CIVIL ENGINEERING ASSOCIATES, INC.
10 Mansfield View Lane
South Burlington, VT 05403
Phone: 802-864-2323
Fax: 802-864-2271
E-Mail: mail@cea-vt.com

November 16, 2016

Mr. Joe Rheaume, Public Health Officer
Town of Charlotte Offices
PO Box 119
Charlotte, Vermont 05445

Re: Town of Charlotte Wastewater Disposal System
Proposed Expansion of Capacity
State Wastewater & Potable Water Supply Permit Application

Dear Mr. Rheaume:

The Town of Charlotte is looking to increase the disposal capacity of the existing municipal wastewater disposal system located on the former Burns property from the currently permitted 4,999 gallons per day (GPD) to 6,499 GPD. This application specifically seeks to amend Item 14 of the original permit WW-4-1485 to accordingly increase the reserve sewer allocation of the municipal wastewater disposal system.

Background - The original design work completed by Civil Engineering Associates (CEA) and the hydrogeological study completed by Wagner, Heindel & Noyes (WH&N) on behalf of the Town of Charlotte, limited the hydrologeologic review of the site to a design flow of 4,999 GPD. This value was chosen at the time as the permitting requirements set forth in the State Environmental Protection Rules (EPR's) for small scale (<6,500 GPD) wastewater disposal systems required that systems with design flows of 5,000 GPD or greater, that the replacement area system be constructed coincidently with the primary system and the primary and secondary wastewater disposal fields be alternated on an annual basis. In order to avoid those capital costs, the original system was limited to a design capacity of 4,999 GPD.

Since then, the Environmental Protection Rules have eliminated this requirement for disposal systems with capacities in excess of 5,000 GPD and as such, there is the possibility to expand the permitted disposal capacity of the wastewater disposal system without any construction improvements or capital costs.

System Size and Allowable Application Rate - Sheet C5 of the original approved plan set identified the maximum allowable application rate to be 1.13 GPD per Square Foot (GPD/SF). When applied to the 5,760 SF of trench area constructed for the primary system and depicted for the replacement area, this equate to a

maximum of 6,504 GPD. As noted on the plan sheet, the proposed application rate was reduced to 0.9 GPD/SF consistent with the standards for the design and permitting of wastewater disposal systems with capacities of ≥6,500 GPD. By limiting the design capacity to 6,499 GPD, the system remains under the jurisdiction of the small scale wastewater disposal program and the maximum allowable application rate of 1.13 GPD/Sf can be utilized in support of expanding the permitted capacity to 6,499 GPD.

Hydrogeological Conditions - Another critical component of the compliance review is whether the site can manage the increase in design flows while complying with the vertical separation distance between the bottom of the disposal system trenches and the induced groundwater table.

Attached is a copy of the update to the original hydrogeological work completed for the original system design authorized under State Permit WW-4-1485. The Summary of this report states that:

> *The various general and localized analyses indicate that the disposal capacity at the existing conventional disposal system can be increased from the currently permitted 4,999 GPD to 6,499 GPD while remaining compliant with the vertical groundwater separation requirements associated with the small scale system Environmental Protection Rules based on the existing configuration of the constructed wastewater disposal system and that the replacement area can be readily configured to meet the same requirements.*

Pump Station - The proposed increase in disposal field capacity from 4,999 GPD to 6,499 GPD does require a review of the existing pump station. The increase in capacity will increase the number of dose cycles that the pump station will go through. This does not violate any written standard of the Environmental Protection Rules. The increase in design flows will require an increase in the required emergency storage from 1,250 gallons to 1,625 gallons. A review of the pump station configuration (Sheet C6) shows that there is 1,692 gallons of emergency storage not including any eligible storage within the collection system (See Attachment – Pump Station Basis of Design). Therefor no modifications to the existing system are required.

The existing wastewater collection system has four (4) identified connections (Town Offices, Library, Senior Center and Fire Dept. & Rescue) plus 237 GPD of infiltration allowance for allocated flow of 3,102 GPD (See Attachment – Design Flows) leaving the current reserve allocation capacity in the existing system to be 1,897 GPD. This application seeks to increase that to reserve allocation capacity to 3,397 GPD.

We have attached a copy of the originally approved design plans for the project for reference. We have re-submitted

- Sheet C4 to identify the revised elevation for trench R-8 of the replacement system (raised 0.1 feet),
- Sheet C6 which has been revised to show the new design flows at the pump station.
- Sheet 1 to show the isolation distances around the wastewater disposal system.

This completes our summary of the compliance requirements for the proposed expansion of the disposal capacity of the municipal wastewater disposal system located on the former Burns property. If you should have any questions, please feel free to contact me at 864-2323 x310.

Respectfully,

David S. Marshall. P.E.
Project Engineer

\dsm

Enclosures
Application Form
Application Fee (Waived by Selectboard)
Act 145 Form 4 Overshadowing Notification
Example of letter and Form 1 sent to Overshadowed Properties.
Two sets of full size plans, one set of 11x17
Design Flow Summary
Pump Station Basis of Design
Hydrostudy Report w Attachments
CD of PDF's of application

cc: F. Tegatz (w/ enclosures (1 set 11x17), CEA File 00271.00 (w/ enclosures 1 set 11x17 plans)

Drinking Water & Groundwater Protection Division - Permit Application

Wastewater System & Potable Water Supply

VERMONT
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

For Office Use Only:

Application#	PIN#	Date Complete Application Received

Authority:
10 V.S.A. Chapter 64, the Environmental Protection Rules, Chapter 1, Wastewater System & Potable Water Supply Rules, and Chapter 21, Water Supply Rules, Appendix A. Part 11 - Small Scale Water Systems.

General Information:
The organization and/or content of this form may not be altered, however, the form is designed to expand to allow additional information to be entered. Changes in the organization and/or content of the form may result in an invalid application or permit.

In most cases a licensed designer will be required for your project and to help complete this application form. There are also line-by-line instructions available to assist with completing this form.

NOTE: We strongly suggest referring to the application instructions while completing this application form.

Part I Applicant (Landowner) & Project Contact Information

Section A - Applicant Details (if Landowner is an Individual or Individuals)

1 Last Name	2 First Name (and Middle Initial if appropriate)

3 Mailing Address Line 1	4 Mailing Address Line 2

5 Town/City	6 State/Province	7 Country	8 Zip/Postal Code
		United States	

9 Email Address	10 Telephone

Remove This Applicant

Add Another Applicant

Section B - Applicant Details (if Landowner is other than an Individual or Individuals, e.g. Corporations, Homeowner's Associations, etc.)

