

**Environmental Impact Assessment  
Registration  
Mactaquac Centennial Park,  
Onsite Effluent Disposal**

**Submitted to:** NB Department of the Environment and Local Government  
Sustainable Development & Impact Evaluation  
Marysville Place  
P. O. Box 6000  
Fredericton, NB  
E3B 5H1

**Prepared by:** NATECH Environmental Services Inc.  
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**Date:** July 28, 2016





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## **1 THE PROPONENT**

### **1.1 Name of Proponent**

NB Department of Tourism, Heritage and Culture

### **1.2 Address of Proponent**

Centennial Building

P. O. Box 6000

Fredericton, NB

E3B 5H1

Canada

### **1.3 Chief Executive Officer**

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Phone: (506) 470-1144

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### **1.4 Principal Contact for Purposes of Environmental Impact Assessment**

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### **1.5 Property Ownership**

NB Department of Tourism, Heritage and Culture

## **2 THE UNDERTAKING**

### **2.1 Name of the undertaking**

New On-site Effluent Disposal System, Mactaquac Provincial Park, N.B.

### **2.2 Project overview**

The project consists in the development of a replacement effluent disposal system for the failing mechanical wastewater treatment plant. The effluent from two comfort stations and the TreeGo office will be settled in septic tanks, and then disposed of in on-site disposal fields.

Mactaquac Provincial Park is a Canadian provincial park with an area of 5.25 square kilometres (2.03 sq mi). It is located on the Saint John River 15 kilometres west of Fredericton, New Brunswick in the community of Mactaquac.

The park was created in the 1960s during the construction of the Mactaquac Dam. The park contains a golf course, a campground, two beaches, hiking trails, and cross-country skiing trails in the winter.

The existing treatment plant was installed in 1980. It consists of a FMC mechanical package plant, using the extended aeration process. The system includes a screen and comminutor, followed by an aeration tank, a clarifier and a return sludge pump. An air compressor provides the aeration. A chlorination chamber for disinfection is no longer in use. The system was designed for an effluent load in terms of BOD (biochemical oxygen demand) of 6.2 kg/d (13.7 lbs/day) and a flow of 19 m<sup>3</sup>/d (5000 USgpd). The effluent is discharged via a 150 mm diameter pipe into the Mactaquac head pond, approximately 150 m off shore. The settling tank requires periodic pumping of the sludge. In the past, 18 m<sup>3</sup> of sludge have been removed every two years from the tank

### **2.3 Purpose/Rationale/Need for the undertaking**

The existing mechanical plant treating the wastewater from the washrooms in York Centennial Park (including the TreeGo building) is not producing the desired effluent quality. The effluent has an elevated solids concentration, and is no longer disinfected. The plant consists of a three chamber steel container that is over 30 years old and that has reached the end of its life expectancy. The treated effluent is currently being discharged into the Mactaquac Headpond, relatively close to shore where recreational contact with the water cannot be precluded. It is possible that recently introduced environmental regulations will require better effluent treatment and possibly an environmental risk assessment in the future.

Table 1 lists updated frequentation figures and wastewater flow calculations. We consulted with the operator of TreeGo and found out the following about their operation:

- There are up to 6,000 visitors per season (April 1<sup>st</sup> to October 15<sup>th</sup>)
- The peak number of visitors per day was 180 per day in recent years
- There are two washrooms in the TreeGo building
- There are outhouses along the TreeGo course in the forest. Therefore the washrooms from the Park or in the TreeGo building connected to the wastewater treatment plant are only partially used by TreeGo customers.

To calculate wastewater flows generated, it was assumed that washrooms are used once per visit per person, both for Park visitors and TreeGo visitors, with an average volume of 13L/flush for all washrooms.

Table 1. Estimated wastewater flows

Facility	Washroom usage		Unit flow	Effluent flow	
	Average	Peak		Average	Peak
	people	people	L/flush	L/day	L/day
Park	30	150	13	390	1950
TreeGo	31	180	13	403	2340
<b>Total</b>	<b>61</b>	<b>330</b>		<b>793</b>	<b>4290</b>

The site was surveyed on May 20, 2016 with a Total Station Survey Instrument. LIDAR elevation data were obtained for the site, as well.

Three test pits were dug to a depth of at least 1.8 m to determine soil conditions. The typical soil structure in the area below the Tree Go building is 0.1 m of organic topsoil, followed by 0.3 m of sandy loam, and 1.4 m of sandy clay loam and/or clay mixed with rocks. No bedrock was encountered in the two upper test pits, but it was found at a depth of 1.8 m in TP3. No groundwater was encountered. A percolation test was carried out in the sandy loam layer and a rate of  $6.1E^{-5}$  m/s was measured.

Several alternatives for upgrading the treatment system were evaluated. Table 3 lists these options, as well as corresponding advantages and disadvantages. Refurbishing the existing aerated tank was not considered, since the effluent quality from this type of system does not appear to consistently meet current standards for solids removal and disinfection.

Effluent quality records of the existing WWTP are summarised in Table 2. The BOD<sub>5</sub> or CBOD<sub>5</sub> concentrations were below the standard of less than 20 mg/L, but TSS regularly exceeded the standard of 20 mg/L (maximum concentrations listed in the Approval to Operate for the facility). E. Coli concentrations were significant. The current standard for E. Coli is less than 200 MPN/100 mL in waters used for primary contact recreation (such as swimming), as is the case here. The average concentration was near 10,000 with a peak of 26,000 MPN/100 mL. The regulators in New Brunswick require that new or



upgraded facilities include disinfection, to meet this standard prior to discharging the effluent.

Table 2. Effluent quality from 2011 to 2015

Parameter	Unit	Min	Max	Average	Number of data
BOD <sub>5</sub> or CBOD <sub>5</sub> *	mg/L	<10	35	<b>&lt;12</b>	24
TSS	mg/L	10	110	<b>26</b>	24
Total ammonia	mg/L	1.8	8.5	<b>5.2</b>	2
Nitrates-N	mg/L	3.1	17	<b>8.9</b>	6
Nitrites-N	mg/L	<0.1	1.7	<b>0.6</b>	6
TKN	mg/L	<1	23	<b>5.5</b>	14
TP	mg/L	<1	1.1	<b>&lt;1.1</b>	2
E.Coli	MPN/100 mL	70	26,000	<b>9,700</b>	6

BOD<sub>5</sub> was measured until 2013, and CBOD<sub>5</sub> was measured subsequently.

Table 3. Comparison of Wastewater Treatment Options

<b>Treatment type</b>	<b>Advantages</b>	<b>Disadvantages</b>	<b>Effluent disposal</b>
<b>Mechanical plant</b>	- Small footprint	- More difficult to operate, - Monitoring and equipment maintenance required - Disinfection required - Requires Approval to Operate	<b>Outfall in headpond</b>
<b>Lagoon</b>	- Proven technology to meet standards	- Flat area not available close to facilities - Monitoring and equipment maintenance required - Unsightly - Disinfection required - Requires Approval to Operate	Outfall in headpond
<b>Subsurface constructed wetland</b>	- Natural look	- Monitoring and equipment maintenance required - Disinfection required - Requires Approval to Operate	Outfall in headpond
<b>Conventional septic system</b>	- No discharge in Lake - No disinfection required - Minimal monitoring required	- High mound and large footprint required due to soil conditions - Construction difficult due to steep slopes - Septic tanks require pumping once per year - pump station requires maintenance	In-ground disposal

<p><b>Contour trenches (non-conventional system)</b></p>	<ul style="list-style-type: none"> <li>- No discharge in Lake</li> <li>- No disinfection required</li> <li>- Limited footprint and mound</li> <li>- No monitoring</li> </ul>	<ul style="list-style-type: none"> <li>- Septic tanks require pumping once per year</li> <li>- pump station requires maintenance</li> </ul>	<p>In-ground disposal</p>
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Costs are preliminary and do not include allowances for contingencies and engineering

## 2.4 Project location

The proposed project is located on provincially owned land identified by Service New Brunswick (SNB) as PID 75132449, off highway 105, in the Local Service District of Mactaquac, N.B, in the Parish of Bright and the County of York. The approximate coordinates of the centre of the property N 7,438,524 m, E 2,470,435 m (in the NB Stereographic system) or N 45.9462°, W -66.8813° (latitude and longitude).

Figure 2-1 shows the location of the site using a topographic map of the area as a background. A project layout is shown on the attached Drawing C-01 in Appendix A.



Environmental Impact Assessment  
 Mactaquac Provincial Park, Mactaquac, NB  
 Location Map



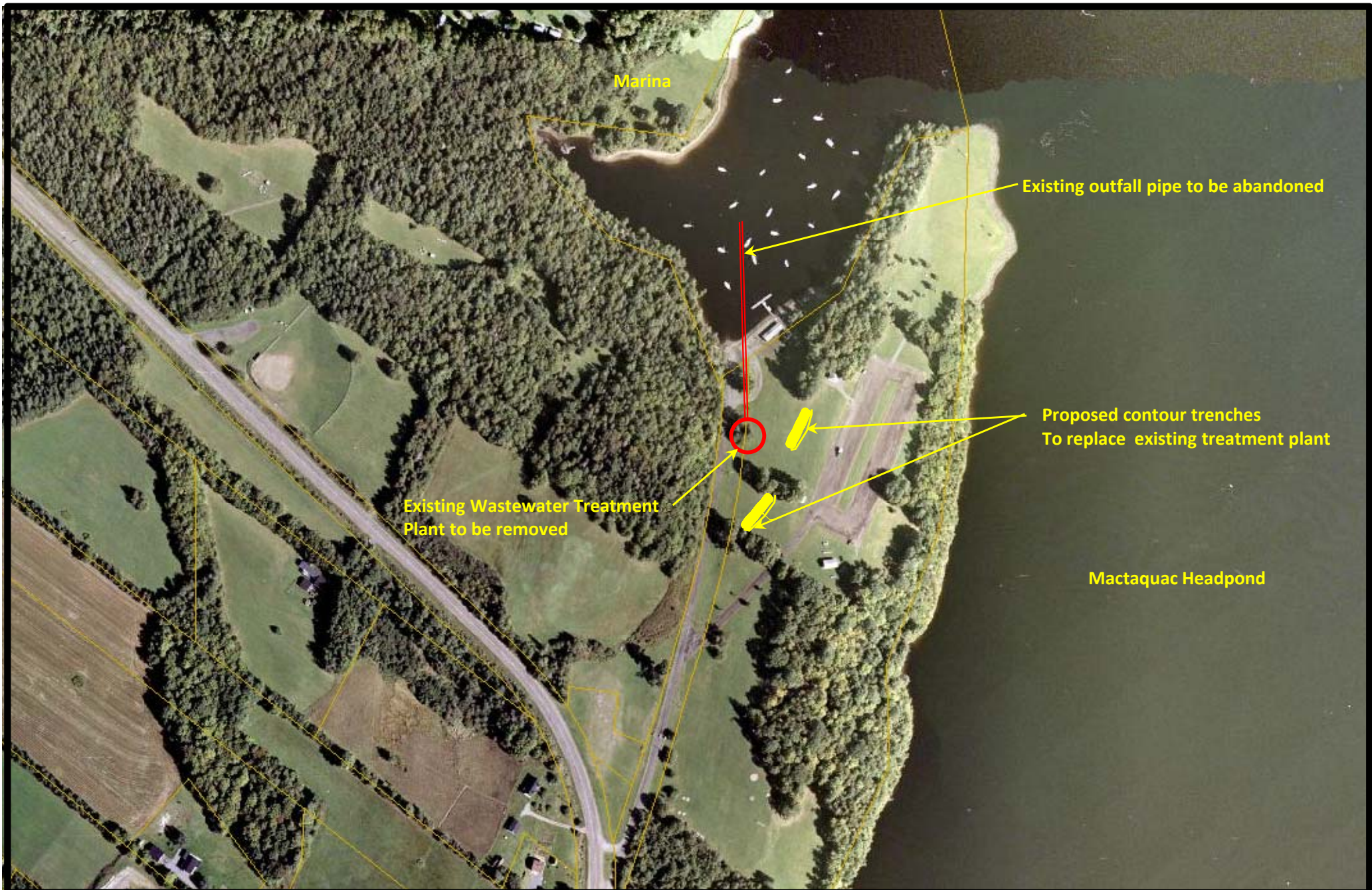
**Environmental Services Inc.**  
 2492 Route 640, Hanwell, NB, E3E 2C2  
 ph: (506) 455 1085, fax (506) 455 1088

DATE: 2016/07/27

FILE: MPP-16-01

SCALE:

FIGURE: 2-1



Environmental Impact Assessment  
 Mactaquac Provincial Park, Mactaquac, NB  
 Site Layout



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 ph: (506) 455 1085, fax (506) 455 1088

DATE: 2016/07/27  
 SCALE:

FILE: MPP-16-01  
 FIGURE: 2-2

## 2.5 Siting considerations

The location of the disposal field was chosen based on the slope of the terrain, soils conditions, and to minimize the amount of earth work required.

