PROVISION AND OPERATION OF A CONSTRUCTION CAMP
CAM-F Distant Early Warning (DEW)
Line Site, Nunavut

(O/Ref.: ZY5453)
(Y/Ref.: 413334)

WORK PLAN

PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

December 2005

Mikim Contracting Limited
Box 760
Iqaluit, Nunavut X0A 0H0

Tel.: (867) 979-6747
Fax: (867) 979-0184

PROVISION AND OPERATION OF A CONSTRUCTION CAMP

CAM-F Distant Early Warning (DEW)
Line Site, Nunavut
(O/Ref.: ZY5453)
(Y/Ref.: 413334)

WORK PLAN

PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

December 2005

Written by: _____
Jean-Pierre Pelletier

Revised by: _____
Sylvain Laberge

Approved by: _____
Thomas Webster

TABLE OF CONTENTS

TABLE

LIST OF FIGURES

LIST OF APPENDICES

1 SCOPE OF WORK

The provision and operation of the construction camp for the CAM-F restoration project involves the following activities:

- Mobilize all required camp equipment in Hall Beach in September 2005;
- Erect a camp for 40 people (plus camp personnel);
- Operate the camp for the entire duration of the remediation project;
- Provide security for the camp;
- Provide medical facilities and assistance;
- Provide reliable communications;
- Provide safety equipment;
- Winterize the camp between the summer work seasons;
- Demobilize the camp at the end of the project;
- Ensure health and safety for all personnel present on camp;
- Ensure environmental protection during camp operations.

2 PROPOSED METHODOLOGY

This section provides information on some of the project's key activities.

2.1 PROJECT SCHEDULE

The following is a summary schedule for major activities associated with the camp:

Table I : Summary Schedule for Major Activities

Activity	Date
Equipment Arrival in Hall Beach	End of August 2005
CAT-Train (Const. Contractor)	Spring 2006
Camp Erection	June 2006
Camp Operation	July-September 2006
Winterization	September 2006
Camp Re-Opening	June 2007
Camp Operation	July-September 2007
Camp Shutdown	September 2007
CAT-Train (Const. Contractor)	March 2008
Sealift	August 2008

2.2 MOBILIZATION

The equipment was sealifted from Montreal to Hall Beach at the end of August 2005. Containers and trailers were placed on skids and skis to allow transportation *via* CAT-Train from Hall Beach to Sarcpa Lake. The CAT-Train will be set to transport the material in March/April 2006.

The personnel is not scheduled to arrive on-site before June 2006. Personnel will be flying to Iqaluit or Hall Beach by commercial airline, then by chartered aircraft to CAM-F (provided by the Construction Contractor).

2.3 CAMP ERECTION

All personnel required to set up the camp will fly to CAM-F approximately 2 weeks prior to arrival of all Construction Contractor personnel on-site. Public Works and Government Services Canada (hereinafter called "PWGSC") will provide tents to ensure personnel lodging for at least 2 weeks during camp setup. With the help of some of the Construction Contractor's personnel and machinery, the structures and infrastructures described in the following sub-sections will be put in place.

The final camp location is presented in Figure 1. This final location is away from water bodies and drainage path; it is located on a firm plateau northeast of the airstrip. This location is already disturbed as it is located in an identified potential borrow area. Underneath a thin organic layer, gravel and rocks provide a firm base for the camp. It is anticipated that the camp will be mounted on blocks, approximately 0.5 m above ground.

Appendix A provides an inventory of all equipment to be used in the construction camp.

2.3.1 Buildings

Mikim will utilize a 45-man camp that includes accommodations, laboratories and office for the Construction Contractor's personnel, the camp Contractor's personnel, the Engineer's, Engineer's support staff and other regulatory agency representatives. Figure 2 provides a layout of the construction camp.

The camp is made out of the following areas and facilities:

- **General Sleeping Quarters**. Intended for the Construction Contractor and the camp personnel. Twenty double-occupancy rooms separated into 2 complexes (consisting of 6 modules of 3 m × 15 m) will be provided. General washrooms, including toilets, mirrors, urinals, washbasins, showers and cubicles, are located in the middle of each complex.

- **Engineer's, Engineer's Support Staff, Female Quarters, and Sick Quarters**. These will be in a separate complex (3 modules of 3 m × 15 m). Separate washrooms will be available if required for male and female staff. The sick quarters, the medic and the Engineer's room will occupy 3 rooms, while 4 other double-occupancy rooms will be available for the Engineer's support staff and visitors. The Construction Contractor will use the 3 remaining rooms as site office.

- **Geotechnical and Analytical Laboratories**. They will be located in a separate module (3.7 m × 18.3 m) and will be equipped with phone lines, fax and all required equipment as stipulated in the Construction Camp Contract.