1 Registered Legal Entity or Organization Name	2 Telephone
Town of Charlotte	425-3533

3 Mailing Address Line 1	4 Mailing Address Line 2
PO Box 119	

5 Town/City	6 State/Province	7 Country	8 Zip/Postal Code
Charotte	Vermont	United States	05445

Certifying Official
The Certifying Official must be a person who has signatory authority for the legal entity or organization that is the Applicant.

9 Certifying Official Last Name	10 Certifying Official First Name (and MI if appropriate)
Morrison	Lane

11 Certifying Official Title
Chair, Selectboard

12 Certifying Official Email Address	13 Telephone
lmorrison@gmavt.net	425-3071 x 5

Remove This Applicant

Add Another Applicant

Section C - Primary Contact Information (if other than Applicant)

1 Last Name	2 First Name (and Middle Initial if appropriate)

3 Mailing Address Line 1	4 Mailing Address Line 2

5 Town/City	6 State/Province	7 Country	8 Zip/Postal Code
		United States	

9 Email Address	10 Telephone

Section D - Building/Business Owner Information

1 Last Name	2 First Name (and Middle Initial if appropriate)

3 Mailing Address Line 1	4 Mailing Address Line 2

5 Town/City	6 State/Province	7 Country	8 Zip/Postal Code
		United States	

9 Email Address	10 Telephone

Part II Certifying Designer(s) Information

1 Designer Last Name	2 Designer First Name (and Middle Initial if appropriate)
Marshall	David

3 Designer License#	4 Company Name
6019	Civil Engineering Associates, Inc.

5 Mailing Address Line 1	6 Mailing Address Line 2
10 Mansfield View Lane	

7 Town/City	8 State/Province	9 Country	10 Zip/Postal Code
South Burlington	Vermont	United States	05403

11 Email Address	12 Telephone
dmarshall@cea-vt.com	864-2323 x310

13 Designer Role(s) (check all that apply)

- [x] Water Supply Designer
- [x] Wastewater Disposal System Designer

Remove This Designer

Add Another Designer

Part III Property Location Information

Section A - Property Location

1 Please provide the property Town and the property address or a brief description of the location.

(a) Town or City	(b) Street or Road Location

Section B - Center of Property GPS Coordinates

1 Enter the approximate center of property coordinates using GPS set for NAD83 or as derived from a map (map must be based on NAD83).

(a) Latitude
(in decimal degrees to five decimal places, ex. 44.38181°)

N 44.30574 °

(b) Longitude
(in decimal degrees to five decimal places, ex. -72.31392 °)

W (-) 73.25217 °

Part IV Project Information

Section A - General Project Information & Questions

1 Project Name (if applicable)
Town of Charlotte Municipal Wastewater Disposal System

2 Total Acreage of Property
53.83

3 Business Name (if applicable)

4 Detailed Project Description
Expand the permitted disposal capacity of the existing wastewater disposal system from 4,999 GPD to 6,499 GPD. Modify Condition #14 of WW-4-1485.

5 (a) Were all existing buildings or structures, campgrounds, and their associated potable water supplies and wastewater systems substantially completed before January 1, 2007? ..... ◉ Yes ○ No

(b) Were all existing improved and unimproved lots in existence before January 1, 2007? ..... ◉ Yes ○ No

6 Does this application include subdividing the property? ..... ○ Yes ◉ No

7 Has anyone from the Drinking Water & Groundwater Protection Division's Regional Office been to the property?..... ○ Yes ◉ No

If Yes, enter the staff person's name and the date of the visit.

(a) Name of Staff Person

(b) Date of Visit (m/d/yyyy)

8 Will any construction occur within 50 feet of a wetland boundary, mapped or designated? ..... ○ Yes ◉ No

If Yes, contact the Wetlands Program of the Watershed Management Division at (802) 338-4835.

9 Will more than one acre be disturbed during the entire course of construction, including all lots and phases? ..... ○ Yes ◉ No

If Yes, contact the Stormwater Program of the Watershed Management Division at (802) 241-4320.

10 Will there be any stream crossings by roads, utilities, or other construction? ..... ○ Yes ◉ No

If Yes, contact the River Corridor Mgmt. Program of the Watershed Management Division at:

Central & Northwest Vermont ..... (802) 879-5631
Southern Vermont ..... (802) 786-5906
Northeastern Vermont ..... (802) 751-0129

11 Is the project located in a special flood hazard area as designated on the flood insurance maps prepared for a municipality by the Federal Emergency Management Agency? ..... ○ Yes ◉ No

If Yes, show the special flood hazard area limits on the site plan.

12 Act 250: Has the Applicant (Landowner) subdivided any other lots of any size within a five mile radius of this subdivision, or within the environmental district within the last five years ? ..... ○ Yes ◉ No

If Yes, enter the town(s) and the associated number of lots in the table below:

	(a) Town	(b) Number of Lots
X		

Add Another Town/Lot

13 Is there any prior Act 250 jurisdiction on the tract of land?..... ○ Yes ◉ No

If Yes, enter the Act 250 permit number:

(a) Act 250 Permit Number

Section B - Project Deed Reference

1 Please provide the Town, Parcel ID, Book, and Page reference for the current landowner's deed(s) to this property:

	(a) Town	(b) Parcel ID	(c) Book	(d) Page(s)
X	Charlotte	05-05-26.0		

Add Another Deed Reference

Section C - Project Plan Reference

1 Please provide the following information for all water supply and wastewater disposal system plans being submitted.

	(a) Sheet#	(b) Title	(c) Plan Date	(d) Plan Revision Date
X				

Add Another Plan Reference

Section D - Existing Project Lot/Building Details

Please provide the existing project details. This section is used to describe what is existing for the project. For example, if you are subdividing an undeveloped 21-acre parcel, you would list the existing parcel. If you are revising the boundary lines of two commercial lots in an industrial park, and constructing an addition to an existing building you would list the existing lot numbers, existing acres, existing buildings, existing uses, construction date(s), prior permits, and answer the compliance questions.

