The Real Dairy Company of Newfoundland
Environmental Preview Report Submittal for
The Establishment of Dairy Secondary Processing

Submitted To: Department of Environment and Climate Change.

Submitted By: The Real Dairy Company of Newfoundland.

Submitted Date: February 20, 2023

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1. Name of the undertaking

The undertaking has been assigned the name "Deer Lake Dairy Secondary Processing Facility" by the Department of Environment and Climate Change

2. The Proponent

2.1. Proponent name and corporate body

The Proponent is a corporate body, registered (March 20, 2020) in the province of Newfoundland and Labrador operating under the name of The Real Dairy Company of Newfoundland (RDCN).

2.2. Chief executive officers

The Real Dairy Company of Newfoundland's Directors / Executive officers are:

Brent Chaffey, Interim Director / Executive officer of: St. David's, NL. Canada.A0N1X0 Phone: 709 649 0163 Email: brent@ncws.ca	Leslie Brophy, Interim Director / Executive officer of: Stadium Rd, Daniel's Harbour, NL. Canada, A0K 2C0 Phone: 709 898 7506 Email: lesliebrophy4@outlook.com

2.3. Principal contact person for purposes of environmental assessment

Principal contact person, for purposes of the environmental preview report can be either Mr. Brophy or Mr. Chaffey listed above.

If questions regarding the content of this submittal are of a technical or minor nature please contact the owners representative Mr. Warren Neville, P.Eng. at 709 640 5106 or email, mechanicaladvantage@outlook.com

3. The Undertaking

3.1. The nature of the undertaking

The nature of the undertaking will be the construction and operation of a facility which carries out, in an environmentally conscious way, secondary processing of industrial milk produced within the Province of Newfoundland to produce butter and skim milk powder (SMP). The Real Dairy Company of Newfoundland endeavours to develop the facility in a manner of environmental mindfulness and stewardship, such that it will be viewed by the global dairy community as establishing a new standard of minimizing the environmental footprint and impact of secondary dairy production.

3.2. Project rational

The critical need to develop secondary dairy processing within the province has been recognized by NL dairy producers, the Canadian Dairy Commission, the Canadian Milk Supply Management Committee, Dairy Farmers of Canada, the Federal government and the government of Newfoundland and Labrador as indicated in the previous Environmental Assessment submittal.

As recognized in the province's agricultural vision statement and strategy, *The Way Forward*, the imbalance between NL's production of secondary dairy products and our consumption of secondary products is very significant and unacceptable. NL imports and consumes the equivalent of approximately 100 million litres of industrial milk in various secondary dairy products, while producing virtually none. This deficiency is recognized by the provincial government as a fundamental structural weakness that impedes growth, industry maturation and threatens the sustainability of dairy farming in this province.

Newfoundland's industrial milk production, is currently shipped to processing plants in the Maritimes due to the absence of secondary processing capacity in this province. This constitutes a massive and unnecessary carbon footprint. (Several hundred tractor trailers transporting industrial milk to processing plants in Nova Scotia and New Brunswick annually).

This undertaking requires the construction of a new facility on 10 acres of the Deer Lake Veteran's Memorial Industrial Park in Deer Lake, NL. The proponent will own and operate the facility which will process raw milk into butter and skim milk powder (SMP). End products will be sold to local, national, and international distributors and vendors, including the Canadian Dairy Commission.

The undertaking will allow Newfoundland suppliers of industrial milk to significantly reduce transportation costs, decrease the greenhouse gases (GHGs) associated with the current carbon footprint, incentivize growth within the Newfoundland dairy industry, increasing food self-sufficiency and sustainability within the province.

4. A description of the Undertaking

4.1 Geographic location / physical components/ existing environment

Several industrial sites in Corner Brook, Pasadena and Deer Lake were examined for the potential location of the undertaking. The expansion site of Deer Lake Industrial Park was selected as the preferred site based on considerations illustrated in table 1 below.

The preferred site is located in the Western region of Newfoundland within the municipal planning boundary of the Town of Deer Lake. The town is located at the North end of Deer Lake at the junction of the Trans-Canada Highway and the Great Northern Peninsula Highway, see *Exhibit* 1, 2, 3, 4, 5 and 6 below.

The Town of Deer Lake is a primary gateway and transportation hub for Western Newfoundland. The town is located at the crossroads of the Trans-Canada Highway serving points East, West and North of the province allowing for quick and unincumbered milk transportation.

The Deer Lake site is the closest of the evaluated sites to the dairy-producing area of Cormack / Goose Arm Road. It is immediately adjacent to the TCH with excellent access and egress. The Town has committed to provision of a fully serviced industrial park location with potable water, sanatory sewer and electrical power.

The location is a prime site within the industrial park with ample room for expansion and is owned and managed by the very progressive and business-friendly Deer Lake Town Council.

The proposed site is bounded by the property lines of industrial lot #2 to 14 located on the North West side of the Deer Lake Veteran's Memorial Industrial Park (49*11'17"N, 57*24'16"W), about 500m South of the Trans-Canada Highway and about 1500m East of the of Deer Lake town center, see *Exhibit 3* and 4 below. The nearest community to the North are Reidville, Cormack and Bonne Bay Pond. The nearest communities to the West are Pynn's Brook, Pasadena, Little Rapids, Steady Brook, Massey Drive and Corner Brook. The nearest communities to the East is Howley. There are not any communities near in the South direction. The proposed site's civic address would be 2 - 14 Veteran's Memorial Industrial Park, Deer Lake, Newfoundland and Labrador, Canada.

Criteria	Comment
Acreage Required – Min 6 Acres, ideal 6-10 acres	Up to 10 acres available – will be presented in turnkey state
Location- Proximity to Milk Production areas	Located in close proximity to the major milk producing area of Cormack and Deer Lake. Nearest port is Corner Brook.
Site Access-Proximity to TCH	Adjacent to TCH
Site Zoning – Compatibility of surrounding properties	Zoned industrial. The location is an expansion to the existing industrial park owned by the Town of Deer Lake. (64 acres for development)
Site Services Availability	Adequate water supply to meet demand; 3 phase power supply at site; Industrial park provided sewer services connected to Town owned effluent treatment - 3 stage aerated lagoon
Support Services Availability	Good. Ample skilled trades available within an hour

Table 1 Site selection criteria

Exhibit 1 - Location of the Town of Deer Lake and adjacent towns in Newfoundland and Labrador.

Exhibit 2 - Location of the Deer Lake Veteran's Memorial Industrial Park area with respect to the Town of Deer Lake.

Exhibit 3 - Proposed site location within the town of Deer Lake, Newfoundland.

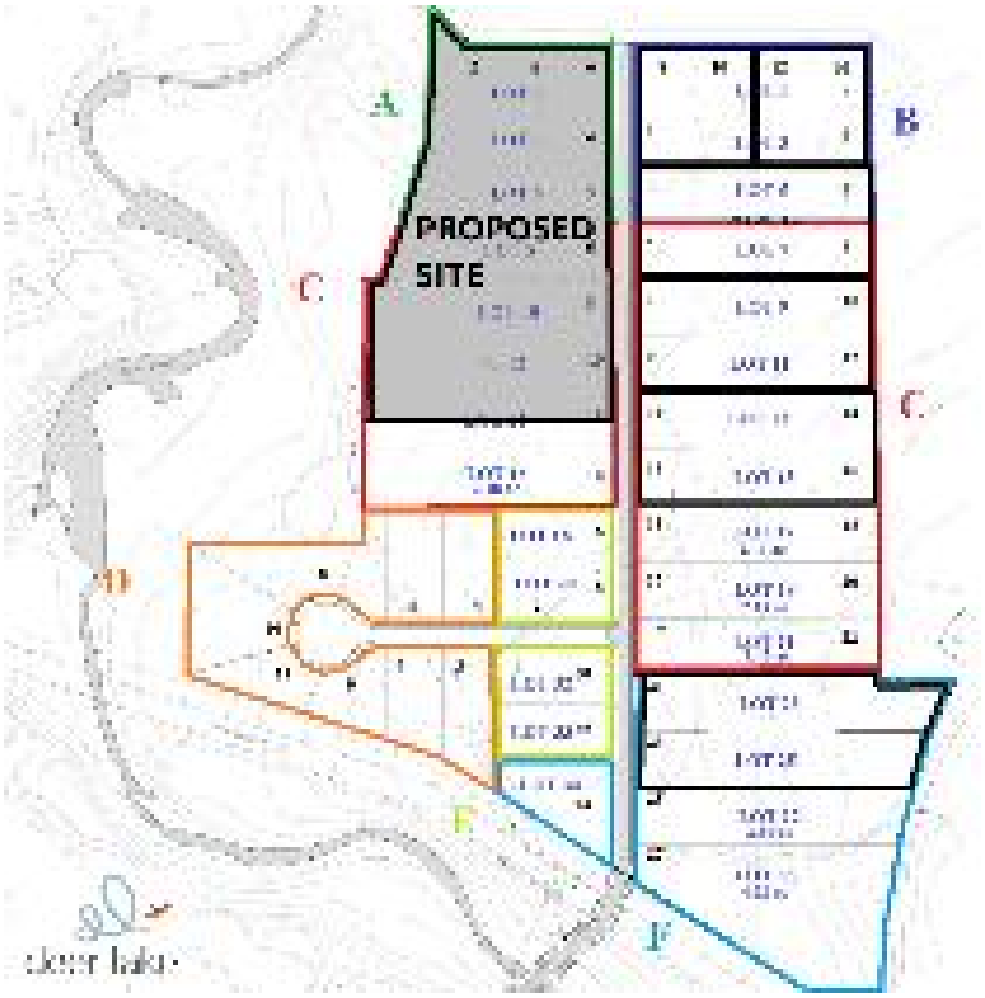

Exhibit 4 - Proposed site location within Deer Lake's Veteran's Memorial Industrial Park.

Exhibit 5 – Photo of proposed site, Deer Lake's Veteran's Memorial Industrial Park .Viewed from North end looking South.

Exhibit 6 – Photo of proposed site, Deer Lake's Veteran's Memorial Industrial Park .Viewed from North end looking South West.

4.2 Physical features - Buildings design and construction

The Undertaking shall utilize general methods of construction known and proven for the region with a history of acceptance from the Authorities Having Jurisdiction (AHJ) for the site area.

The foundations and floor slabs shall be buried, frost protected, concrete and rebar construction as prescribed in the National Building Code of Canada (NBCC).

The main structure shall consist of an engineered steel building package designed to resist the reginal snow and wind loads and be constructed in accordance with the NBCC.

The building structure shall be insulated in accordance with the requirements of the NBCC.

The interior finishes for the administration areas shall be of a painted gypsum type and the interior finishes in the processing areas shall be clad in a material which is easily sanitized and cleanable.

The Undertaking would consist of a processing facility housed in a single building. The building would have the main plant and processing on the ground level with a 2nd level for administration and quality control laboratory, see previously submitted Environmental Assessment documents for details. In general, the building would house the following areas:

1. Milk Intake, separation & primary processing unit
2. Butter making and packing Room
3. SMP production and packing room
4. Dry warehouses for dispatch of products and receipt of packing material. Bulk butter, when manufactured, will be transferred to a refrigerated container for onward dispatch.

The outside utilities that would be required for the operation of the facility would be:

1. Potable water & distribution
2. Fire protection water
3. Storm wastewater services
4. Sanitary wastewater services
5. Electrical power

In-house equipment required for operations would include:

1. Steam generation, distribution, including condensate collection and return/reuse.
2. Cold water system distribution.
3. Refrigerant system and distribution.
4. Compressed air system and distribution.
5. Electrical system including pad mount transformer, distribution for MVB and MCC.
6. HVAC and lighting systems.
7. Life safety systems, sprinkler, standpipe, fire / smoke alarm, emergency, and egress lighting.
8. Conveying, Palletizing and elevating systems.

4.3 Proximity to Glide Brook, Humber Canal and Deer Lake

The Undertaking's site closest body of water is Glide Brook which drains into the Upper Humber and flows from upper Glide Lake about 120m upstream of the proposed site's closest boundary (See *Exhibit 7 & 8).* The brooks centerline is approximately 15 meters below the elevation of the site. At the Western site boundary, the land between the proposed site and Glide Brook is zoned as a reserved green space which provides protection for the waterway and wildlife It's use is regulated and prohibited in accordance with the Town's Municipal Plan. The Undertaking shall not encroach upon the reserved space.

The Humber canal is located 1.3 KM to the South of the proposed sites closest boundary at approximately 49*10'33"N, 57*23'50"W. The canals elevation is 40 meters above the proposed site. The canal was constructed and is utilized to supply water to the local power plant, Deer Lake Power, Kruger Energy by way of 9 penstocks. The town's domestic (drinking) water treatment plant is supplied from one of the penstocks. Deer Lake is a body of water fed by the Upper Humber River and is located 1.6 KMs Northwest of the proposed site at an elevation of 24 meters below the site.

Exhibit 7 – Adjacent waterway to the proposed project location.

4.4 Town of Deer Lake Storm Water control infrastructure

Communications with the Town of Deer Lake verify that storm water control infrastructure is intended to be incorporated in the new development of Deer Lake Veteran's Memorial Industrial Park and connected with the existing storm water control infrastructure for the town. The existing system consists of grading of impervious services to storm drain catch basins within the town. These basins are connected in a system by underground piping and discharged to an outfall into Deer Lake.

As communicated by the Town, an Engineering consultant firm has been engaged to deliver complete planning and construction documents for these control systems. The Town has confirmed its intention to construct these systems in 2023, prior to the start-up of the Real Dairy Company of Newfoundland's dairy facility. These communications have confirmed that the Town of Deer Lake's "Offer of sale" (see Appendix D of previously submitted Environmental Assessment) to The Real Dairy Company of Newfoundland which noted "(inclusive of water, sewer and HST)", is inclusive of both storm and sanitary sewer services connection points at the boundary of the proposed property.

The Undertaking's proposed site will utilize storm water control systems within the property boundary, designed and constructed in accordance with the standards outlined in the "Town of Deer Lake Development Regulations 2019-2029" and in keeping with good Engineering and construction practices. In general, the designs will incorporate roof drainage systems for the building structures, site grading to lot catch basin systems and underground stormwater piping infrastructure. No storm water will be diverted from the site to the waterway of Glide Brook or other bodies of water. The above-mentioned systems will direct all storm water from site and structures to the newly installed Town owned stormwater infrastructure for the industrial park development.

4.5 Town of Deer Lake Sanitary Sewer infrastructure

Communications with the Town of Deer Lake verify that the new sanitary wastewater infrastructure shall be incorporated in the development of Deer Lake Veteran's Memorial Industrial Park.
As communicated by the Town, an Engineering consultant firm has been engaged to deliver complete planning and construction documents for this new municipal infrastructure. The Town has confirmed its intention to construct these systems in 2023, prior to the start-up of the Real Dairy Company of Newfoundland's dairy facility.
The newly constructed sanitary sewer infrastructure shall be connected to the existing sanitary sewer system currently conveying sanitary sewer to the town's existing sewage Lagoon.

The Town of Deer Lake owns and operates a three-cell aerated sewage lagoon that is complete with chambers, distribution piping, static aeration system, and outfall (See appendix 4). This lagoon receives all the sewage produced by the town and is located within the Town of Deer Lake in Western Newfoundland.
The daily average temperature for the warm months (June to August) is below 20°C and the cold months (December to February) are below the freezing mark (0°C).
The site receives an annual rainfall of about 697 mm and snowfall of about 3938 mm. The yearly cumulative hours of sunshine are approximately 1550 hours, according to the historical climate data available online through the Government of Canada (Government of Canada, n.d.). No wind direction or speed data is presented in the historical climate data. This meteorological data is based on the closest weather station for which historical climate norms were available through the Government of Canada.

The Town owned wastewater treatment (WWT) lagoon is approximately 196 m away from Glide Brook.
The brook is twisty and narrow at points and is 196–376 m away from the Eastern border of the WWT lagoon.
The effluent discharged from the Town owned lagoon travels approximately 3 km along the brook before reaching the Upper Humber River.

The Town manages the WWT lagoon and is responsible for all its buildings, the water, sewer and storm infrastructure located within the Town's limits. Certified operators are responsible for operating the WWT lagoon, managing the Town's water treatment plant and conducting the water quality control sampling. The company Biomax, a St. John's contractor, completes the discharge water quality and quantity monitoring of

the WWT Lagoon under contract with the Town.

The WWT lagoon, constructed in 1994, serves approximately 5800 people and consists of three (3) 4.8 meters deep, aerobic cells. Each cell holds approximately 26,000 m³ of wastewater which is contained using a geosynthetic clay liner superimposed under 300 mm of compacted granular material. The liner is anchored at the top of the berms using the trench cut and backfill method.
A monitoring program is a part of the regular operation of the WWT lagoon by Town staff and the contracted company Biomax. All logbooks are digitized in bulk at month's end. In addition to daily monitoring, sampling is carried out in the receiving brook upstream and downstream near the discharge point.

4.6 Nearby properties and surrounding land uses.

The Town of Deer Lake's Municipal Plan 2019-2029 has been reviewed for zoning classification and the proposed site was deemed to comply with Land Use Zones presented in the Municipal plan document. See Appendix 1 (The Town of Deer Lake's Municipal Plan 2019-2029). Based on this review, the Town of Deer Lake has proceeded with and "Offer of sale" (see Appendix D of previous Environmental Assessment submittal) to The Real Dairy Company of Newfoundland for the proposed property.
The adjacent spaces of the proposed location consist of the following (see Exhibit 8 below):
Industrial General zoned property, the nearest neighboring properties to the East and the South are zoned for similar uses as the proposed facility.

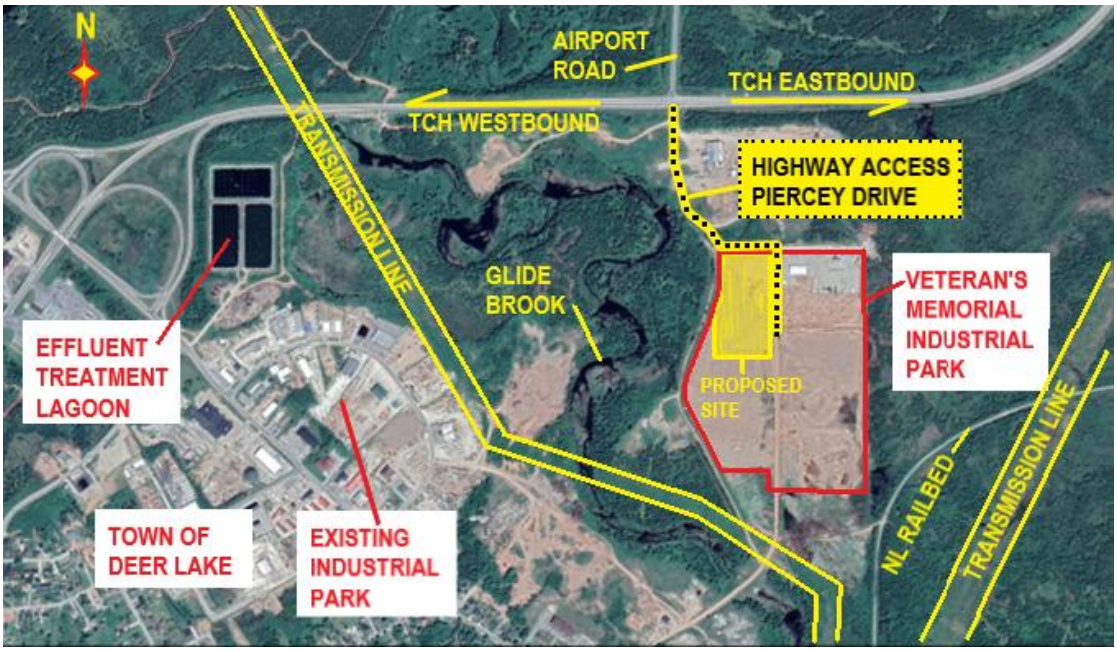

Exhibit 8 - Proposed site adjacent spaces and transportation routing.

4.7 Construction details, materials, methods, schedule, and location

The facility construction will be a continuous endeavor without interruption. The construction is expected to take place for 54 weeks (see Appendix 2 for project schedule).
The first physical construction would be expected to begin May of 2023 and will consist of civil site works and the construction of the building foundations. The remainder of the project will progress as indicated on the schedule of Appendix 2 throughout 2023 and reach completion in the summer of 2024.