- **Engineer's Office, Kitchen, and Dining Area**. This other complex will be made out of 3 modules of 3.7 m × 18.3 m. The Engineer's office will be equipped with 1 bookcase, 2 double pedestal desks, 2 swivel chairs, 4 stackable chairs, 2 × 4 drawer legal size cabinets. The dining area will consist of 11 tables and 44 chairs, while the kitchen will be fully equipped.

- **Recreation Area, Laundry and Commissary.** This will be the fifth complex. The commissary will provide some necessary personal hygiene goods for people who run out or forget. The laundry will be equipped with 3 washers and 3 dryers, one of each dedicated for the cook's clothing and sheets (presence of bleaching agent). The recreation room will be split into 3 sections. Two sections will be devoted to televisions. Each of theses sections will have its own 32" television equipped with DVD and VHS players. One television will be equipped with a video game centre, while the other one will be equipped with a satellite receiver for satellite feed. The next area will include a game area and an exercise area equipped with soccer tables, 2 card tables, 2 universal gym sets, 2 treadmills, and 2 stationary bikes.

- **Vehicle Parking Area**. Although the quantity of vehicles that will be on-site is limited, Mikim will establish a parking area immediately adjacent to the camp. The area will be graded, and all larger boulders and debris will be removed.

- **Drinking Water Treatment Plant**. Drinking water treatment equipment is fitted in a 20-foot container adjacent to the camp. Because of the distance between the camp and the freshwater source, a 10,000 L tank will be used to transfer water from Sarcpa Lake to the water processing system.

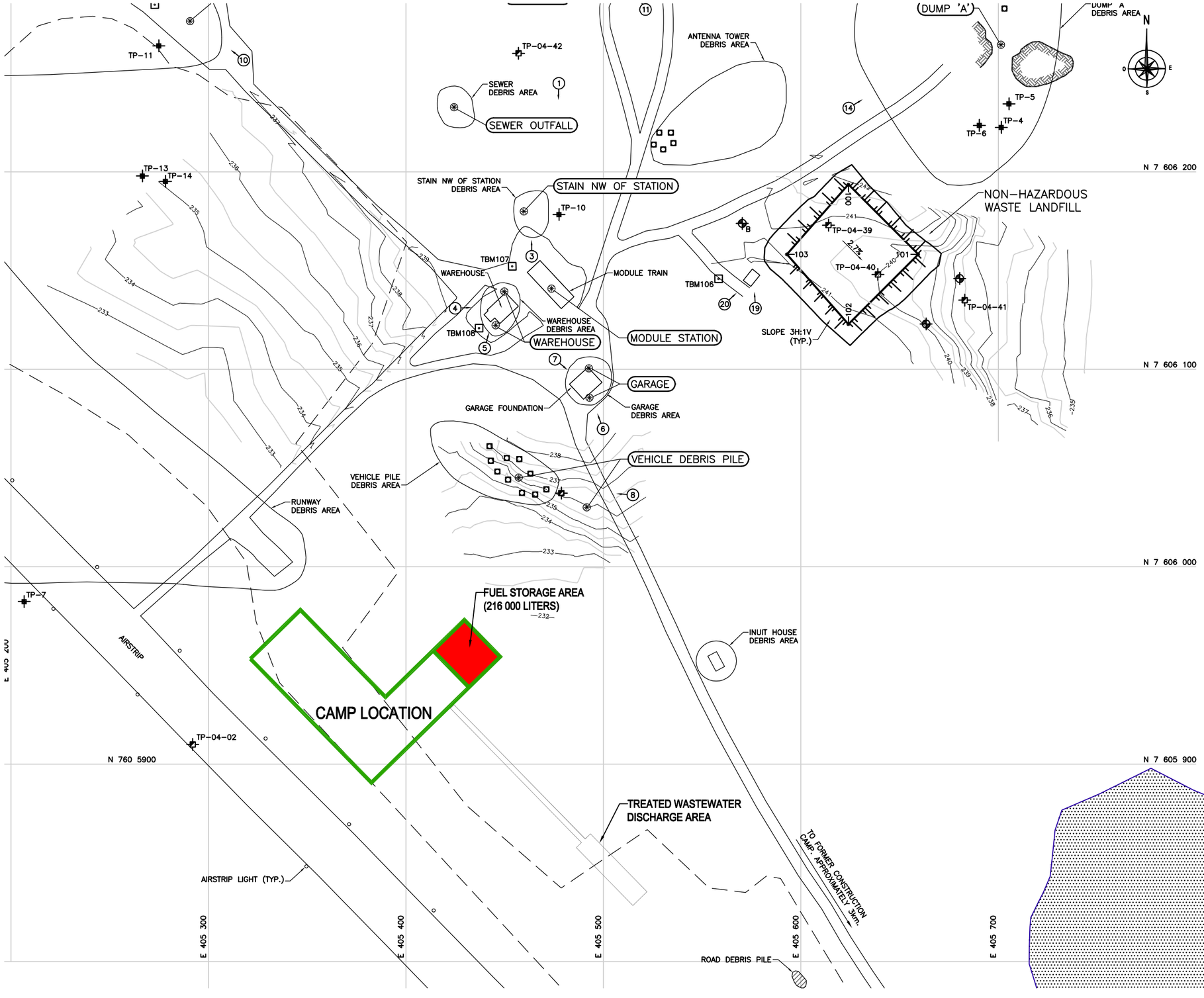
- **Wastewater Treatment Plant**. All wastewater generated during camp operations will be pumped into a 1,000 L sewage tank. A multure pump will ensure that only small organic waste is transferred into the BioGreen Treatment unit. The unit is designed to discharge wastewater with concentrations of biological oxygen demand (BOD) and total suspended solids (TSS) of 20 mg/L, which is well below the maximum concentration allowable for discharge as defined in the contract specifications. Treated water will be disposed of 100 m away from the camp via a tile field (Figure 1).