1 Lot#	2 Lot Size (acres)	3 Existing Use of the Lot
1	2.96	Commercial

4 Provide the following information for each building on the lot:

	(a) Building ID	(b) Existing Use	(c) Date Construction of Building Substantially Complete	(d) Prior Permits	(e) In compliance with with existing permits?
X	Town Offices	Commercial	01-01-1998	WW-4-0694 WW-4-1485	(●) Yes ( ) No
X	Town Library	Commercial	01-01-2000	WW-4-0694-1, WW-4-1485	(●) Yes ( ) No

Add Another Building

Remove This Lot

1 Lot#	2 Lot Size (acres)	3 Existing Use of the Lot
2	1.27	Commercial

4 Provide the following information for each building on the lot:

	(a) Building ID	(b) Existing Use	(c) Date Construction of Building Substantially Complete	(d) Prior Permits	(e) In compliance with with existing permits?
X	Vol. Fire Dept.	Commercial	01-01-1998	WW-4-1070-1, WW-4-1485	(●) Yes ( ) No

Add Another Building

Remove This Lot

1 Lot#	2 Lot Size (acres)	3 Existing Use of the Lot
4	0.83	Commercial

4 Provide the following information for each building on the lot:

	(a) Building ID	(b) Existing Use	(c) Date Construction of Building Substantially Complete	(d) Prior Permits	(e) In compliance with with existing permits?
X	Senior Center	Commercial	01-01-2000	WW-4-1401-1, WW-4-1485	(●) Yes ( ) No

Add Another Building

Remove This Lot

Add Another Lot

Section E - Proposed Project Lot/BuildingDetails

This section is used to describe what you are proposing to do in this project. For example, if you were going to create 4 lots for construction of single family residences, you would list each lot, proposed acreage, proposed buildings, and proposed use.

1 Lot#	2 Lot Size (acres)	3 Proposed Use of the Lot
1	2.96	Municipal Facilities

4 Is the lot being created as part of a subdivision? ..... ○ Yes ◉ No

5 Are you requesting that the Blood, Marriage, or Civil Union special fee be applied to this lot? ..... ○ Yes ◉ No

6 If the lot is exempt, please indicate the specific exemption from the Wastewater System and Potable Water Supply Rules? .....

7 Provide the following information for each building on the lot:

	(a) Building ID	(b) If building is exempt, indicate exemption	(c) Construction or increased flow?	(d) Proposed Use
X	Town Offices		☐	Town Offices
X	Town Library		☐	Library

Add Another Building

Remove This Lot

1 Lot#	2 Lot Size (acres)	3 Proposed Use of the Lot
2	1.27	Volunteer Fire Dept. & Rescue Services

4 Is the lot being created as part of a subdivision? ..... ○ Yes ◉ No

5 Are you requesting that the Blood, Marriage, or Civil Union special fee be applied to this lot? ..... ○ Yes ◉ No

6 If the lot is exempt, please indicate the specific exemption from the Wastewater System and Potable Water Supply Rules? .....

7 Provide the following information for each building on the lot:

	(a) Building ID	(b) If building is exempt, indicate exemption	(c) Construction or increased flow?	(d) Proposed Use
X	Fire Dept. & Rescue		☐	Volunteer Fire Dept. & Rescue Services

Add Another Building

Remove This Lot

1 Lot#	2 Lot Size (acres)	3 Proposed Use of the Lot
3	0.83	Senior Center

4 Is the lot being created as part of a subdivision? ..... ○ Yes ◉ No

5 Are you requesting that the Blood, Marriage, or Civil Union special fee be applied to this lot? ..... ○ Yes ◉ No

6 If the lot is exempt, please indicate the specific exemption from the Wastewater System and Potable Water Supply Rules? .....

7 Provide the following information for each building on the lot:

	(a) Building ID	(b) If building is exempt, indicate exemption	(c) Construction or increased flow?	(d) Proposed Use
X	Senior Center		☐	Senior Center

Add Another Building

Remove This Lot

Add Another Lot

Part V Water Supply Information

Section A - Water Supply Screening Questions

1 Are you proposing a new water supply or water service line or changes to a permitted but not constructed water supply or water service line for this project? ○ Yes ● No

2 Are you proposing changes to an existing water supply or water service for this project (including changes to location, design flows, or operational change)? ○ Yes ● No

3 Is there an existing connection to a water supply or water service line for this project? ● Yes ○ No

Complete Part V if you answered Yes to any of the above questions. A project with no existing or proposed water supply may skip to Part VI.

Section B - General Water Supply Questions

1 Does this project involve a failed water supply? ○ Yes ● No

2 Will any of the proposed water sources serve 25 or more people or have 15 or more service connections? ○ Yes ● No

If Yes, the applicant must contact the Drinking Water & Groundwater Protection Division at (802) 241-3400 for source, construction and an operating permit.

3 Are any of the existing or proposed water sources located within a special flood hazard area? ○ Yes ● No

4 Are any of the existing or proposed water sources located within a floodway? ○ Yes ● No

5 Are any of the proposed water sources located within 1 mile of a hazardous waste site as designated by the Waste Management Division and identified on the Agency mapping website? ○ Yes ● No

If Yes, please submit additional information on the site. The Waste Management Division can be reached at (802) 241-3888.

6 Does this project require an approval letter from the Drinking Water & Groundwater Protection Division for the construction of a public water system, municipal water line extension over 500 feet, or hydrants or sprinkler systems? ○ Yes ● No

If Yes, please submit a copy of the approval letter from the Drinking Water & Groundwater Protection Division.

7 Does the proposed or existing water supply(ies) use a water treatment device to obtain compliance with the quality requirements in the Water Supply Rule? ● Yes ○ No

If Yes, please submit additional information regarding the constituent(s) that exceeds the standards and plans, details, and specifications of the treatment device.

8 Is any portion of the proposed water supply located in or near a Water Source Protection Area as designated by the Drinking Water & Groundwater Protection Division? ○ Yes ● No

If in areas of known interference issues, contact the Drinking Water & Groundwater Protection Division at (802) 241-3400.

Section C - Individual Water Supply Details

Please provide the following information for each of the existing and proposed water supply(ies) serving a building or structure, or campground on the property.