Wetlands: Based on the publicly available wetland mapping (<http://geonb.snb.ca/geonb/>), there are no provincially regulated wetlands near the construction site. The GeoNB Map viewer wetland mapping layer as of July 28, 2016 is attached in Appendix B.

All options considered are technically feasible and the costs are in a similar order of magnitude. The two on-site disposal options have significant advantages over the point source discharges, by eliminating the need for an Approval to Operate, reducing the need for equipment maintenance and for effluent quality monitoring. The last two options (conventional septic system and contour trenches) have no longer an impact on the receiving environment (the Mactaquac Headpond), as the local soil is used to absorb the effluent and, the existing outfall can be abandoned and decommissioned.

Compared to a conventional disposal field, contour trenches are best suited to steeper terrain, as is the case here, and are therefore recommended. They can also be better integrated in the landscape than a septic field. The top 0.4 m of soil under each trench and down gradient of the trench is permeable, and will absorb and filter the wastewater before it eventually reaches the groundwater table. Deeper soil layers contain a fraction of clay and are less permeable than the top layer. Therefore, the contour trenches will have to be raised slightly above the existing terrain.

Drawings of the proposed contour trenches are provided in Appendix A. Several septic tanks will be needed for pre-treatment (solids removal), and a duplex pump station and two force mains will be required to convey the effluent into the two contour trenches.

## **2.6 Physical components and dimensions of the project**

The components of the proposed development are shown on the attached Drawings No. C-01 to C-05 in Appendix A.

The activities associated with the undertaking include stripping of top soil, excavation of trenches and holes, placement of structures and topsoil and re-seeding. These activities will increase vehicular traffic during construction.

No off-site facilities or processes were identified as part of this project.

## **2.7 Construction details**

The construction will occur in the late summer or fall of 2016, after the tourism season. The contour trenches and associated piping, as well as the pump station will be installed first. Once the system is operational, the septic tanks will be installed and all effluent will be routed to the new field. Subsequently, the old mechanical treatment plant will be removed. All disturbed areas will be restored to original conditions.

## **2.8 Operation and maintenance details**

Routine activities during the operational phase.

## **2.9 Future modifications, extensions, or abandonment**

No modifications, extensions or abandonment are envisioned.

## **2.10 Project-related documents (attached)**

Appendix A – Site Layout and Environmental Characteristics Drawings

Appendix B – Wetland Map

Appendix C – Historical Aerial Photographs

Appendix D – Public consultation - draft letter

Appendix E – Photographs



### **3 DESCRIPTION OF THE EXISTING ENVIRONMENT**

#### **3.1 Physical and natural features**

Site topography: minimum elevation: 41 m, maximum: 66 m. Minimum gradient: 4%, maximum gradient: 31%.

General surface drainage: toward the North-West and East with a high ridge running from South to North, as shown on Drawing No. C-02 in Appendix A

There are no mapped wetlands on the property, the property is surrounded on two sides by the Mactaquac Headpond. A site visit and survey was carried out on May 20, 2016. Test pit logs are shown on Drawing No. C-05 in Appendix A.

Protected areas: There are no protected areas in the park area where construction will take place. Species at risk or of conservation concern: There are no concerns beyond the normal concerns related to operating a park in a natural setting. All construction work is carried out on mowed lawn.

#### **3.2 Cultural features**

There are no known cultural features of concern in the construction area.

#### **3.3 Existing and historic land uses**

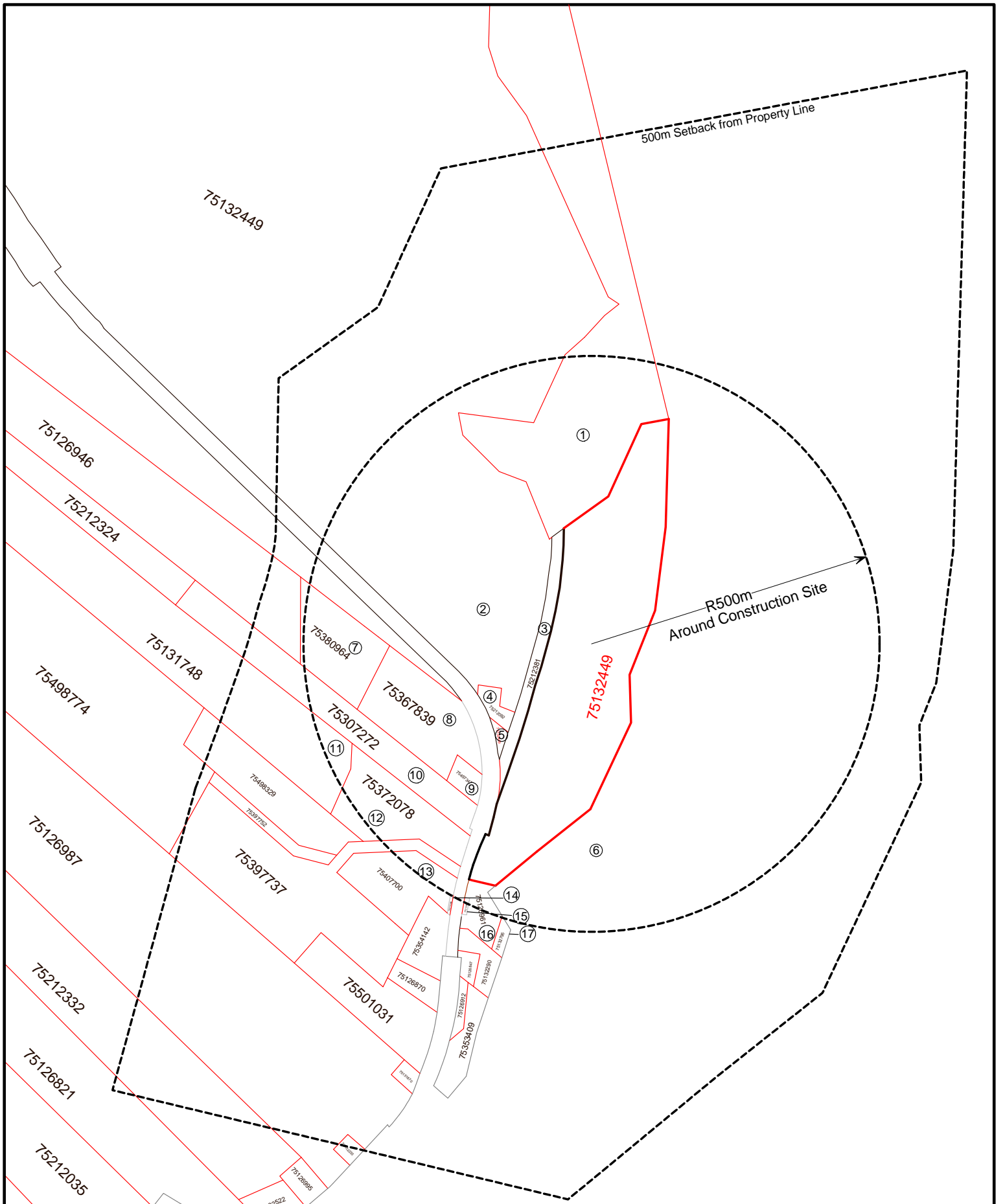
The land appeared to be farmed since 1945 at least, based on a review of aerial photos (see Appendix C).

### 3.4 Neighbouring properties

The PIDs and owner listings within 500m from the construction site are listed in Table 4. and in Figure 3-1

Table 4: adjacent landowners to Tourism and Parks Property

ID	PID	OWNER 1
1	75132662	
2	75132449	
3	75212381	
4	75212092	
5	75132449	
6	75104505	
7	75380964	
8	75367839	
9	75497347	
10	75307272	
11	75131748	
12	75372078	
13	75407700	
14	75212399	
15	75212407	
16	75126961	
17	75132795	



Environmental Impact Assessment  
 Mactaquac Provincial Park  
 Neighbouring PID`s



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Date: 2016/07/27	Date:	Project No.: MPP-16-01	N du projet
Scale: AS SHOWN	Echelle:	Sheet No.: FIGURE 3-1	N de la feuille:

#### **4 SUMMARY OF ENVIRONMENTAL IMPACTS**

The following potential impacts were identified, mainly during the construction phase.

- Air/Water/Soil Contamination during construction
  
- Erosion
  
- Noise, Vibration
  
- Storm water runoff during construction

## **5 SUMMARY OF PROPOSED MITIGATION**

### **5.1 Air/Water/Soil Contamination:**

Best Construction Management practices will be applied.

### **5.2 Erosion**

Air/Water/Soil Contamination: Silt fences and check dams will be installed as per the design drawings.

### **5.3 Noise and Vibration**

Construction will be carried out during normal operation hours from 8:00 to 18:00. A limited amount of truck traffic is expected for the import and export of materials.

### **5.4 Storm water**

The construction site is close to the top of a local ridge, and no significant amounts of stormwater are anticipated in the construction area.

## **6 PUBLIC INVOLVEMENT**

Should an EIA review be required, based on the minimum public involvement standards for registered projects outlined in Appendix C of “A Guide to Environmental Impact Assessment in New Brunswick” (NBDELG, 2012) the proponent may notify all neighbours within 500 m of the construction site and relevant local stakeholders (local watershed group, MLA, etc.) of the development by mail out. A draft mailout letter is attached (in Appendix D) including information on where to find the EIA registration document. The comments received from the public would be provided to the technical review committee.