The Undertaking shall utilize general methods of construction known and proven for the region with a history of acceptance from the Authorities Having Jurisdiction (AHJ) for the site area.

The foundations and floor slabs shall be buried, frost protected, concrete and rebar construction as prescribed in the National Building Code of Canada (NBCC).
The main structure shall consist of a pre-engineered steel building package designed to resist the reginal snow and wind loads and be constructed in accordance with the NBCC.

The building structure shall be insulated in accordance with the requirements of the NBCC.

The interior finishes for the administration areas shall be of a painted gypsum type and the interior finishes in the processing areas shall be clad in a material which is easily sanitized and cleanable.

The construction shall follow the schedule provided in Appendix 2.
All construction for the facility shall occur within the boundaries of the proposed 10 acre lot located in the new Veteran's Memorial Industrial Park in Deer Lake.

4.8 Employment information

The Undertaking construction will require human resources on a contractual basis. The number of resources, type, employment durations and enumeration of these resources are listed in table 2 below identifying these contract positions.

Number employed	Project Roll	Approximate Duration
1	Owner's Representee	24 Months
8	Architect / Engineering Personnel	18 Months
2	General Contractor Personnel	14 Months
3	Heavy Eq. Sub-contractor Personnel	3 Months
8	Mason Sub-contractor Personnel	2.5 Months
8	Steel Worker Sub-contractor Personnel	2.5 Months
4	Carpenter Sub-contractor Personnel	3 Months
4	Electrical Sub-contractor Personnel	4 Months
5	Mechanical Sub-contractor Personnel	5 Months

Table 2 - Contract positions for construction phase

4.9 Facility Decommissioning and area rehabilitate.

The construction plan has considered the requirements of decommissioning and rehabilitation with the complete removal of the facility should the need ever arise. A decommissioning plan is included in Appendix 5 of this document.

4.10 Emergency response plan development.

Plant operations will require the development of detailed emergency response procedures (ERPs) for potential risks and hazards in the facility. These ERPs should be developed as an integrated part of operational procedures. As in all processing plants the ERPs should be a living document and should be updated regularly whenever an new risk or hazard is realized or the level increases or decreases. A preliminary Emergency Response Plan for spills has been attached in Appendix 6 as part of this submittal. Like all ERPs this plan should be updated as the facility begins operation to address any additional risks or hazards which may become apparent.

5. Wastewater stream descriptions, quantity, and quality

The following information is based on the concept design of the process only. The detailed design process has not yet been completed due to the project not yet receiving approval from the Department of Environment and Climate Change, and therefore the information presented is of a preliminary and estimating nature. The presented information is, however, reflective of sound and good Engineering Judgment and practices, well established in the areas specific to the secondary processing of dairy products. Because actual design flows and conditions for each piece of processing equipment are not available this report will provide the estimated quantity and quality of wastewater streams to and from:

1. Pre-treatment wastewater buffer tank (Tank 1)
2. Post-evaporator buffer tank (Tank 2)
3. The facility's concept wastewater treatment system.

These estimates are based on a maximum daily raw milk production rate of 100,000L with a fat content between 4% to 6%.

The wastewater streams involved in the operation and maintenance of the proposed facility can be divided into two general categories,

1. domestic wastewater flows
2. process wastewater flows.

Within the two general categories mentioned above, sub-categories have also been described in further detail below.

No wastewater of any kind will be directed from the project site, facility or process to any streams, lakes, or rivers. All wastewater and storm water flows, treated or untreated, shall be discharged into the Town of Deer Lake's municipal stormwater and sanitary sewer infrastructure.

5.1 Domestic wastewater streams

All domestic gray water & black water shall be contained in a separate drainage system apart from the storm water and untreated processing wastewater systems.
Specifically, the domestic wastewater flows from this site will result from:

1. Toilets (Black water, sanitary sewer).
2. Handwash sinks, janitor sinks (Gray, sanitary sewer).
3. Rainwater leaders (Storm sewer).
4. Lot surface water and catch basin flows (Storm sewer).

Drainage from plumbing fixtures inside the building shall be classed as sanitary sewer.
Drainage from outside the building specifically, roof drains and lot surface water shall be classed as storm sewer and will drain directly into the Town's designated storm water infrastructure of drainage piping.
Each of the storm sewer and the sanitary sewer building drains shall be independently piped below ground to the Town's infrastructure systems in accordance with the Canadian National plumbing code and applicable requirements of the Authority Having Jurisdiction (AHJ) for the Town of Deer Lake.

5.2 Process wastewater

Process wastewater shall not be co-mingled with either sanitary or storm wastewater draining from the property until it has been appropriately treated or proven to meet or exceeding the requirements of the latest revision of NEWFOUNDLAND AND LABRADOR REGULATION 65/03, Environmental Control Water and Sewage Regulations, 2003, under the Water Resources Act (O.C.2003-231).

Normal operating process wastewater flows within this site will result from:

1. Tanker external washdown.
2. Process plant floor drains.
3. Condensate wastewater.
4. Cleaning In Place (CIP) equipment.

Wastewater flows from all sources listed above shall be directed to buffer tanks located on site. Each tank system is described in general, in the sections below.

The following process wastewater flows shall be received and contained for a period at the pre-treatment wastewater buffer tank (Tank 1 for the purposes of this report):

1. Tanker external washdown.
2. Process plant floor drains.
3. Cleaning In Place (CIP) equipment.
4. Chemical storage area maintenance wash water (infrequent contributing waste stream)

NOTE: Because of the reusable energy contained in Condensate wastewater and its higher level of purity this wastewater stream shall be described separately in section 5.5 below.

Wastewater from these areas shall be directed to Tank 1, a tank upstream of the on-site wastewater treatment process equipment. This tank is sized to hold the daily volume of wastewater produced before releasing it to the on-site wastewater treatment process.
Tank 1's purpose is to collect the daily process wastewater flows, allow dwelling time and balancing to occur in terms of pH, temperature and wastewater constituents collected then allow release to the treatment process at a controlled flow rate.

Tank 1 ensures that the wastewater treatment equipment will receive a constant, stabilized flow minimizing swings in flow rates, pH, temperature, and constituent levels (example: Tank 1 holding a cleaning alkali previously for cleaning is partially neutralized later that day by an acid rinse flowing into Tank 1.

5.3 Process wastewater flow stream

1. The milk intake bays shall be equipped with trench type floor drains to collect any water which drips off the exterior of the tanker trucks during periods of rain or snow and water from floor washing in the bays. These drains are equipped with sediment traps to protect drainage piping from clogging with road salt and sand.
   To protect against oil, fuel or gasoline contamination from tanker truck malfunctions in the intake bays or a failed elevator lift hydraulic systems an oil/water separator shall be installed in accordance with the National plumbing code of Canada downstream of the sediment trap. Wastewater discharged from these areas shall be directed to Tank 1.

2. Wastewater from washdowns of the processing areas shall be collected at the floor drain systems. All floor drains within this area of the facility shall direct wastewater Tank 1.

3. Wastewater flows from the cleaning in place equipment (CIP) will contain milk products, solids, diluted acid detergents and diluted alkaline detergents. The losses of the diluted acids and alkaline shall be kept to a minimum by employing recycling of the cleaning / sanitizing products wherever possible. This multi-use CIP system is described in section 5.4. These cleaning systems shall still require the drainage of wastewater of a minimized flow. The wastewater flow from all the cleaning systems shall be directed to Tank 1.

4. Chemical totes which contain spare quantities of wet and dry chemical used to replace consumed quantities within the CIP system will be held within the facility. These totes will be housed in a chemical storage section of the facility in which a leak proof membrane will be installed on the floor and up the lower wall to protect against accidental losses. For regular cleaning intervals of this area a floor drain is required. Any washing wastewater which is used in this berm will be drained through a floor drain, to Tank 1. The floor drain in this area will be non-reactive to the chemicals stored and shall be equipped with a isolating valve which fails to an normally closed position and has to be manually held open during washing routines within the berm.

Appendix 7 – Composition of milk processing effluents, indicate the typical constituent levels found in the dairy processing industry.

Tank 1 will have a holding capacity of approximately 175,000L to accommodate an expected maximum daily wastewater volume of 150,000L from the processing areas.
The wastewater from Tank 1 will have a pH of 9.1 +/-6.7, at a temperature below 32C, the Biological Oxygen Demand (BOD) of wastewater supplied to the tank can be expected to be as high as 3,000mg/L, typical expected values are shown in Appendix 7.
The waste flow discharged from Tank 1 will be at a continuous, controlled flow rate that is compatible with the equipment chosen for the on-site wastewater treatment plant.
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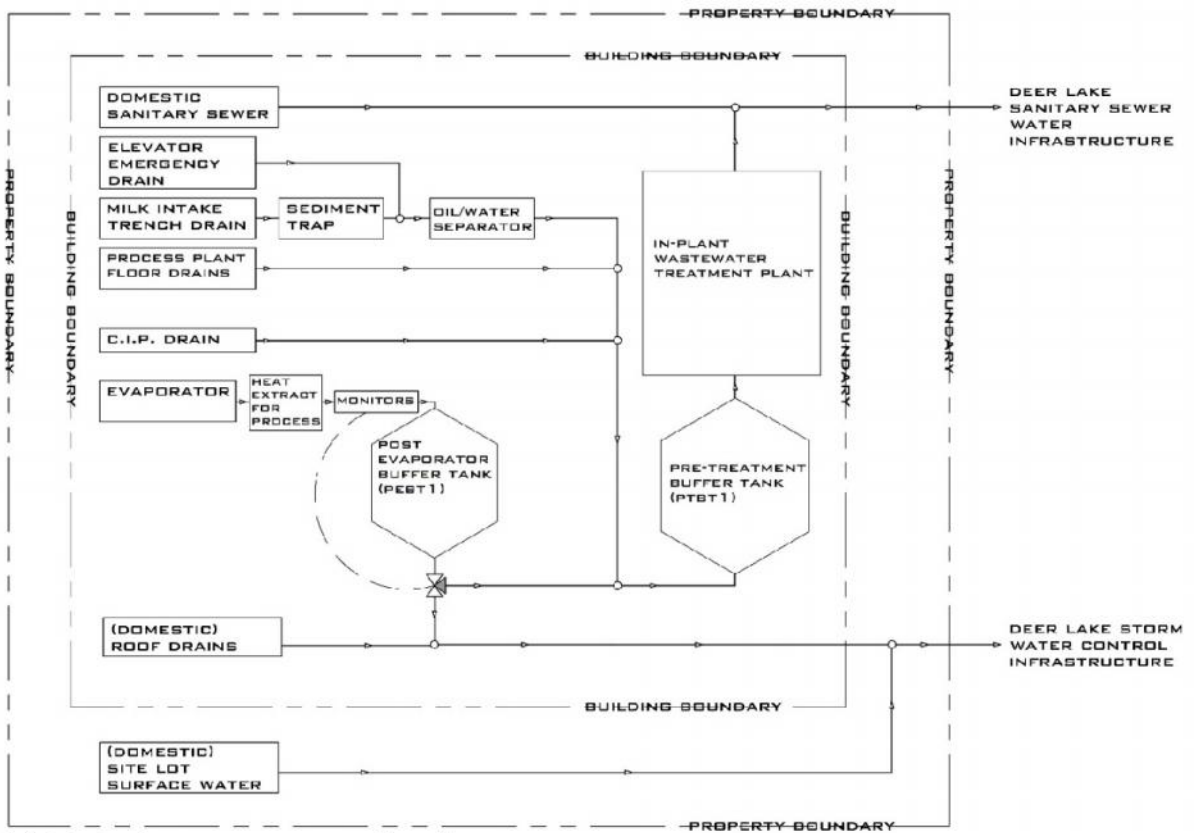

Exhibit 9 - Basic wastewater stream flow diagram

5.4 Cleaning in place (CIP) wastewater

The cleaning and sanitation of dairy processing equipment is critical to products that are safe for consumption. Cleaning in place (CIP) is an optimized cleaning method that has been used for nearly 50 years where hygiene is critical, like the dairy industry. It utilizes various cleaning chemicals, heat, and water to clean different machinery, vessels, or pipes without having to take anything apart.

Dairy CIP programmes differ according to whether the circuit to be cleaned contains heated surfaces or not. We distinguish between:

- CIP programmes for pasteurizers and other equipment with heated surfaces.
- CIP programmes for pipe systems, tanks and other process equipment with no heated surfaces

The main difference between the two is acid circulation is often included in the first type to remove solids (encrusted protein, salts) from the surfaces of heated equipment.

A CIP programme for hot components, consists of the following stages:

1. Pre-rinsing with warm water for (~10 minutes). An essential part of the CIP cycle which wets interior surfaces of piping and tanks, rinsing away residue, solids and fats. In a multi-use CIP. Water from previous rinse cycles can be reused for this pre-rinse to reduce water usage.

2. Circulation of an alkaline detergent solution (0.5 – 1.5 %) (~30 minutes at 75 °C). This involves a mix of hot water and alkali, with a high pH used as detergent for dairy CIP cleaning cycles. These washes will be returned to the tank and re-used a few times to reduce water, chemical, and energy usage.

3. Rinsing out alkaline detergent with warm water (~5 minutes). Some of this water can be recycled for pre-rinsing of point 1 above.

4. Circulation of (nitric) acid solution (0.5 – 1.0 %) (~20 minutes at 70 °C) for chemical disinfection.

5. Post-rinsing with cold water. This removes any possible remaining residue detergents. For this rinse fresh potable town water will be used. In many cases, the water from the final rinse can be saved and reused in the next CIP process.

The pasteurizer is usually disinfected in the morning before production starts. This is typically done by circulating hot water at 90 – 95 °C (~10 – 15 minutes).

A CIP programme for a circuit with pipes, tanks and other 'cold components' is the same as for heated equipment with the exception of acid usage.

The Real Dairy Company Project will employ an automated multi-use CIP system which is typical in the modern dairy plant. These systems are designed to recover rinse water to make up subsequent cleaning solutions. Most of the cleaning solution itself is reused to minimize chemical usage. This approach utilizes make-up water and cleaning chemical additions to achieve equilibrium in a cleaning solution and can run several weeks without the need to dump large volumes of cleaning solution. Final sanitizing rinse water is not reused for sanitizing but can be recovered for initial rinse water.

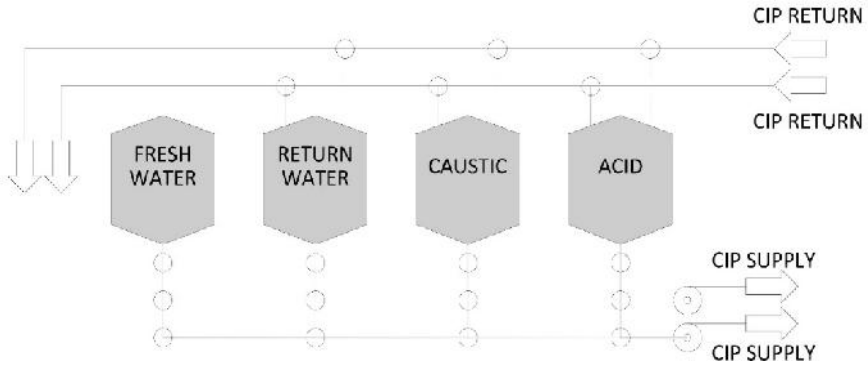

Exhibit 10 – Typical multi-use CIP system.

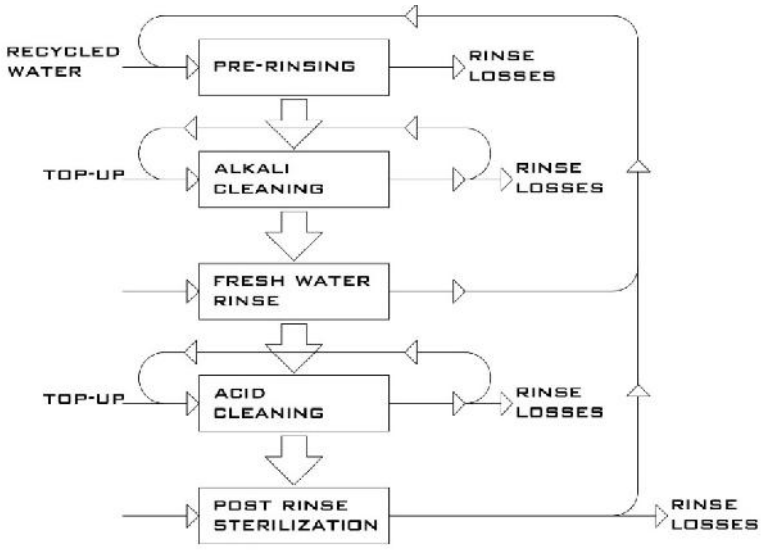

Exhibit 11 – Typical multi-use CIP cycle.

Typically, the alkaline detergent solution is a dilution (0.5 – 1.5 %) of caustic soda (initially ~30% NaOH before dilution). A 0.5 – 1.0% Nitric acid dilution is used for the acid rinse. The initial concentration of HNO3 is 60%

before dilution. The actual strength of the dilutions is dependant on the process design, the materials of construction and the dairy products manufactured.
The utilization of a multi-use system reduces the losses for the CIP chemicals as well as the sewage treatment efforts and costs.
The actual chemical volumes used is dependant on internal surface area of tanks, piping and equipment to be cleaned after contact with dairy products. Although only in the concept stages of design, an estimate of chemical usage (below) has been provided by the engaged dairy processing Engineering consultant on a scale basis of similar operations.
The estimated usage of 30% NaOH is 1000 L per week, based on the maximum production rate of 30M liters of milk / year.
The estimated usage of 60% HNO3 is 600 L per week, based on the maximum production rate of 30M liters of milk / year.
The estimates above factor in the requirement to have to empty and clean the chemical holding tanks on occasion due to fouling from the recycling processes. The dumping of these tanks is based on the condition of the chemicals.
Before being discharged to the wastewater treatment, the rinse water is held in the Pre treatment buffer tank (Tank 1). This tank allows some balancing of pH as the alkali is mixed with the acid throughout the daily CIP cycle.

5.5 Condensate wastewater flow stream

Evaporator equipment shall use vacuum pressure and heat to remove moisture from pasteurized liquid milk for the purposes of producing skim milk powder (SMP).

The removed moisture is known as milk condensate.

The condensate water removed by this process has valuable heat energy which will be recovered and utilized in other processes within the plant.
Typically, condensate will be at a high quality which is expected, in most cases, to satisfy the requirements of the latest revision of NEWFOUNDLAND AND LABRADOR REGULATION 65/03, Environmental Control Water and Sewage Regulations, 2003, under the Water Resources Act (O.C.2003-231), without any further treatment. Most secondary dairy processing plant designs considered condensate clean enough to be discharged to the environment without further treatment as is nearly pure water.

This condensate shall be drained to, and contained within, a balance tank, (Tank 2 for the purposes of this report) as a holding point to allow further cooling and evaluation of water quality. Condensate water which flows between the evaporator and Tank 2 shall be real time monitored for processing purposes and to determine if any wastewater treatments are required before release to municipal infrastructure.

The concept design for this project is expecting the condensate volumetric flow to be discharged from Tank 2 at rate of 440,000L per week. The typical characteristics of the condensate discharged to storm sewer, at a temperature of below 32 degrees C are shown in Appendix 7, specifically:
[γ/(g/L)]: pH=8.3, BOD5 =nil, COD=nil, FOG=nil, TS=nil, TSS=nil, TN=0.0006, TP=0.0001, Alkalinity as CaCO3=nil.
(REF: Watkins M, Nash D. Dairy factory wastewaters, their use on land and possible environmental impacts – a mini review. Open Agric J. 2010;4:1–9. 10.2174/1874331501004010001)

Real time monitoring of condensate quality can be accomplished in several ways, the final decision will be based upon the detailed design of the equipment which will be used to extract the heat energy from the condensate. It is the intent, at this conceptual stage, to employ turbidimeters and make a relation with actual data and contaminants (FOG/SS).

It is expected, at this conceptual stage, that the plant will have a composite sampler and extract treated and non-treated wastewater samples which will be laboratory analysed at least once a week or more if required. This testing will provide additional guidance for plant operation. Calibrated colorimetry testers from Hach will

be used to detect levels of COD, phosphorus and others constituents.
The real time monitoring equipment will be used to determine if the condensate should be treated or if it is of a quality high enough the be drained to storm water infrastructure.