1 Water Supply Name/Identifier	2 Water Supply Owner (if not Applicant)
Town of Charlotte Offices Well	
3 Water Source Type	**4 Type of Change to Supply**
Public Transient Non-Community	No Change

5 Lots/Buildings Served by this Water Supply System

	(a) Lot#	(b) Building ID	(c) Type of Change to the Building's Supply	Design Flows (Gallons Per Day) (d) Existing	(e) Change	(f) Total	(g) Rule or Meter Based Flows
X	1	Town Offices	No Change	320	0	320	Rule-based
X	1	Town Library	No Change	195	0	195	Rule-based

Add Another Lot/Building Served by this Supply

6	7	8
515	0	515

9 Is this water supply located off-lot? ..... ◯ Yes ◉ No

10 Is this water supply shared? ..... ◉ Yes ◯ No

If the water supply is located off-lot or shared, submit a copy of the agreement to provide an easement prior to construction.

11 Is a variance being requested for this water supply? ..... ◯ Yes ◉ No

If Yes, please submit additional details related to the variance request.

Remove This Water Supply

1 Water Supply Name/Identifier	2 Water Supply Owner (if not Applicant)
Vol. Fire Dept. & Rescue Services	
3 Water Source Type	**4 Type of Change to Supply**
Non-Public Drilled Bedrock Well	No Change

5 Lots/Buildings Served by this Water Supply System

	(a) Lot#	(b) Building ID	(c) Type of Change to the Building's Supply	Design Flows (Gallons Per Day) (d) Existing	(e) Change	(f) Total	(g) Rule or Meter Based Flows
X	2	Fire Dept. & Rescue	No Change	350	0	350	Rule-based

Add Another Lot/Building Served by this Supply

6	7	8
350	0	350

9 Is this water supply located off-lot? ..... ◯ Yes ◉ No

10 Is this water supply shared? ..... ◯ Yes ◉ No

If the water supply is located off-lot or shared, submit a copy of the agreement to provide an easement prior to construction.

11 Is a variance being requested for this water supply? ..... ◯ Yes ◉ No

If Yes, please submit additional details related to the variance request.

Remove This Water Supply

1 Water Supply Name/Identifier	2 Water Supply Owner (if not Applicant)
Senior Center Well	
3 Water Source Type	**4 Type of Change to Supply**
Non-Public Drilled Bedrock Well	No Change

5 Lots/Buildings Served by this Water Supply System

	(a) Lot#	(b) Building ID	(c) Type of Change to the Building's Supply	Design Flows (Gallons Per Day) (d) Existing	(e) Change	(f) Total	(g) Rule or Meter Based Flows
X	3	Senior Center	No Change	2,000	0	2,000	Rule-based

Add Another Lot/Building Served by this Supply

6	7	8
2,000	0	2,000

9 Is this water supply located off-lot? ..... ◯ Yes ◉ No

10 Is this water supply shared? ..... ◯ Yes ◉ No

If the water supply is located off-lot or shared, submit a copy of the agreement to provide an easement prior to construction.

11 Is a variance being requested for this water supply? ..... ◯ Yes ◉ No

If Yes, please submit additional details related to the variance request.

Remove This Water Supply

Add Another Water Supply

Section D - Water Supply Design Flows Summary Table

1 If the project includes more than one water supply, please list each water supply system and provide the total water supply design flows for the project. **IMPORTANT**: Please don't include systems that were identified in this Part on Section C, Line 4 as a "Replacement Area Designation" in this summary table.

	(a) Water Supply Name/Identifier	Design Flows (Gallons Per Day) (b) Existing	(c) Change	(d) Total
X	Town Offices Well	515	0	515
X	Vol. Fire Dept. & Rescue Well	350	0	350
X	Senior Center Well	2,000	0	2,000
	Add Another Water Supply	2	3	4
		2,865	0	2,865

Part VI Wastewater Disposal System Information

Section A - Wastewater Disposal System Screening Questions

1 Are you proposing a new or replacement wastewater disposal system, a new wastewater service line, or changes to a permitted but not constructed wastewater disposal system or wastewater service line for this project? ..... ◯ Yes ◉ No

2 Are you proposing changes to an existing wastewater disposal system, replacement wastewater disposal system, replacement area, or wastewater service line for this project (including changes to location, design flows, or operational change)? ..... ◉ Yes ◯ No

3 Is there an existing connection to a wastewater disposal system or wastewater service line for this project?..... ◉ Yes ◯ No

Complete Part VI if you answered Yes to any of the above questions.
A project with no existing or proposed wastewater disposal systems may skip to Part VII.

Section B - General Wastewater Disposal System Questions

1 Does this project involve a failed wastewater disposal system? ..... ◯ Yes ◉ No

2 Do any of the systems require a curtain or dewatering drain as part of the design? ..... ◯ Yes ◉ No

3 Is a hydrogeologic study required for this project? ..... ◉ Yes ◯ No

4 For projects using soil-based wastewater systems having a total design flow that exceeds 1,000 gpd, is this project located in a Class A Watershed?..... ◯ Yes ◉ No ◯ NA

If Yes, indicate the Class A Watershed in which the system(s) is located:

(a) Class A Watershed Name

5 Are there any existing or proposed floor drains as part of this project?..... ◯ Yes ◉ No

If Yes, indicate where the floor drains will discharge:

(a) Floor Drain Discharge Point

6 If the project utilizes an Innovative/Alternative System or Product, has the applicant received a copy of the Drinking Water & Groundwater Protection Division's approval letter? ..... ◯ Yes ◉ No ◯ NA

7 Is any portion of the proposed wastewater disposal system located in or near a Water Source Protection Area as designated by the Drinking Water & Groundwater Protection Division? ..... ◯ Yes ◉ No

If Yes, contact the Drinking Water & Groundwater Protection Division at (802) 241-3400.

Section C - Individual Wastewater Disposal System Details

Please provide the following information for each of the existing and proposed wastewater disposal systems serving a building or structure, or campground on the property.

1 Wastewater Disposal System Name/Identifier	2 Wastewater Disposal System Owner (if not Applicant)
Municipal Wastewater Disposal System	
3 Wastewater Disposal System Type	**4 Type of Change to System**
In-ground	New Connection or Increased Flow

5 Lots/Buildings Served by this Wastewater Disposal System

	(a) Lot#	(b) Building ID	(c) Type of Change to the Building's System	Design Flows (Gallons Per Day) (d) Existing	(e) Change	(f) Infiltration	(g) Total	(h) Rule or Meter Based Flows
X	1	Town Offices	No Change	320	0	0	320	Rule-based
X	1	Town Library	No Change	195	0	0	195	Rule-based
X	2	Vol. Fire Dept.	No Change	350	0	0	350	Rule-based
X	3	Senior Center	No Change	2,000	0	0	2,000	Rule-based
X	2 & 3	Infiltration	No Change	0	0	237	237	Rule-based
X	Uncommitt	ed Capacity	Increased Flow (no constructi	1,897	1,500	0	3,397	Rule-based
				6	7	8	9	
				4,762	1,500	237	6,499	

Add Another Lot/Building Served by this System

10 Is this wastewater disposal system located off-lot? ..... (●) Yes ( ) No

11 Is this wastewater disposal system shared? ..... (●) Yes ( ) No

If the wastewater disposal system is located off-lot or shared, submit a copy of the agreement to provide an easement prior to initiation of construction.