## **7 APPROVAL OF THE UNDERTAKING**

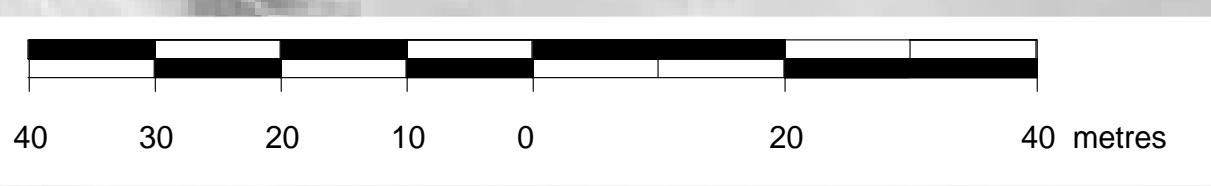
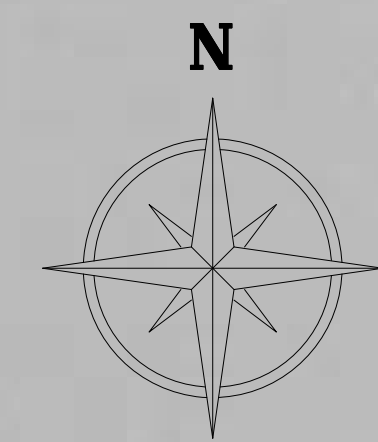
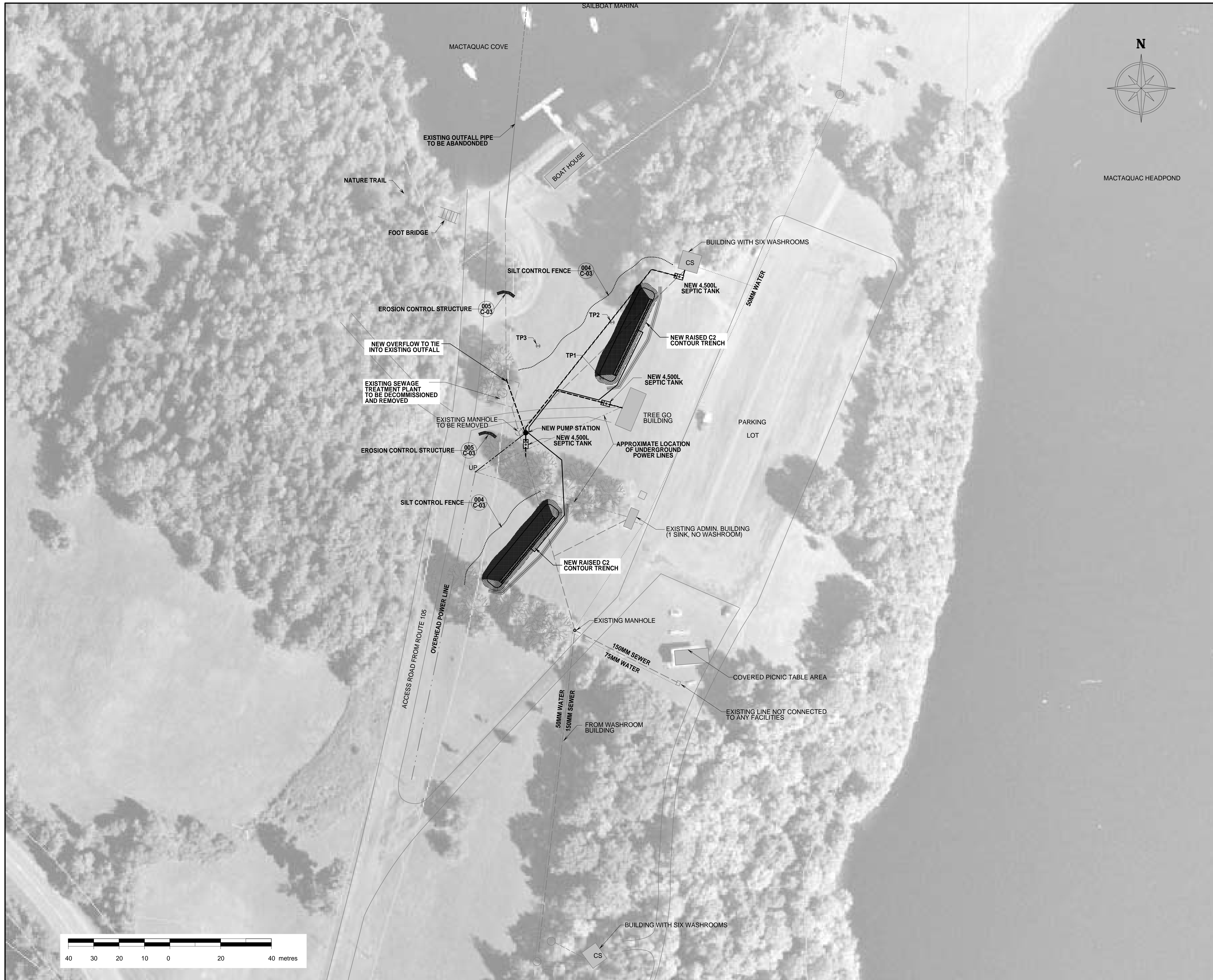
Permits, licenses and other authorizations required for the undertaking include:

Approval from the NB Department of Public Safety for a non-conventional onsite effluent disposal system. The approval will be obtained by the installer selected through the tender process.

**Appendix A – Drawings**







**New Brunswick**  
Nouveau Brunswick

Department of Transportation and Infrastructure
Ministère des Transports et de l'Infrastructure

Buildings Division
Division des Bâtiments

**NATECH**

Environmental Services Inc.

2492 Route 640, Hanwell, NB E2E 2C2  
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General notes	Notes générales

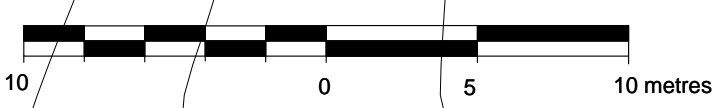
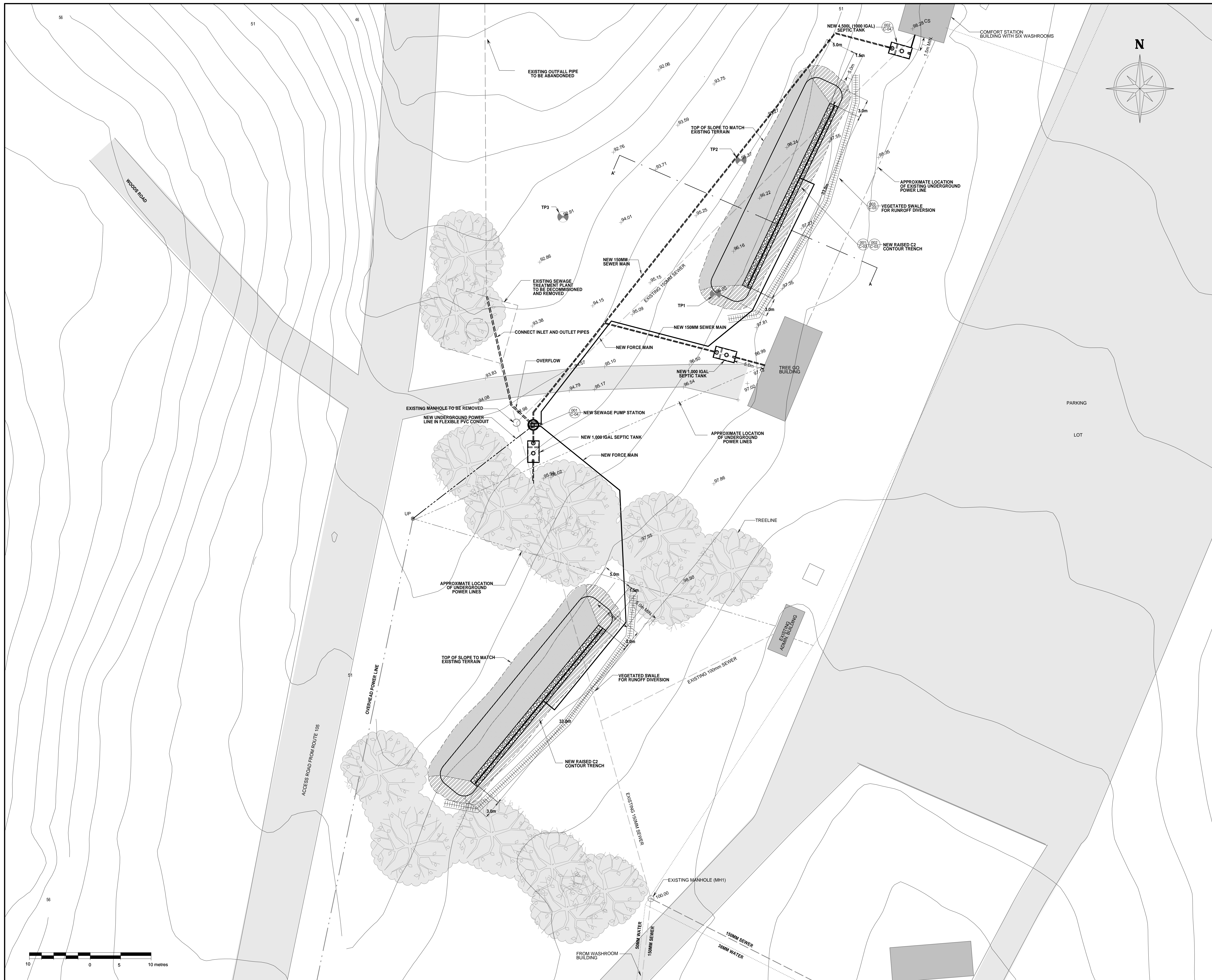
For Tender	03	2016 06 24
For Approval	02	2016 06 21
For Information	01	2016 06 09
Revisions / Révisions	No/N <sup>o</sup>	Date

**NEW ON-SITE EFFLUENT DISPOSAL SYSTEM  
MACTAQUAC PROVINCIAL PARK  
MACTAQUAC, NB**

**COVER**

Date: 2016 05 24	Date:	<b>Stamp</b>	<b>Seau</b>
Scale: 1 : 600	Échelle:		
Drawn by: T. CLEIGHORN	Drawn par:		
Approved by: J. SCHROER	Approuvé par:		
Consultant reference number:	Numéro de référence de l'expert-consultant:		

Project No. P04-PT4 BYGR11	N <sup>o</sup> du projet	Sheet No. C-01	N <sup>o</sup> de la feuille
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**New Brun Nouveau**  
 Department of Transportation and Infrastructure / Ministère des Transports et de l'Infrastructure  
 Buildings Division / Division des Bâtiments

Consultant / Expert-conseil  
**NATECH**  
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 2492 Route 640, Hanwell, NB E2E 2C2  
 ph: (506) 455-1085, fax: (506) 455-1088

General notes / Notes générales

NOTE: NB POWER TO BE CONTACTED TO LOCATED UNDERGROUND POWER LINES PRIOR TO ANY EXCAVATION TAKING PLACE.