If it is determined that treatment is not required, heat will be extracted for use within the plant and the condensate water shall be released at a controlled rate to the on-site storm water drain system.
If real time monitoring indicates the condensate requires treatment to meet regulations, flow shall be diverted to the pre-treatment buffer tank, Tank 1, upstream of the onsite wastewater treatment process, by an automated 3-way, fail-safe, flow control valve.
This approach lessens any unnecessary flow loading of the on-site treatment system and the Town's wastewater treatment systems. Tank 2 shall be equipped with a flow control valve to enable the rate of discharge from this tank to be adjusted based on the Towns infrastructure requirements and limitations.

6. On-site wastewater treatment and process

Every dairy wastewater treatment application is unique, possessing its own set of variables that make having an experienced wastewater process designer an absolute necessity. The Real Dairy Company of Newfoundland has engaged the Canadian company, H2Flow Equipment Inc. (see Appendix 8) in addition to a resident Engineer of Ireland, with decades of experience specializing in the treatment of wastewater produced from dairy secondary processing to assist in conceptual process design.
Moving forward, their mandate will be to complete a detailed design which carries a performance guarantee ensuring the on-site treatment processes meet the provinces Environmental Control Water and Sewage Regulations. The on-site treatment plant design and construction will be sized and equipped to employ the latest treatment methods for the maximum predicted facility throughput. Engagement at the concept design stage ensures the most accurate, realistic data is utilized in determining the selection, specifications and descriptions of the wastewater treatment plant design and equipment.

As with all greenfield projects, future proofing at the concept level is a prudent step to ensure process bottlenecking does not occur if production demand increase in the future. Along with the processing equipment, wastewater treatment equipment shall not be overlooked in this project in terms of future proofing. The site selection, and concept design has considered the possible need for currently unforeseen physical space requirements for process and wastewater equipment. Further to that end, the trend of containerized treatment systems is increasing. This provides opportunities for expansion beyond the traditional physical limitations of an existing building. The final design of facility spaces for process and wastewater treatment shall account for the possibility of additional equipment requirements should the current intended capacity be exceeded due to higher then anticipated product demand.

In keeping with the Real Dairy Company of Newfoundland's goal of setting a new industry standard for environmental footprint, we consider our responsibility to "do no harm" to the province's environment or to the social community of Deer Lake as a top priority for the outcomes of the project.
In short, at this stage, these engagements shall provide estimates and concept development of the equipment needed to provide the level of treatment ensuring output levels meet or exceed the latest revision of NEWFOUNDLAND AND LABRADOR REGULATION 65/03, Environmental Control Water and Sewage Regulations, 2003, under the Water Resources Act (O.C.2003-231).

Their recommendations are reflected throughout this report and have been made based on the concept design criteria and should be considered to be as accurate as possible without having the detailed design of the plant completed.

The on-site wastewater treatment concept that has been developed based on the concept process design and is demonstrated in Appendix 9.

The treatment will be a multi-stage process.

The first stage of the process would utilize mechanical separating of solids with a rotary drum screen. Once the wastewater exits the rotary screen it will be received by the pre-treatment wastewater buffer tank (Tank 1 describe in section 5). This will be a holding point allowing time through the day for balancing of the pH and temperature as processes within the dairy plant continue.
If determined non-compliant by the condensate quality monitoring system, the condensate from Tank 2 will contribute to the contents and dilution of Tank 1.

The second stage is present to adjust the pH and chemically dose the wastewater in preparation for the downstream process as described below (MBBR). These adjustments are completed at the flocculator using dosage pumps, variable speed supply pumps and specific piping lengths to allow for proper dwell time and monitoring.

The third stage employs the first of two dissolved air flotation systems (DAF1). Dissolved air flotation is a proven and effective physical/chemical technology for treating wastewater. Its main objective is the removal of

insoluble fats, oils & greases (FOG) and suspended solids to meet treatment goals.
DAF1 will be a containerized, modular design which will also house the second stage flocculator mentioned above. The FOG, BOD and SS removed by the flotation system will be skimmed from the wastewater stream and sent to the sludge press of stage 6.

In accordance with the information provided from the manufacturer (H2FLOW), these first three stages will remove approximately 90-95% of the insoluble TSS, FOG, and BOD from dairy processing with proper chemistry applied. The remaining 5-10% will be treated in the processing that follows and are described below.

Stage four of the treatment process utilizes a moving bed biofilm reactor (MBBR). This biological process removes the soluble BOD from the wastewater stream by using bacteria or nematodes to take advantage of natural cellular processes to decompose this waste. MBBR uses plastic carriers covered in biofilm to decompose waste products (see Appendix 9 page 11). The biofilm carrier elements (cubes) are freely mixing around in the reactor and are specially designed for biofilm growth. The bacteria will grow and develop a solid biofilm on the large, protected surface area. The moving pattern of the carriers in the reactors will also provide a natural removal of excess biofilm, due to the shear forces between the carriers and the water in the reactor. MBBR can be used to reduce soluble BOD to less the 10 PPM when used downstream of the previous process steps described. The proposed MBBR equipment is again containerized for convenience.

The next stage of treatment will utilize another DAF system (DAF2) to polish the effluent for suspended solids and phosphorus. Similar in operation to DAF1, and sludge from DAF2 is also skimmed and sent to the sludge press of stage 6.

Both engaged parties state that the result of this concept wastewater treatment design would be expected to easily meet the requirements of Schedule B of latest revision of NEWFOUNDLAND AND LABRADOR REGULATION 65/03, Environmental Control Water and Sewage Regulations, 2003, under the Water Resources Act (O.C.2003-231).

Stage 6, although not technically a part of the wastewater treatment process, sludge collection and processing has been integrated in the wastewater treatment concept. Skimmed sludge from DAF1 and DAF2 shall be sent to a holding tank and metered to a screw press for dewatering to a dryness estimated to be 18% to 20%. This dewatered sludge has value as fertilizer or feedstock for anaerobic digesters.

6.1 Alternatives to current wastewater treatment processing concept

The modern alternatives, in general, for dairy treatment process options all have the initial three stages in common with one another, specifically with:

1. Separating of large undissolved solids using a screening device
2. Adjusting pH and chemistry through flocculation
3. Removal of insoluble F.O.G. and S.S. using DAF

The diversity of options begins at the secondary treatment stages downstream of these initial, primary treatment processes.

The different secondary process options are mainly:

1. Aerated lagoons
2. Sequencing batch reactor (SBR)
3. Membrane Bioreactor (MBR)

Each one of the above options can achieve results equal to that of the currently preferred MBBR but all have different impact on initial capital cost, annual operational costs, and physical site requirements.

Alternative 1 - Aerated lagoons

An aerated lagoon is a wastewater treatment process using suspended growth in a large earthen lagoon or basin. Mechanical aerators maintain an aerobic environment and prevent biomass settling. The treatment is dependent on detention time.

Aerated Lagoon disadvantages

1. Aerated Lagoons usually have a large physical footprint and are usually build, unsheltered outside. The initial civil / structural construction is significant in both time and cost.
2. Lagoons have a long hydraulic retention time, between 400 to 500 hours which results in a large structure.
3. During a maintenance interval a significant commitment of time and money must be made, production may have to decrease or stop at times.
4. While in this maintenance period, sludge must be removed from the lagoon, usually with vacuum equipment, dewatered by temporary equipment and transported for disposal. Removal, handling, transportation, and disposal fee can be substantial.
5. Lagoon efficiency is temperature dependent, and as these are usually built outside, the temperature would need to be above 4 degrees C in order to effectively treat wastewater with ammonia.

Aeration lagoon advantages

1. Dewatering equipment is not required.
2. Daily or weekly sludge disposal is not a concern therefore lagoons will operate with little maintenance generally for three to seven years.

Selection decision - aeration lagoon

Because of the disadvantage of very high initial capital cost and the disadvantages associated with the work load during a maintenance interval a aerated lagoon was not chosen as the preferred option for this project.

Alternative 2 - Sequencing batch reactor (SBR)

A sequencing batch reactor (SBR) is a type of activated sludge process where at least four operations occur in the same vessel sequentially during the process, these are:

1. Fill
2. Aerate
3. Settle
4. Decant

SBR disadvantages

1. A higher level of sophistication of timing units and controls is required for the process to operate correctly.
2. A higher level of maintenance is associated with sophisticated controls, automated switches, and automated valves.
3. There exists a potential for plugging of aeration devices during selected operating cycles, resulting in unscheduled downtime and maintenance costs.
4. For this project two tanks would be required since it is a batch process and can not support high, continuous volumes of wastewater with one tank. This twinning of the vessels required a significant physical footprint (but smaller than a lagoon).
5. SBR processes can produce spikes at the discharge because of potential of discharging floating or settled sludge during the decant phase resulting in non-compliance issues.

SBR advantages

1. The process is a combination of equalization, biological treatment, secondary clarification, and final settlement in a single tank, therefore removing the need for independent final settlement tanks and recycle streams.
2. SBR process usually have a short cycle time required to complete the four sequential steps identified above, somewhere in the range of 4 to 6 hours.
3. Since the entire process occurs in the SBR vessel there is not need for the initial capital and operating cost of a second DAF.
4. Less mechanical equipment than MBBR and MBR. Bigger footprint but never as much as lagoons.

Selection decision - SBR

Because of the disadvantage of potential for reliability issues, larger footprint and possibility of non-compliance issues a SBR was not chosen as the preferred option for this project.

Alternative 3 - Membrane Bioreactor (MBR)

MBR is a wastewater treatment process which combines a membrane filtration and a biological treatment in a single process. It is similar to an activated sludge process but with higher mixed liquor concentration that permits a lesser footprint than an aeration lagoon or an SBR. The membranes are used to remove the suspended solids. MBRs are usually selected for applications that require a high-quality water effluent discharge specification.

MBR disadvantages

1. This process has a high capital cost in relation to the requirements of the project.
2. Very sensitive to changing influent values. FOG leaks can cause clogging of the fine membranes requiring cleaning or replacement.
3. Require monitoring of the activated sludge process as well as backwashing of the membranes.
4. Operation can be challenging, and higher qualifications are necessary.
5. Permanent backwashing of the membrane and fouling prevention require elevate air usage resulting in elevated energy usage.

MBR advantages

1. Can produce very high-quality wastewater treatment process (discharge less than 5 ppm BOD).
2. Required less space due to higher efficiency allow more BOD removal per water volume.

Selection decision - MBR

Because of the disadvantage of higher operational and maintenance costs, higher energy usage and unnecessary level of efficiency without cause, a MBR was not chosen as the preferred option for this project.

Selected Alternative – Moving Bed Biofilm Reactor (MBBR)

MBBR is a highly effective biological treatment process based on a combination of conventional activated sludge process and biofilm media. The MBBR process utilizes floating high-capacity plastic carriers covered in biofilm (micro-organisms) within the aeration tank. The media provides increased surface area for the biological micro-organisms to grow. The micro-organisms attached to the media in the tank consume waste in the water, leaving it cleaner and safer for reuse or disposal. The type of microorganisms introduced into the tank will depend on what type of waste needs to get eliminated, in this case, dairy waste.

The increased surface area reduces the footprint of the tanks required to treat the wastewater. The treatment process operates at high volume loads (see Appendix 9 for details). This approach combines many of the strengths of biological processes, specifically an activated sludge process and biofilm media, while minimizing the shortcomings that tend to come with biological processes for wastewater treatment.

MBBR disadvantages

1. Manual bacterial monitoring required.
2. Biological systems are more difficult to monitor than other treatments. You cannot simply put a sensor in the tank to consistently keep track of the bacteria in the bio media. Operators have to regularly take samples of the media and analyze them in a lab by hand to ensure that the bacteria are alive and healthy.
3. Skilled operators are needed to monitor the bio media and need to be experienced in biological water treatment. The physical operation is not complex, but the biological processes are complex resulting in a requirement of skilled staff.

MBBR advantages

1. Compact: MBBR is an excellent option for facilities with space constraints, in this case it is containerized.
2. An MBBR aeration tank can effectively treat the same amount of water as a much larger tank used for a more traditional process because the maximized surface area the media provide for biofilm growth.
3. Simple: MBBR is a relatively straightforward process allowing nature to take its course, minimizing the operator's roll. The process does not require many steps.
4. Low maintenance: known for being a low-maintenance process. Operator backwashing required in other systems are typically unnecessary. This system is self-moderating, it to operate effectively without ongoing maintenance intervention.
5. Flexible: naturally able to adjust to varying loads and changes in the influent, since the microorganisms on the carriers respond to changes. It allows MBBR systems to resist shock loading or a sudden spike in pH levels. MBBR system's ability to remain highly stable when faced with organic, hydraulic and salt shock loadings and to quickly return to normal.
6. Efficient: One of the most significant advantages of MBBR is its impressive level of efficiency. An MBBR system can work quicker than alternative methods to treat the water. The hydraulic retention time (HRT) for BOD and nitrogen removal is around three to four hours. The continuously moving media and the sheer amount of biofilm make this low HRT possible. These systems require less energy because the air supply of the biofilm is installed directly underneath the fill media which results in a better oxygen intake.

Selection decision - MBBR

MBBRs are a good solution for treatment of high BOD levels. Their resistant and forgiving design make them suitable for the application. Additionally, the easy operation and maintenance, guarantee a long-life time product solution for low cost in the long-term service. For these reasons MBBR was chosen as the preferred option for this project.

6.2 Disposal of unacceptable raw milk

The requirement to handle and dispose of raw milk which is deemed to be unacceptable is likely to be rare given the regulations set forth by the Dairy Farmers of Newfoundland and Labrador regarding the pick-up, transportation and delivery of raw milk.

The regulations require that raw milk meet criteria of acceptance prior to being loaded into a transport tanker. The responsibility of care remains with the transporter until it is offloaded. This arrangement significantly reduces the possibility of unacceptable milk requiring disposal at the facility.

If unacceptable milk must be disposed of from the facility, it will be collected by a third parity environmental waste collection contractor and offloaded at farm in the area to be disposed of in an aerobic digester. If this option were to become unavailable it would be offloaded to manure lagoons at farms in the area.

7. Water resources management plan

All water used for this project site, facility, process, and human occupancy shall be sourced, solely from the Town of Deer Lake's municipal drinking water infrastructure system. No water, for any use, shall be sourced from any streams, lakes, or rivers or any other independent bodies of water.

Potable water usage shall vary with production rates at the facility however, at the plants maximum anticipated capacity of processing 30,000,000 L of raw milk per year the anticipated domestic water flow into the plant is expected to be about 15000 L per hour or 4.2 Liters per second.

The town's existing potable water infrastructure has a capacity to support a usage of up to 73 liters per second.
The Town's historical data (provided by the Town) shows:
The town's daily average usage is 24 L/s.
The maximum daily peak demand is 48 L/s.

Using the peak demand as a baseline the remaining available capacity of the system is 600% larger than the requirements of the proposed plant operating at its maximum capacity.

It is the intention however, to have a water storage tank for potable water at the facility. This tank shall contain enough water to allow facility fire protection and processing to continue in the event of a Town water outage.

When possible, the water tank shall be filled during off-peak demand times of the towns potable water volumes.

In the event of a town water outage the plant would use the stored water on the site to complete the processing in progress and provide fire protection during that period. If the water outage continued beyond that production period, then production would be suspended until the tank could be refilled.

The water usage streams are expected to be:

1. Tanker truck exterior wash –The Dairy Farmers of Newfoundland agreement to transport raw milk require the exterior of the tanker trucks to be washed prior to leaving the intake facility. The proposed facility shall accommodate this regulation by providing vehicle washing spray wands located inside a truck washing bay within the building for this purpose.

2. Plant washdown water – between production runs and at the end of work shifts it is expected that a cleaning of all equipment will be performed. The interior of all piping and equipment will be done automatically using the CIP systems. The exterior of the equipment shall be sanitized and rinsed using potable water supplied washing spray wands.

3. Feed water to Cleaning In Place (CIP) systems - the CIP systems will be used to automatically sanitize all internal parts of the process piping and equipment. This process is expected to occur 3 times per production day at set time intervals. The process uses rinse water which is recycled from the previous process where possible. This approach greatly reduces the demand on potable water for the proposed plant. Some of the recycled rinse is lost during the process to the wastewater treatment plant and requires replenishment. The replenishment of rise water is the only requirement placed on potable water for the CIP systems.

4. Domestic water use (toilets, handwash sinks, janitor sinks) – potable water will be supplied to the restroom facilities and the handwash sinks within the plant. The restrooms in the plant will accommodate approximately 15 occupants.

8. Waste management plan

Normal operation of the facility shall produce waste materials that will require management. The following plan shall be used to identify the expected types of waste generated at the facility and the methods that are to be used to recycle, repurpose, or dispose if the generated material waste streams.

The waste streams expected to be generated are:

1. Sludges from the wastewater treatment processes will be a waste stream. This by-product is well suited for use as feedstock in anaerobic digesters and manure lagoons.
   This material will be insoluble solids and soluble FOG, BOD and COD which has been skimmed from the dissolved air flotation equipment, DAF1 and DAF2. After being removed by the rotary screen and the DAFs this material is sent to a screw press for dewatering.
   The engaged wastewater treatment design and equipment supply company, H2Flow Equipment Inc. (see Appendix 8) has indicated that an estimate of sludge volume is difficult to tender in the absents of a higher level of detail concerning equipment selection upstream of wastewater treatment design. They have presented that the final product discharged from the press has a dryness of approximately 18 to 20%.
   The dewatered sludge will be conveyed to a dedicated storage bin for short term storage. The facility will ship the dewatered sludge to local farm to be used as feedstock for an anaerobic digester when permitted capacity allows. (Appendix 9 for equipment details)

   The contingency plan for this waste stream, should distribution be interrupted for any reason, dewatered sludge would be collected and disposed of by a local environmental waste management contractor holding a certificate of approval until distribution can be restored.

2. Shipping pallets will be used to store and transfer the final products from the plant to the shipping trucks. Additional some raw materials will be received on hardwood pallets. Wherever possible these pallets will be reused or returned to the orignal distributor to reduce waste stream volumes. When damaged pallets need to be disposed of, they will be sent to the designated landfill facility in the area. The segregation of materials will be followed when delivering waste to the landfill site.

3. Butter boxes and misc. cardboard these items will be a waste stream generated at the facility if they become damaged. Otherwise, they would become part of the end product. Cardboard will be segregated at the facility and sent to the nearest cardboard recycling facility which accepts cardboard.

4. Chemical totes will be used to store chemicals which are used in the Cleaning In Place (CIP) systems. When emptied, these totes will be returned to the supplier for exchanged.

5. Domestic refuse and recyclables resulting from employee activities such as lunchroom and locker room refuse shall be collected on site and segregated in to landfill materials and recycling, blue bin materials. Recycling will be sent to the appropriate facilities and non recyclable materials will be sent to the designated landfill site for the area.
   The contingency plans for streams two to five are as follows: In the event that one of these waste streams can not temporarily be managed in the above-described manner due to an unforeseen event, the waste stream shall be diverted to the next closest facility approved to handle the materials. If an alternate facility is not available, the materials will be sorted into appropriate bins at the proponent's facility and stored until the receiving issues are resolved.

9. Project related documents.

Environmental Assessment documentation previously submitted June 2022.

10. Approvals of the Undertaking

The required local, provincial, and federal permits, licenses, approvals, and other forms of authorization required for the Undertaking along with the authorities of issuance are listed in Appendix 3.

Appendix 1

Excerpt of The Town of Deer Lake's Municipal Plan 2019-2029

5.0 LAND USE DESIGNATIONS

The Town's growth and development will be managed by designating lands within the Planning Area according to broad land use categories. These designations are shown on Future Land Use Maps 1, 2, and 3. Policies outlined in this section specify Council's intent related to land use and forms of development in each of the following land use designations.

Future Land Use Designations	**Zones**	
Conservation	Environmental Protection Protected Watershed Floodway	EP PW FW
Residential	Residential Medium Density Residential High Density Residential Mini-Home Residential Floodway Fringe Rural Community	RMD RHD RMH RFF RC
Town Centre	Town Centre	TC
Commercial/Industrial	Commercial General Commercial-Light Industrial Commercial Highway Tourism Recreation Industrial General	CG CLI CH TR IG
Public Use	Public Use	PU
Open Space	Open Space	OS
Airport	Airport	AIR
Utility	Utility	UT
Highway Corridor	Highway Corridor	HC
Rural	Mineral Working Rural	MW RU

Table 3.