12 Is a variance being requested for this wastewater disposal system? ..... ( ) Yes (●) No

If Yes, please submit additional details related to the variance request.

13 If this wastewater disposal system type is a connection to an Indirect Discharge System, please provide the Indirect Discharge System ID number.

Indirect Discharge System ID Number

14 If this wastewater disposal system type is a connection to a municipal system, please select the town.

Town

15 If this wastewater disposal system is a soil-based system, please select the design approach used.

Design Approach Used

Prescriptive

16 For soil-based systems, please check all that apply (Note: Store and dose does not apply to standard pump/pump chamber systems).

☐ Storage and Dose ☐ Filtrate ☐ Constructed Wetlands

17 If this is an Innovative/Alternative soil-based system, please select the system use type.

Innovative/Alternative System Use Type

18 If this is an Innovative/Alternative soil-based system, please select the Innovative/Alternative system or product.

Innovative/Alternative System or Product

Remove This Wastewater System

Add Another Wastewater System

Section D - Wastewater Disposal Systems Design Flows Summary Table

1 If the project includes more than one wastewater disposal system, please list each system on this page and provide the total wastewater disposal design flows for the project. **IMPORTANT**: Please don't include systems that were identified in this Part on Section C, Line 4 as a "Replacement Area Designation" in this summary table.

		Design Flows (Gallons Per Day)			
	(a) Wastewater Disposal System Name/Identifier	(b) Existing	(c) Change	(d) Infiltration	(e) Total
X		4,762	1,500	237	6,499
	Add Another Wastewater System	2	3	4	5
		4,762	1,500	237	6,499

Part VII Application Fees

1 Fee Amount $1,500.00 **Waived by Selectboard**

2 Fee Calculation Details

1,500 gallon increase /avergage per unit design flow of 500 gpd = 3 units x $500 per unit = $1,500.

Part VIII Designer Certification & Copyright License

Section A - Certifying Designer 1 Certification & Copyright License

"i hereby certify that in the exercise of my reasonable professional judgment, the design-related information submitted with this application is true and correct, and that the design included in this application for a permit complies with the Vermont Wastewater System and Potable Water Supply Rules and the Vermont Water Supply Rules.

As the individual who prepared this application, including all documents that are marked as copyrighted, I hereby grant a non-exclusive, limited license to the State to allow the documents to be made available for public review and copying in order to properly implement and operate the permitting programs for Wastewater Systems and Potable Water Supplies, and for no other purposes. As a condition to this license, the State agrees that it will not make any changes to such documents, nor will the State delete any copyright notices on such documents."

1 Check the design(s) you are certifying. This should be the same as the Designer Role(s) you selected in Part II, Section A, Line 13.

- [x] Water Supply Designer
- [x] Wastewater Disposal System Designer

1 Designer 1 Name	2 Designer 1 Signature	3 Signature Date
David S. Marshall, P.E.		11.16.16

Section B - Certifying Designer 2 Certification & Copyright License

"i hereby certify that in the exercise of my reasonable professional judgment, the design-related information submitted with this application is true and correct, and that the design included in this application for a permit complies with the Vermont Wastewater System and Potable Water Supply Rules and the Vermont Water Supply Rules.

As the individual who prepared this application, including all documents that are marked as copyrighted, I hereby grant a non-exclusive, limited license to the State to allow the documents to be made available for public review and copying in order to properly implement and operate the permitting programs for Wastewater Systems and Potable Water Supplies, and for no other purposes. As a condition to this license, the State agrees that it will not make any changes to such documents, nor will the State delete any copyright notices on such documents."

1 Check the design(s) you are certifying. This should be the same as the Designer Role(s) you selected in Part II, Section B, Line 13.

- [ ] Water Supply Designer
- [ ] Wastewater Disposal System Designer

1 Designer 2 Name	2 Designer 2 Signature	3 Signature Date

Part IX Applicant(s) Signature & Acknowledgements

In order to insure compliance with the requirements of the regulations administered by the Department of Environmental Conservation, Drinking Water & Groundwater Protection Division, it may be necessary to visit the property. As this would involve a Department employee entering private property, we request your approval to do so.

1 If we do visit your property, do you have any special instructions?

Pack out what you bring in.

"As landowner of the property for which I am requesting a permit from the Department of Environmental Conservation, I understand that by signing this application I am granting permission for the Department employees to enter the property, during normal working hours, to insure compliance of the property with the applicable rules of the Department.

I also understand that I am not allowed to commence any site work or construction on this project without written approval from the Department of Environmental Conservation.

If my project utilizes an Innovative/Alternative System or Product, I have received a copy of the Drinking Water & Groundwater Protection Division's approval letter and agree to abide by the conditions of the approval.

I also certify that to the best of my knowledge and belief the information submitted above is true, accurate and complete."

X	2 Print Applicant Name	3 Applicant Signature	4 Signature Date
	Mr. Lane Morrison, Selectboard Chair	Lane Morrison	11/16/2016

Add Applicant Signature Block

ANR Form 4: Certification Statement for Notification of Overshadowed Property Owner(s) pursuant to the Wastewater System and Potable Water Supply Program

A person submitting an application to the Secretary for a Wastewater System and Potable Water Supply Permit where the proposed project has isolation distances (overshadowing) that extend onto property owned by persons other than the permit applicant shall submit the following certification with the application.

Note: When the property subject to the permit application is owned by more than one person, only one of the landowners must sign this certification statement even though all landowners must sign the permit application itself.

> **I hereby certify that the individual(s) that own property that is overshadowed by my proposed project have been sent by certified mail a copy of the required notification form and the site plan(s) that accurately depicts all isolation distances. I also certify that I attached to this certification form a copy of all certified mail receipts for notifications that were sent to the affected property owners.**

Signature Lane Morrison

Name (Printed) **Mr. Lane Morrison, Selectboard Chair, for Town of Charlotte.**

Property Address or Property Tax ID # **00004-3205 (Burns Property)**

Date of this certification 11/16/2016

Please list all of the property owners who were sent a notification by certified mail.

