full scope, and will state that if there are any questions/concerns regarding the project they are welcome to contain the owners of Nutrento directly to discuss and provide any resolutions if necessary.

The environmental impact statement will be made available to anyone who requests it at our facility.

If there are questions/concerns regarding the project by external parties, these will be reported to the Department of Environment for their review and records.

7.0 Project Approval

Only EIA approval is required to put this project into action. Although CFIA approval is required prior to Nutrento selling any product either commercially or direct to the public. CFIA application has also been submitted and currently under review. We do not expect any issues with the application as it follows the same processes as other similar facilities already operating in Canada.

8.0 Funding

Funding received to date;

$25,000 - Impact loan

$25,000 - Plant Hatch/RDC grant

$80,000 - Innovation Voucher through NBIF (grant)

$40,000 - NBIF Clean Tech Fund (grant)

$1.15M - Farm Credit Canada and BDC - loan

$900K - ACOA - Loan

$200K - ACOA - Towards employee wages for technical positions (grant)

$600K - Private Investors (equity)

9.0 Signature & Contact Information

Point of contact;
Trevor Pardy, Partner
Nutrento Inc, Fredericton, NB

Signature 9/11/2022