- **Mud Room**. A mud room will be located in a 20-foot container at the camp's main entrance to allow workers that may come from the site with muddy boots and suits to change in order to keep the walkways and trailers free of dirt. The firefighting equipment will also be located in this room.

- **Camp Generator**. The 2 camp generators (one acting as a backup) will be located in a 40' container to attenuate noise and ease transportation. A fuel line connected directly to one of the nearby 20,000L ISO tank containers supplied by the Construction Contractor will ensure fuel supply to the generator and minimize fuel transfer.

- **Incinerator Area**. The incinerator will be located at a secure distance from the fuel storage area, outside the secured perimeter of the camp.

- **Waste, Garbage, and Refuse Storage Area**. This area will be located adjacent to the incinerator area to allow easy movement of waste for incineration. This area will also be located at a fair distance from the secured perimeter of the camp to prevent wildlife access to waste.



LEGEND

Source :

UMA An AECOM Company, project n° 41334, sheet n° C03, 3 march 2005

0 20 40 60 80 100m

NO.	VERSION	DATE	BY	VERIF.	APPR.
2	CONSTRUCTION REVISE	05-11-28	A.J.	G.R.	S.L.
1	CONSTRUCTION	05-08-04	A.J.	G.R.	S.L.

Public Works and Government Services Canada

CAM-F SARCPA LAKE CONSTRUCTION CAMP

SARCPA LAKE, NUNAVUT

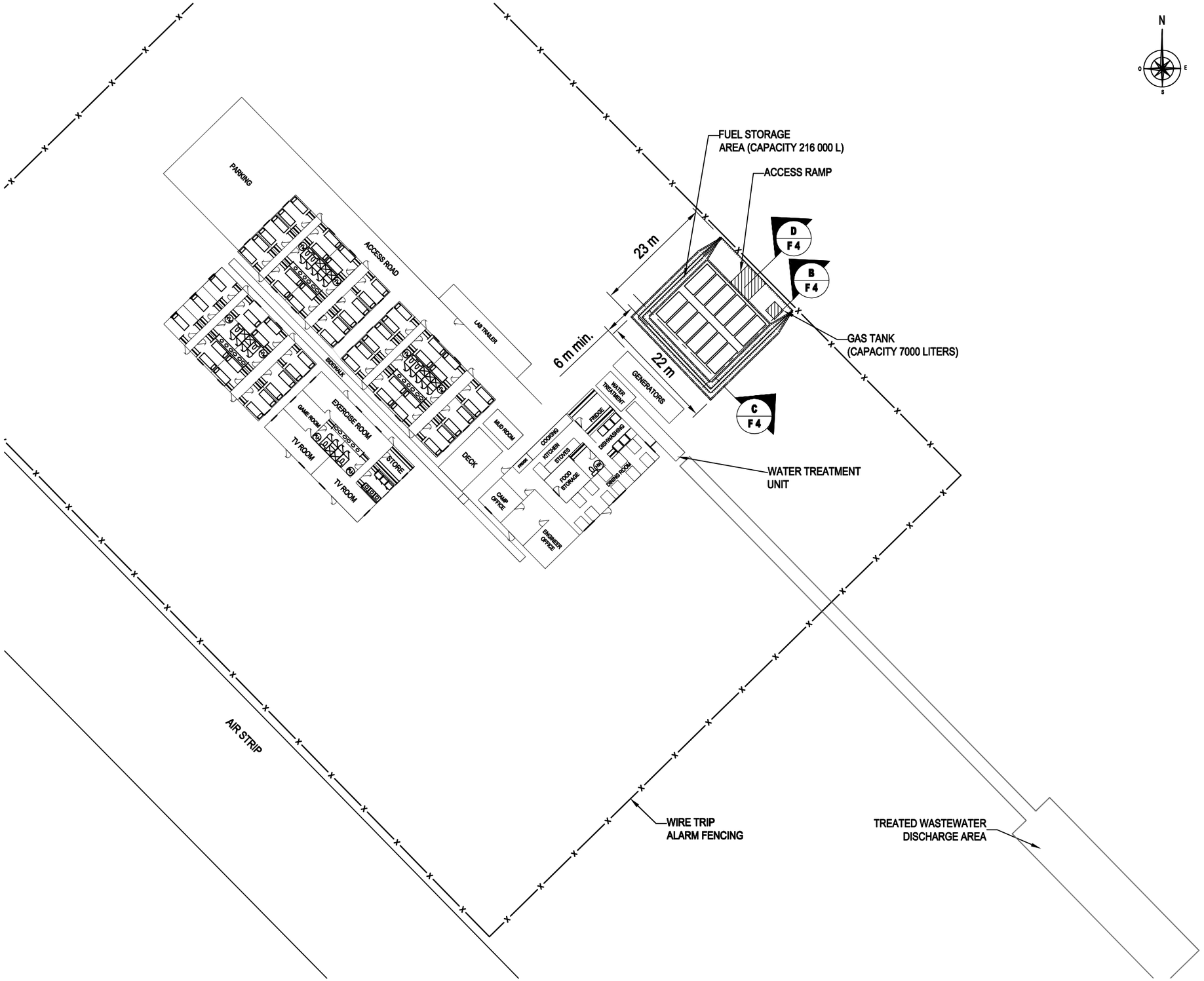
CAMP AND FUEL STORAGE LOCATION

MCL

UNIT OF MEASURE: METRE	SCALE: 1 : 2000	DATE (month-year): JUIN 2005
DRAWN BY: A. JACQUES	VERIFIED BY: G. ROBERT	APPROVED BY: S. LABERGE
PROJECT: ZY5453-001	DRAWING NO: ZY5453_001_E1_115_1	PAGE NAME: CP

FIGURE 1

G:\ZY5453\ZY5453_FIGURE 1.dwg



NO.	VERSION	DATE	BY	VERIF.	APPR.
2	CONSTRUCTION REVISE	05-11-28	A.J.	G.R.	S.L.
1	CONSTRUCTION	05-08-04	A.J.	G.R.	S.L.

Public Works and Government Services Canada

CAM-F SARCPA LAKE CONSTRUCTION CAMP

SARCPA LAKE, NUNAVUT

CONSTRUCTION LAYOUT - CAMP SEWAGE SYSTEM AND FUEL STORAGE LOCATION

MCL

UNIT OF MEASURE	SCALE:	DATE (month-year):
METRE	1 : 750	JUIN 2005
DRAWN BY: A. JACQUES	VERIFIED BY: G. ROBERT	APPROVED BY: S. LABERGE
PROJECT: ZY5453-001	DRAWING NO: ZY5453_001_E1_115_2	PAGE NAME CP