Affected Property Owner(s) – (Please provide a second sheet using this format when there are more than three affected property owners)

Name: Richard G. Leboeuf Family Trust
c/o Ms. Shirley Bruce
167 Bittersweet Circle
Williston, Vermont 05495
Prop.Address: 251 Ferry Rd
Parcel ID# M05B05L18 and 00061-0251

(To Comply with Act 145 and Act 117 – 8-24-12, Last Revised 9-11-12)

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Richard G. Leboeuf Family Trust
c/o Ms. Shirley Bruce
167 Bittersweet Circle
Williston, VT 05495

9590 9403 0343 5163 4514 46

2. Article Number (Transfer from service label)

7007 3020 0002 0019 9303

COMPLETE THIS SECTION ON DELIVERY

A. Signature

X S Bruce

☐ Agent
☐ Addressee

B. Received by *(Printed Name)*

C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type

- ☐ Adult Signature
- ☐ Adult Signature Restricted Delivery
- ☑ Certified Mail®
- ☐ Certified Mail Restricted Delivery
- ☐ Collect on Delivery
- ☐ Collect on Delivery Restricted Delivery
- ☐ Insured Mail
- ☐ Insured Mail Restricted Delivery (over $500)
- ☐ Priority Mail Express®
- ☐ Registered Mail™
- ☐ Registered Mail Restricted Delivery
- ☐ Return Receipt for Merchandise
- ☐ Signature Confirmation™
- ☐ Signature Confirmation Restricted Delivery

PS Form 3811, April 2015 PSN 7530-02-000-9053

Domestic Return Receipt

ANR FORM 1
Notice of Overshadowing at the time of Filing an Application for a Wastewater System and Potable Water Supply Permit

To: Richard G. Leboeuf Family Trust
c/o Ms. Shirley Bruce
167 Bittersweet Circle
Williston, Vermont 05495

Prop.Address: 251 Ferry Rd
Parcel ID# M05B05L18
(Overshadowed Landowner):

The Town of Charlotte is currently preparing an application for a State of Vermont Wastewater System and Potable Water Supply Permit. The Town's project proposes a wastewater (septic) system designed to comply with the technical standards of the Wastewater System and Potable Water Supply Rules (Rules). The Rules include required isolation distances around the system. These isolation distances are designed to prevent wastewater systems and water supplies from being built too close to each other in order to protect drinking water quality and human health.

The isolation distances for the existing (proposed capacity to be expanded) wastewater system extends onto your property. The extension of these isolation distances is often referred to as an "overshadowing" of property.

In 2010, the legislature determined that people who own property that will be "overshadowed" by the required isolation distance be notified of that fact. This form is being sent to you in order to provide that notice. Attached to this form is a copy of a plan that shows the existing system and the isolation areas around the disposal system that extend onto your property.

Please consider the following facts to help you understand what this actually means to you:

1. Under the existing Rules, an evaluation of the horizontal relationship between existing potable water supplies and newly proposed wastewater systems is required during the review of any application. Therefore, the horizontal isolation distance between newly proposed wastewater systems and the location of your current water supply will be evaluated and determined to comply with the Rules as part of the permit process.

2. A permit application review does not determine if the proposed wastewater system may affect or restrict potential future development of a water supply on your property. These possible restrictions exist because of the required isolation distances between potable water supplies and wastewater systems.

3. It is important to note that in many instances overshadowing may have no effect on the ability to develop adjoining properties. Whether there is actually any effect is a very site specific determination that depends on a number of factors. For example, the fact that an isolation distance from a wastewater system may prohibit where a well could be drilled may have no real effect because that portion of the neighboring property that is overshadowed by the wastewater system is too steep to be accessed by a well drilling rig or that property is currently served by a water supply system that does no rely upon drilled wells.

ANR FORM 1
Notice of Overshadowing

4. When considering potential effects on your property, you should be aware that you may drill a well within the identified well isolation zone provided the well complies with the technical standards of the Rules. What may not be allowed without providing additional technical information is putting a well in a wastewater system isolation zone.

5. The wastewater system isolation zones only restrict the construction of water supplies. Construction of other things such as houses, garages, and driveways may be in the isolation zones as allowed by the Rules.

6. This notification requirement did not start until 2010 and the state permit program has been in place since 1969 so it is possible that there are already water supplies or wastewater systems that "overshadow" your property or that your own wastewater system and/or water supply "overshadows" your neighbor's property.

7. The Legislature created the notification requirement so that neighbors have the opportunity to discuss the possible effects on future development and potentially resolve them before a septic system is built. Therefore you are getting this notice before the permit application is filed so that you may consider having those discussions.

8. VERY IMPORTANT: Although the legislature has required notification to potentially affected landowners, the legislature did not give the Agency of Natural Resources the authority to deny a permit application based on isolation zones that may "overshadow" your property.

Please contact me if you have any questions.