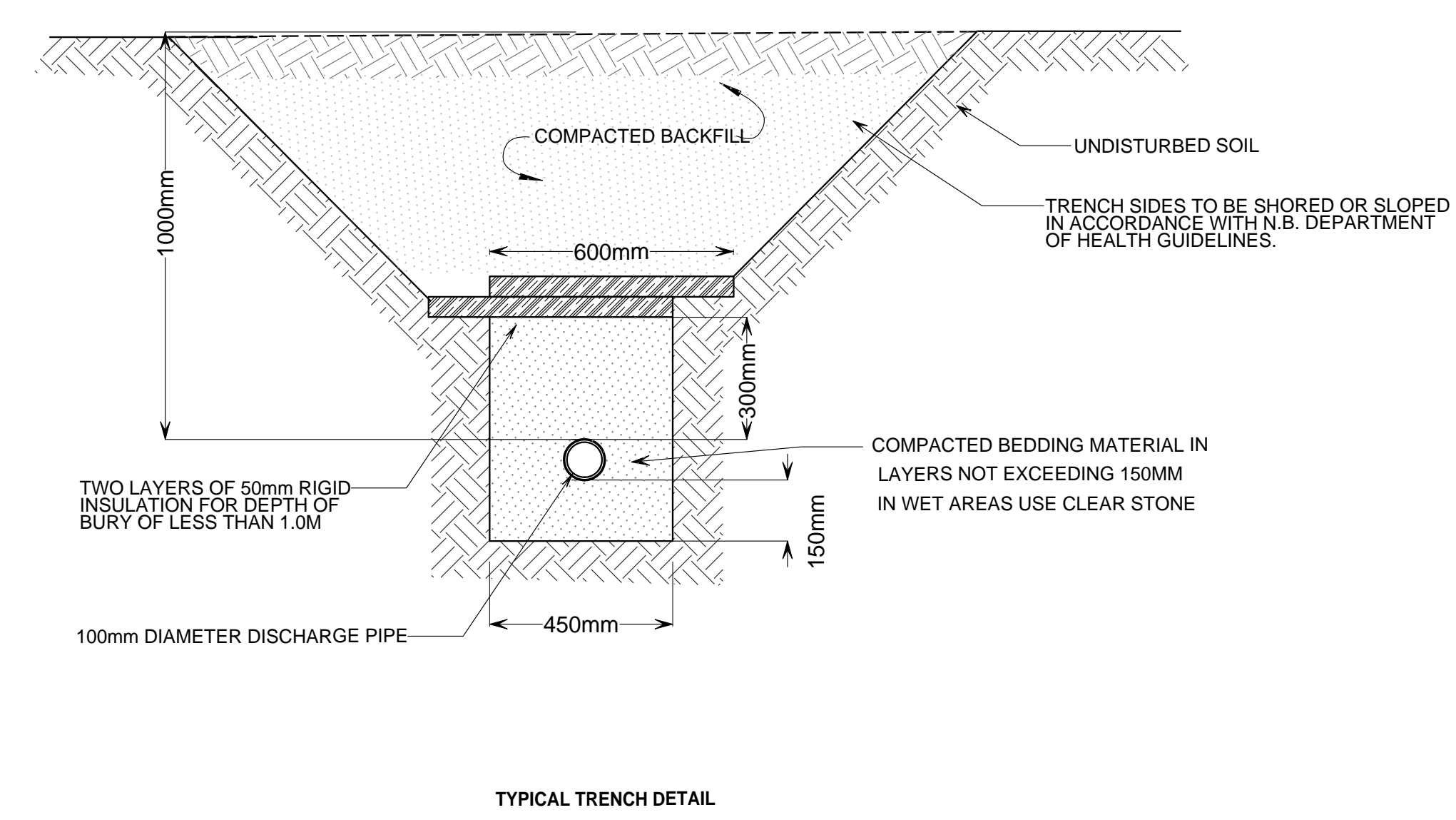
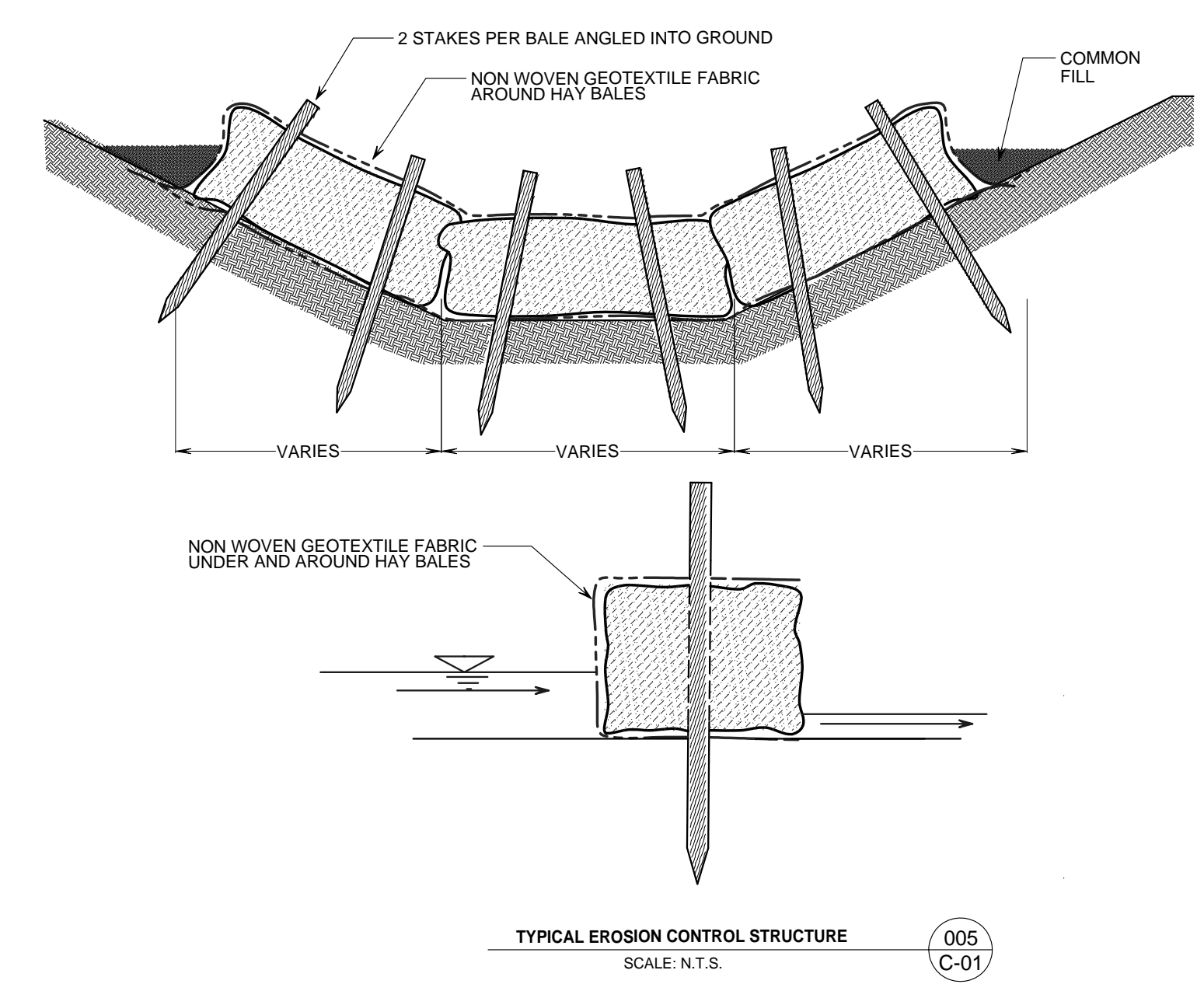
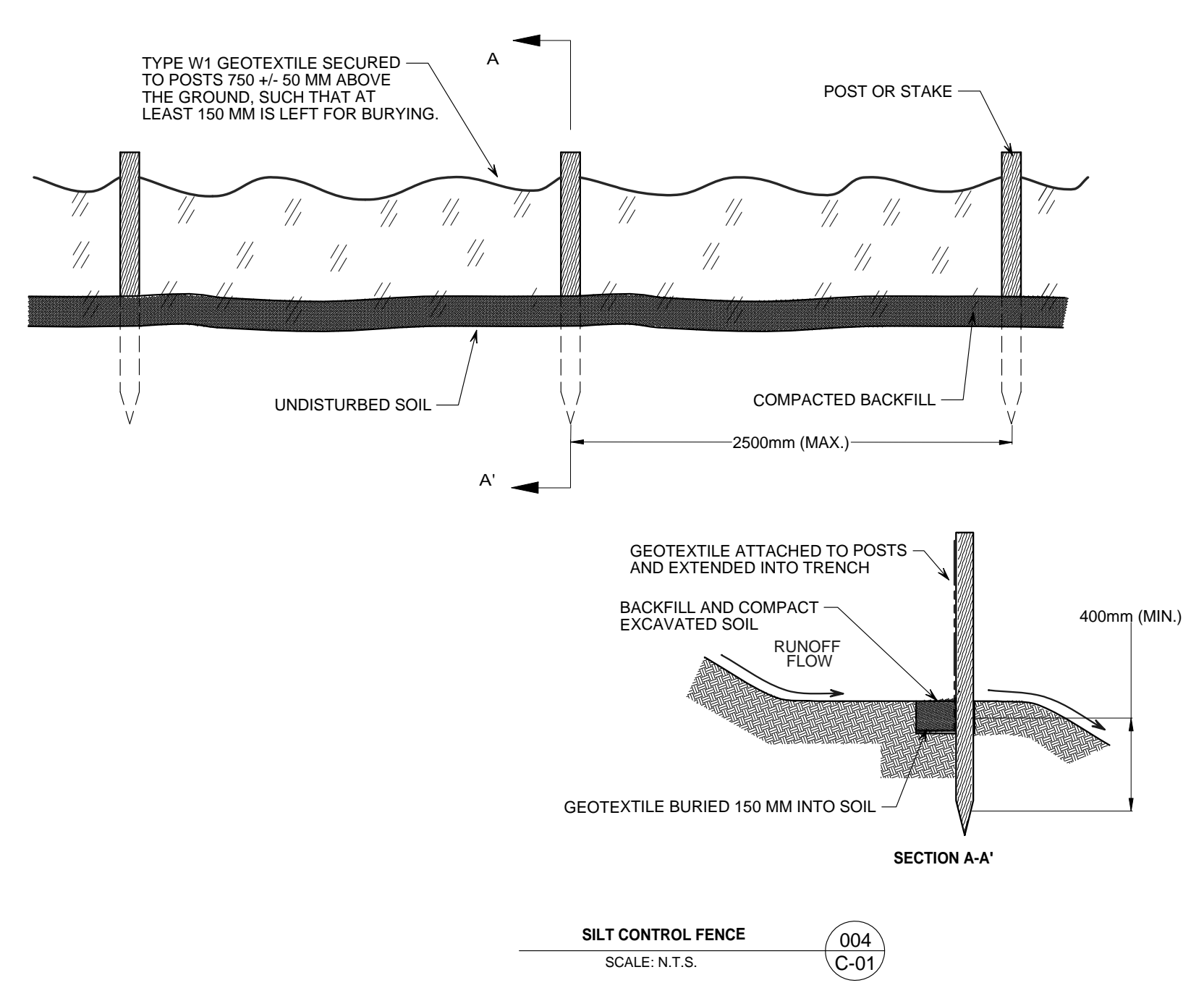
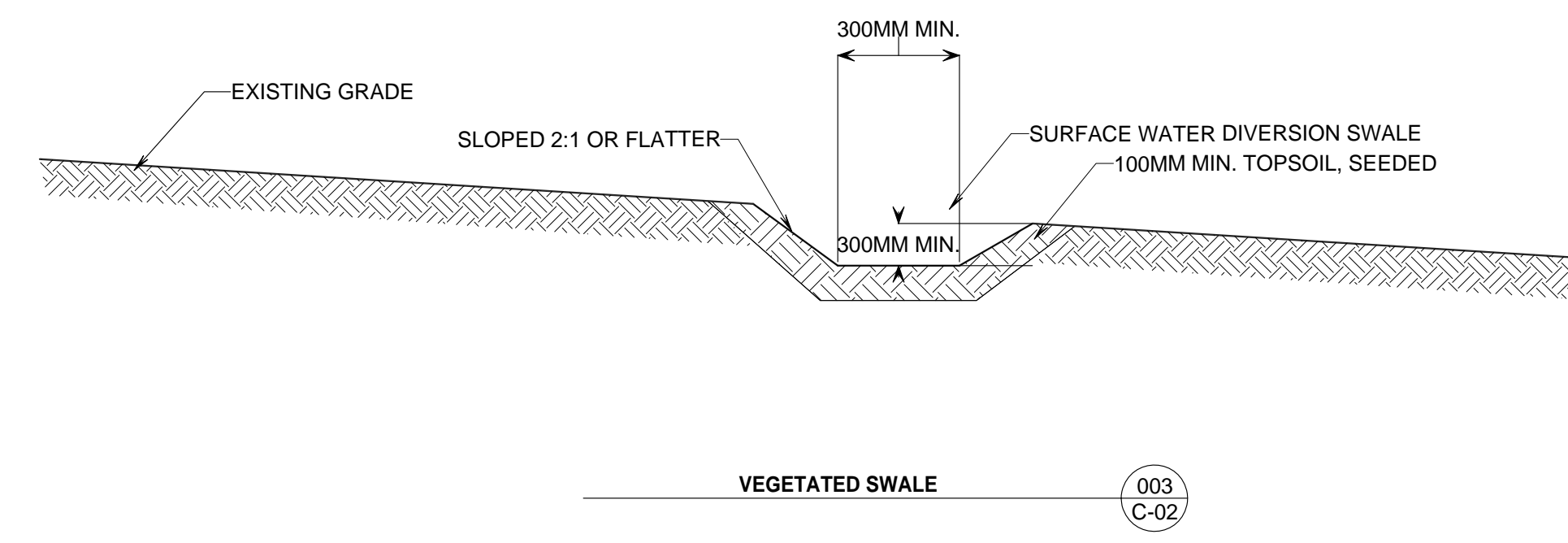