FIGURE 2

G:\ZY5453\ZY5453_FIGURE 2.dwg

2.4 CAMP OPERATION

It is anticipated that the camp will be in operation from July 2006 to September 2006, and again from June 2007 until its final shutdown in September 2007. The camp will be winterized from October 2006 until June 2007 and will be demobilized in the winter of 2007-2008. The main operations of the camp are as follows:

- To provide food and drinking water to all personnel on-site;
- To provide lodging and recreation to all personnel;
- To provide first-aid and medical assistance and facility;
- To provide janitorial and cleaning services;
- To manage all waste;
- To provide communication links;
- To provide electricity and heating.

2.4.1 Meals

It is anticipated that approximately 57 kg of food per person per week will be required. This number includes disposables such as paper towels, napkins, etc.

Mikim's suppliers will be ordering food and ensuring transfer and transportation of goods from Iqaluit to CAM-F through the Construction Contractor's chartered aircraft. Non-perishable food and goods will be stored in the kitchen area, while perishable food (meat, fruits, vegetables, and dairy products), purchased on a weekly basis, will be stored in the refrigerators and freezers.

Meals will be served 3 times per day. Casual meals or forth meals will be made available upon request. Lunch boxes, Mug Ups, apples, oranges and other fruits, fresh salads and dairy products (mainly whole milk) will be made available daily.

As no hunting will be allowed in the immediate vicinity of CAM-F, a supplier of Arctic Char and Caribou will be hired/contracted either in Igloolik or Hall Beach in order to ensure that traditional food is available on a weekly basis.

2.4.2 Drinking Water

Samples collected in July 2005 indicate that water from Sarcpa Lake meets *Health Canada Guidelines for Canadian Drinking Water Quality* (CDWQ). Bottled drinking water will be provided to personnel until the water treatment system is functional and 2 sets of analytical results for treated water meet with the guidelines. Drinking water will be treated using the treatment process described below.