Sincerely, Dean Bloch, Town Administrator

Name of Applicant: **Town of Charlotte**

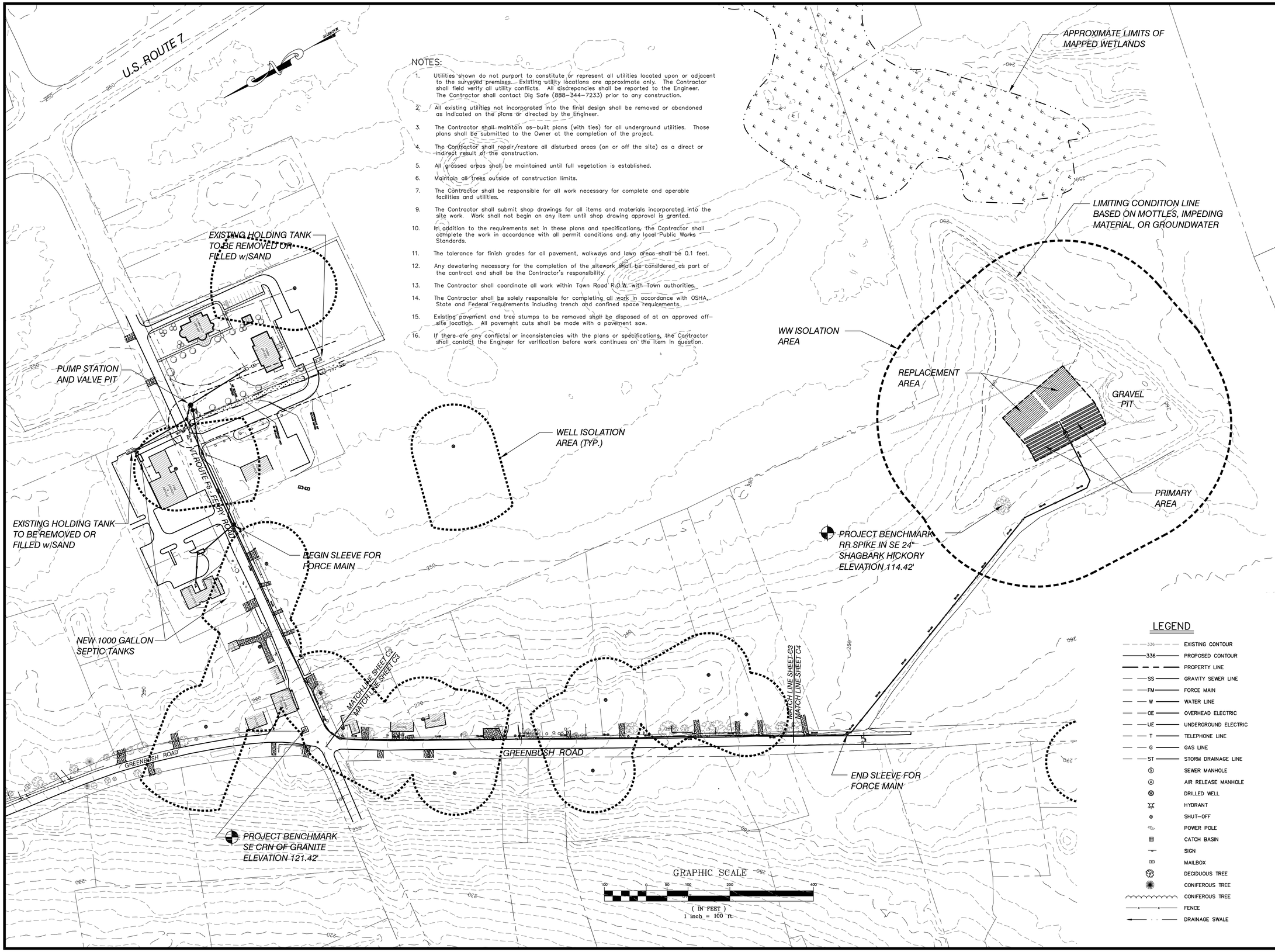
Address: **159 Ferry Road, Charlotte, Vermont 05445**

Phone Number: **802-425-3533** ext. 5

8/24/12 Last Revised 9/11/12 (To Comply with Act 145 and Act 117)

NOTES:

1. Utilities shown do not purport to constitute or represent all utilities located upon or adjacent to the surveyed premises. Existing utility locations are approximate only. The Contractor shall field verify all utility conflicts. All discrepancies shall be reported to the Engineer. The Contractor shall contact Dig Safe (888-344-7233) prior to any construction.
2. All existing utilities not incorporated into the final design shall be removed or abandoned as indicated on the plans or directed by the Engineer.
3. The Contractor shall maintain as-built plans (with ties) for all underground utilities. Those plans shall be submitted to the Owner at the completion of the project.
4. The Contractor shall repair/restore all disturbed areas (on or off the site) as a direct or indirect result of the construction.
5. All grassed areas shall be maintained until full vegetation is established.
6. Maintain all trees outside of construction limits.
7. The Contractor shall be responsible for all work necessary for complete and operable facilities and utilities.
9. The Contractor shall submit shop drawings for all items and materials incorporated into the site work. Work shall not begin on any item until shop drawing approval is granted.
10. In addition to the requirements set in these plans and specifications, the Contractor shall complete the work in accordance with all permit conditions and any local Public Works Standards.
11. The tolerance for finish grades for all pavement, walkways and lawn areas shall be 0.1 feet.
12. Any dewatering necessary for the completion of the sitework shall be considered as part of the contract and shall be the Contractor's responsibility.
13. The Contractor shall coordinate all work within Town Road R.O.W. with Town authorities.
14. The Contractor shall be solely responsible for completing all work in accordance with OSHA, State and Federal requirements including trench and confined space requirements.
15. Existing pavement and tree stumps to be removed shall be disposed of at an approved off-site location. All pavement cuts shall be made with a pavement saw.
16. If there are any conflicts or inconsistencies with the plans or specifications, the Contractor shall contact the Engineer for verification before work continues on the item in question.



LEGEND

336	EXISTING CONTOUR
336	PROPOSED CONTOUR
	PROPERTY LINE
SS	GRAVITY SEWER LINE
FM	FORCE MAIN
W	WATER LINE
OE	OVERHEAD ELECTRIC
UE	UNDERGROUND ELECTRIC
T	TELEPHONE LINE
G	GAS LINE
ST	STORM DRAINAGE LINE
	SEWER MANHOLE
	AIR RELEASE MANHOLE
	DRILLED WELL
	HYDRANT
	SHUT-OFF
	POWER POLE
	CATCH BASIN
	SIGN
	MAILBOX
	DECIDUOUS TREE
	CONIFEROUS TREE
	CONIFEROUS TREE
	FENCE
	DRAINAGE SWALE

SITE ENGINEER:

CIVIL ENGINEERING ASSOCIATES, INC.
10 MANSFIELD VIEW LANE, SOUTH BURLINGTON, VT 05403
802-864-2323 FAX: 802-864-2271 web: www.cea-vt.com

DRAWN: SAL
CHECKED: DSM
APPROVED: DSM

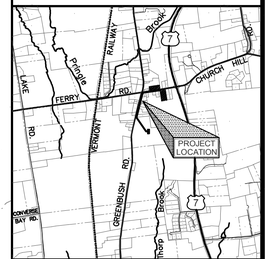
CLIENT:

TOWN OF CHARLOTTE
P.O. BOX 119
CHARLOTTE, VT 05445

PROJECT:

BURNS PROPERTY WASTEWATER SYSTEM

GREENBUSH ROAD AND FERRY ROAD
CHARLOTTE, VERMONT



LOCATION MAP
1" = 3000'