5.1 Conservation

The overriding goal of the Conservation designation is to protect environmentally vulnerable and important lands and natural resources including Deer Lake's drinking water supply, other surface water resources, wetlands, flood risk areas, steep slopes, and protected waterfowl habitat.

5.1.1 Land Use Zones

The Development Regulations will establish three land use zones within the Conservation designation.

(2) Area Plan Adoption

An Area Plan will be a professionally prepared document with text and accompanying maps. It will be reviewed by Council to determine conformity to the Municipal Plan and Development Regulations. Prior to approving an Area Plan, Council at its discretion may give public notice, make the plan available for public review, and consider all objections and representations received.

5.4.6 Land Use Zones

The Development Regulations shall establish five land use zones within the Commercial-Industrial designation.

Commercial-Industrial Designation - Land Use Zones		
Zone	**Purpose**	**Application**
Commercial General	Recognize existing general retail sites and accommodate future retail development needs.	Existing and future commercial lands in vicinity of Commercial Street.
Commercial-Light Industrial	Recognize existing mixed commercial-light industrial areas and provide for future development.	Existing and future commercial lands south and north of Old Bonne Bay Road.
Commercial Highway	Recognize existing highway service areas and provide for future development.	Existing highway and commercial accommodation service area along Trans Canada Highway.
Tourism Recreation	Provide lands for a mix of land-extensive visitor accommodation and passive recreational uses.	Existing and future mixed-use tourism and recreation areas south and north of Humber River.
Industrial General	Provide lands for exclusive general industrial development.	Some small existing areas as well as new industrial land north of Old Bonne Bay Road towards the Trans Canada Highway.

Table 4

5.4.7 Commercial General Zone

The Commercial General zone applies to land fronting onto Commercial Street as well as land designated for future general commercial development north of Commercial Street. The intent of this zone is to facilitate general commercial development to enhance Deer Lake's position as a regional retail and service centre.

1. Land Use

(1) The Commercial General zone will allow for the development of various types of retail and service businesses, as well as certain cultural and public service uses.

(2) Permitted business uses include shops, catering, general and personal services, indoor and outdoor markets, offices, take-out food services, and veterinary services.

Appendix 2

Project Constructing Scheduling

Appendix 2

Step #	DESIGN BUILD PROCESS	Week # 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70
1	RFP Development /review	O	O																																																																																		
2	RFP Open Period																																																																																											
3	TENDER AWARD MILESTONE																																																																																											
4	Arch. Design process Pkg 1							A	A	A																																																																															
5	Steel package order																																																																																																				
6	Reaction load / pre-order Pkg																																																																																											
7	Dairy Equipment order Pkg 1								O																																																																																		
8	EQUIPMENT ORDER MILESTONE																																																																																											
9	Foundation / structure design															S	S	S	S	S																																																																									
10	Steel Pkg delivery																																																																																											
11	Arch. Design process Pkg 2										A	A	A	A	A	A																																																																											
12	Door/ window, interior order																GC																																																																									
13	Mechanical design Pkg 1																			M	M	M	M	M	M																																																																	
14	Mechanical material order 1																									GC																																																																
15	Electrical design Pkg 1																									E	E	E	E																																																																
16	Electrical Material Order 1																													GC																																																									
17	Mechanical process design Pkg 2																									M	M	M	M	M	M																																																																
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19	Electrical design Pkg 2																													E	E	E	E																																																						
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25	Site/ground Work inspections																C	C	C	C	C																																																																									
26	Door/ window, interior delivery																																																																																											
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48	electrical ext, int, emerg, light(Pkg1+2)																																																																																											
49	mechanical- plumb, hvac (Pkg1)																																																																																											
50	Sprinkler system																																																																																											
51	Fire alarm																																																																																											
52	Elevator																																																																																											
53	drywall																																																																																											
54	Inspections																																																																																											
55	Mech Const. - Process (Pkg2)																																																																																											
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60	Occupancy inspections																																																																																											
61	OCCUPANCY MILESTONE																																																																																											
62	Deficiency rectification																																																																																											

Legend
Owner
Design team, (A)Arch. (E)Elect. (M)Mech. (C)Civ. (S)Struct.
Contractor
Purchase / delivery of equipment

45 Weeks

21 Weeks

Appendix 3

Table of Permits, licenses, approvals, authorizations.

Appendix 3

Required approvals for the Undertaking										
Description of submission	Governance Level	Receiving department	Legislation	Regulations	Regsit.	Cert.	License	Permit	Review	Approval
CONSTRUCTION RELATED										
Municipal Building Permit	Municipal	Township - Municipal	N/A	Local Development Regulations				X	X	
Compliance Letter	Municipal	Township - Municipal	N/A	Local Development Regulations					X	
Municipal Water and Sewer Connection Permit	Municipal	Township - Municipal	N/A	Local Development Regulations				X		
Signage Permit	Municipal	Township - Municipal	N/A	Local Development Regulations				X		
Building accessibility design registration	Provincial	Digital Govt & Service NL	Building Accessibility Act	Building Accessibility Regulations	X				X	
Fire and life safety plan review	Provincial	Digital Govt & Service NL	Fire Protection Serv. Act	Building Accessibility Regulations	X				X	
Electrical Permit	Provincial	Digital Govt & Service NL	Public Safety Act	Electrical Regulations				X		X
Elevating Device	Provincial	Digital Govt & Service NL	Public Safety Act	Amusement rides & Elevating Devices Reg.	X					
Pressure plant registration	Provincial	Digital Govt & Service NL	Public Safety Act	B.P.V & C.G. Reg.		X				
Pressure piping system registration	Provincial	Digital Govt & Service NL	Public Safety Act	B.P.V & C.G. Reg.	X					
FOOD PROCESSING / MANUFACTURING / SALES										
Manufacturing / processing food premises	Provincial	Digital Govt & Service NL								
Weighing and measuring	Federal									
Safe Food for Canadians	Federal	Can. Food Insp. Agency					X			

Appendix 4

Deer Lake Lagoon drawings

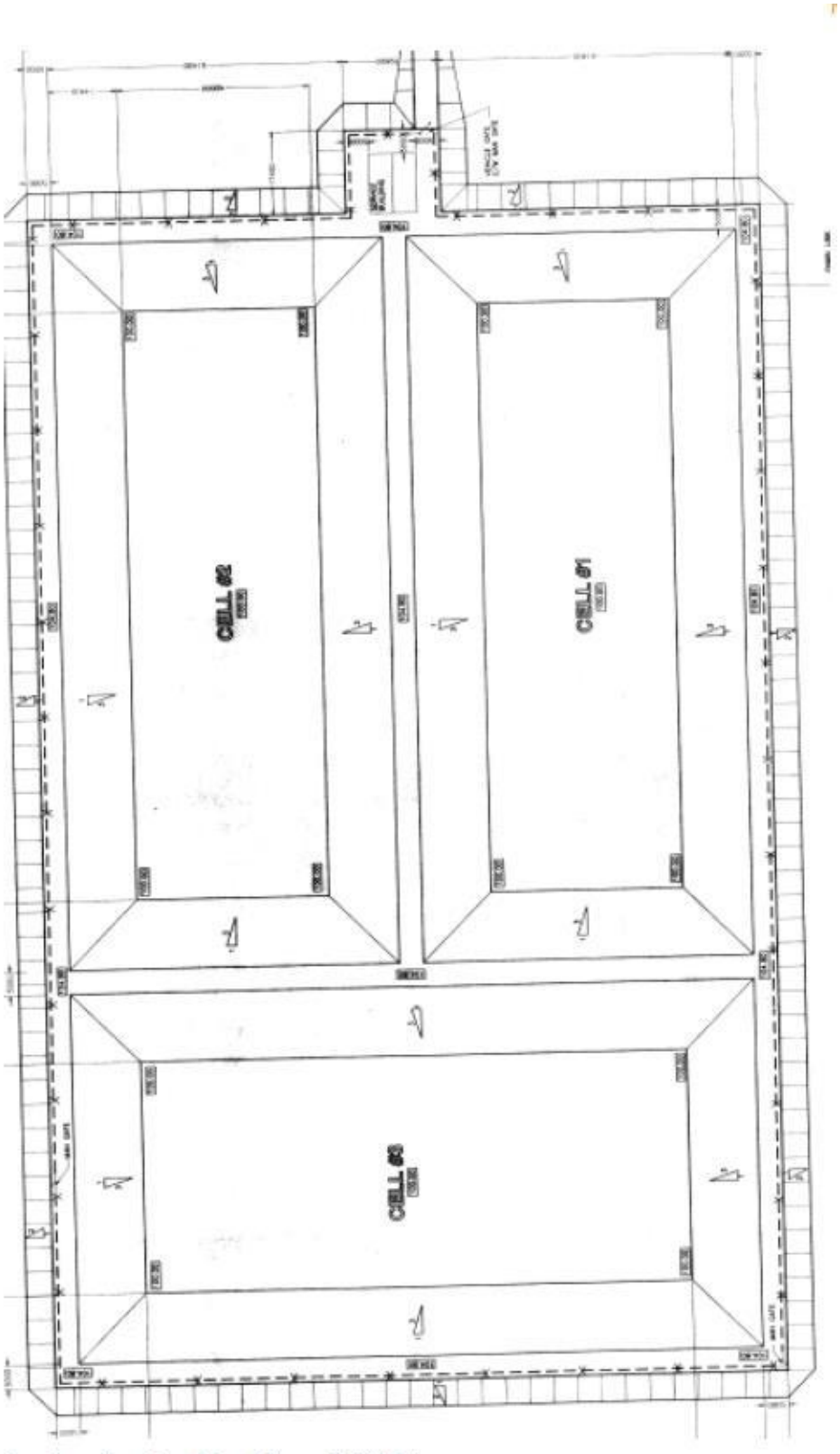


Exhibit 12 - Deer Lake Lagoon Cell Location

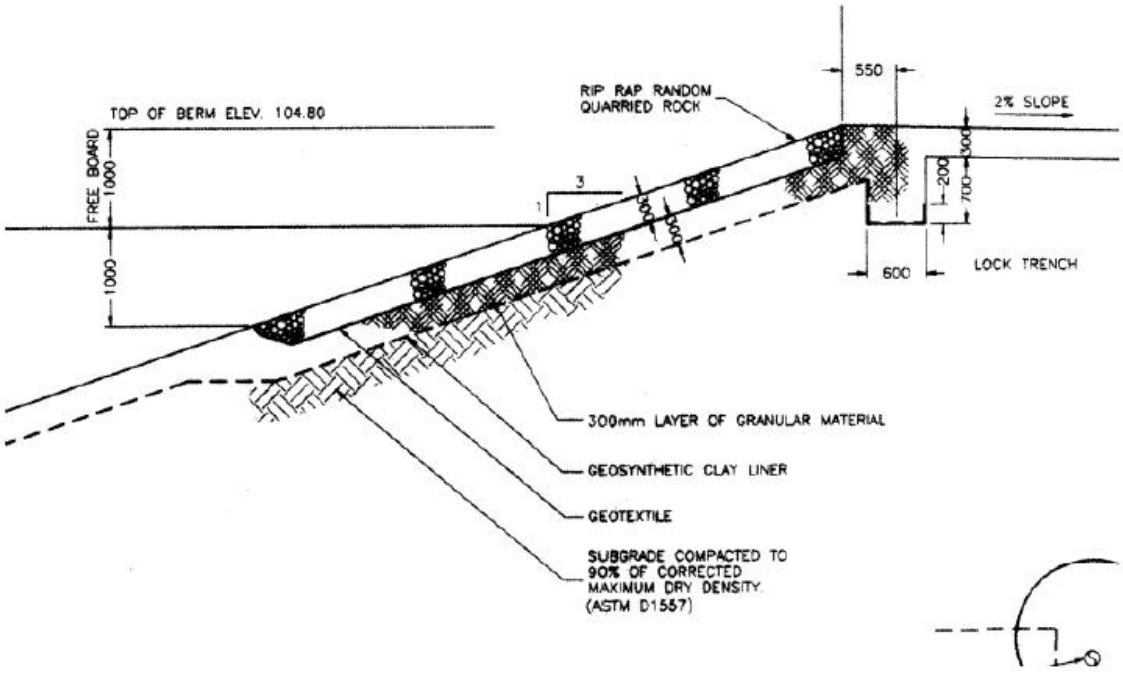


Exhibit 13 - Typical Section Through Deer Lake Lagoon

Appendix 5

Facility Decommissioning and area rehabilitate.

Appendix 5 Facility Decommissioning and area rehabilitate.

Although a plant closure in part or in whole is not anticipated the following plans for decommissioning and rehabilitation for the entire project footprint have been developed.

1. All applicable divisions of the provincial government shall be contacted to notify of the plant decommissioning and invited to provide input on subject matter related to the decommissioning activities.
2. All underground services of water and power shall be isolated at the property boundary.
3. Any raw materials stored on site at the time of decommissioning would be sold back to suppliers where possible and where this is not feasible or appropriate, the materials will be disposed of through the appropriate registered waste disposal contractors.
4. Any product which remains on site at the time of decommissioning would be sold to the appropriate customers. If the sale of product is not feasible or appropriate, the materials will be disposed of through the appropriate registered waste disposal contractors.
5. Plant machinery and equipment will be cleaned post final operations, dismantled and stored under suitable conditions until it may be sold to operators involved in similar manufacturing operations. Any remaining components for which a buyer can not be sourced, shall be disposed of, or recycled through appropriate registered disposal and recycle contractors.
6. Waste products present at the time of decommissioning shall be disposed of through the appropriate registered disposal contractors.
7. The production building and facilities shall be subject to a thorough in-house cleaning procedure prior to final disassembly.
8. The production facility structure and building envelop shall be sold from the property to operators involved in similar manufacturing operations. Any remaining components for which a buyer can not be sourced, shall be disposed of, or recycled through appropriate registered contractors.
9. Remaining building foundations shall be demolished separating rebar from concrete and both materials shall be binned and disposed of thorough recycle of a managed, registered disposal site.
10. Underground piping infrastructure shall be uncovered and capped at all open ends and located on a demolition site plan. Water service piping shall be located on the plan after being isolate at the Town/Project boundary. Under ground electrical supply cables shall be disconnected from the sources by the applicable authority after obtaining appropriate permitting. All buried electrical cable remaining on the site shall be recorded on the demolition site plan. When complete, the demolition site plan shall be submitted to the Town of Deer Lake and the applicable provincial government departments.
11. The excavation resulting from the foundation removal shall be infilled with clean materials to eliminate hazards of an open pit and the possibility of water retention in the opening. The site shall be graded to control surface water.

Appendix 6

Emergency response plan – spills

WHAT IS A MAJOR SPILL?

A major spill is one which:

- involves the release of a toxic chemical that poses an immediate risk to health, **OR**
- involves fire or explosion.

What to do if there is a major spill - Take Action!

If necessary, activate the fire alarm and evacuate the building immediately.

Personal Injury or Chemical Contamination

If there is personal injury or chemical contamination:

- Move the victim to safety (only if safe to do without further injuring the victim or you).
- Locate nearest emergency eyewash or safety shower if someone is contaminated.
- Remove any contaminated clothing.
- Flush all areas of the body contacted by chemicals with copious amounts of water for 15 minutes.

As soon as persons are away from immediate danger

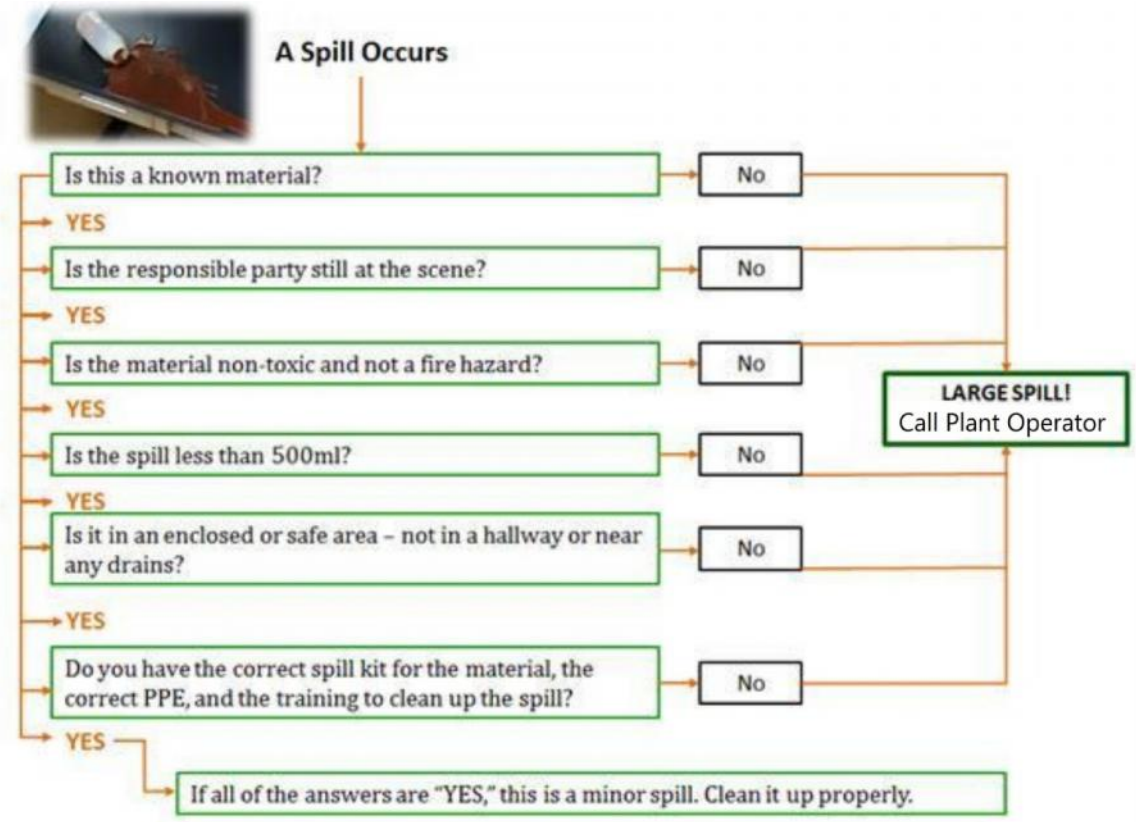
Call:

- Plant operator @ XXX-XXXX Ex XXX.

They are trained to determine the next course of action, which may be: alerting the fire department, shutting down equipment, alerting 911, alerting Environmental protection.

- Tell the person who answers the phone details of the accident:
  - the location – building section, equipment name,
  - types of hazardous materials involved,
  - your name,
  - a phone number where you can be reached and note the time of the spill

What is a LARGE SPILL vs. a SMALL SPILL



Actions for LARGE SPILL (See chart above) - Chemical

- Contain the spill, if you can do so without risk to yourself or others.
- Warn others in the immediate area.

  Evacuate the area if necessary.
- Notify the plant operator will contact the appropriate Emergency Spill Response personal. They are specially trained to handle hazardous chemical spills.
- Provide the following information:
  - Your name and extension or cell phone number
  - Location of the spill
  - Quantity
  - Name of the chemical spilled.

Actions for LARGE SPILL (See chart above) – Dairy

Milk is not toxic for humans but is considered a pollutant because as large volumes of milk break down in the water, it creates a high biological oxygen demand that could result in a fish kill."

- If spill occurs after tanker unloading including milk intake
  - Follow steps for large Chemical spill outlined above.

- If spill occurs prior to tanker unloading milk.
  Any dairy spills prior to unloading of a tanker is the responsibility of the transporter. If a spill occurs they have been trained to respond appropriately in accordance with dairy transportation regulations.

  - Notify the plant operator they will contact the appropriate Emergency Spill Response personal. They are specially trained to handle hazardous chemical spills.
  - Provide the following information to the operator:
    - Your name and extension or cell phone number
    - Location of the spill
    - Quantity
    - Name of the chemical spilled.

  - **DO NOT LEAVE THE AREA UNTIL THE TRANSPORTER HAS TAKE ALL APPROPREATE MEASURES**

  - Provide assistance to the transporter as requested.

MINOR SPILL (See chart above)

- Alert people in the immediate area of the spill and restrict access.
- Locate the correct spill kit.
- Don the appropriate PPE – consult the SDS for special precautions
    - Clean, buttoned, long sleeve lab coat
    - Nitrile gloves if appropriate
    - Disposable shoe covers
    - Safety goggles or a full-face shield

For Chemical Spills

- Use the appropriate spill kit to confine and contain the spill.
- Liquids:
    - Cover with the appropriate materials (vermiculate, absorbent pads, etc.) to absorb the liquid.
    - Dispose of as chemical waste in spill kit bucket and secure cover.
- Powders:
    - If it is in powder form, carefully sweep into a dustpan. DO NOT VACUUM.
    - Avoid generating respirable dust.
    - Dispose of as chemical waste in spill kit bucket and secure cover.