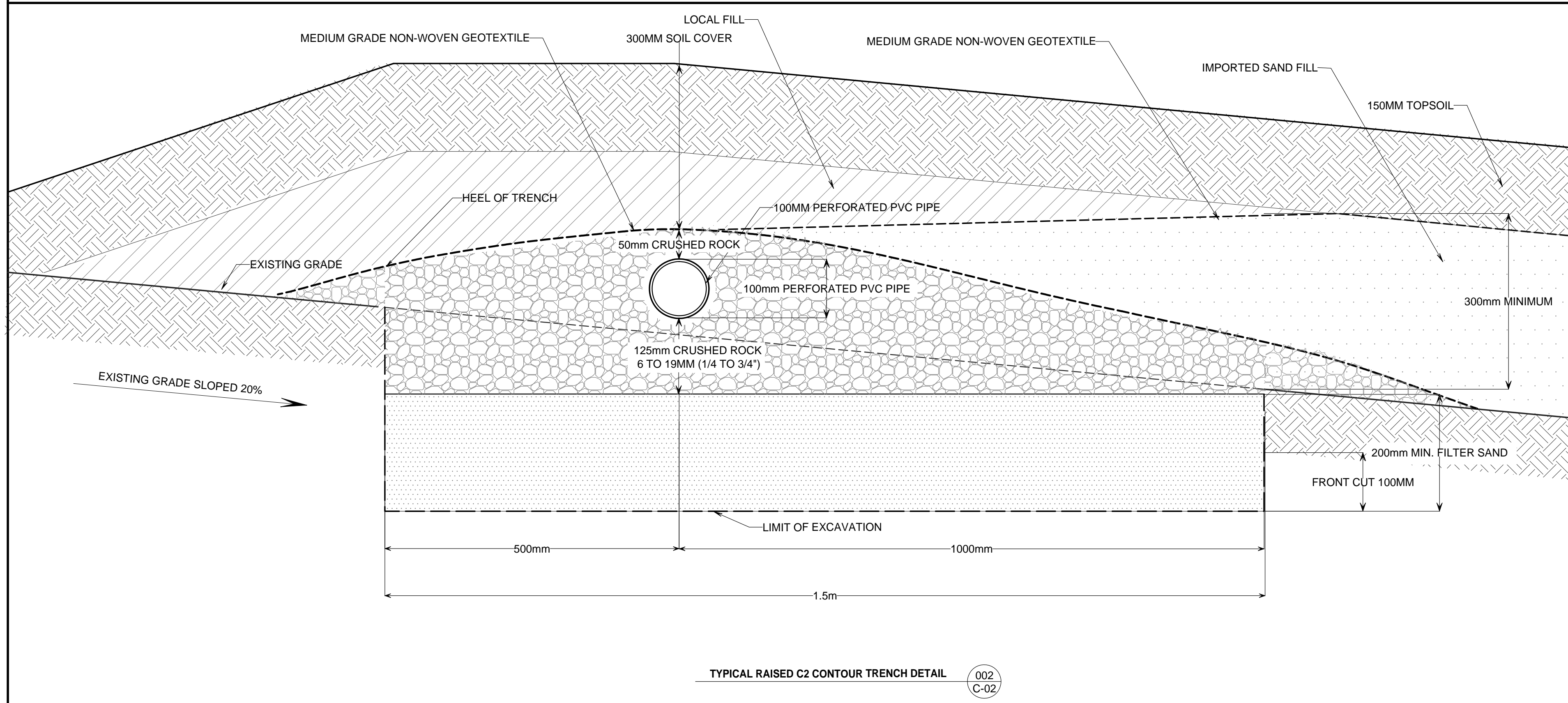
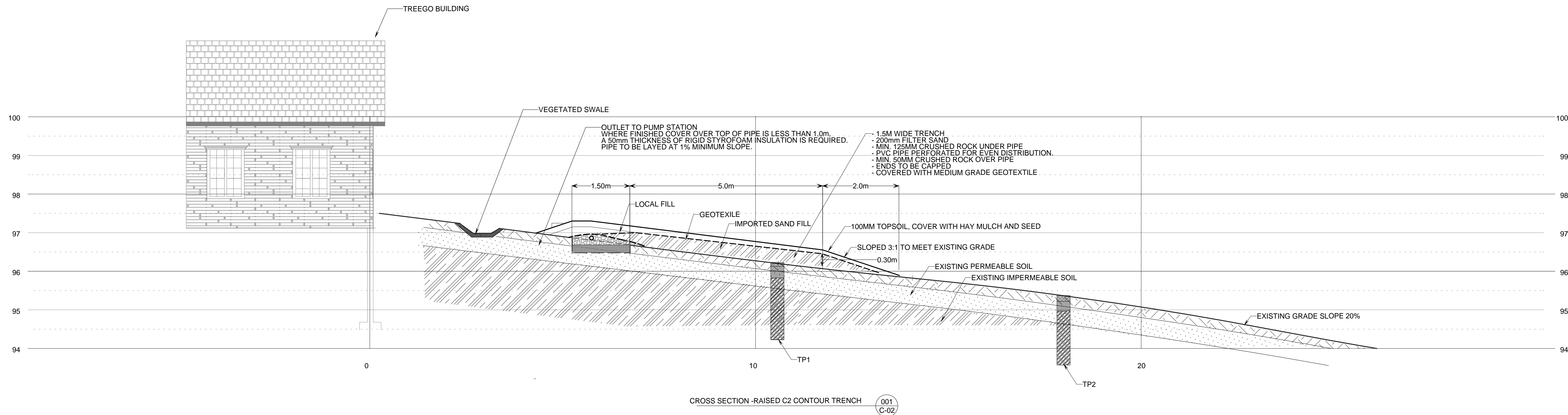
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For Information	01	2016 06 09