The treatment process consists of a 5,100-gallon tank complete with piping integration system for tank filling. The outlet side has a sediment and carbon in-line filter system and a UV filter than can filter 7-14 usgpm. It is also equipped with 2 ½ hp 115v jet pumps and 2 pressure tanks of approximately 40 gallons each. If treatment is not required, the piping and pressuring system will still be used.

Using a 2-inch water pump, water will be pumped from Sarcpa Lake into a 10,000 L portable water tank sitting on a flatbed trailer. The portable tank will then be hauled to the camp for water transfer into the water treatment/processing system. Using the 1995 Department of Fisheries and Oceans' *Freshwater Intake End-of-Pipe Fish Screen Guideline*, the following calculations can be performed:

- Arctic Char and Lake Trouts are present in Sarcpa Lake
- Pump maximum flow is 17 L/s
- Open Screen Area is 0.15 m^2
- 8 × 8 stainless steel alloy mesh: 60% Open Area
- Effective screen area is 0.25 m^2

In order to have an effective screen area of 0.25 m^2, the screening box to be used will be 0.22 m × 0.22 m × 0.22 m. Figure 3 provides details on the actual screening box to be used and the intake placement into Sarcpa Lake. It is estimated that a total volume of 225 L per person per day will be required. The total volume of 10,000 L/day for all camp operations will be processed through the treatment/processing system.

2.4.2.1 Water Quality Monitoring Plan

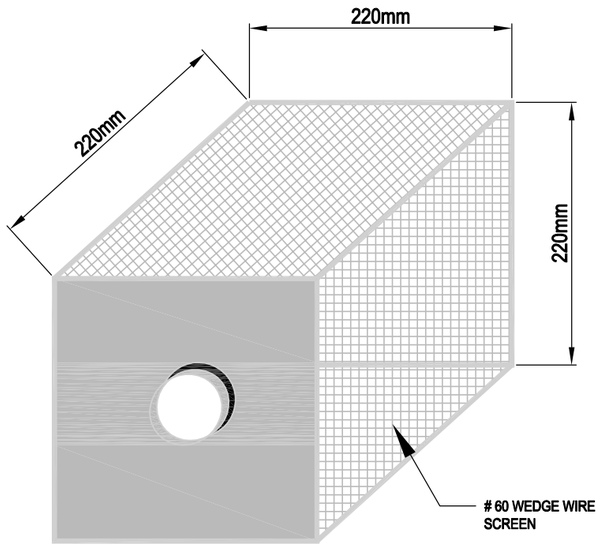
During camp erection (June 2006) and camp re-opening (June 2007), water will be sampled for the following laboratory analyses: metals, benzene, toluene, ethylbenzene and xylenes (BTEX), chlorinated phenols, fluoride, nitrite and nitrate, pH, sulfates, turbidity, BOD, total coliforms, fecal coliforms , polychlorinated byphenyls (PCBs) and TSS.

Periodic sampling of potable drinking water on-site will be carried out during the course of the project in order to ensure the health of all site personnel. Parameters that will be monitored during these sampling events include bacteria and TSS. Samples will be collected at the source (Sarcpa Lake) and after treatment/processing (in the Camp).

The results of the July 2005 sampling were compared to the 1999 CDWQ and are presented in Appendix B.

