Wastewater Treatment Facility Design, Operation and Maintenance Details

Site Remediation of FOX-E Durban Island and Padloping Island

Introduction

Biogenie has designed two systems that will be used on site to treat waste water. Waste water originating from camp operations will be treated with a lagoon system, while waste water originating from site work i.e. barrel washing, excavations, tank cleaning etc. will be treated with a water treatment unit described below.

Camp Waste Water Management

Biogénie's wastewater system will comprise of two sets of sewage lagoons. This system has been successfully used on previous projects such as CAM-F, CAM-5, Bear Island and FOX-3.

All sewage and wastewater generated from the operation of the camp (grey water, kitchen water, black water etc.) are to be pumped to one of two temporary and independently operated sewage lagoons. Each site will possess two lagoons with a capacity of 100 m^3 for FOX-E Durban Island and 36 m^3 for Padloping Island based on the estimated monthly water use. Only one lagoon will be in use at a given time for a duration of one month, then sewage will be pumped into the second lagoon to allow for the sewage in the first lagoon to settle. The lagoons will be located a minimum of 100 m from the camp and a minimum of 100 m from drainage paths. Refer to Appendix A for our proposed sewage lagoon locations. It is important to note that the locations may be changed after the initial site visit and is subject to Departmental Representative (DR) approval.

The lagoons will take approximately 6 hours to construct. An excavator will be used to dig the lagoon basins as they are below grade and will use the excavated material to construct the 0.5 m berm around the lagoons. All construction activities on the sewage lagoons will be carried out avoiding sedimentation of any surrounding water bodies. There will be no hazardous substances affiliated with the sewage disposal facility.

Prior to entering the lagoons, sewage and wastewater will initially be drained to a sewage transfer tank adjacent to the camp. A mulcher pump will be installed in this tank, with the ability to grind any solids in the wastewater, creating slurry, which will then be pumped to the lagoons. The lagoons will rely on natural processes of bacteria and algae to reduce organic matter to acceptable levels, while allowing an appropriate amount of time for the solids to settle out as sludge. The settling section allows for the physical removal of solids and grease from the incoming wastewater. Heavy organic matter is settled out in the lagoons, with the lighter grease forming a scum layer on the water surface. The lagoons will be operated in parallel configuration to reduce excessive Biological Oxygen Demand (BOD) and fecal coliform and to avoid the use of calcium hypochlorite as a treatment method. Detention time will also be maximized to again reduce excessive BOD and fecal coliform. Security measures will include a sign clearly identifying the sewage lagoons. This area will also be explained and identified during the WOS as a restricted area. The berms constructed will be high enough to prevent any accidental intrusion in the lagoons.

The lagoons and pipe system will be monitored daily to check the fluid level and to prevent inadvertent seepage of effluent through the lagoon berms. If the lagoons leak or inadvertent seepage occurs, discharge of effluent in the lagoon will be stopped and switched to the other lagoon. If necessary, a temporary lagoon can be constructed. Deficiencies in lagoons or piping will be corrected immediately.

Lastly, the mulcher pump installed in the sludge tank will enable considerable accumulation of sludge in the tank. This should lead to a minimal sludge accumulation in the lagoon which can then be disposed of off-site.

Discharge Locations

Prior to discharging from the lagoons, samples will be collected and analyzed in an approved laboratory (Exova in Ottawa) for the parameters set out in the Water License. Wastes which meet the criteria set forth by the Nunavut Water Board will be discharged at one of two points dependant on which lagoon is being discharged. These discharge points are located 100 m from any drainage course or fish-bearing body of water. During the pre-mobilization site visit, possible discharge locations will be identified. Once on-site, the sampling stations and discharge point shall be surveyed and the coordinates will be provided to the DR.