**NEW ON-SITE EFFLUENT DISPOSAL SYSTEM  
 MACTAQUAC PROVINCIAL PARK  
 MACTAQUAC, NB**

**SITE LAYOUT**

Date: 2016 05 24  
 Scale: 1 : 250  
 Drawn by: T. CLEIGHORN  
 Approved by: J. SCHROER

Stamp: **Seeau**  
 REGISTERED PROFESSIONAL ENGINEER  
 JOHANN SCHROER  
 16/05/2016



General notes / Notes générales

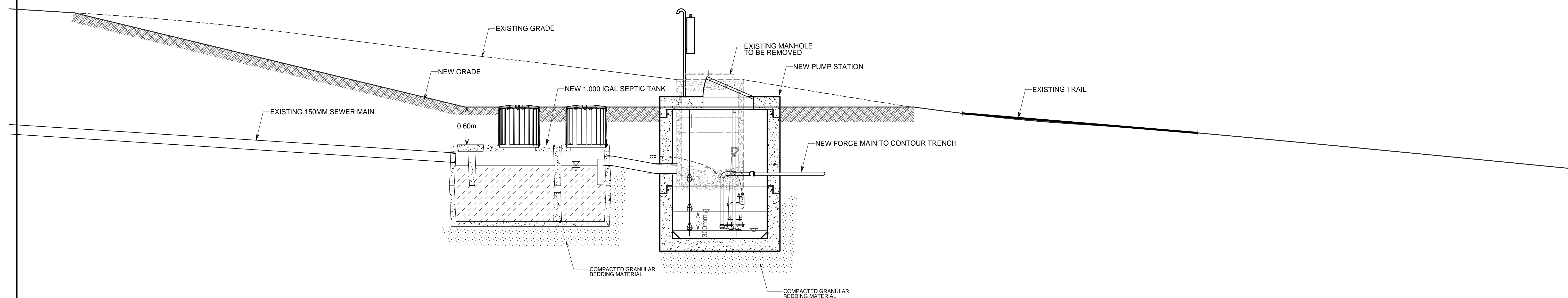
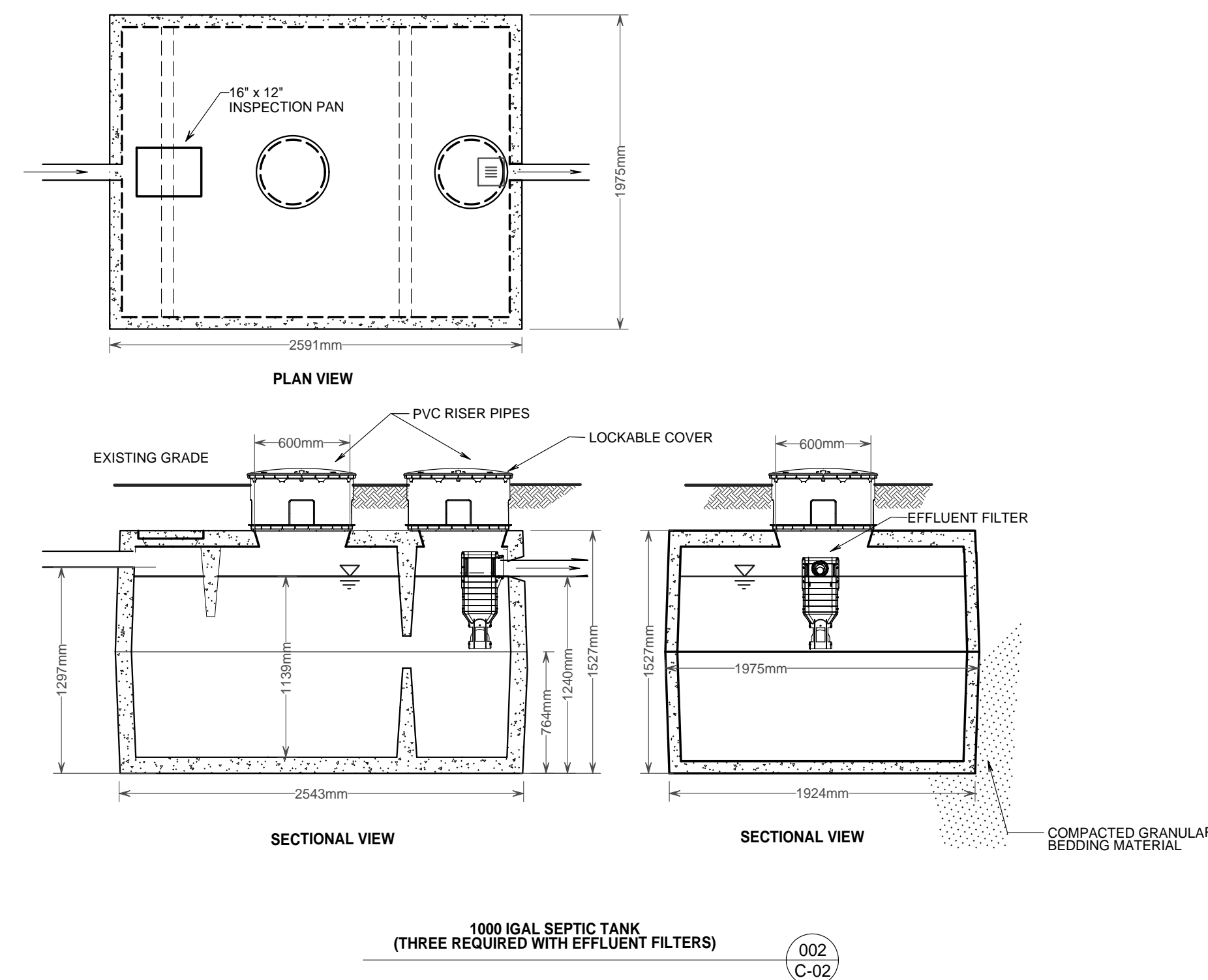
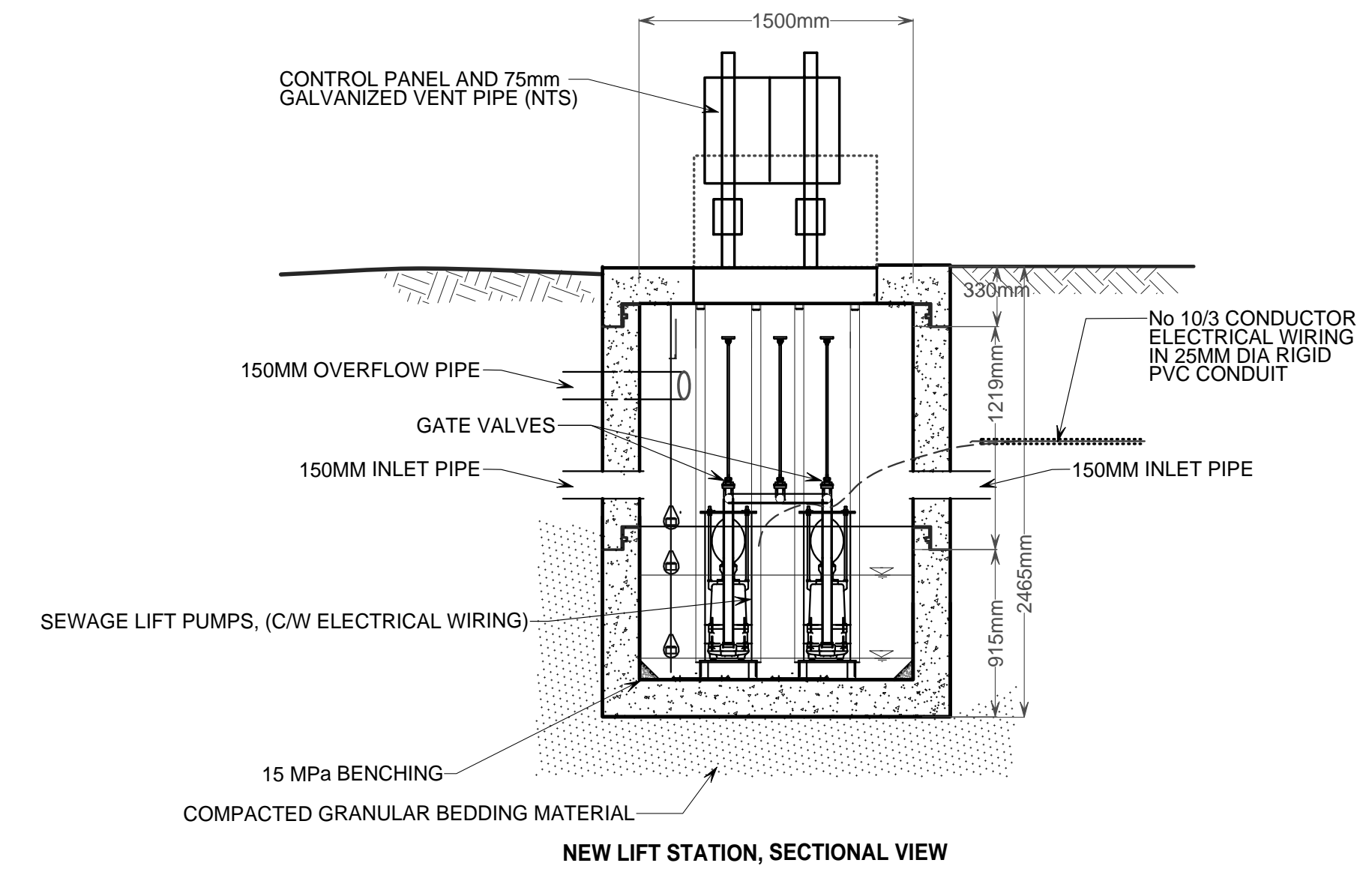
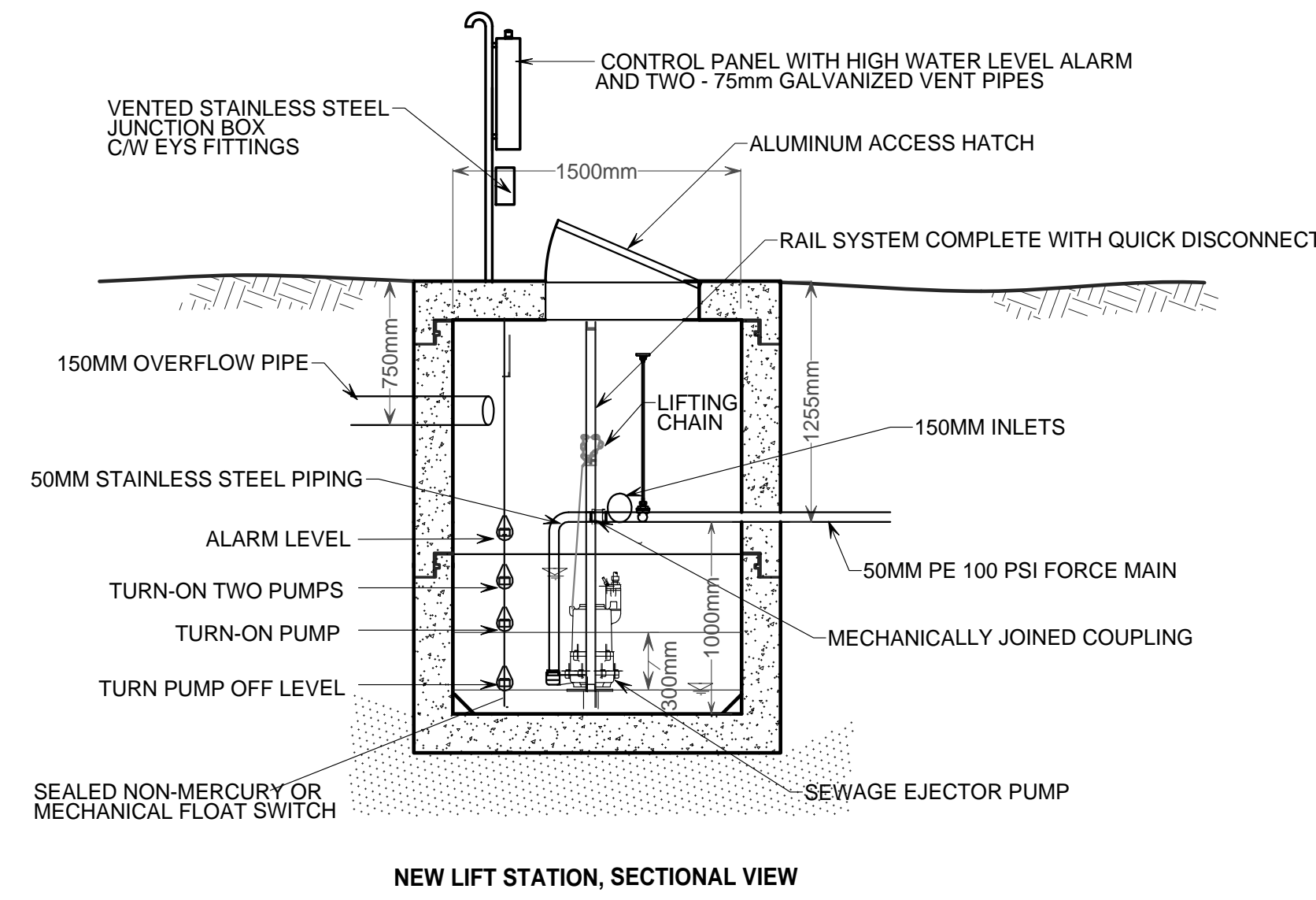
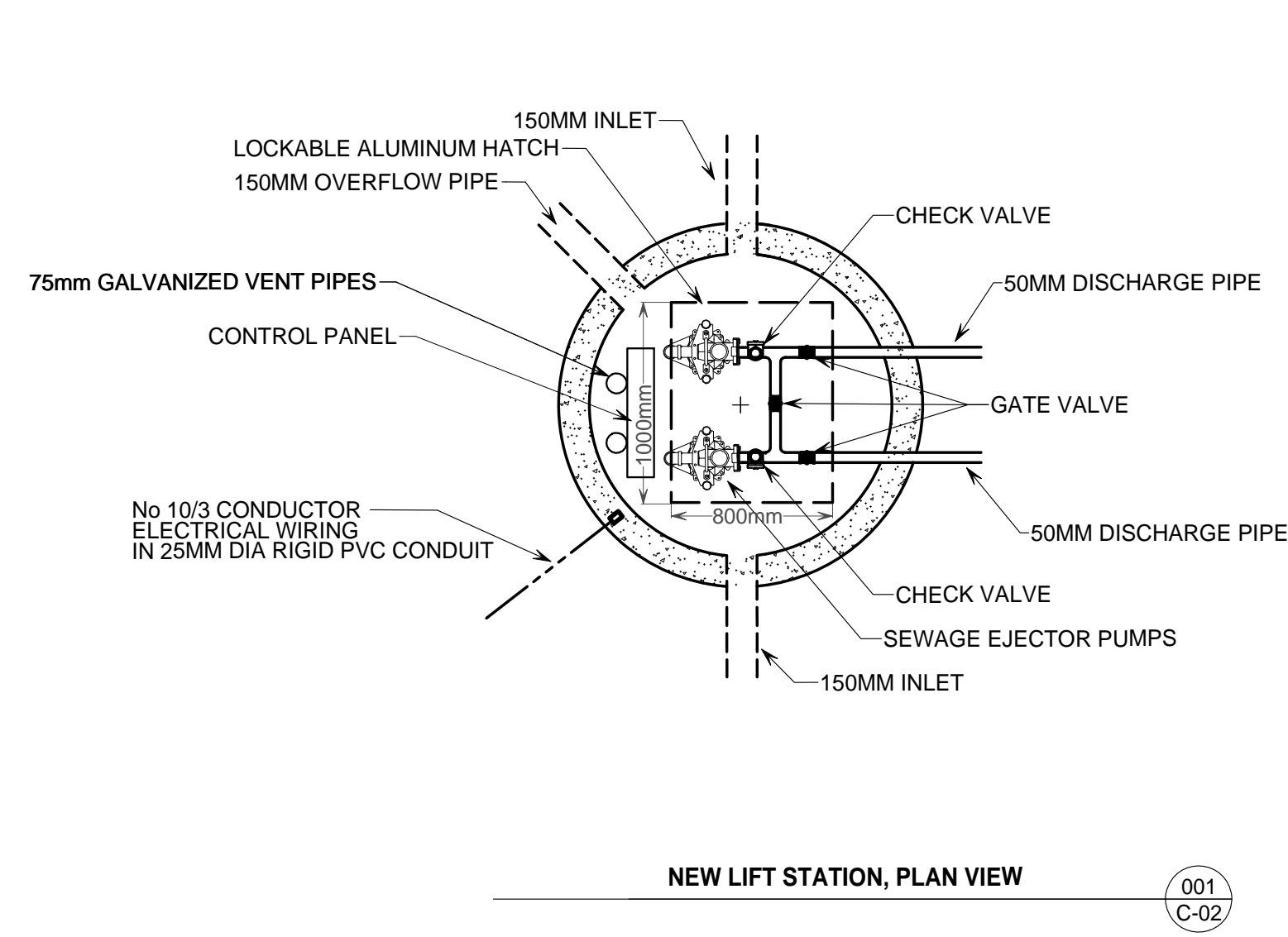
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NEW ON-SITE EFFLUENT DISPOSAL SYSTEM  
MACKTAQUAC PROVINCIAL PARK  
MACKTAQUAC, NB