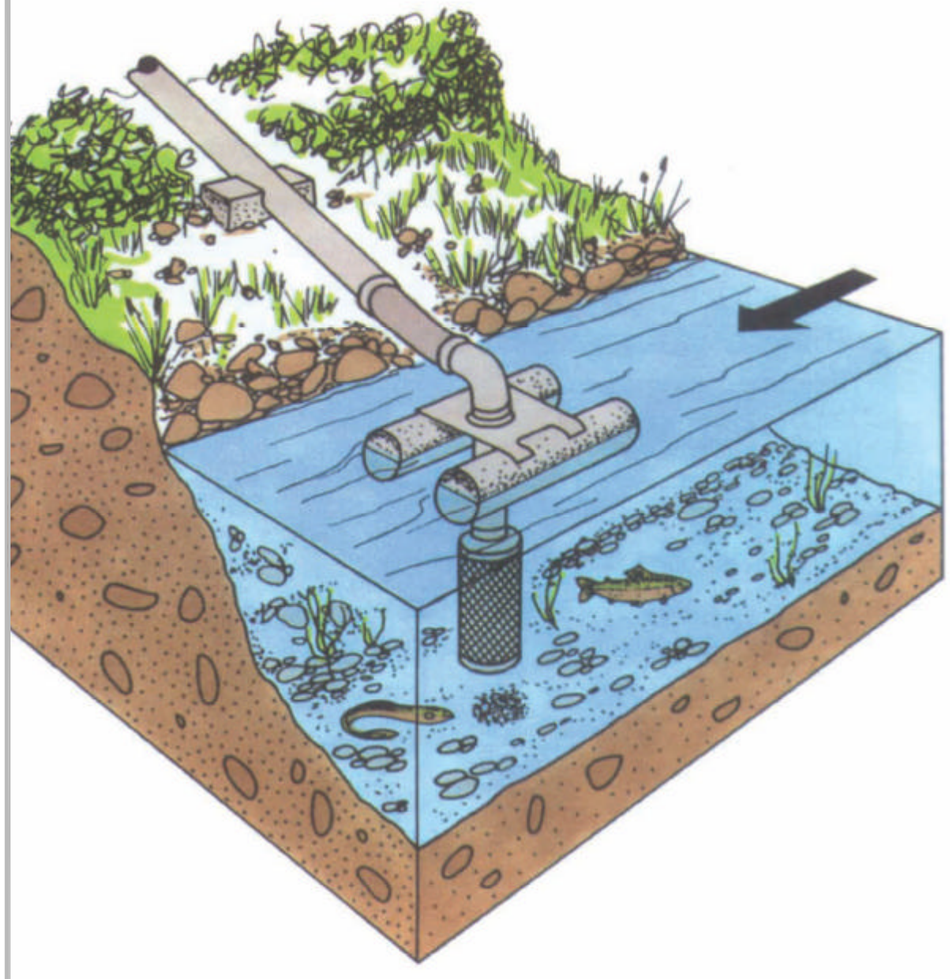
2.4.2.2 Water Volume Monitoring

It is estimated that a total of approximately 1,500,000 L of water will be required for all camp operations. Water will be pumped from Sarcpa Lake and placed into tanks (known volume). The suction intake will be equipped with a screen as per section 2.4.2 to prevent capture of fish during pumping. This volume will be recorded daily and provided to the Engineer.



DESIGN

0 5 10 15 20 25



TYPICAL PROJECTED WATER SUPPLY INSTALLATION

NO.	VERSION	DATE	PAR	VERIF.	APPR.
A	CONSTRUCTION	05-12-15	A.J.	G.R.	M.P.

Public Works and Government Services Canada

CAM-F SARCPA LAKE CONSTRUCTION CAMP

SARCPA LAKE, NUNAVUT

DETAILED DRAWING OF WATER SUPPLY INTAKE DESIGN AND INSTALLATION

MCL

UNIT OF MEASURE: METER	SCALE: AS INDICATED	DATE (month-year): DECEMBER 2005
DRAWN BY: A. JACQUES	VERIFIED BY: G. ROBERT	APPROVED BY: M. POULIOT
PROJECT: ZY5453-001	DRAWING NO: ZY5453_001_E3_115_1	PAGE NAME: DF

FIGURE 3

G:\ZY5453\ZY5453_FIGURE 3.dwg, DF (2), 2005-12-16 13:47:29

2.4.3 Personnel Lodging

It is anticipated that approximately 45 people will be involved in the project. Mikim intends to provide a total of 24 double-occupancy rooms in addition to the 3 single occupancy units intended for the Engineer, the sick quarters, and the medic. Each occupant will be provided with the linens and beddings specified in the contract.

2.4.4 Medical Assistance

A Medic qualified to administer emergency and survival first aid will be assigned. In the case of an emergency requiring transportation to the closest medical facilities, the emergency response plan will be called for. This plan will be provided to the Engineer for approval prior to the commencement of work. More details regarding health and safety are provided in the Health and Safety plan.

2.4.5 Laundry, Janitorial and Cleaning

Sheets and pillow cases will be laundered on a regular basis in order to provide weekly supply of clean linens to all occupants. Building floors will be cleaned daily. Washrooms will be cleaned and sanitized on a daily basis.

2.4.6 Wastewater

The following sections provide details regarding the wastewater treatment unit to be used during camp operations. Details regarding the proposed wastewater management plan during camp erection are also provided.