For Dairy Spills

All building floor drainage is connected to the on-site wastewater treatment process. If the spill is located near a floor drain it can be washed into the floor drain. Otherwise treat as a chemical spill as indicated above.

RECOMMENDED SPILL KIT

Commercial spill kits are available, but a basic spill kit for most spills up to 500 ml can be put together easily using inexpensive materials such as the ones listed below (Can be used as an inventory check list).

- ☐ Five (5) gallon bucket(s) with lid(s) – to store the kit
- ☐ 2 pairs of chemical splash goggles
- ☐ 2 pairs of gloves (nitrile)
- ☐ 2 pairs of shoe covers
- ☐ 2 disposable lab coats
- ☐ Absorbent material to contain the spill (paper towels, spill booms or pillows, vermiculite)
- ☐ Forceps/tongs to pick up contaminated debris or broken glass.
- ☐ Zipper seal type bags (1 gallon size)
- ☐ Waste disposal bag

How to Pack a Spill Kit

Spill kits should be packaged in the order of when materials will be needed:

1. PPE should be stored on the top so that it is easily accessible and serves a reminder to don the PPE ***prior to the cleanup***.

2. Absorbents and other equipment needed should be under the PPE.

3. Plastic bags and drums to contain the spill debris should be next.

4. The pan and broom should be located at the bottom of the kit.

Appendix 7

Composition of milk processing effluents

Composition of milk processing effluents

Table 6

Milk processing effluent	Active reaction (pH)	γ/(g/L)								Reference
		BOD_5	COD	FOG	TS	TSS	TN	TP	Alkalinity as $CaCO_3$	
Mixed dairy	4–11	0.24–5.9	0.5–10.4	0.02–1.92	0.71–7	0.06–5.80	0.01–0.66	0–0.6	0.32–1.2	(1,3–7,9,11,13,14, 17,18,20,22,23,35)
Milk reception	7.18	0.8	2.54	1.06	–	0.65	–	–	–	(20)
Dairy/sewage=7:3	9.1±6.7	1.08–2.81	2.04–4.73	0.24–0.29	–	0.53–1.13	–	0.02–0.03	–	(13)
Fluid milk	5–9.5	0.5–1.3	0.95–2.4	–	–	0.09–0.45	–	–	–	(11)
Product omitted for clarity - Product not applicable to process										
Butter	12.08	0.22–2.65	8.93	2.88	–	0.7–5.07	–	–	–	(6, 20)
Products omitted for clarity – products not applicable to process.										
Condensate	8.3	–	–	–	–	–	0.0006	0.0001	–	(23)
Washing wastewater	10.37	3.47	14.64	3.11	–	3.82	–	–	–	(20)

BOD_5=biological oxygen demand for 5 days, COD=chemical oxygen demand, FOG=fat, oil and grease, TS=total solids, TSS=total suspended solids, TN=total nitrogen, TP=total phosphorus

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Data provided from Richard Rousseau, ing. of H2Flow equipment Inc.,580 Oster Lane, Vaughan, Ontario, L4K 2C1, Canada, Phone: (905) 660-9775, Toll Free: 1-(888)-575-8642, Email: info@h2flow.com
Richard Rousseau of H2Flow equipment has been engaged by The Real Dairy Company of Newfoundland to assist with the concept design of the processes integration and equipment selection for the on-site wastewater treatment
Below are three recent examples of dairy processing wastewater treatment projects which H2Flow had been successful with. The information below has been provide by H2Flow in order to demonstrate the typical composition of wastewater which can be expected in the production of butter and skim milk powder, similar to the intent of The Real Dairy Company of Newfoundland.

Butter production
Vitalus Nutrition Inc.
3911 Mount Lehman Road
Abbotsford BC, V2T 5W5

Influent Composition

- The waster water treatment plant is expected to receive effluent from the new process facility with the following characteristics;
- FOG: 550 mg/L
- TSS: 749 mg/L
- COD: 3,825 mg/L
- BOD: 1,530 mg/L
- TEMP: 55 deg C
- PH: 6 to 9

Table 7 - Influent Composition design criteria for Vitalus Nutrition Inc

Butter & margarine production
Upfield Head Office
Europe BV
Beethovenstraat 551 – 7th floor
1083 HK Amsterdam
Netherlands

Parameter	Unit	Value Phase 1	Value Phase 2	Targeted Effluent
Average Hourly Flow	m^3/h	17	27	< 30
Maximum Hydraulic Flow	m^3/h	45	80	–
Wastewater TSS	mg/L	20500		< 350
Wastewater FOG (total)	mg/L	8570		< 150
Chemical Oxygen Demand (COD)	mg/L	7920		TBC
Soluble Chemical Oxygen Demand (SCOD)	mg/L	3540		TBC
pH	–	8.8		6 – 10.5
Wastewater Temperature	°C	< 60		< 60

Table 8 - Influent Composition design criteria for Upfield butter and margarine

Skim Milk Powder
Feihe - Canada Royal Milk
1680 Venture Dr.
Kingston, ON
K7P 0E9
(613) 817 1228

Facility	Monitoring location	Date	Item	Discharge concentration test results (mg/L)
				Average
waste water treatment station	Inlet	2008.12.22	pH	5.41~6.83
			SS	140
			NH_3N	1.16
			COD	2380
			BOD_5	1090
			Fat oil from Animal and Vegetable	13.75
			LAS	0.298
	Outlet	2008.12.22	pH	7.67~7.89
			SS	20
			NH_3N	0.27
			COD	39.4
			BOD_5	8.85
			Fat oil from Animal and Vegetable	0.3
			LAS	0.074

Table 9 - Influent Composition design criteria for Feihe -Canada Royal Milk

As you can see, the analysis vary from one plant to another based on the fabrication process and the CIP.

Advise if you need more info from us.

Best Regards

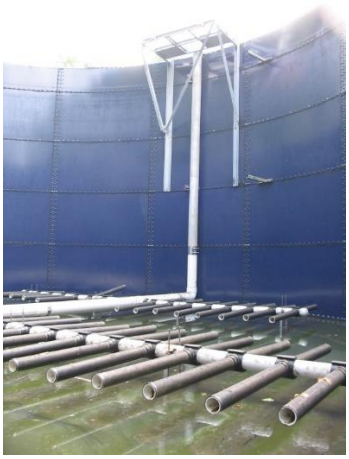
Richard Rousseau ing.

Appendix 8

H2Flow Equipment Inc. – Company profile.

H2FLOW EQUIPMENT INC.





COMPANY PROFILE:

H2FLOW EQUIPMENT INC.

June 01, 2020

Dear Prospective Customer,

H2Flow Equipment Inc. is a Canadian company focused exclusively on sales and service of municipal and industrial water and wastewater treatment plants.

Established in January 1992, H2Flow has been providing water treatment solutions, exceptional customer service and building long lasting relationships with clients and customers for twenty-seven years. Our team consists of skilled engineers, technicians and support staff oriented towards customer support.

We have completed hundreds of projects, both large and small, and on all of them, our focus has been making our customers satisfied. We are ISO 9001:2015 certified and adhere by those quality standards.

We are committed to working with our customers and providing a competitive price, well built, superior system to meet their treatment requirements.

Please do not hesitate to contact us for any information you may require.

Sincerely,

Michael Albanese

Michael Albanese, P.Eng.

President
H2Flow Equipment Inc.
michael@H2Flow.com

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Appendix A 22

1. Introduction

H2Flow Equipment Inc. is pleased to submit this company profile document. It provides additional information that demonstrates that our company and proposed team has superior resources, local capabilities and expertise to successfully execute the entire scope of work, on time and within a good project budget.

2. Company Experience

2.1 Company Background

H2Flow Equipment Inc. is a Canadian company based in Vaughan, Ontario focused on the design, sales and service of municipal and industrial water and wastewater treatment plants.

We actively work with plant engineers & operators, consulting engineers, developers and contractors. We also participate in local, national and international projects. We operate in three primary market segments: Municipal Water, Municipal Wastewater, and Industrial (both Water and Wastewater). In the Industrial market segment, our typical customers include the food, automotive, pulp & paper, metal & steel, chemical and petrochemical industries.

Since opening for business in January 1992, the company has been establishing itself aggressively in the marketplace and has enjoyed steady growth. This business growth has helped expand H2Flow's operations to **50** staff with offices in Toronto, Montreal and Vancouver. Our team consists of skilled engineers, technicians and support staff. Our company focus has been predominantly on capital equipment and oriented towards process solutions.

We are committed to providing good customer service and to building long lasting relationships with clients, consultants, and contractors.

2.2 Design, Construction and Service Capability

2.2.1 Water and Wastewater Treatment

H2Flow Equipment Inc. can recommend, size and supply engineered equipment. We can supervise the installation, and for some projects, provide the installation of the equipment (design / build or turnkey). Custom engineered solutions to water and wastewater problems are our specialty. We have supplied from single unit process equipment to entire treatment plants. We have the ability to run pilot trials to determine treatment feasibility, and have a full fleet of rental treatment systems.

Service and customer support after the sale is an H2Flow promise. Our skilled professionals provide operation support and troubleshooting, as well as on-site training of operators and plant maintenance personnel. Service contracts are available to assist our customers with on-going equipment operation.

There is always an opportunity to turn water and wastewater problems into solutions. Whether municipal and/or industrial, our customers deserve the best technology available with either a pre-engineered, or custom treatment unit designed for their individual requirements.

- Water and Wastewater Treatment Equipment
- Engineered Solutions
- Design Assistance
- Quotations, Specifications and Drawings
- Pilot Trials and Equipment
- Service
- Spare Parts
- Start-Up and Repair Services
- Operator Training
- Support and Troubleshooting
- Service Contracts
- Installation Services

Along with our built-on site tank division, H2Flow Tanks & Systems Inc., we can supply full treatment systems including the required tankage for equalization, reaction tanks, clarifiers, anaerobic digesters.

2.2.2 Wastewater Treatment

H2Flow has extensive experience in both solid and liquid process systems. We are industry experts in wastewater processes, as well as the upgrade replacement of wastewater processes with innovative and/or alternative technologies. Our experience includes all treatment processes from headworks through primary/secondary/tertiary treatment, disinfection, and sludge processing. Our demonstrated experience includes the following:

- Treatment plant capacity enhancement and new systems
- Process analysis, selection of the optimum treatment
- Instrumentation and control design
- Pretreatment systems
- Treatability levels
- Odour control
- Sludge Treatment and Dewatering

2.2.3 Typical Applications and Customers Served

Municipal & Government Facilities

- Water Treatment Plants
- Water Distribution and Wells
- Wastewater Treatment Plants
- Wastewater Collection and Pump Stations
- Solid waste treatment facilities
- Waste-to-energy facilities
- Airports

Industrial Facilities

- Food and Beverage
- Mining
- Automotive
- Metal & Steel
- Chemical & Petrochemical
- Pulp & Paper
- Organics Processing

Privately Owned Water and Wastewater Facilities

- Campgrounds
- Developer Subdivisions
- Hospitals
- Nursing Homes
- Shopping Malls
- Highway Rest Areas

2.2.4 In-House Design Services

H2Flow has been actively involved in water and wastewater engineering projects since its inception in 1992 and has acquired extensive experience in a wide variety of design and construction projects. H2FLOW provides a complete engineering package for water and

wastewater treatment plants, including process design, drawings, control panel, control philosophy and O&M manuals. The units are fabricated and assembled (as far as possible) in our shop and fully tested prior to shipping. Our water/wastewater services are supported by the design disciplines listed below.

2.2.5 Mechanical Engineering

Mechanical engineering, typically applies the principles of flow, pumping, general arrangement, some structural, and construction engineering to public works, industrial, commercial, and projects of all sizes and levels of construction. In general, H2Flow's mechanical engineers are concerned with the overall interface of specific core equipment to the rest of the project's infrastructure. Our engineers work closely with other disciplines to design and construct projects within a given site, restraint geometry or space.

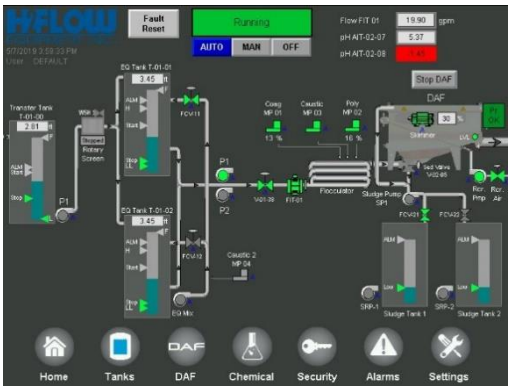
2.2.6 Process Engineering

H2Flow's process engineering group provides design assistance to choose the right technology to solve complex wastewater issues. Our first task on each job is to clearly understand the required performance, operational and maintenance needs and define the water quality and flow conditions that could be expected over the life of the system. Then basic chemical, biological, and physical principles are taken into consideration and provide recommendations and designs that will work the best. Finally, we review all products with an operator's mind to ensure that systems are operable and can be maintained within reasonable expectations and means.

With engineers experienced in all areas of water and wastewater processes, you can count on H2Flow to provide cost-effective recommendations and designs that meet your performance requirements. Below is a selection of our process engineering expertise:

- Headworks treatment including screening, grit removal
- Primary treatment from conventional to high rate clarification (DAF)
- Suspended growth biological treatment processes (Activated Sludge)
- Aeration
- Membrane Bio Reactors (MBR)
- Extended Aeration (EA)
- Sequencing Batch reactors (SBR)
- Attached growth biological treatment processes (MBBR)
- Effluent disinfection (UV, Ozone)
- Tertiary treatment for nitrogen and phosphorus
- Sludge handling and stabilization
- Odour Control

2.2.7 Instrumentation, Automation, and Control

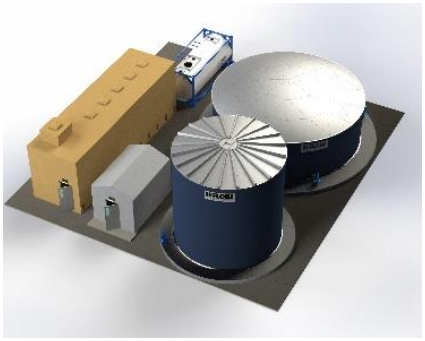


H2Flow's instrumentation and automation personnel have extensive experience in the design, installation for municipal, industrial facilities. H2Flow will provide a cost-effective product that meets specifications and process requirements while reducing operation and maintenance costs. From simple controls with little automation, to a full automation package that can be controlled from a remote location, we have the expertise to assist our clients with all of their needs.

H2Flow can provide custom solutions to produce process graphics and animation, automation databases, daily production reports, historical trending analyses, and statistical process controls. H2Flow is fluent in Allan Bradley's popular automation programming packages including, but not limited to RSLogix 500 & 5000, FactoryTalk Studio. For smaller systems, we also work with Schneider PLC's. Some of our relevant instrumentation, automation, and control services include:

- PLC and HMI programming
- Remote telemetry and automation
- Software installation, troubleshooting and debugging
- Onsite operator training

2.2.8 Computer-Aided Design and Drafting



H2Flow maintains a highly-skilled, full-service computer-aided design and drafting (CADD) department with multiple workstations. Our designers and draftspersons are capable of providing design drafting services in a traditional sense, as well as utilizing advanced programs (i.e. AutoCAD and SOLIDWORKS). We routinely use SOLIDWORKS to create 3D models, allowing better design coordination and overall representations of facilities.

2.2.9 Service Group

In Ontario, H2Flow has six service technicians and trucks, primarily servicing a total installation base of over 300 municipalities and industrial clients. In addition, we have field service engineers available when required. Our skilled professionals provide operation support and troubleshooting, as well as on-site training of operators and plant maintenance personnel. H2Flow also has more than 30 service

contracts with various municipal and industrial customers, where service technicians maintain, service, record, re-certify and train the operation personnel. H2Flow stocks spare parts for many different types of equipment and components and can typically deliver 90 percent of all needed parts next day, or sometimes the same day within Ontario. Service and customer support after the sale is an H2Flow promise.

2.2.10 International Profile

H2Flow has supplied projects all across Canada as far north as the Arctic Circle plus many projects in the US and Mexico. We routinely work on US projects and in the Caribbean (Cayman Islands, St. Kitts, Bermuda). We have supplied goods to Nigeria, Taiwan and Ecuador and are expanding in other markets, especially Africa. We have completed a complete wastewater treatment plant for the Government of Gabon. In 2017, we completed a large project for a mining company in Suriname. In 2019, we completed a treatment system for the largest dairy and citrus producer in Morocco, and are expanding in that area.

2.2.11 Insurance and Bonding

H2Flow has very strong financial backing and is very financially sound. We can offer the following surety and coverages:

- Up to $10,000,000 Liability Insurance policy with Liberty Insurance
- Up to $5,000,000 Pollution Liability Insurance policy with Liberty Insurance
- Up to $5,000,000 Errors & Omissions Insurance policy with Liberty Insurance
- Up to $10,000,000 Bonding facility with Intact Insurance

2.3 Safety

H2Flow understands that our employees are the company's most valuable resource and that they deserve the right to practice their profession in a safe working environment. H2Flow recognizes that our clients maintain the same level of commitment to safety and; therefore, safety ranks as the highest priority of commitment by management. Our goal with respect to safety performance is for each employee to consider safety a service that we provide to our clients. Our corporate record for safety is something we are proud of, recognizing that there is always room for improvement.

Health and Safety procedures are addressed and outlined in H2Flow's ISO 9001:2015 Quality System and in our corporate health and safety program. H2Flow strives to provide a sound and minimal risk

work environment for each employee through the prevention of accidents, occupational illness, and injuries. We prepare and implement a site-specific Health and Safety Plan for every site that we work on. On-site, H2Flow staff complete daily safety toolbox meetings to review safe work practices for the day and identify any risks that could be encountered throughout the working day.

A copy of our Health and Safety Policy Statement can be found in Appendix A.

2.4 Quality Control and Management Strategy

H2Flow firmly believes that QA/QC is essential to delivering the consistent quality service expected by our clients.

The purpose of this strategy is to ensure that H2Flow has a documented procedure for project management as well as a Quality Assurance/Quality Control (QA/QC) plan for every project which will be a part of the company policy. The objective is to execute and deliver a superior product to the Owner and implement actions to achieve planned results for continual improvement of the product.

H2Flow's success at exceeding our clients' needs is evidenced by the high percentage of repeat business that H2Flow enjoys with many long-term clients.

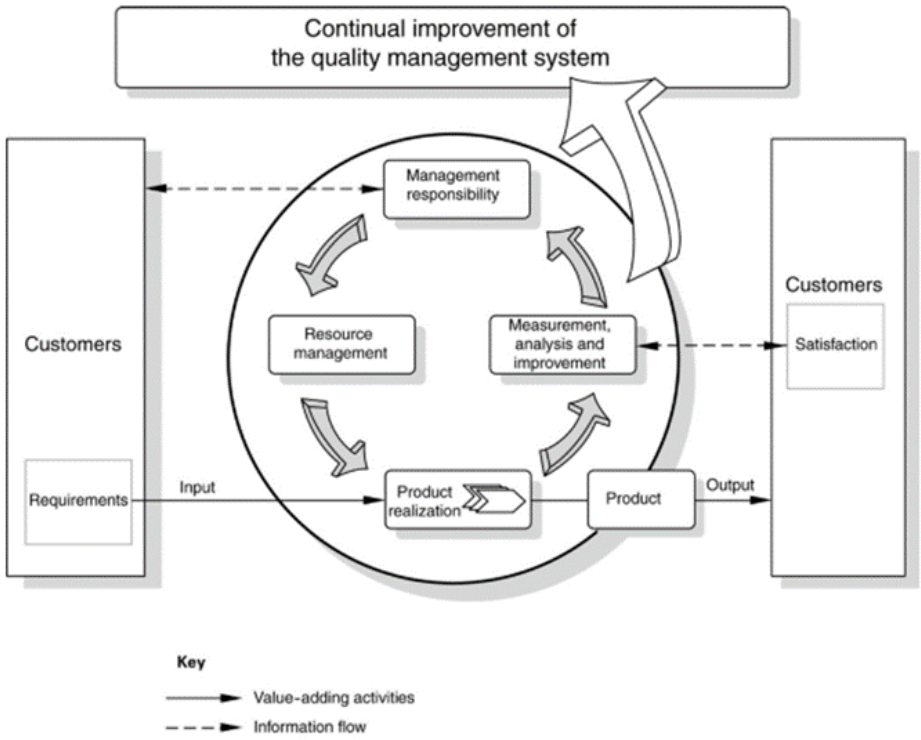
For an organization to function effectively, it must determine and manage numerous linked activities. An activity or set of activities using resources and managed in order to enable the transformation of inputs into outputs, can be considered as a process. Often the output from one process directly forms the input to the next.