PROFILE & DETAILS

Date: 2016 05 24 / Date: 2016 05 24  
 Scale: AS SHOWN / Échelle: AS SHOWN  
 Drawn by: T. CLEGGHORN / Dessiné par: T. CLEGGHORN  
 Approved by: J. SCHROER / Approuvé par: J. SCHROER  
 Consultant reference number: / Numéro de référence de l'expert-consultant: /

Stamp: Sceau  
 Registered Professional Engineer  
 16/06/21  
 J. SCHROER  
 Ingénieur en Génie Civil



General notes	Notes générales	

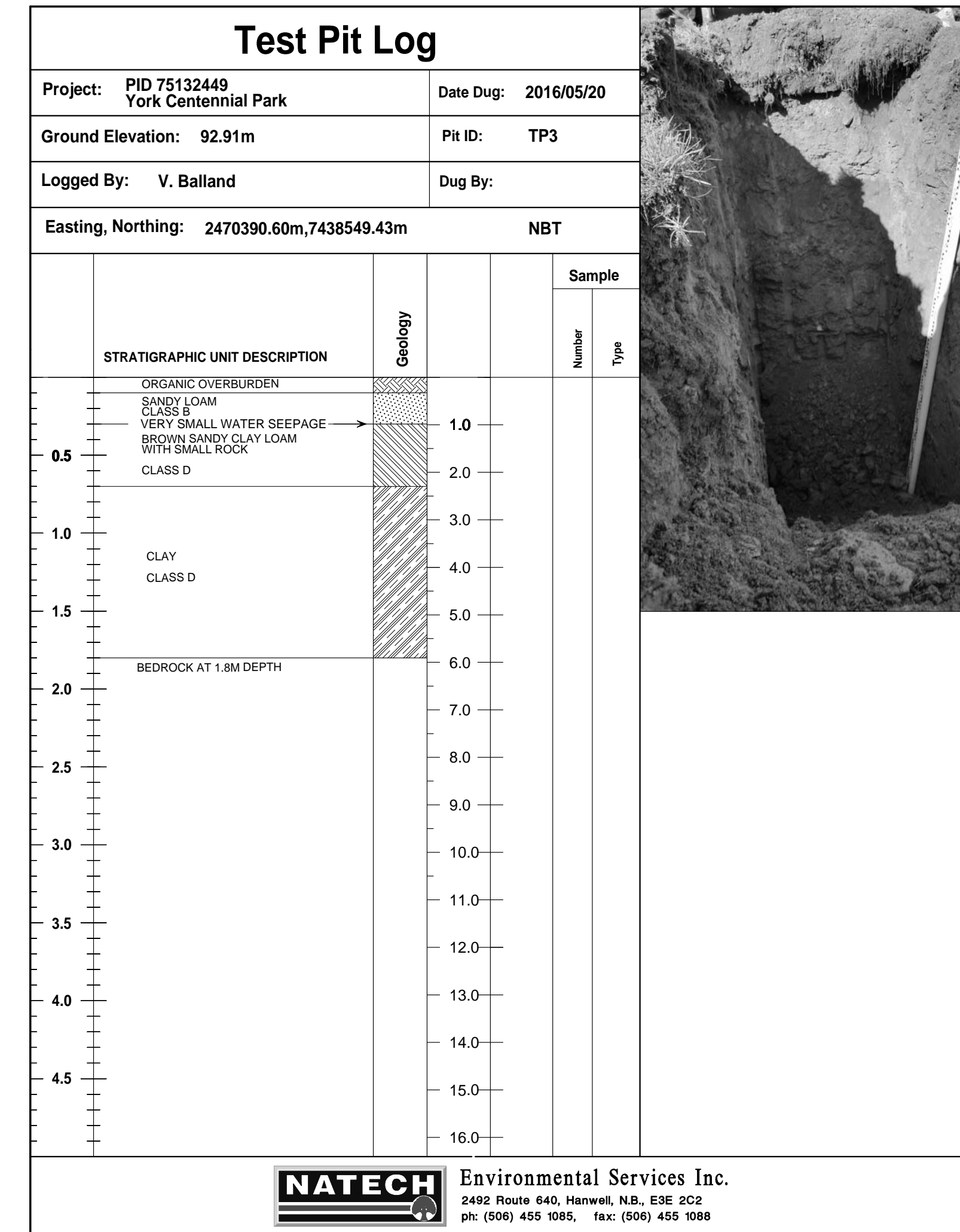
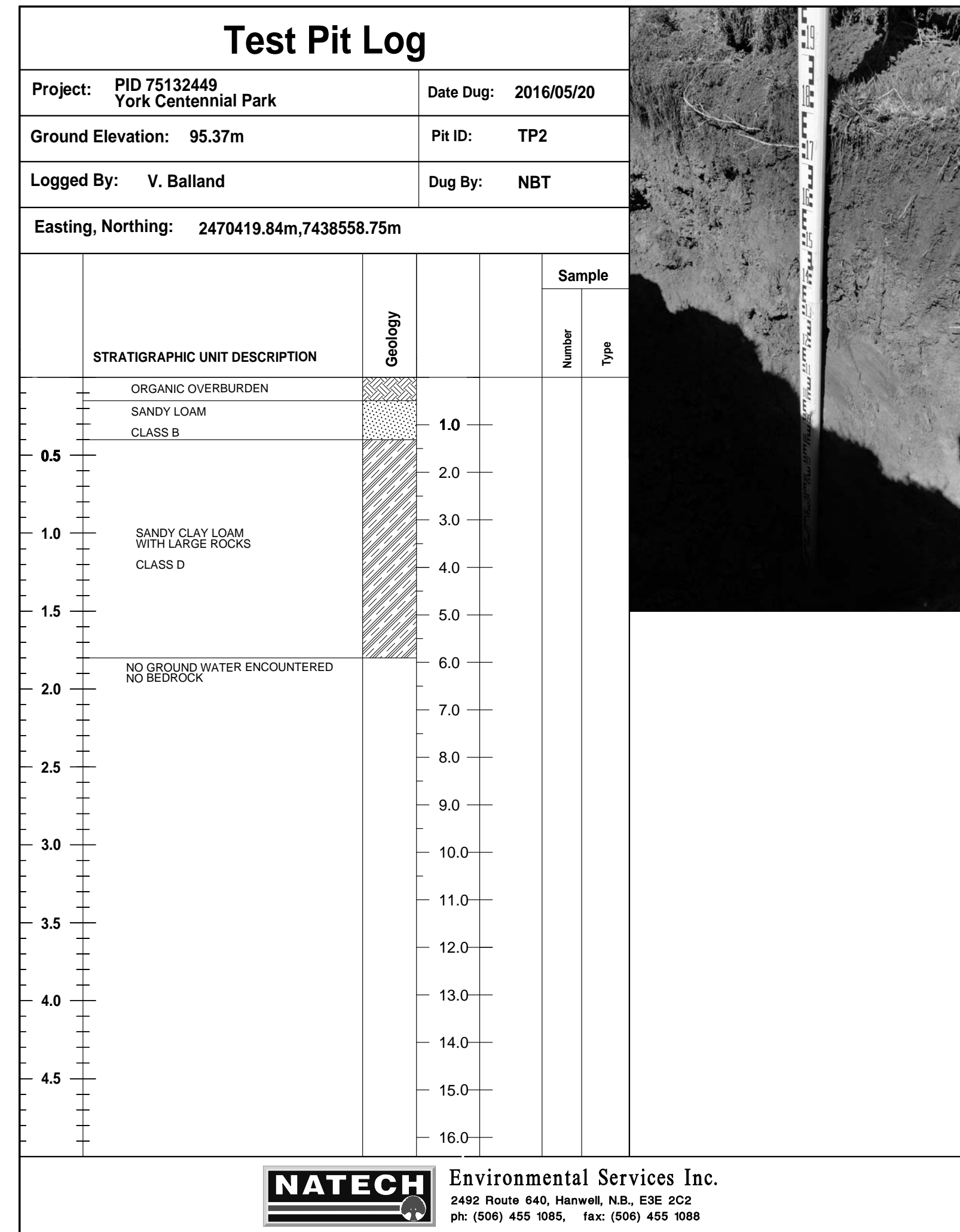
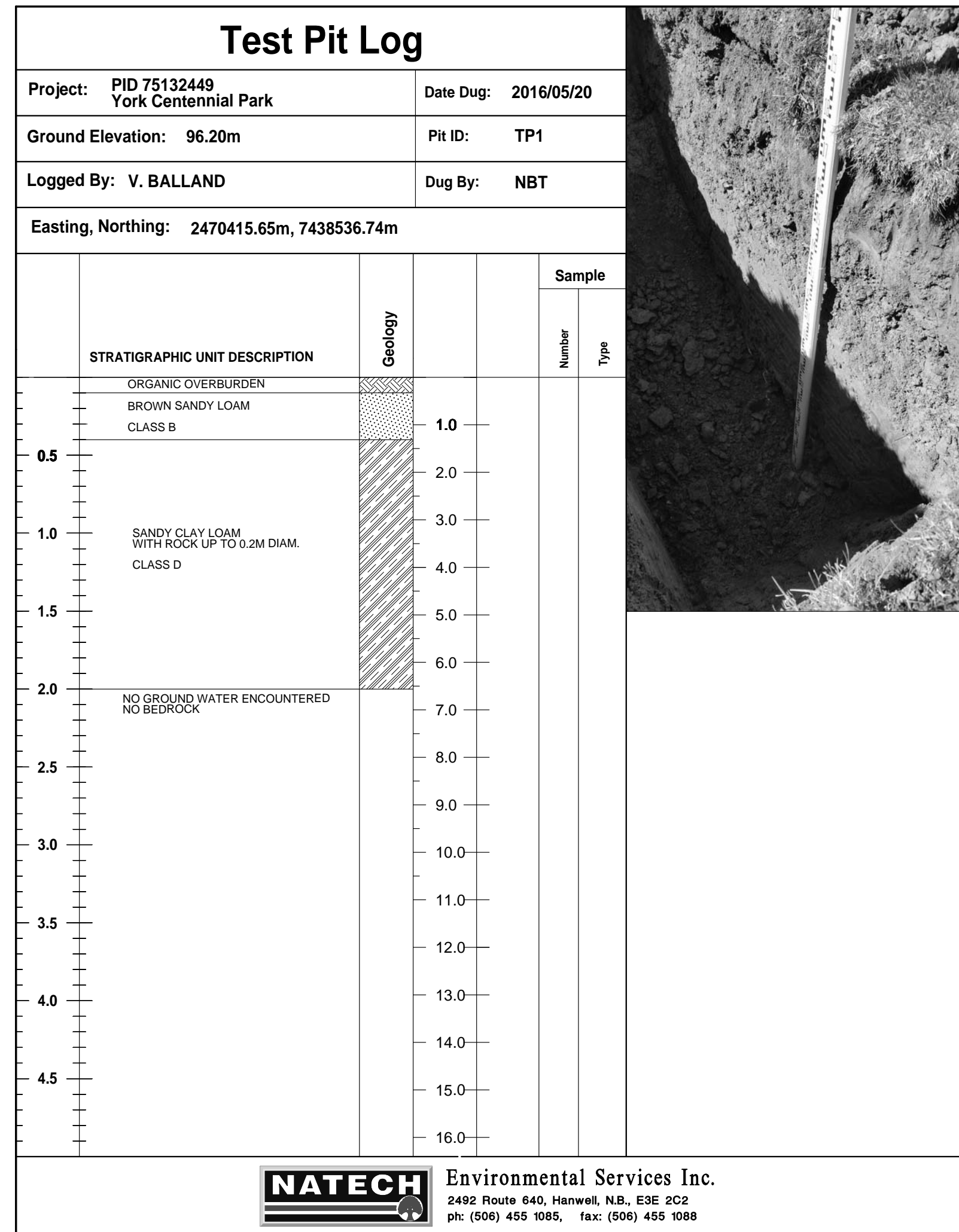
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**NEW ON-SITE EFFLUENT DISPOSAL SYSTEM  
MCTAQUAC PROVINCIAL PARK  
MCTAQUAC, NB**