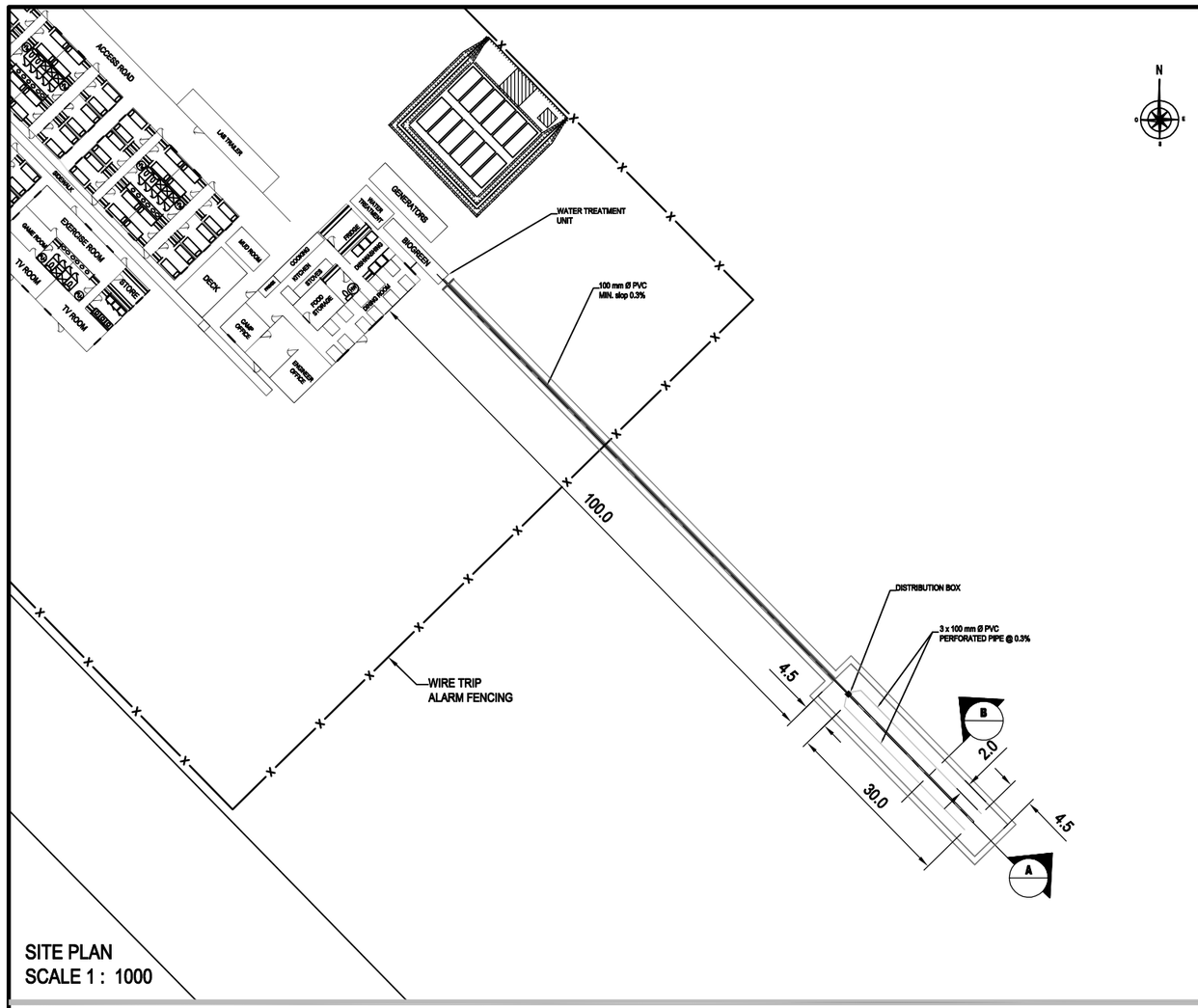
2.4.6.1 Camp Wastewater Management

Proper wastewater management is very important to Mikim. Considering that what is currently done in similar projects can be improved, Mikim will go beyond the minimal requirements and take a complete portable wastewater treatment unit to the site to process all wastewater generated during camp operations.

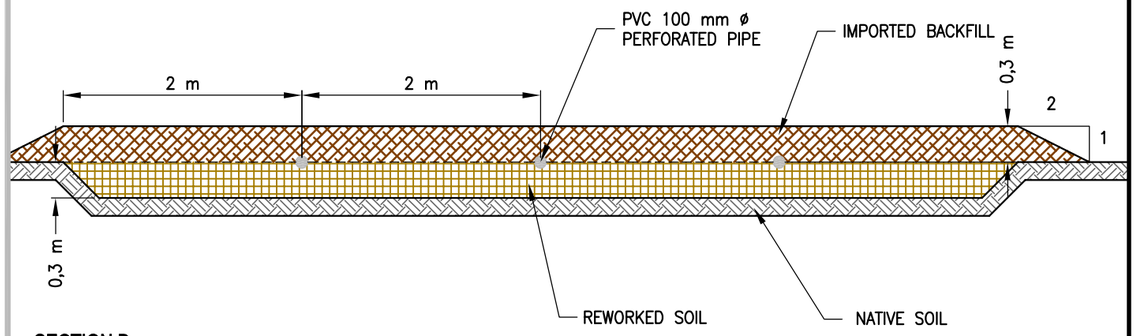
The BioGreen system was successfully used in similar weather conditions, during the remediation of the Saglek radar station, in Labrador. The system is also currently used in several hamlets of the Labrador coast and proves efficient and reliable. This unit will ensure to easily meet all discharge criteria. All wastewater will be collected into a 1,000 L sewage tank. A multure pump will then ensures that only small organic waste is transferred into the treatment unit. Figure 4 provides a general layout of this process.