The application of a system of processes within an organization, together with the identification and interactions of these processes, and their management to produce the desired outcome, can be referred to as the "process approach".

An advantage of the process approach is the ongoing control that it provides over the linkage between the individual processes within the system of processes, as well as over their combination and interaction. When used within a quality management system, such an approach emphasizes the importance of:

- Understanding and meeting requirements
- The need to consider processes in terms of added value
- Obtaining results of process performance and effectiveness
- Continual improvement of processes based on objective measurement

The model of a process-based quality management system shown in Figure below illustrates the process. This illustration shows that customers play a significant role in defining requirements as inputs. Monitoring of customer satisfaction requires the evaluation of information relating to customer perception as to whether the organization has met the customer requirements.



Note: In addition, the methodology known as "Plan-Do-Check-Act" (PDCA) can be applied to all processes. PDCA can be briefly described as follows:

- Plan: establish the objectives and processes necessary to deliver results in accordance with customer requirements and the organization's policies
- Do: implement the processes
- Check: monitor and measure processes and product against policies objectives and requirements for the product and report the results
- Act: take actions to continually improve process performance

H2FLOW will have a dedicated Project Manager who will oversee the project during the different phases of the project like the contract award, shop drawings approval/production, equipment fabrication, equipment delivery to site, onsite coordination with other sub-trades, plant commissioning and warranty adherence. During each of these phases, the project manager shall ensure that H2FLOW follows the Quality Assurance and Quality Control (QA/QC) procedures to deliver a superior product to the Owner. The procedures to be followed can be listed as follows:

- Identify processes that are necessary for implementing QA/QC procedures.
- Determine the sequences and interactions of the various process. This will be achieved by developing a detailed schedule after communicating with the project team members to ensure effective coordination. A kick-off meeting will be initiated by the project

manager involving all disciplines like engineers, CAD technicians, fabrication supervisor and assembly supervisor.
- Ensure the availability of resources in terms of manpower, materials etc. in accordance to the requirements of each task.
- Monitor work methods by having an inspection and testing plan in order to measure and analyze the processes. Inspection forms or checklists shall be used frequently to ensure that items in question conforms to specifications and requirements.
- Implement actions to achieve planned results and for continual improvement of the product. This will be followed by quick follow-up on all items which are non-conforming.

After product delivery to site, effective coordination and cooperation will be maintained to ensure the project meets the requirement.

The purpose of the startup and commissioning is to provide some guidance in developing a plan and procedure for the systematic start up and commissioning of the project. Based on the project requirements on special cases a Factory & Site Acceptance Test Procedure (FAT/SAT) will be used by H2Flow to help with this phase of the startup procedure. These FAT/SAT procedures are to be issued for review/approval prior to any of the tests being carried out. FAT/SAT activities can be witnessed by Owner/ Consultant/ General Contractor

Once the products and materials which make up the scope of the contract documents have been verified as complete and installed as required by the vendor or manufacturer, H2Flow will require the final sign off. This final sign-off of the treatment plant equipment may consist of signatures by Owner/ Consultant or their designated representative, General Contractor, the vendor and H2Flow.

3.0 Proposed Project Team

3.1 Corporate Organization

H2Flow is certified under ISO 9001:2015 as confirmed by our certificate in this submission.

3.2 H2Flow's Key Personnel

Based on our extensive experience and strong track record on similar projects, H2Flow understands the importance of assembling the right mix of expertise and experience to successfully complete this important assignment, both from a corporate perspective and in terms of the project manager and key project team members. We will assemble a team of highly experienced professionals, with expertise in all aspects of this assignment including both technical as well as familiarity with operational procedures expected to work on your project.

4. Project Execution and Approach

4.1 Overview

Your interest is choosing an equipment vendor to design, fabricate, deliver, erection of field erected tanks and installation of internals, provide supervision of the equipment interconnecting installation, inspection, on-site start-up, operator instruction and training, commissioning and performance testing services. The objective is to ensure a quality product that is delivered and commissioned on schedule and on budget.

4.2 Project Management Plan

An H2Flow project manager will have overall management responsibility for this project. The main duties include:

- Maintaining client and client engineer communications
- Managing project schedules and budgets
- Managing sub-contractors
- Managing safety, quality and environmental programs

The H2FLOW project manager will be supported by the various division leaders and personnel within H2Flow. These division manager positions include:

- Process Engineering
- Fabrication Leader
- Quality Manager
- Assembly and Shipping
- Electrical/ Commissioning/ Training Manager
- Documentation Coordinator
- HSE officer

The H2Flow project management team has worked together for many years successfully delivering projects throughout Canada and internationally.

For as much as possible, the design basis is fully assembled integrated design of the H2Flow treatment plant with minimal assembling and site work. This, along with the experience of the H2Flow team and history of working together on similar projects will assure that your project experiences a smooth, on time, on budget treatment plant delivery.

4.3 Submittal Drawings

Within a short time frame from the notice to proceed, H2Flow will immediately commence on the compilation of submittal drawings for review.

Shop drawings shall show at the minimum the following:

1. Bill of Materials
2. General Arrangement Drawings
3. PFD (Process Flow Diagrams)
4. P & ID's
5. Equipment Cut Sheets
6. Installation details
7. Any required flow / performance calculations

4.4 Procurement of Long Lead Equipment

H2Flow will ensure that all submittals are processed in a timely manner to help assist the suppliers, fabricators and vendors to meet or exceed their projected timelines. It should also be noted that any approvals with regard to long lead-time items would need to be expedited prior to the completion and acceptance of the final detailed design. H2Flow will track all procurement items on a "shop drawing tracking" form ensuring that all project deliverables meet their respective milestone dates.

4.5 Training, Commissioning, Start Up and Operation

H2Flow understands that the transfer of responsibility for a facility and/or system to the client is a critical phase. H2Flow utilizes an approach that includes provision of adequate documentation, training, and operations support to ensure that the client can assume the facility/system in a cost-effective, efficient and safe manner.

The commissioning will be undertaken by the Design and Construction team members supported by H2Flow personnel with client's operations staff present at key times. This will allow operations personnel to become familiar with the installed systems and will facilitate the opportunity to "hand-over" the system to the operations personnel.

4.6 Operation and Maintenance Manuals

A detailed Operations and Maintenance Manual will be prepared for the project. The manual will include the following items:

- Record of the installed materials and equipment
- Record drawings
- Equipment component data sheets
- Maintenance instructions for system components
- Operating instructions for system components
- Operation philosophy (English language description) for operating systems
- Documentation of warranties
- Testing, and commissioning reports

4.7 Health and Safety Plan

H2Flow will be responsible for the preparation of a health and safety plan and the implementation of the plan throughout the construction and commissioning phases of the project.

In general, the health and safety plan requirements will be executed by:

- Preparation of a Site-specific health and safety plan for the Industrial Pre-treatment plant project including general requirements and specific procedures based on the Occupational Health and Safety Act, as amended and its associated standards and regulations
- Worker training standards and implementation
- Designation of a health and safety officer
- Work procedures such as confined space, hot work, lock-out/tag-out, personal protective equipment, heat and cold stress, etc.
- Provision of site signage and warnings
- Provision of first aid equipment
- Communication procedures and protocols
- Emergency response and notification procedures

5. Signature Projects

H2Flow would like to share and highlight some significant projects as our Signature Projects. When selecting these, H2Flow chose projects that we believe are representative of the key factors to be considered in selecting a company best suited to successfully execute your project. These key factors include the successful completion of complex wastewater treatment plants, with extensive design capability particularly related to wastewater treatment plants. The Signature Projects include:

1) New 5000 home housing development – Angondje, Gabon, Africa

Design-build of a new domestic sewage wastewater treatment plant in West African country. This was to accommodate 5000 new homes, with 20,000 people equivalent population. H2Flow designed and supplied an H2Flow FER Field Erected plant, complete system suitable for the tropical climate and outdoor environment. The entire plant was based on built on site PERMASTORE Glass Fused to Steel tanks by H2Flow's crew. The treatment process is based on Sequencing Batch Reactor type (SBR). The plant consisted of a primary screen, equalization tank, two SBR tanks (combined aeration and clarification chambers), sludge digester tank, blowers, UV disinfection, main control panel with PLC controller. The system is designed to handle a flowrate of 3500 m3/day.

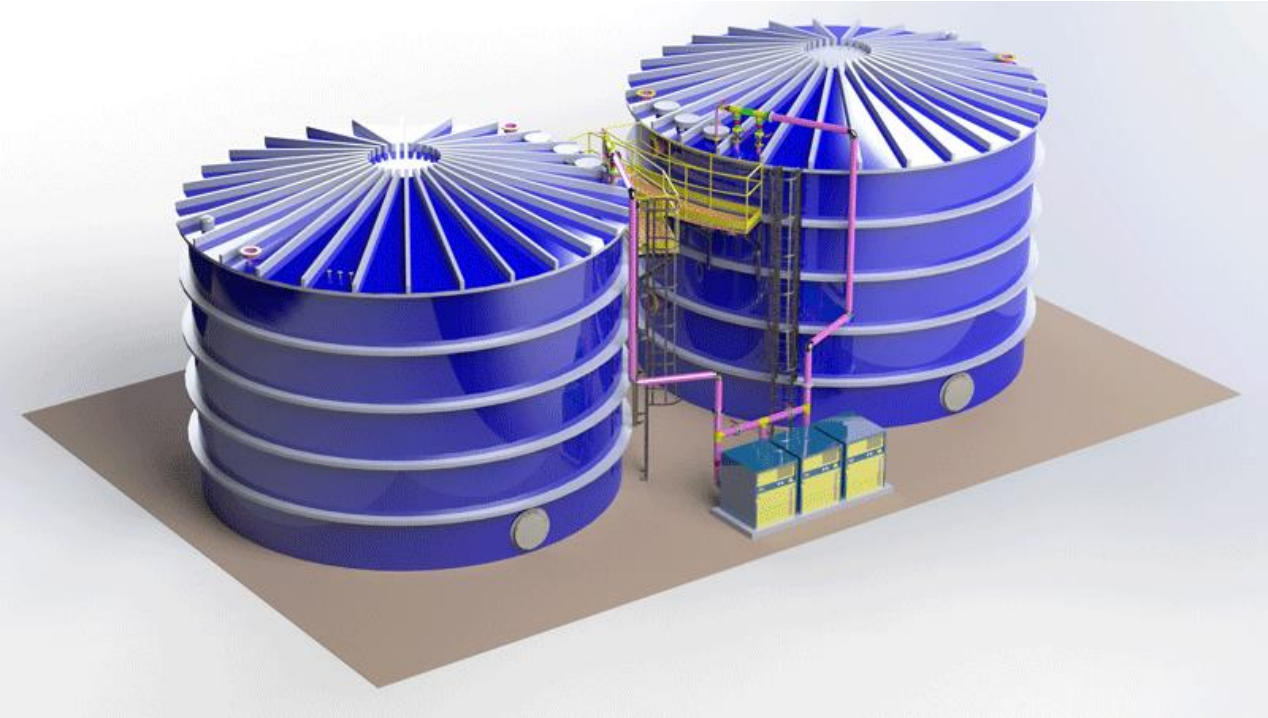
Contract Value: $3.65 Million USD

2) Vale Mining, Voisey's Bay, Newfoundland

Design-build of a new domestic sewage wastewater treatment plant in remote mining camp. H2Flow designed and supplied a fully containerized, complete packaged system suitable for the harsh climate and outdoor environment. Due to customer's preference and operator familiarity, the technology chosen was extended aeration. The system consisted of a primary screen, equalization chamber, sludge holding chamber, pre-anoxic chamber, aeration chamber, clarifier chamber, UV disinfection, sludge dewatering press and main control panel with PLC controller and remote monitoring. Custom modified ISO containers were utilized to house some of the equipment, as well as custom fabricated tankage. The system is designed to handle a flowrate that is 358 m3/day.

Contract Value: $1.6 Million CDN

3) TECK Mining – Fording River, BC



H2Flow was contracted to treat the process wastewater of a mining company in British Columbia, Canada. H2Flow designed and supplied an H2FLOW FER Field Erected plant. The plant was based on built-on-site PERMASTORE Glass Fused to Steel tanks by H2Flow's crew. The treatment process is based on Moving Bed Bioreactor type (MBBR). The system scope of supply included two moving bed biofilm reactors to remove BOD from the process wastewater; operating in parallel. The MBBR reactors comprised of two glass fused-to-steel tanks with tapered beam roof complete with access ladder, safety cage and platform in hot dipped galvanized steel. The dimensions of each tank were 28 ft / 8.54m diameter x 32.5 ft/ 9.9m nominal wall height providing each a 474 m3 nominal operating volume. Three Aerzen PD blower packages was also provided in the system design. Maximum Design Flowrate was 11,358 m3/day (per MBBR).

Contract Value: $1.5 Million CDN

4) City of Toronto, Dufferin Transfer Station – Toronto, ON

H2Flow was contracted to treat the process wastewater of a source separated organics facility in Toronto, Ontario, Canada. Working with Anaergia, H2Flow designed and supplied H2Flow's FER Field Erected plants. The plant was based on built-on-site PERMASTORE Glass Fused to Steel tanks supervised by H2Flow's crew. The wastewater treatment process is based on FIBRACAST Membrane Bioreactor type (MBR), while the organics waste processing is based on anaerobic digestion. The MBR bioreactor tanks are 550 m3 in volume each and are 15.4m diam. x 9.5m high. There are also many ancillary tanks (Anoxic, Buffer, Process Water and Equalization), all of glass fused to steel. H2Flow also provided a 5337 m3 anaerobic digester tank, as well as ancillary equipment like screens, in-line automatic strainer, shaftless screw conveyor package, odour control biofilter. Three Aerzen PD blower packages was also provided in the system design. Maximum MBR Design Flowrate is 500 m3/ day of very high strength wastewater, especially with ammonia.

Contract Value: $2.55 Million CDN

5) City of Toronto, Dufferin Transfer Station – Toronto, ON

H2Flow was contracted to treat the process wastewater of a source separated organics facility in Toronto, Ontario, Canada. Working with Aecom, H2Flow designed and supplied H2Flow's FER Field Erected plants. The plant was based on built-on-site PERMASTORE Glass Fused to Steel tanks supervised by H2Flow's crew. The wastewater treatment process is based on Sequencing Batch Reactor type (SBR), while the organics waste processing is based on anaerobic digestion. The SBR bioreactor tanks are 746 m3 in volume each and are 12m diam. x 7m high. There are also many ancillary tanks (Anoxic, Buffer, Process Water and Equalization), all of glass fused to steel. Many of the tanks were also insulated and cladded. H2Flow also provided two 5700 m3 anaerobic digester tank, each 20m diameter by 20m high, as well as ancillary equipment like screens, shaftless screw conveyors, Aerzen PD blower packages, odour control biofilter. Maximum SBR Design Flowrate is 200 m3/ day of very high strength wastewater, especially with ammonia.

Contract Value: $4.8 Million CDN

6) City of Chilliwack, Brewery Wastewater – Chilliwack, BC

H2Flow was contracted to build a facility to process high strength brewery wastewater for a municipality of Chillwack in British Columbia, Canada. Working with its project partner GWE, H2Flow designed and supplied an H2Flow FER Field Erected plant. The plant was based on built-on-site PERMASTORE Glass Fused to Steel tanks installed by H2Flow's crew. The high strength wastewater treatment process is based on anaerobic treatment (Upflow Anaerobic Sludge Blanket). There are also many ancillary tanks (Anoxic, Buffer, Process Water and Equalization), all of glass fused to steel. Biogas generated from the UASB reactor is collected and reused in the brewery for heating of the inlet wastewater for maximum anaerobic treatment efficiency and operational costs saving. Average Design Flowrate is 2120 m3/ day of very high strength wastewater, especially with high BOD.

Contract Value: $3.35 Million CDN

Appendix A

HEALTH & SAFETY POLICY – COMPANY STATEMENT

Health and Safety and the protection of our environment are the two most important fundamental principles that our company will promote and pursue in respect to doing business.

The company's commitment to health and safety and protection of the environment demonstrates our intent and commitment towards an accident free work place. Accidents are not part of our daily business, and are never accepted as an acceptable risk. Our Health & Safety Policy will be reviewed annually, and amended if need be.

The health and safety of all employees and/or subcontractors, and their employees working for our company, are definitely our primary concern.

In order for there to be no accidents and the Health & Safety Policy to be a success, the company requires cooperation, dedication and commitment of all levels of management, supervisors, employees, and/or subcontractors and their respective employees.

Any health and safety violations by any employees and/or subcontractors or their employees will be considered as a violation of our company policy and will be dealt with immediately, and depending on the severity of the violation.

The company definitely supports the Internal Responsibility System (IRS), which enforces that all different levels/parties in a work place must work together to achieve its ultimate goal of protecting its workers.

It is always better to be safe than sorry.

Michael Albanese _____ *Jan.3, 2020* _____

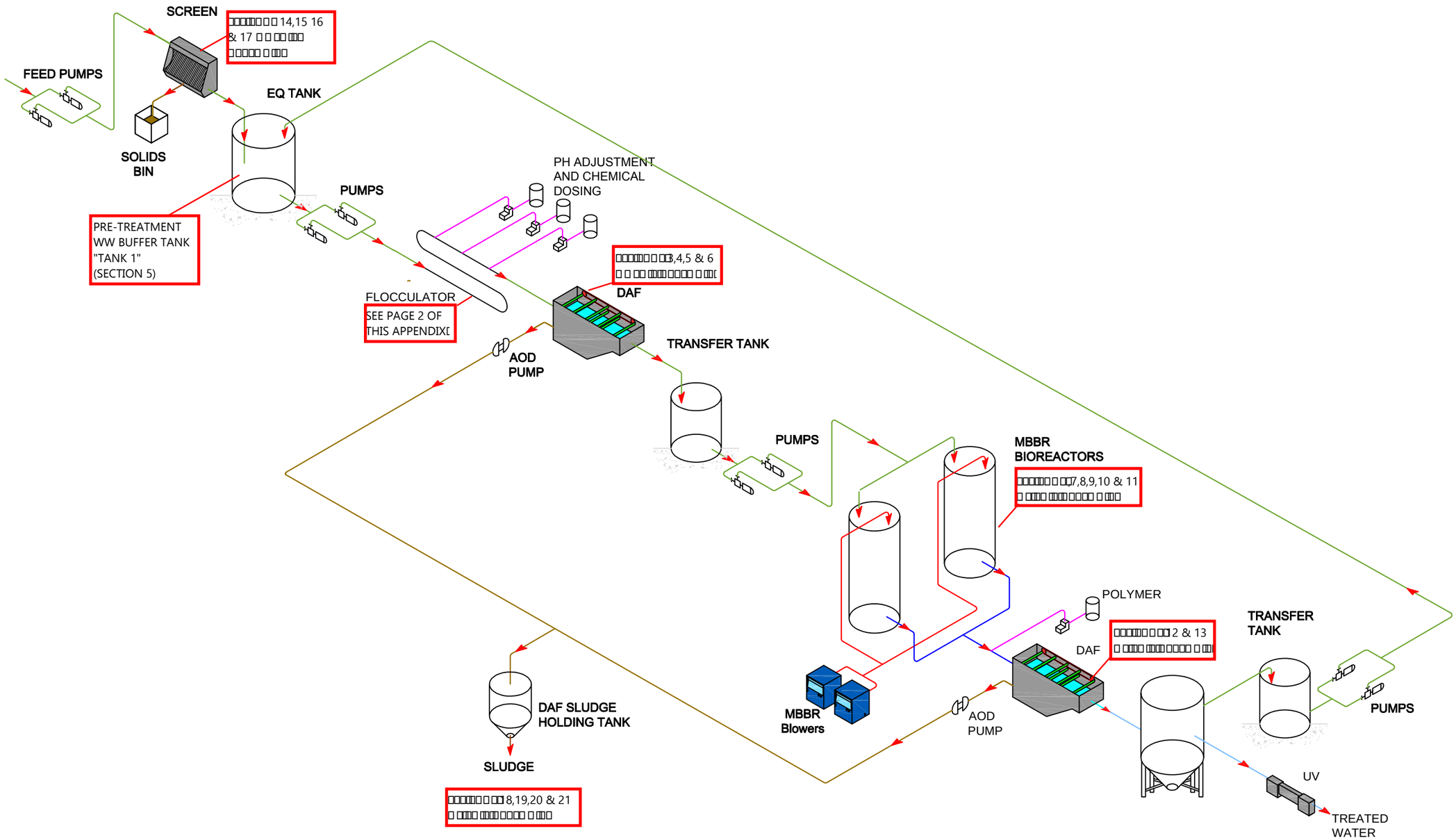
President & CEO Date

Appendix 9

Wastewater treatment concept process and recommended equipment

APPENDIX 9 PAGE 1 - WASTEWATER TREATMENT PROCESS CONCEPT AND RECOMMENDED EQUIPMENT

REV	DESCRIPTION	DATE	BY	APP'D
0	FOR REFERENCE ONLY	MM/DD/YY	BY	XX



H2FLOW EQUIPMENT INC.