**DETAILS**

Date 2016 05 24	Date	<b>Stamp</b>	<b>Sceau</b>
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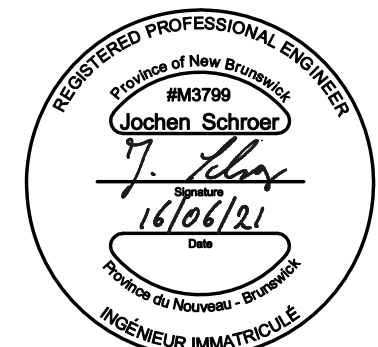


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For Approval	02	2016 06 21
For Information	01	2016 06 09
Revisions / Révisions	No/N <sup>o</sup>	Date

## NEW ON-SITE EFFLUENT DISPOSAL SYSTEM MACTAQUAC PROVINCIAL PARK MACTAQUAC, NB

### TEST PITS

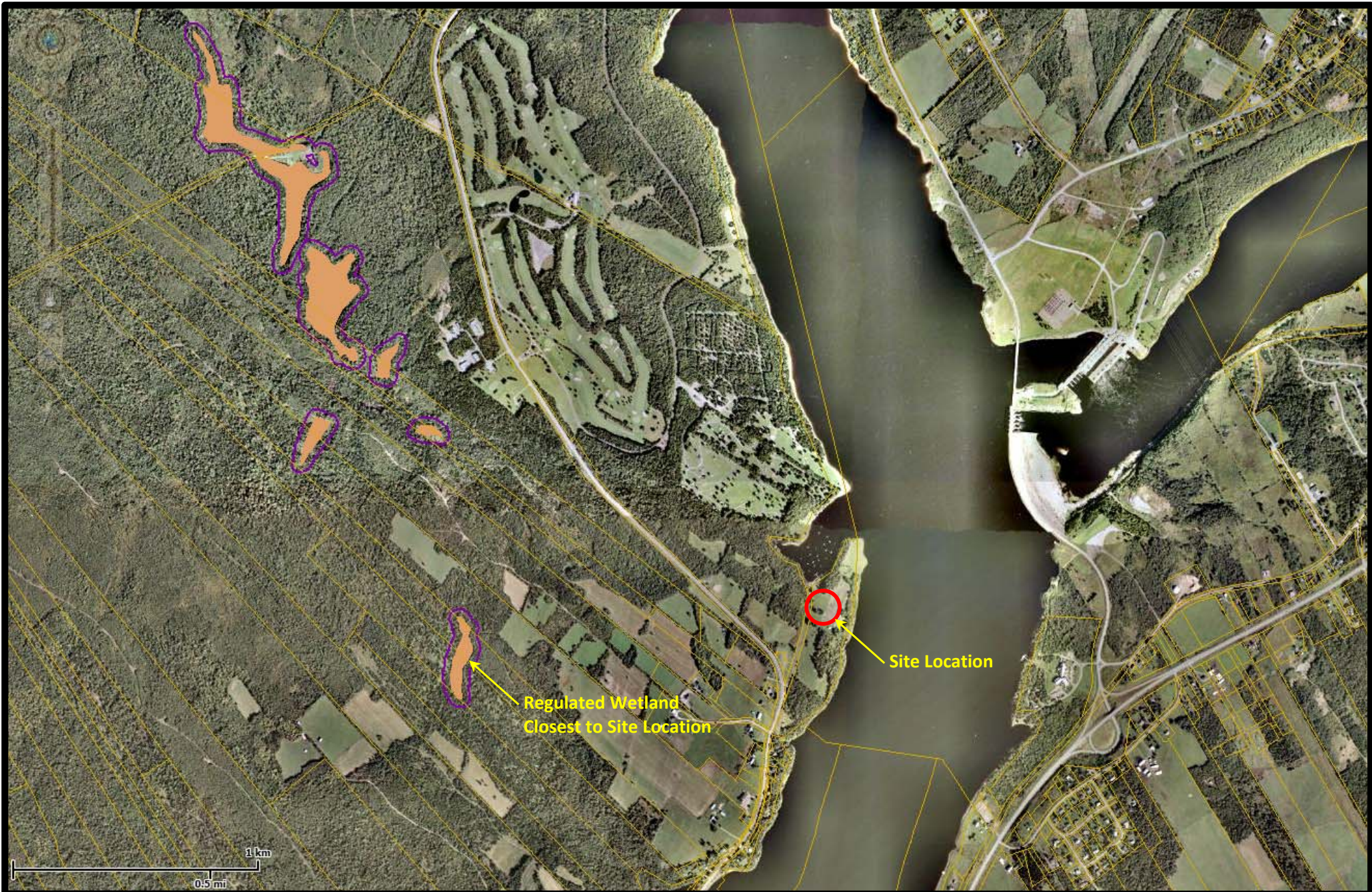
Date: 2016 05 24	Date:	<b>Stamp</b> Sceau
Scale: AS SHOWN	Échelle:	
Drawn by: T. CLEGHORN	Dessiné par:	
Approved by: J. SCHROER	Approuvé par:	
Consultant number:	Nom de l'expert-conseil:	



**Appendix B – Wetland Map**







Environmental Impact Assessment  
 Mactaquac Provincial Park, Mactaquac, NB  
 Wetland Map



**Environmental Services Inc.**  
 2492 Route 640, Hanwell, NB, E3E 2C2  
 ph: (506) 455 1085, fax (506) 455 1088

DATE:  
 2016/07/27

FILE:  
 MPP-16-01

SCALE:

FIGURE:  
 Appendix B



## **Appendix C – Historical Aerial Photographs**





Site Location

2004

Environmental Impact Assessment  
Mactaquac Provincial Park, Mactaquac, NB  
Site Historical Aerial Photo 2004



**Environmental Services Inc.**  
2492 Route 640, Hanwell, NB, E3E 2C2  
ph: (506) 455 1085, fax (506) 455 1088

DATE:  
2016/07/29

FILE:  
MPP-16-01

SCALE:  
NTS

FIGURE:  
Appendix C-1



Environmental Impact Assessment  
Mactaquac Provincial Park, Mactaquac, NB  
Site Historical Aerial Photo 1981



**Environmental Services Inc.**  
2492 Route 640, Hanwell, NB, E3E 2C2  
ph: (506) 455 1085, fax (506) 455 1088

DATE:  
2016/07/29

FILE:  
MPP-16-01

SCALE:  
NTS

FIGURE:  
Appendix C-2



Environmental Impact Assessment  
Mactaquac Provincial Park, Mactaquac, NB  
Site Historical Aerial Photo 1976



**Environmental Services Inc.**  
2492 Route 640, Hanwell, NB, E3E 2C2  
ph: (506) 455 1085, fax (506) 455 1088

DATE:  
2016/07/29

FILE:  
MPP-16-01

SCALE:  
NTS

FIGURE:  
Appendix C-3



Environmental Impact Assessment  
Mactaquac Provincial Park, Mactaquac, NB  
Site Historical Aerial Photo 1963



**Environmental Services Inc.**  
2492 Route 640, Hanwell, NB, E3E 2C2  
ph: (506) 455 1085, fax (506) 455 1088

DATE:  
2016/07/29

FILE:  
MPP-16-01

SCALE:  
NTS

FIGURE:  
Appendix C-4





Environmental Impact Assessment  
Mactaquac Provincial Park, Mactaquac, NB  
Site Historical Aerial Photo 1951



**Environmental Services Inc.**  
2492 Route 640, Hanwell, NB, E3E 2C2  
ph: (506) 455 1085, fax (506) 455 1088

DATE: 2016/07/29  
SCALE: NTS

FILE: MPP-16-01  
FIGURE: Appendix C-5



Environmental Impact Assessment  
Mactaquac Provincial Park, Mactaquac, NB  
Site Historical Aerial Photo 1945



**Environmental Services Inc.**  
2492 Route 640, Hanwell, NB, E3E 2C2  
ph: (506) 455 1085, fax (506) 455 1088

DATE:  
2016/07/29

FILE:  
MPP-16-01

SCALE:  
NTS

FIGURE:  
Appendix C-6

**Appendix D – Public Consultation - Draft letter**





# Environmental Services Inc.

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2492 Route 640, Hanwell, NB E3E 2C2 Ph.: (506) 455-1085 Fax.: (506) 455-1088

August 1, 2016

Re: **Public Involvement in Environmental Impact Assessment**

**Dear property owner:**

As you may know, Centennial Park has been operating a wastewater treatment plant for the TreeGo facility and the comfort stations. The treated effluent is being discharged into the head pond near the marina. The treatment plant has come to the end of its useful life and it is planned to replace it with a septic system. Once installed, the effluent will be percolated into the ground, rather than discharged into the head pond.

This development (so called “undertaking”) is undergoing a routine provincial Environmental Impact Assessment (EIA) registration, as outlined in Section 5 (1) and Schedule “A” of the Environmental Impact Assessment Regulation. As part of the EIA registration, the developer is required to inform local interest groups and neighbours within 500 m of the property of the planned development. The consultation and the EIA registration are being handled by NATECH Environmental Services Inc.

The purpose of the proposed undertaking is to improve the wastewater treatment system of the park and to protect the head pond from effluent discharges. The proposed project involves: a) removing the existing treatment plant, and b) replacing it with an engineered contour trench septic system. The treated effluent will be infiltrated into the ground on the park property. Construction is planned for August/September of 2016.

A copy of the EIA Registration document is available for public review at the Department of Environment and Local Government, Sustainable Development, Planning and Impact Evaluation Branch, 3<sup>rd</sup> floor, 20 McGloin Street, Fredericton, NB.

If you have any concerns or questions about the project, we would ask you to contact Jochen Schroer with NATECH Environmental Services Inc. (506-455-1085, [jochen.s@natechenv.com](mailto:jochen.s@natechenv.com)), or NBDELG (506-444-5382), before August 15, 2016. Thank you for your interest and cooperation.

Best regards,



Jochen Schroer, M.Eng., P.Eng.  
President

## **Appendix E – Photographs**







First contour trench location



First contour trench location



Marina





Second contour trench location