CLEANUP AND RESTORATION OF THE MID-CANADA LINE SITE AT BEAR ISLAND, NUNAVUT

OPERATIONS AND MAINTENANCE PLAN FOR THE SEWAGE DISPOSAL FACILITIES

Final Version

(O/Ref.: TP-0654) (Y/Ref.: EW699-091300/001/NCS)

PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

June 2010

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1 INTRODUCTION

In April 2010, Biogenie, a division of EnGlobe Corp. (hereinafter called "Biogenie") was awarded the contract for the remediation of the Bear Island Mid-Canada Line Site by Public Works and Government Services Canada (hereinafter called "PWGSC") on behalf of the Indian and Northern Affairs (INAC). This plan is intended to highlight the sewage treatment facilities to be constructed and operated on Bear Island throughout the course of the project. As per the Nunavut Water Board's Licence No. 1BR-BEA1015, this document will include:

a) 95% complete For-Construction Drawings of the Sewage Disposal Facilities stamped and signed by an Engineer (Figure 1);

b) Final discharge locations BEA-2a and BEA-2b identified on a map (Figure 2);

c) Monitoring Program;

d) Abandonment and Restoration information including sludge disposal instructions.

2 SEWAGE DISPOSAL FACILITIES DETAILS

The following sections provide details on the Sewage Disposal Facilities to be used during camp operation of the Bear Island Mid-Canada Line site remediation project.

2.1 SEWAGE LAGOONS

All sewage and wastewater generated from the operation of the camp on Bear Island are to be pumped to one of two temporary and independently operated sewage lagoons. The lagoons are to be located 100 m from the camp and a minimum of 100 m from drainage paths, and each lagoon will have a capacity of 400 m^3.

It is estimated that over the course of the project, 612 m^3 of waste water will be generated by the camp. This is based on a daily consumption of 25 L of water per person for a camp of 35 people. Based on this, each lagoon will need to hold a maximum of 306 m^3; with a total berm height of 1 m, the lagoons will maintain a minimum freeboard of 0.235 m.

Prior to entering the lagoons, sewage and wastewater will initially be drained to a sewage transfer tank adjacent to the camp. A Multure Pump will be installed in this tank, with the ability to grind any solids in the wastewater, creating a slurry, which will then be pumped to the lagoons. The lagoons will rely on natural processes of mainly 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. If these processes do not reduce organic matter to acceptable levels, then chlorine (calcium hypochlorite) will be added to the lagoons to reduce the BOD and fecal coliforms. A side profile of the sewage lagoon construction can be observed in Figure 1, Appendix A. The location of the sewage lagoons on the island are shown in Figure 2.

3 MONITORING PROGRAM

3.1 DISCHARGE CRITERIA

Prior to discharging from the lagoons, samples will be collected and analyzed in an approved laboratory for the parameters set out in the Water License. Wastewater treatment targets defined for this project by the Nunavut Water Board are listed in Table I hereafter:

Table I : Effluent Quality Limits for Wastes Discharged from the Sewage Disposal Facilities.

Parameter	Maximum Allowable Concentration
BOD	80 mg/L
Total Suspended Solids	100 mg/L
Fecal Coliforms	10,000 CFU/100 mL
pH	6.0 to 9.0
Oil and Grease	No visible sheen

3.2 FINAL DISCHARGE POINTS

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. The two points are described below in Table II, including the monitoring requirements at each point. These discharge points are to be located 100 m from any drainage course or fish-bearing body of water, and their location is shown in Appendix A, Figure 2.

Once on site, the sampling stations and discharge point shall be surveyed and the coordinates will be provided to the Engineer.

Table II : Discharge Points from the Sewage Disposal Facilities and the Monitoring Requirements at Each Point.

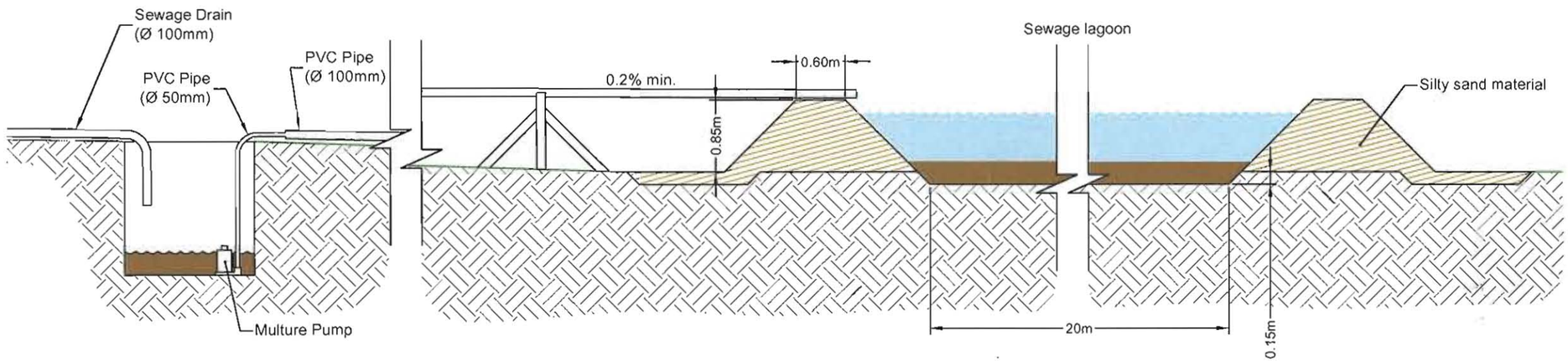
Monitoring Program Station Number	Description	Status
BEA-2a	Final Discharge Point from Sewage Disposal Facilities, Lagoon 1	Active (Volume and Water Quality)
BEA-2b	Final Discharge Point from Sewage Disposal Facilities, Lagoon 2	Active (Volume and Water Quality)

4 ABANDONMENT AND RESTORATION

At conclusion of the work on Bear Island, all materials imported to the island, including the camp, will be removed. This includes the sewage lagoons, which will be closed and restored back to natural conditions. This work will include treating the solids remaining in the lagoons, known as sludge, and backfilling/grading the lagoons. The sewage sump which will be used during the camp and sewage lagoon construction will be treated with lime and covered with native material. Lime will also be added to the sludge from the two sewage lagoons at the end of the project and the lagoons will be backfilled and covered/graded with native materials to achieve the pre-existing natural contours of the land.