Estimated Water Discharge

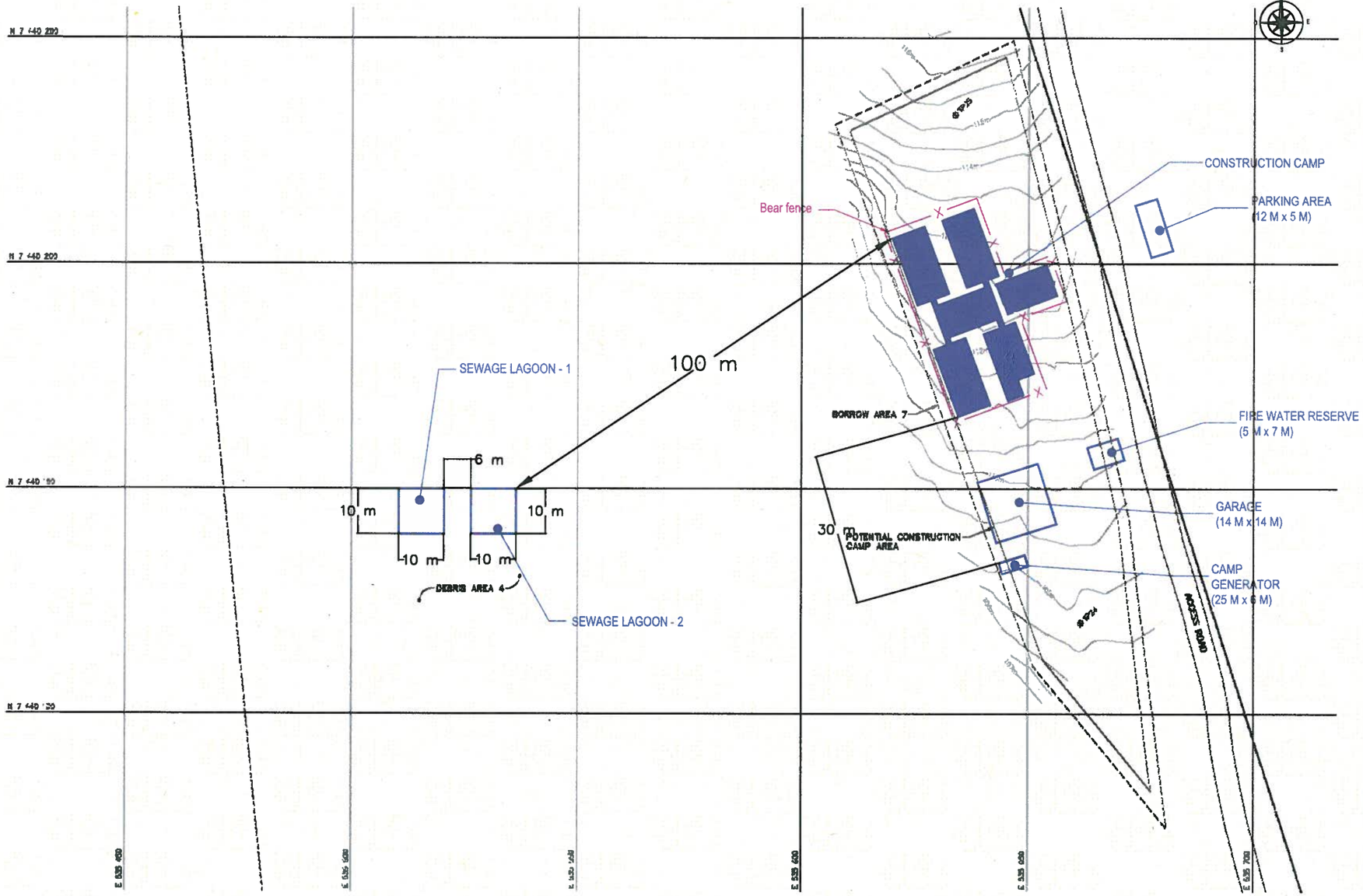
It is estimated that over the course of a month, a 40-person camp (FOX-E) will generate 72 m^3 of wastewater based on the daily water consumption of 60 L while the camp at Padloping Island will generate approximately 36 m^3 based on a 20-person camp. Sewage lagoons will be discharged monthly after appropriate testing and settling takes place.

Treatment of Waste Water

Waste water can generated during barrel clean-up, pipe and tank cleaning, and collection during excavation. A two lagoon system (or tank) in conjunction with the Water Treatment Unit (WTU) will be used to treat barrel wash water. The lagoons will be constructed adjacent to the MPA where barrel processing takes place. Wash water will be pumped into the first lagoon and allowed to stand to promote settling of sediment and metals. Absorbent booms will be deployed to absorb any oil or grease. Taking care not to disturb the settled sediments, the water will be pumped into the second lagoon. From the second lagoon, water will be circulated through the WTU. Please refer to Appendix B for design details of the WTU. The WTU is designed so that different filtration media (like activated carbon, organo-clays and ion exchange resins) can be used in the filtration units to capture contaminant compound of different nature. The filtration components can be arranged in various configurations to adapt the flow rates and the treatment to a specific contaminant. It is anticipated that, from the soil contamination profiles detailed in the characterization data, the water treatment unit proposed will meet the requirements of this site. Used filter media will be containerized in a lined wooden Sea-Can. Wash water will be circulated until sample results indicate that the water complies with discharge criteria. Treated water will be discharged with DR approval at a location of least 31 m from all water courses. The WTU requires little maintenance beyond the periodic checking for leaks and deficiencies and the changing of filter media.