* WATER AND WASTEWATER TREATMENT EQUIPMENT *
470 N. RIVERMEDE RD, UNIT#7, CONCORD, ON. L4K 3R8 CANADA
TEL: (905) 660-9775 FAX: (905) 660-9744
www.h2flow.com

DRAWN BY: BB	DATE:	PROJECT NAME:	TITLE:
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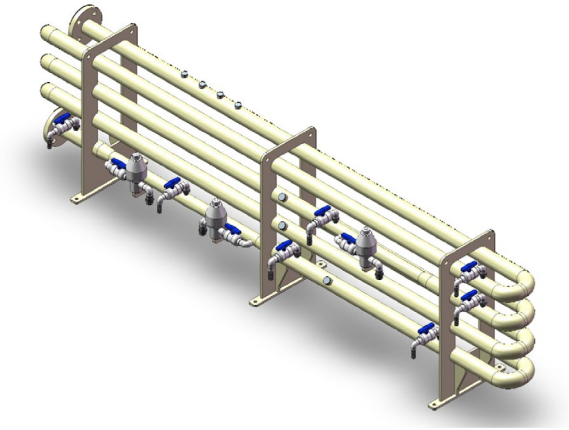
H2FLOW DAF
www.h2flowdaf.com

Plugflow Pipe Flocculator
Model: PF 10
Product Information Sheet



DESIGN DETAILS			
Minimum Capacity	:	6 m^3/hr	26.5 usgpm
Nominal Capacity	:	10 m^3/hr	44usgpm
Maximum Capacity	:	12 m^3/hr	53 usgpm
Head Loss Minimum	:	0.05 bar	0.7 psi
Head Loss Maximum	:	0.15 bar	2.2 psi
CONSTRUCTION DETAILS			
Unit Length	:	2500 mm	98.4 in.
Unit Width	:	430 mm	16.9 in.
Unit Height	:	750 mm	29.5 in.
Inlet	:	DIN 50 mm	2 in.
Outlet	:	DIN 50 mm	2 in.
Weight Empty	:	85 kg	187 lbs
Weight Full	:	165 kg	363 lbs
Coagulant Dosing Point	:	Quantity 1	
pH Correction Dosing	:	Quantity 1	
Polymer Dosing Point	:	Quantity 1	
Sampling Points	:	Quantity 5 Ball Valves	
MATERIAL OF CONSTRUCTION			
Piping	:	Polypropylene(PP)	
Frame	:	Polypropylene(PP)	
Dosing Points	:	PVC	
Sampling Points	:	PVC Ball Valves	

Containerized Dissolved Air Flotation:

Compact, Rapid and Economical Solution to On-Site Treatment

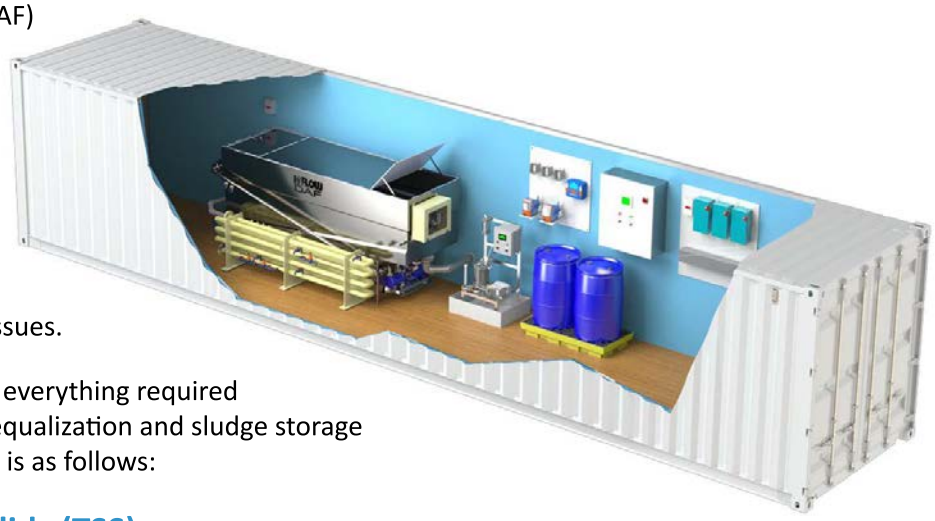
H2FLOW DAF

www.h2flowDAF.com

ISO 9001:2015 Certified

EQUIPMENT AND TECHNOLOGY

H2Flow can provide Dissolved Air Flotation (DAF) units in fully containerized, pre-engineered, factory tested, modular containers. This provides a flexible, easy-to-install, and affordable solution for smaller scale wastewater treatment requirements.



Containerized units eliminate on-site building requirements and reduce project delivery schedules in order to meet tight compliance issues.

The containerized DAF unit generally contains everything required for treatment, with the exception of influent equalization and sludge storage tanks. Normal expected removal performance is as follows:

- **90-95% of Total Suspended Solids (TSS)**
- **90-95% of Fats, Oils & Grease (FOG)**
- **90-95% of insoluble Biochemical Oxygen Demand (BOD)**

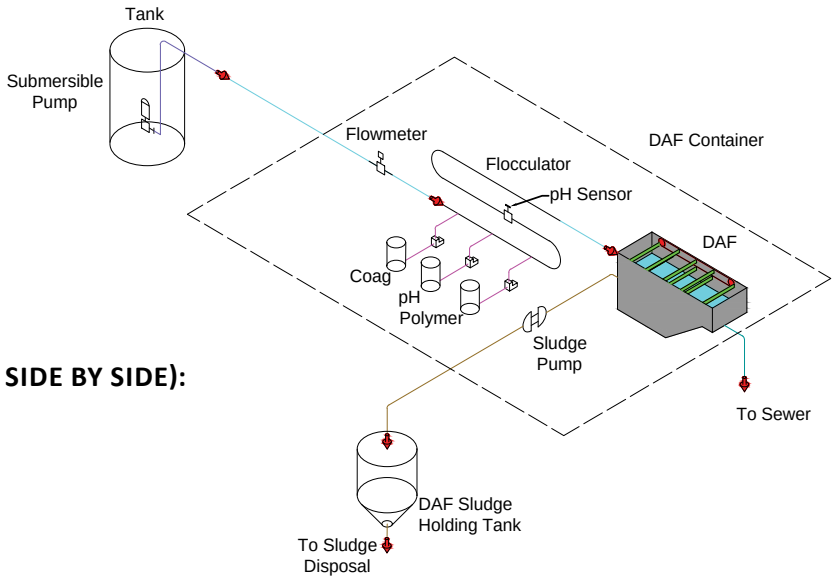
These modular Dissolved Air Flotation units can be used for normal operation, rentals and plant pilot testing. Minimal on-site time and labor is required to hook-up and run. Units are plug & play within hours of arriving at site.

AVAILABLE MODELS:

20FT LONG CONTAINER:
CA5: for 5 m^3/hr (22 usgpm) – 8.5 ft wide, standard
CA10: for 10 m^3/hr (44 usgpm) – 8.5 ft wide, standard
CA15: for 15 m^3/hr (66 usgpm) – 10 ft wide, custom

40FT LONG CONTAINER:
CA15: for 15 m^3/hr (66 usgpm) – 8.5 ft wide, standard
CA20 for 20 m^3/hr (88 usgpm) – 8.5 ft wide, standard

DUAL WIDE 40FT LONG (2 ATTACHED CONTAINERS SIDE BY SIDE):
2CA20, 2: for 20 m^3/hr (88 usgpm) - 17 ft wide, custom
2CA30: for 30 m^3/hr (132 usgpm) - 17 ft wide, custom
2CA40: for 40 m^3/hr (178 usgpm) - 17 ft wide, custom
Larger sizes available in Dual Wide container format

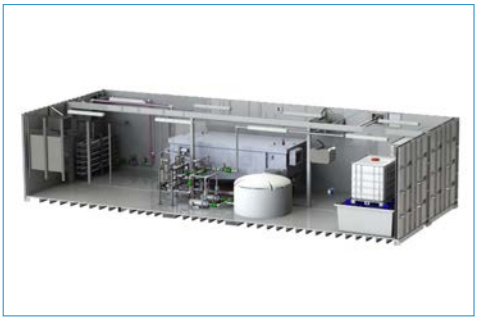


Custom container options available, including stackable arrangements

FEATURES AND OPTIONS:

UTILITY REQUIREMENTS

3 phase Power	230 V / 460 V / 575 V
Single Phase Power	120V
City Water	4-8 lpm (60 - 120 gph) @ 60 psi



STANDARD FEATURES – FACTORY INSTALLED AND TESTED

DAF Unit	Model Alpha or Delta, 304SS Material of construction
Flow Monitoring	Electro-magnetic flowmeter with totalizer
Chemical Dosing	Caustic and/or Acid, Coagulant, Emulsion Polymer
Pipe Flocculator	Polypropylene with pH Loop Chemical injection ports c/w back pressure valves
pH Monitoring	pH controller and pH probe
Recirculation Pump	For air saturation (air compressor included)
Skimmer Drive	Sludge raking system with speed control
Sludge Removal	Electric operated diaphragm (EOD) pump
Control Panel	NEMA 4X enclosure in 304 SS, UL / CSA approved, Allen-Bradley PLC Controller, colour touch screen HMI & E-Stop
Data Access	Remote monitoring, data logging, troubleshooting
Ventilation	Motorized exhaust fan and louvers, timer
Interior Electrical	Fluorescent lights, plugs, switch, breakers
Container Entry	Standard container latched opening doors

AVAILABLE CONTAINER OPTIONS

Climate Control	Heating and / or Air Conditioning
Insulation	Rigid wall insulation, undercoating foam spray
Flooring	FRP, Aluminum or Painted Steel
Interior Finishing	HDPE Wall and ceiling panels
Classified Area	Class 1 Div.1 or Div.2 ratings available
Container Entry	Lockable man-door & windows
Double Wide	Two containers side by side to accommodate larger DAF units and more space

Also available: Feed Pump, Screening, Equalization Tank, Biological Treatment, Sludge Holding Tank, Sludge Dewatering Press System

RENTALS SERVICES CUSTOMERS

DAF PILOT & RENTALS

H2Flow offers complete ready to go mobile DAF units.

Allow us to show you what a DAF can do for your water.

CONTAINERIZED UNIT

SKID MOUNTED UNIT

WATER AND WASTEWATER TREATMENT EQUIPMENT

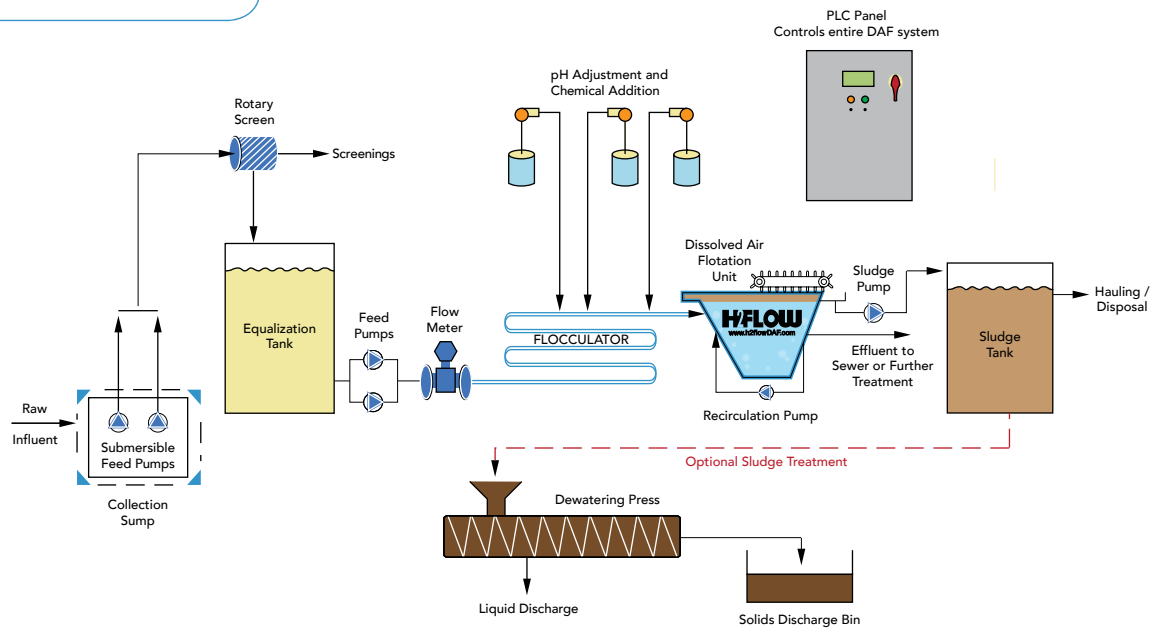
Engineered Solutions
Design Assistance
Quotations, Specifications and Drawings
Pilot Trials and Chemical Jar Testing
Spare Parts
Start-Up and Repair Services
Operator Training
Support and Troubleshooting
Maintenance Contracts
Rentals
Turn-key Installation Services

APPLICATIONS

Food and Beverage
Pulp & Paper
Automotive
Metal & Steel
Chemical & Petrochemical
Mining
Power Generation Facilities
Water Treatment Plants
Wastewater Treatment Plants
Solid Waste Treatment Facilities
Oil and Gas
Electronics
Recycling Facilities

CLEAN WATER OVER WEIR

INSIDE A CONTAINERIZED DAF



TYPICAL DAF TREATMENT FLOW DIAGRAM, DESIGNED AND SUPPLIED BY H2FLOW

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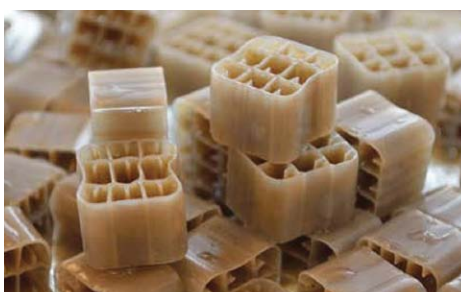
Tel: (604) 908-7398

TILT MBBR

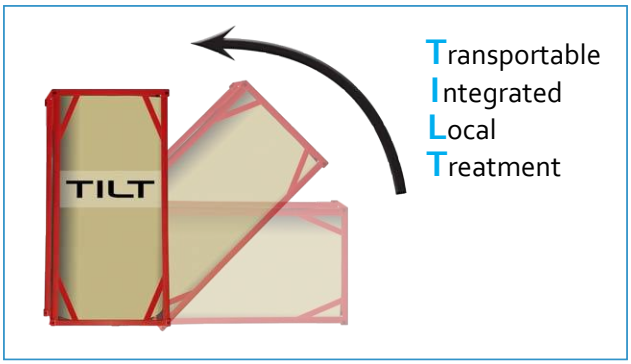
Wastewater Treatment for Communities and Industries

An incredible combination
of technology and efficiency

www.h2flowTILT.com
ISO 9001:2015 Certified



DESCRIPTION & FEATURES



TILT Treatment Plants

DESCRIPTION

The TILT treatment plants are an innovative, radical departure from conventional wastewater treatment plants.
Not only do they utilize modular ISO containers as the basis for the treatment plant, but H2FLOW has revolutionized the industry by tilting the containers onto their side, hereby maximizing oxygen transfer efficiency in the aerobic treatment reactors.
This is a unique idea protected by worldwide patent submission.

TILT SOLUTION - WHY IT MAKES SENSE

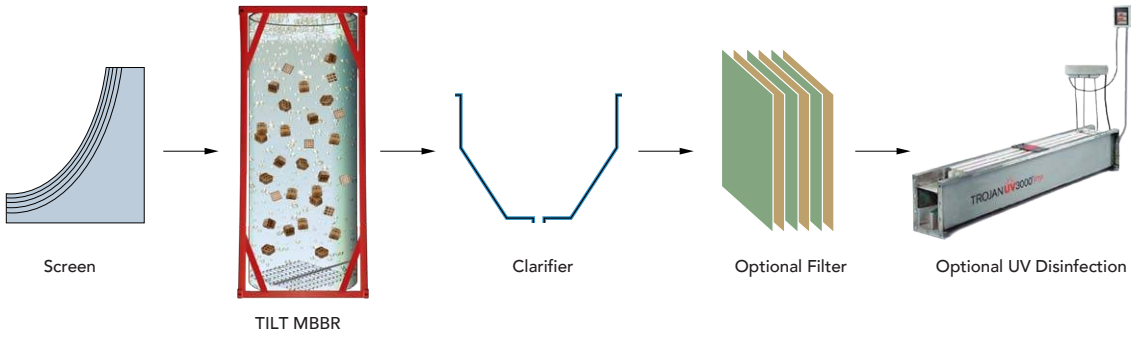
The idea of tilting the container onto its side makes complete sense. When it comes to containerized wastewater treatment plants, our competitors try to work within the normal height of a standard container 2.6 or 2.9m (8.5ft or 9.5ft). We came up with the idea for tilting the container onto its side and using the length 6.1m (20ft) to maximize oxygen transfer efficiency. A tank with a depth of around 6.1m (20ft) is the standard used to design a wastewater treatment plant aeration basin, so why not do that in containerized systems also?

TILT MBBR - MOVING BED BIO REACTOR

The TILT MBBR is an incredible combination of technology and efficiency. The TILT MBBR system is based on the concept where moving plastic carriers with fixed biofilm remove organic and inorganic substances in the water.

The Biowater biofilm carrier elements are freely mixing around in the reactor and are specially designed for biofilm growth. It offers a great alternative to problematic membrane treatment systems. It has all the benefits of traditional biofilm processes such as RBC (Rotary Biological Contactors) but with many additional benefits. Trouble free, simple operation.

The bacteria will grow and develop a solid biofilm on the large protected surface area. The moving pattern of the carriers in the reactors will also provide a natural removal of excess biofilm, due to the shear forces between the carriers and the water in the reactor. A well developed biofilm can handle an extremely high load of nutrients while avoiding problems associated with clogging or shock.



TECHNOLOGY & SPECS

SYSTEM FEATURES

- Lowest cost system (per unit volume treated) available on the market
- Very compact & occupies less space than any other wastewater treatment plants
- The system is based on standard ISO freight container dimensions
- Less maintenance, low capital & operating costs
- Simple assembly and operation
- Easily transportable anywhere - ship by rail, truck and cargo ship
- Easy start up, fully automatic operation, reliable & robust once started
- Central control panel for easy operation
- No need to add micro-organisms

The above technologies are combined in a prefabricated, skid mounted and standardized tank, suitable for national & overseas transportation as ISO freight containers. Combined with an auxiliary container to house items such as screening, control panel, instrumentation, blower, clarifier, etc. it provides a complete treatment solution.

SIZING AND DIMENSIONAL CRITERIA

H2FLOW offers standard models from 50 to 1000 m3/day. We manufacture smaller or larger plants in different configurations.

The core of the TILT system is its 20ft long reactor vessel which is made of 304 stainless steel. The frame supporting the tank is painted carbon steel. Multiple tanks and configurations can be implemented to suit any particular need. Systems with additional requirement to effluent removal on BOD, COD, Ammonia, or Nutrients will normally require longer retention time and will consequently have lesser treatment capacity or require multiple tanks. Such systems will be designed as customized systems based on the customer's influent analysis and effluent removal requirements. Contact us with your applications.