APPENDIX A

Figures



LEGEND

NO.	VERSION	DATE	BY	VERIF.	APPR.
A	FINAL	10-06-09	P.L.	M.B.	J.P.P.

Public Works and Government Services Canada

BEAR ISLAND
REMEDIATION PROJECT
BEAR ISLAND, NUNAVUT

WASTEWATER MANAGEMENT SYSTEM

PERMIT TO PRACTICE
BIOGENIE S.R.D.C. INC.
Signature
Date June 9, 2010
PERMIT NUMBER: P 543
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

SITE REMEDIATION SOLUTIONS
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P. LÉGARÉ	M. BEVERIDGE	J.-P. PELLETIER
PROJECT NO:	DRAWING NO:	PAGE
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FIGURE 1

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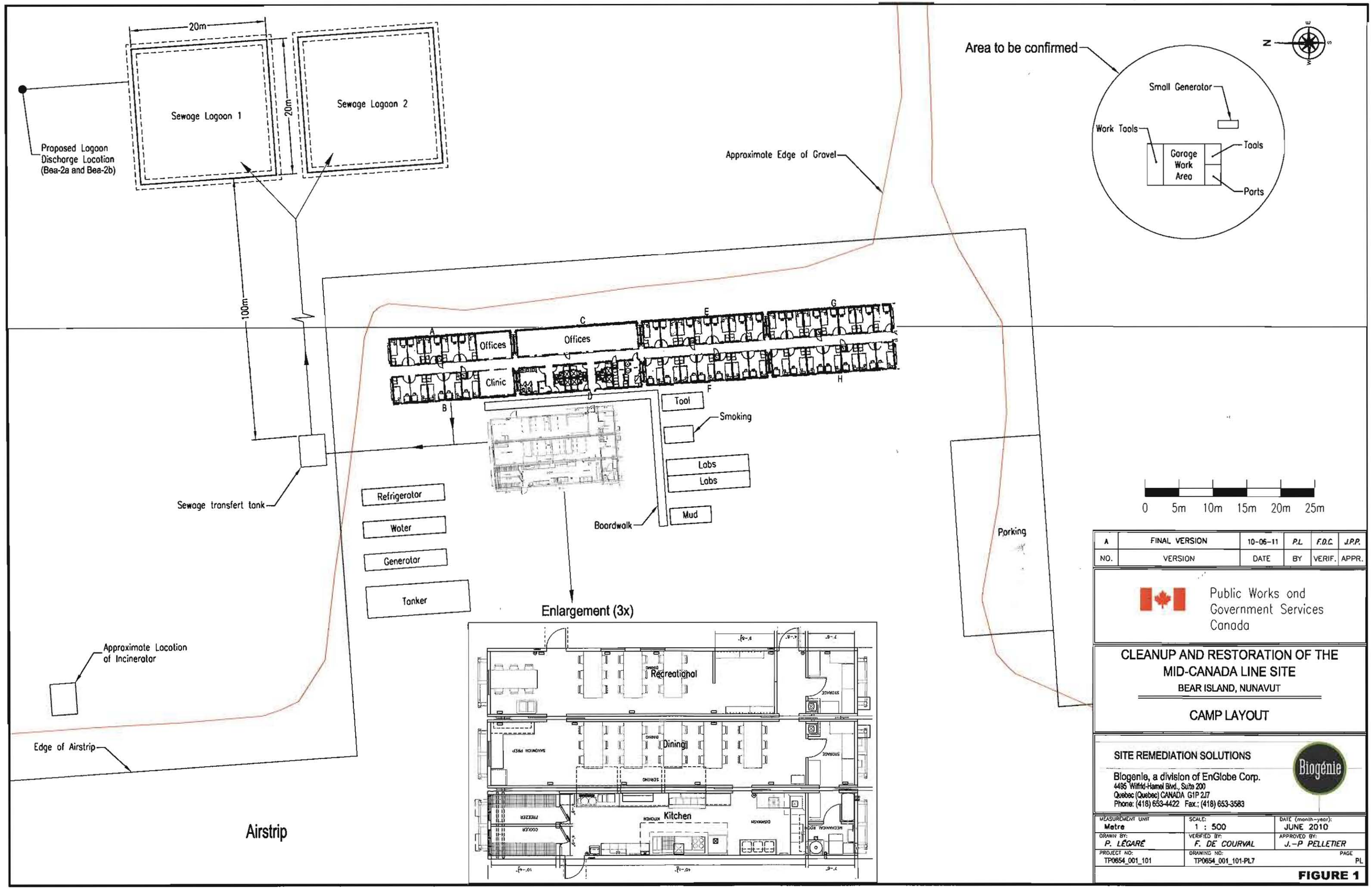

NO.	VERSION	DATE	BY	VERIF.	APPR.
A	FINAL VERSION	10-06-11	P.L	F.D.C.	J.P.P.

Public Works and Government Services Canada

CLEANUP AND RESTORATION OF THE MID-CANADA LINE SITE

BEAR ISLAND, NUNAVUT

CAMP LAYOUT

SITE REMEDIATION SOLUTIONS

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FIGURE 1

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