APPENDIX A

PROPOSED SEWAGE LAGOON LOCATIONS



LEGEND

0 10m 20m 30m 40m 50m

REGISTERED PROFESSIONAL ENGINEER
A. LECLAIR
LICENSEE
NT/NU
2012-06-27

NO.	VERSION	DATE	BY	VERIF.	APPR.
1	PROPOSITION	2012-06-27	M.-A.G.	A.L.	G.R.

Public Works and Government Services Canada

PROJECT:
FOX-E DURBAN ISLAND AND PADLOPING ISLAND REMEDIATION PROJECT

TITLE:
CONSTRUCTION CAMP PROPOSED LOCATION PLAN - DURBAN ISLAND

SITE REMEDIATION SOLUTIONS

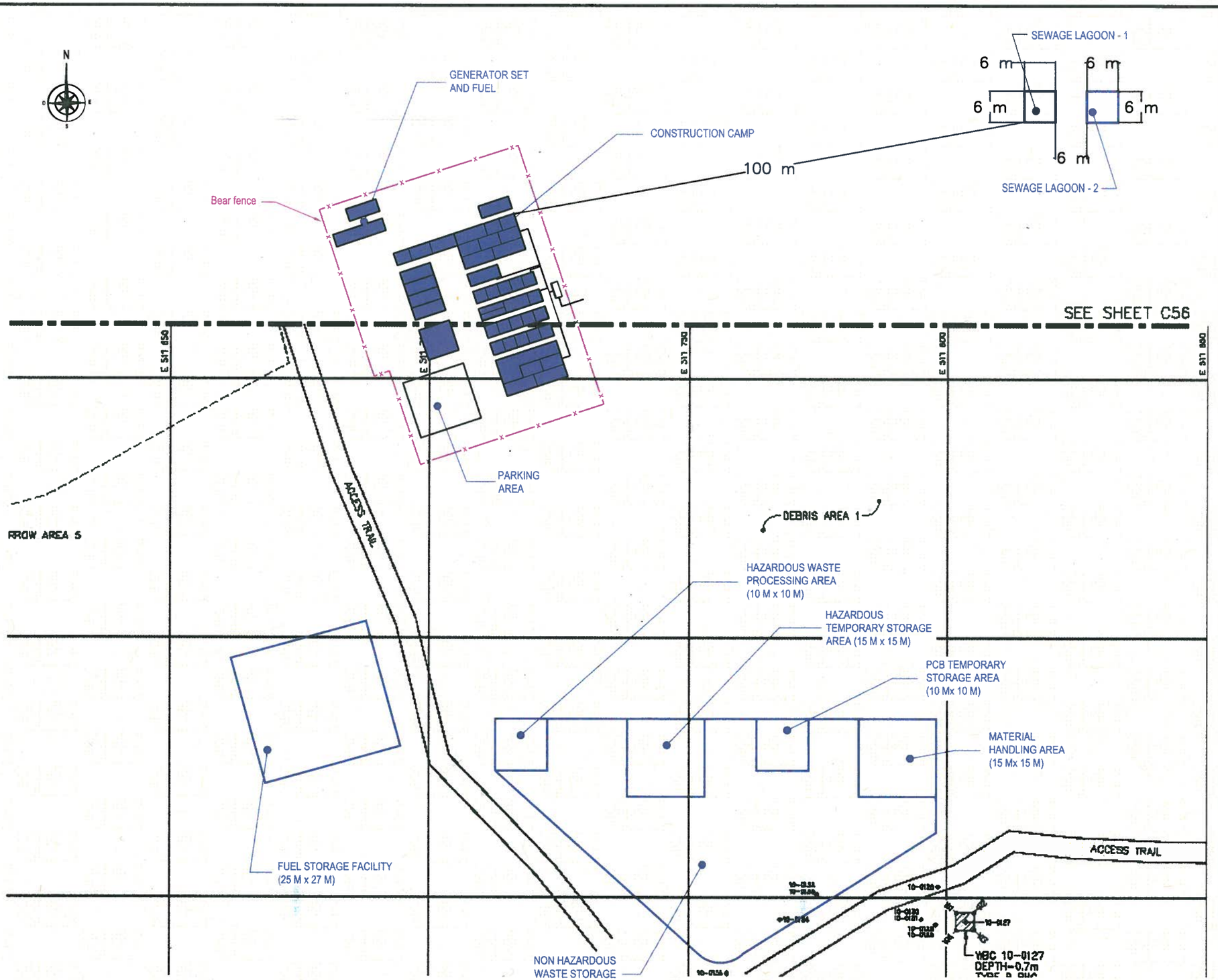
Biogénie, a division of EnGlobe Corp.
1140 Lévis Street, Terrebonne (Quebec) CANADA J6W 5S6
Tel.: 450-961-3535 Fax: 450-961-0220