The BioGreen system is designed to discharge wastewater with BOD and TSS concentrations of 20 mg/L, which is well below the maximum concentration allowable for discharge as defined in the contract specifications.

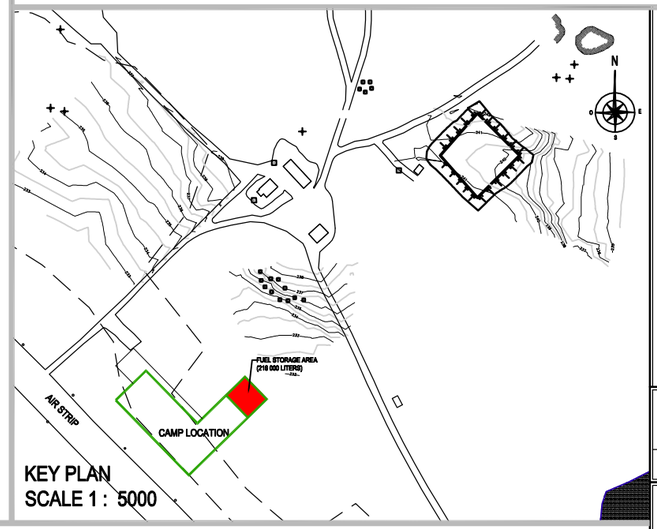
During the first week of camp operations, the effluent may be discharged into a sump having a capacity of approximately 100 m^3 (more than one week of wastewater production). Samples are to be collected and analyzed to ensure that all required parameters meet the concentrations provided in the contract. Upon confirmation that all parameters meet the required concentrations, the effluent will be directly discharged on land at a distance of at least 100 m from the camp, 50 m from a drainage path, 100 m from the lake, and downwind from the camp. See Figure 1 for the proposed discharge location. Figure 4 provides details regarding the wastewater management system.



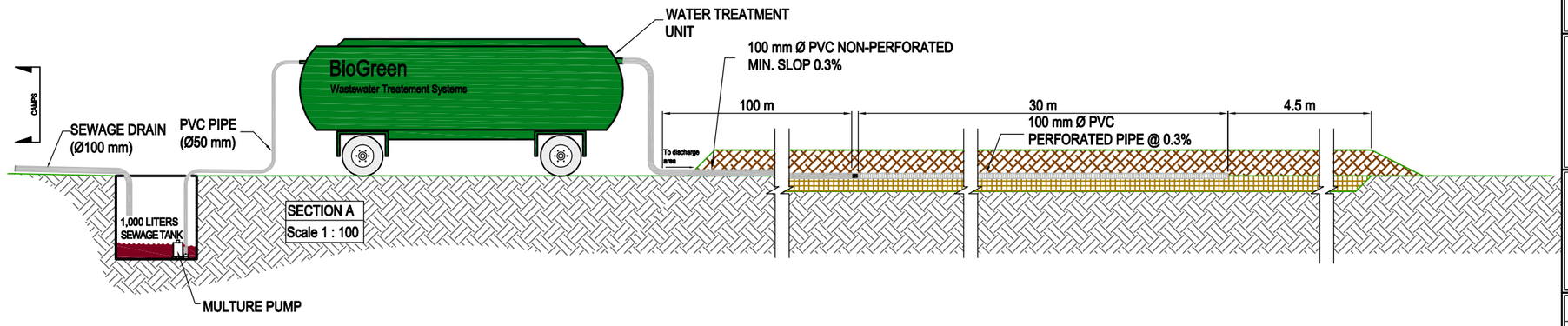
SITE PLAN
SCALE 1 : 1000



SECTION B
SCALE 1 : 50



KEY PLAN
SCALE 1 : 5000



SECTION A
Scale 1 : 100

SOURCE :

UMA AN AECOM COMPANY, PROJECT N°41334, SHEET N° C03, 3 MARCH 2005

NO.	VERSION	DATE	PAR	VERIF.	APPR.
B	CONSTRUCTION	05-11-29	A.J.	G.R.	M.P.

Public Works and Government Services Canada

CAM-F SARCPA LAKE CONSTRUCTION CAMP

SARCPA LAKE, NUNAVUT

SARCPA LAKE SEWAGE DISCHARGE TILE FIELD

MCL

UNIT OF MEASURE	SCALE:	DATE (month-year):
METER	AS INDICATED	NOVEMBER 2005
DRAWN BY: A. JACQUES	VERIFIED BY: G. ROBERT	APPROVED BY: M. POULIOT
PROJECT: ZY5453-001	DRAWING NO: ZY5453_001_E2_115_4	PAGE NAME: DF

FIGURE 4

G:\ZY5453\ZY5453_FIGURE 4.dwg, DF, 2005-12-16 13:47:01