H2FLOW EQUIPMENT INC.

TECHNOLOGY & SPECS cont.

PRE-TREATMENT SYSTEM TANK

As an option, H2FLOW can provide a two chamber combined primary settling/equalization tank. The primary chamber separates paper, sanitary plastics, and settleable solids. The equalization chamber provides buffer capacity sufficient to level out the daily peak flows. This tank would be positioned horizontally and would be supplied with a bioreactor feed pump arrangement. The pump is level controlled and has a capacity which is 2-3 times the average daily flow.

BIOLOGICAL TREATMENT SYSTEM

The bioreactor comes in one or two stages depending on required treatment efficiency. Treatment plants requiring treatment efficiencies higher than 80-85 % need a two-stage system. The bioreactors degrade dissolved organic matter by oxidizing it into carbon dioxide, which escapes into the air, and to biomass that becomes activate sludge. In the MBBR and CFIC® configurations, suspended, free floating biofilm carriers provide a large, protected biofilm surface for the bacteria and is simultaneously growing the active biosludge inside the reactors.

CLARIFICATION SYSTEM

The treated wastewater flows into a clarification stage where the suspended solid settle by gravity, dissolved air flotation or other mechanical means and provides the final clarification of the effluent. Tertiary filtration is also available as an option.

EQUIPMENT SPECIFICATIONS

- TILT plants are fully automatic.
- Main components pre-assembled and tested before shipping.
- Stainless Steel BioReactor Tank, insulated.
- All liquid wetted parts in 304 Stainless Steel.
- Biowater Media™.
- SS Internals and coarse bubble aeration system.
- Necessary cables & accessories.
- Positive displacement blower(s).
- Submersible feed pump(s).
- Necessary piping & valves (PVC or SS)
- Motor Control Panel.
- Electrical control panel with start/stop push buttons, lights & remote alarm.
- Remote Control panel access.

TILT wastewater treatment plants provide a cost effective and elegant solution to communities and industrial customers around the world.

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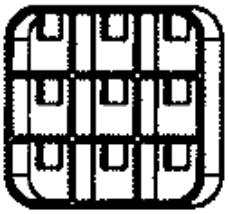
Biofilm Carrier

Product Name – BWTX™

Application	The BWT X™ Biofilm Carrier element is used in biological treatment processes for both water and wastewater treatment.

Design

The BWT X™ elements consist of nine (9) cells, with following dimensions:



Width/Height :	14.5 mm (±0.5 mm)
Length :	8.2 mm (+0.2/-0.2mm)
Outer Perimeter :	55 mm
Inner Perimeter :	197 mm
Wall Thickness :	0.35 (±0.1 mm)

Note: Tolerances according to DIN 16941/3.

Material

Material :	Polyethylene, High-Density (HDPE).
Colour :	Natural
Specific Weight :	
Raw Material	0.96 (± 0.02) kg/L
Extruded Material	0.95 (± 0.02) kg/L

Note: Add-Max® 104 added to material to improve stabilization for extruding process.

The biofilm carrier elements are produced from a material and with a procedure that ensures that material will have a prolonged aging time; guaranteeing proper operation for its service life, provided that the carrier elements are:

- stored and packaged, as from the producer, and;
- applied in the biological reactors, according to standard practice.

The shape of the biofilm carrier elements may in some cases be irregular, which has no negative effect on the total guaranteed specific surface area.

Specifications

Carrier Element :	
Specific Surface Area (Protected)	650 m^2 per m^3
Weight	131 kg/m^3 (in bulk, at production)

Quality Assurance

The producer is instructed to visually inspect/test to control form, dimensions and density (kg/m^3 in bulk), to ensure conformity to specification.

H2FLOW DAF
www.h2flowdaf.com

Dissolved Air Flotation
Model: ALPHA 10

Product Information Sheet

GENERAL INFORMATION		
Type	:	Dissolved Air Flotation
Model	:	ALPHA 10

DESIGN DETAILS			
Hydraulic Capacity (maximum)	:	10 m^3/hr	44 usgpm
Overflow Rate	:	4 m/hr	1.6 usgpm/ft^2
Recirculation Flow	:	2 m^3/hr (6 bar)	8.8usgpm, 85 psi
Free Surface Area	:	2.5 m^2	26.9 ft^2

CONSTRUCTION DETAILS			
Unit Length	:	3475 mm	136.8 in
Unit Width	:	1320 mm	52 in
Unit Height	:	1560 mm	61.4 in
Inlet	:	DIN 80 mm	3” ANSI
Float Discharge	:	DIN 80 mm	3” ANSI
Outlet	:	DIN 80 mm	3” ANSI
Bottom Sludge	:	DIN 80 mm	3” ANSI
Weight Empty	:	700 kg	1540 lbs
Weight Full	:	2500 kg	5512lbs
Skimmer Drive Model	:	NORD	
Recycle pump	:	Regenerative turbine	
Bottom Valve	:	Keystone or equal	
Stairs and Sidewalk (Optional)	:	L-Shape, 800 mm width	

H2FLOW DAF
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Dissolved Air Flotation
Model: ALPHA 10

Product Information Sheet

ELECTRICAL AND CONTROL			
Power Supply	:	230V, 480V or 575V, 3 phase, 60 Hz	
Control Voltage	:	24 VDC	
Skimmer	:	0.37 kW	0.5 Hp
Recirculation Pump	:	3 kW	4 Hp
Air Consumption	:	5Nl/min, 6 bar	0.2 scfm, 85 psi
Pneumatic Panel	:	24 VDC	
Local Control Panel	:	Optional	

MATERIAL OF CONSTRUCTION		
DAF Tank	:	304 SS, optional 316 SS
Static Sludge Thickener	:	304 SS, optional 316 SS
Skimmer System	:	SS with fiberglass blades
Chain	:	Plastic
Chain Wheel	:	Plastic
Recirculation Pump	:	Stainless steel with SS shaft and impeller
DAF Cover (Optional)	:	Plastic or SS
Lifting Lugs	:	304 SS
Dissolved Air Make Up System	:	304 SS, optional 316 SS
AerationValves	:	Stainless steel
Pneumatic Panel	:	Fiberglass
Bottom Valve (Butterfly)	:	Body cast iron GGG-50, disc 316 SS, seal EPDM
Stairs and Sidewalk (Optional)	:	Galvanized steel or fiberglass

Internally-Fed Rotary Drum Screen:

Reliable and Simple Liquid / Solids Separation

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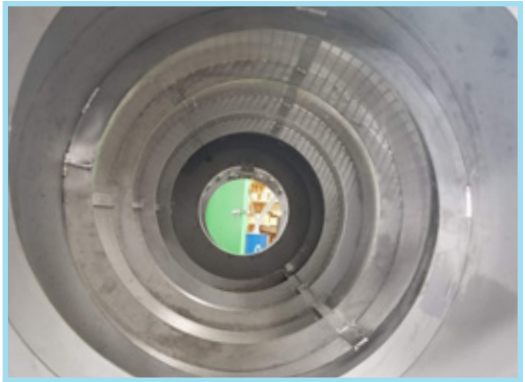
ISO 9001 Certified



DESCRIPTION & FEATURES

SUMMARY

H2FLOW's IFD Internally-Fed Rotary Drum Screens are specifically designed for fine screening of industrial and municipal wastewater. The drums are made of stainless steel wedgewire. Drums made with wire mesh or perforated holes options are also available. Screen openings typically range from 0.010 to 0.25 inches (0.25 – 6 mm). The influent enters a headbox / distribution chamber, and is then directed onto the internal rotating surface of the screen drum. Solids are captured on the screen surface while the liquid flows through the openings. As the screen rotates, solids are transported by internal curved flights to the discharge end of the screen drum. The screen drum rotates on support wheels and is driven by a motor, geardrive and corrosion resistant chain and sprocket. The unit is all stainless steel construction, designed for long life. The rotation of the drum allows the screen surface to be washed by a fixed external spray bar fitted with spray nozzles, either continuously or intermittently. An optional internal spray wash is also available. The equipment is fully enclosed for safety and to contain mist, noise and odour. Inspection and access covers are provided to aid in maintenance.

TYPICAL SCREENING APPLICATIONS:

- Papermills
- Food industry
- Slaughterhouses
- Industrial plants
- Municipal wastewater

FEATURES

- 304 stainless steel construction (optional 316 SS)
- Motor and geardrive
- UHMW polyethylene bearing wheels
- Internal stainless steel flights
- External spray bar (optional internal)
- Sealed enclosure with removable panels
- Drainage pan and solids chute
- Optional control panel with controls, starter, spray timer and/or variable frequency drive

H2FLOW INTERNALLY-FED ROTARY DRUM

IFD Standard Sizes (model number denotes drum diameter & length):

MODEL	LENGTH Inches (mm)	WIDTH Inches (mm)	HEIGHT Inches (mm)	DRUM DIAM. Inches (mm)	DRUM LENGTH Inches (mm)	MOTOR HP (kw)
IFD 7L1000	84.8 (2153)	42.1 (1069)	71.5 (1815)	27.6 (700)	39.4 (1000)	¾ (0.55)
IFD7L1200	92.6 (2353)	42.1 (1069)	71.5 (1815)	27.6 (700)	47.2 (1200)	¾ (0.55)
IFD7L1500	104.5 (2653)	42.1 (1069)	71.5 (1815)	27.6 (700)	59.1 (1500)	¾ (0.55)
IFD10L1500	106.7 (2710)	56 (1422)	86.2 (2190)	39.4 (1000)	70.9 (1800)	1.5 (1.1)
IFD10L1800	116.8 (2967)	56 (1422)	86.2 (2190)	39.4 (1000)	70.9 (1800)	1.5 (1.1)
IFD121500	106.7 (2710)	63.8 (1622)	94.1 (2390)	47.2 (1200)	59.1 (1500)	1.5 (1.1)
IFD12L1800	116.8 (2967)	63.8 (1622)	94.1 (2390)	47.2 (1200)	70.9 (1800)	1.5 (1.1)
IFD12L2500	144.4 (3667)	63.8 (1622)	94.1 (2390)	47.2 (1200)	98.4 (2500)	1.5 (1.1)
IFD15L1800	116.8 (2967)	75.7 (1922)	105.9 (2690)	59.1 (1500)	70.9 (1800)	1.5 (1.1)

H2FLOW INTERNALLY-FED ROTARY DRUM

IFD Typical Flow Sizing Guide USgpm (m^3/hr):

Application	Opening: Inches (mm)	Models								
		7L1000	7L1200	7L1500	10L1500	10L1800	12L1500	12L1800	12L2500	15L1800
Raw sewage	0.1 (2.5)	502 (114)	600 (136.2)	764.8 (173.7)	1492.6 (339)	1677.5 (381)	1825.7 (414.7)	1976 (448.8)	2430.4 (552)	2985.1 (678)
Poultry	0.020 (0.5)	237.7 (54)	275 (62.4)	359.3 (81.6)	589.1 (133.8)	715.9 (162.6)	766.1 (174)	821.6 (186.6)	1117.5 (253.8)	1442.4 (327.6)
Seafood	0.020 (0.5)	237.7 (54)	284 (64.5)	377.7 (85.8)	663.1 (150.6)	795.4 (180.7)	877.3 (199.3)	932.5 (211.8)	1172.9 (266.4)	1386.9 (315)
Fruit & Vegetables	0.020 (0.5)	301.2 (68.4)	355 (80.7)	449.1 (102)	803.1 (182.4)	985.4 (223.8)	1006.7 (228.7)	1043.5 (237)	1248.2 (283.5)	1532.2 (348)
Meat	0.020 (0.5)	232.5 (52.8)	264 (60)	340.8 (77.4)	531 (120.6)	697.4 (158.4)	797.8 (181.2)	898.2 (204)	1143.6 (259.7)	1334.1 (303)

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SD Sludge Screw Press

H2FLOW EQUIPMENT INC.

www.h2flow.com
ISO 9001 Certified

SD SLUDGE SCREW PRESS:

The SD SLUDGE SCREW PRESS was designed to dewater sludge from municipal and industrial processes to obtain sludge dryness between 18 to 25% dry solids.

The sludge entering the press first passes through a drainage chamber. During this phase, the flocculated sludge drains a certain quantity of water by gravity. The rotating screw will then gradually advance the sludge into successive higher compression zones. The level of compression is determined by a pneumatically actuated counterweight, adjustable to provide the best performance of the dewatered sludge.

The water comes out through a wedge wire screen present around the screw. The screen filter is cleaned by the integrated motorized washing system providing washing and cleaning the external surface of the screen filter.

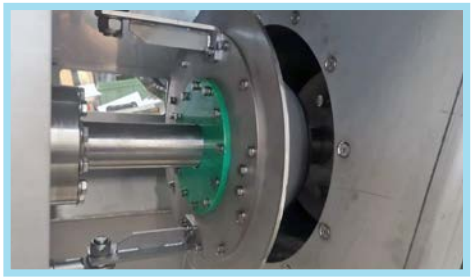
SD SLUDGE PRESS READY FOR SHIPMENT

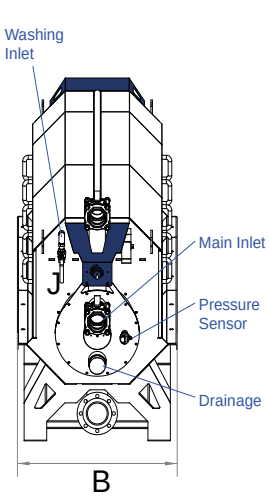
EQUIPMENT AND TECHNOLOGY

Information

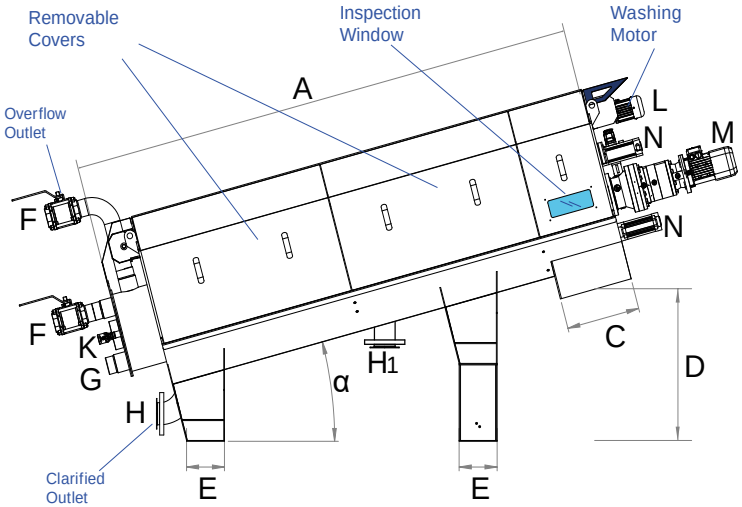
The SD SLUDGE SCREW PRESS is available in 5 different sizes.

As with all dewatering devices, the sludge needs to be conditioned with polymer in order to obtain the correct flocculation. The SD sludge screw press has low energy consumption and low rotation speed. Consequently, the wear of the components is very minimal.

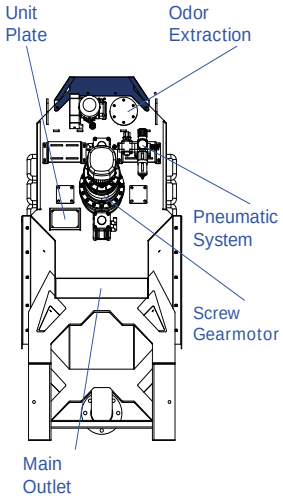




Front



Side



Back

SD SLUDGE SCREW PRESS

Dimensions Table

TECHNICAL DATASHEET					
Model	SD200	SD400	SD700	SD900	SD1200
FLOW					
Solids Content					
	Hydraulic Capacity m3/hr				
<2%	1.1	3.8	8	16.3	21
3-6%	0.8	1.8	3.9	7.7	15
7-10%	0.55	1.3	2.4	5.1	7.7
FILTRATION STAGES					
Wedge Wire	0.5 | 0.4 | 0.15mm		0.5 | 0.4 | 0.25mm		
DIMENSIONS					
A	2500mm	2770mm	4200mm		5200mm
B	618mm	874mm	1230mm	1458mm	
C	300mm	400mm			
D	680mm	740mm	760mm		930mm
E	207mm				
α	15°		10°		
PIPES	2"	3"		4"	
F	3"	4"	5"	6"	
G	3"	4"	5"	6"	
H1	None		5"	6"	
J	3/4"		1"		
Washing l/h	540	600	780	990	
MOTORISATIONS & DEVICES					
K	Pressure Sensor (OPTIONAL)				
L	0.12kW			0.18kW	
M	0.55kW	0.75kW	1.5kW	2.2kW	
rpm	up to 0.86				3kW
N	50/100	80/100			
Air l/s	2-4				
Air System	COMPLETE INCLUDED - IN-BOX SS OPTIONAL				
MATERIALS					
	Manufatured in SS304 or 316				

The above flow table for preliminary information only. The inlet flow depends on the type of sludge and the concentration of solids. For proper equipment selection, please contact H2Flow's Technical Sales Team.

SD SLUDGE SCREW PRESS

SD SLUDGE SCREW PRESS INSTALLED IN A BEVERAGE COMPANY DAF SLUDGE

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Appendix 10

List of responses to inquiries from Environmental Preview Report committee

Appendix 10 - List of responses to inquiries from Environmental Preview Report Committee

Item#	Response location	DOE Comments
1	Appendix 7, Page 13 & 15	Owner to characterize the waste streams with more detail with respect to the concentrations of constituents which will make up the dairy wastewater before treatment (what ar how much of the contaminants listed in schedule B(BOD, pH, Phosphorus, TSS...etc.) are in the wastewater going to pre-treatment plant balance tank)?
2	Appendix 7, Page 13 & 16	Could a reference / source for this information be provided to somehow provide a level of legitimacy to the information, such as, documentation or historical data from a similar plant/process?
3	Appendix 7 + Page 18	Owner to characterize the milk condensate wastewater with more detail with respect to the concentrations of constituents which will make up the condensate wastewater befor discharging to storm water(what and how much of the contaminants listed in schedule A(BOD, pH, Phosphorus, TSS...etc.) are in the condensate wastewater?
4	Appendix 7	Could a reference / source for this condensate information be provided to somehow provide a level of legitimacy to the information, such as, documentation or historical data fror a similar plant/process?
5	Page 18-19	Describe the instrumentation equipment that will be used to monitor the quality of condensate to decide if it can be dumped to storm sewer or requires treatment at the WWTP
6	Appendix 9, Page 20-21	Provide a description of the wastewater process and equipment which will be used, diagrams /pictures may help.
7	Appendix 9, Page 21	Indicate % of reduction of waste elements from each equipment / stage of process that could be reasonable expected. Example...1 st DAF system should reduce TSS and BOD by XX%...MBBR should reduce by....X%. Final discharge will be reduced by XX%
8	Page 22 - 24	Provide a description of the wastewater process and equipment which are alternatives to the MBBR approach. What are the benefits and short comings of each? (We will have tc explain why we chose the option we did).Estimate % efficiency of each option.
9	Page 20	Describe the require space to be expected to be required for the WWTP equipment (floor space?) Will there be room to install additional equipment in the event of future operations expansion / production increases (eg. installation of additional holding capacity for daily wastewater pre-treatment?
10	Page 16	Quantify how much CIP alkali and acid will be used on a normal day, how much will have to be topped up? What volumes will be lost, show how it will impact pH of WW flow.
11	Page 16 - 19	Describe the CIP process. Use diagrams
	Page 28	What's the anticipated volume of sludge on a normal day or peak and how often would it be removed from site?
12	Page 29	Provide further information on where the sludge will be sent. If this is to go to the New World Dairy cattle farm anaerobic digester (currently approved by DGSNL to accept up to 45% off-farm waste), then information will need to be provided to show that the digester is able to handle these volumes.
13	Page 7	Add site photos to appendix
14	Page 13 & 27	Add a statement that no sources of water other than town water will be used, all storm water and sewer will be only discharged to town infrastructure
15	Page 12 + Appendix 6	Provide Emergency plans- for dairy and chemical spills include descriptions of spill kit, procedures, signage, provide a high-level contingency
16	Page 10 & Appendix 4	Provide a description of the Town of Deer Lake's waste water system