MEASUREMENT UNIT: METRE	SCALE: 1 : 1,000	DATE (month-year): JUNE 2012
DRAWN BY: M.-A.GIRARD	VERIFIED BY: B. MACKAY	APPROVED BY: A. LECLAIR, P.Eng.
PROJECT NO: TP2653_001	DRAWING NO: TP2653_001_E1-101_4	PAGE C07

Source :
- Project n°R.048967.001-C07.

FIGURE 1

F:\TP\2653\2-PRE\TP2653_001_E1-101_4.dwg



Source :
- Project n°R.048967.032-C57.

LEGEND

0 7.5m 15m 22.5m 30m 37.5m

REGISTERED PROFESSIONAL ENGINEER
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LICENSEE
NT/NU
2012-06-27

NO.	VERSION	DATE	BY	VERIF.	APPR.
1	PROPOSITION	2012-06-27	M.-A.G.	B.M.	A.L.

Public Works and Government Services Canada

PROJECT:
FOX-E DURBAN ISLAND AND PADLOPING ISLAND REMEDIATION PROJECT

TITLE:
CONSTRUCTION CAMP PROPOSED LOCATION PLAN - PADLOPING ISLAND

SITE REMEDIATION SOLUTIONS

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METRE	1 : 750	JUNE 2012
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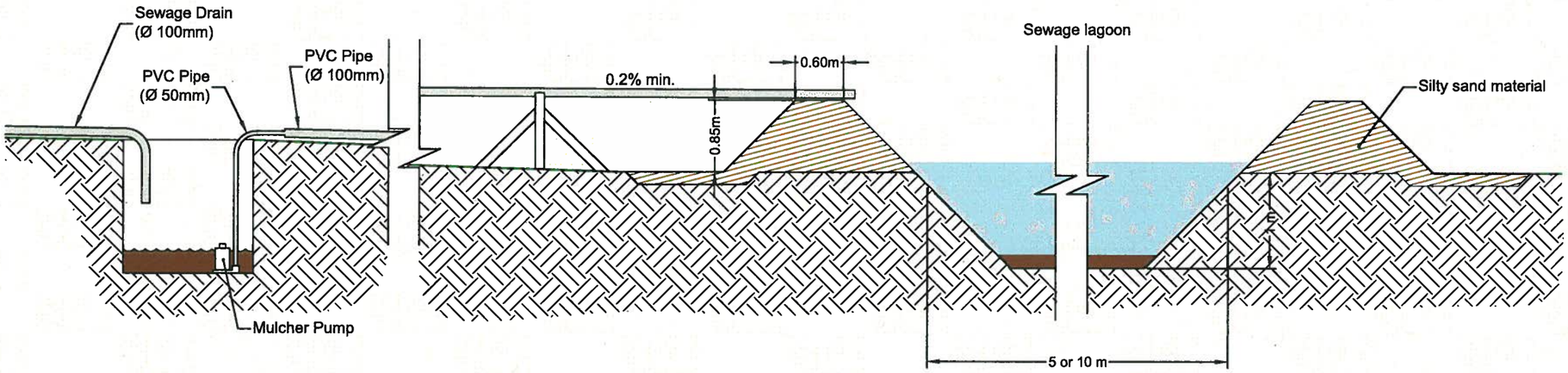
PROJECT NO: TP2653_001	DRAWING NO: TP2653_001_E1-101_4	PAGE C57

FIGURE 2

F:\TP\2653\2-PRÉ\TP2653_001_E1-101_4.dwg

APPENDIX B

DESIGN DETAILS OF WATER TREATMENT UNIT



LEGEND

REGISTERED PROFESSIONAL ENGINEER
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NT/NU
2012-06-27

NO.	VERSION	DATE	BY	VERIF.	APPR.
1	PROPOSITION	2012-06-27	M.-A.G.	B.M.	A.L.

Public Works and Government Services Canada

FOX-E DURBAN ISLAND AND PADLOPING ISLAND REMEDIATION PROJECT

WASTEWATER MANAGEMENT SYSTEM

SITE REMEDIATION SOLUTIONS

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METRE	N.T.S.	JUNE 2010
DRAWN BY: M.-A.GIRARD	VERIFIED BY: B. MACKAY	APPROVED BY: A. LECLAIR, P.Eng.
PROJECT NO: TP2653_001_101	DRAWING NO: TP2653_001_E1-101_5	PAGE PL

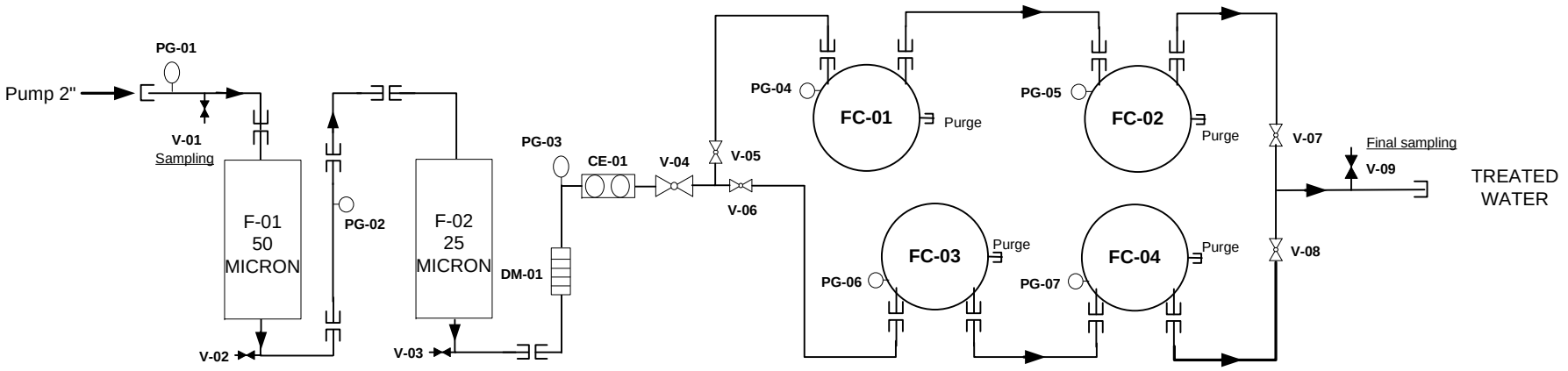
FIGURE 3

F:\TP\2653\2-PRÉ\TP2653_001_E1-101_5.dwg

MAXIMUM OPERATING FLOW: 20 GPM

PROJECT NUMBER:

OPERATED BY:



Date	Time	PG-01 (psi)	PG-02 (psi)	PG-03 (psi)	PG-04 (psi)	PG-05 (psi)	PG-06 (psi)	PG-07 (psi)	DM-01 (gpm)	CE-01 (m^3)

: V-00 : normally closed valve

: V-00 : normally open valve

DM-00 : flowmeter

PG-00 : Pressure gauge

CE-00 : Water meter

FC-00 : Carbon filter

F-00 : Bag filter

Inlet sampling (V-01)

Time _____ # Sample _____

_____ _____

Outlet sampling (V-09)

Time _____ # Sample _____

_____ _____

PURGE :

☐ YES

☐ NO

☐ See Observations

EQUIPMENTS CHECK-UP

ITEM	CHECK-UP	CLEANING	REPLACEMENT
F-01 Filter (bag filter)	☐	N/A	☐
F-02 Filter (bag filter)	☐	N/A	☐
FC-01 Filter	☐	N/A	☐
FC-02 Filter	☐	N/A	☐
FC-03 Filter	☐	N/A	☐
FC-04 Filter	☐	N/A	☐

enGlobe Corp
350 Franquet Street, Ste-Foy, QC, G1P 4P3
Tel.: (418) 653-2074 Fax: (418) 653-1598

Water Treatment Unit
4374

Piping Diagram and
Follow-up Sheet

Units: None	Scale None	Date: 07/08/20
Drawn by: Y.Tremblay	Verified by: Y.Tremblay	Approved by: Y.Tremblay
Project: EQ6021-374	Identification Code : 1560-300-EN05	Drawing No: SUIVI4374_ang.pdf Page: 1/1