DATE	CHECKED	REVISION

OVERALL SITE PLAN

DATE: JAN., 2016
SCALE: 1" = 100'
PROJ. NO. 00271
DRAWING NUMBER: C1

Town of Charlotte
Municipal Wastewater Disposal System

Basis of Design Flow
January 2, 2016

Building	Qty							GPD	GPD
Library	3	Employees		x	15	GPD/S	=	45	
	30	Person	Assembly Area	x	5	GPD/I	=	150	
						Total	=		195
Senior Center	60	Seats	at 2 meals/day	x	30	GPD/S	=	1,800	
	40	Person	Assembly Area	x	5	GPD/I	=	200	
						Total	=		2,000
Fire & Rescue	4	Beds		x	50	GPD/S	=	200	
	30	Person	Assembly Area	x	5	GPD/I	=	150	
						Total	=		350
Town Hall	8	Employees		x	15	GPD/S	=	120	
	40	Person	Assembly Area	x	5	GPD/I	=	200	
						Total	=		320
Infiltration	447	LF 8"	Sewer Main	x	350	GPD/I	=	237	
									237
								Subtotal	3,102
Unallocated Reserve Capacity									3,397
								Total Design Capacity	6,499

Town of Charlotte
Municipal Sewage Disposal System

Pump Station Basis of Design
January 2, 2016

Total Design Flow	6,499	GPD
Average Daily Flow	6.77	GPM
Peaking Factor	5.00	
Peak Flow	33.85	GPM
Duplex Pump Sation	Yes	
Required Storage	1,625	gallons
Diameter of PS	8.00	Ft
Storage per VLF	376.03	Gallons
Alarm Elev.	90.5	Feet
Max. storage Eelv.	95.0	Feet
Vert. Emerg. Storage	4.50	Feet
Storage Provided	1,692	gallons
Force Main Dia.	4.00	Inches
Min. Cleansing Velocity	2.00	FPS
Min. Pumping Rate	78.29	GPM
Chosen Pumping rate	80.00	GPM
Length of FM to Mound	3,100	feet
Friction Losses to Mound	12.00	feet
High Point of FM in Mound	116.75	feet
Low Elevation in PS	87.50	feet
Elevation Change	29.25	feet
Minor headlosses	10.00	feet
Residual	0.00	feet
TDH	51.25	feet
Pump Cycle Storage	940	Gallons
Run Cycle	17.54	Minutes
Wet Well Detention Time	138.85	Minutes

System Curve
Increment 10

GPM	TDH
80.0	51.20
90.0	54.20
100.0	57.40
110.0	60.90
120.0	64.70
130.0	68.70

Pump Selection

Hydromatic SHEF45 , 1 Ph, 230 v, 60 Hz, 0.45 HP

CIVIL ENGINEERING ASSOCIATES, INC.
10 Mansfield View Lane
South Burlington, VT 05403
Phone: 802-864-2323
Fax: 802-864-2271
E-Mail: mail@cea-vt.com

STATE OF VERMONT
DAVID S. MARSHALL
No. 6019
CIVIL
PROFESSIONAL ENGINEER
REGISTERED

Hydrogeologic Study
Town of Charlotte Wastewater Disposal System

January 2, 2016

This study reviews the potential of expanding the permitted capacity of the existing Town of Charlotte municipal wastewater disposal system from 4,999 gallons per day (GPD) to 6,499 GPD. Since the conventional wastewater disposal system has a capacity which is greater than 2,000 GPD, a hydrogeologic study of the proposed conditions is required.

Existing Conditions

The existing site has been analyzed a number of times by Wagner, Heindel & Noyes (WH&N) dating back to 1988 with the most recent studies completed in the Fall of 2000 (See Attachment A – WH&N Hydro Study) for the Town of Charlotte.

The most recent WH&N reports the native soils as follows:

> "Numerous rounds of test pit excavations have been performed on this site (see Attachment for test pit logs; locations are shown on CEA site plans). These excavations indicate the presence of a ridge of beach gravels and sands presumably deposited along the shore of the former Champlain Sea, which was an incursion of the North Atlantic Ocean into the Champlain and St. Lawrence Valleys immediately following the retreat of continental glacial ice approximately 12,000 years ago. Underlying these sand and gravels are very low permeability silt-clays, which were also deposited by the Champlain Sea. No bedrock was encountered in any test pits."

Specialized studies of this soil formation included a localized large scale permeability trench test which yielded a k value of 160 feet/day (See Attachment A – WH&N Study Pg. 3, WH&N Attachment Pg. 30-32).

The most recent work completed by WH&N on behalf of the Town of Charlotte, limited the hydrologeologic review of the site to a design flow of 4,999 GPD. This value was chosen at the time as the permitting requirements set forth in the State Environmental Protection Rules (EPR's) for small scale (<6,500 GPD) wastewater disposal systems required that systems with design flows of 5,000 GPD or greater, that the replacement area system be constructed coincidently with the primary system and the primary and secondary wastewater disposal fields be alternated on an annual basis. In order to avoid those capital costs, the original system was limited to a design capacity of 4,999 GPD.

The hydrogeologic study provided guidance on the maximum hydraulic gradient that could be created while still maintaining the three feet of separation below the bottom of the stone trenches. The assigned bottom of trench elevation in that study was 114.1 feet. When this value was used, the analysis showed that the system would be capable of complying with the minimum three (3) foot separation to the mounded groundwater table while creating a maximum hydraulic gradient of 2.1% (See Attachment A – WH&N Study Attachment Pg. 2) for the design capacity of 4,999 GPD.

Proposed Conditions

The earlier Environmental Protection Rule requirement for disposal systems with capacities in excess of 5,000 GPD which required that the replacement system be coincidently constructed with the primary system is no longer in place. As such, there is the possibility to expand the permitted disposal capacity of the wastewater disposal system without any construction improvements or capital costs.

The issue is whether the site can manage the additional flows while remaining compliant with the requirement of maintaining three (3) feet of vertical separation between the bottom of the distribution trenches and the mounded (induced) groundwater table during Spring time conditions.

The key difference between the original hydrogeological work and the conditions that exist today is that the bottom of the stone distribution trench stone was installed not at an elevation of 114.1 (assumed in the WH&N work), but was installed at elevation 115.25 (See Attachment K - CEA Sheet C4 and Attachment M - CEA sheet C7). This created an additional 1.15 feet of groundwater mounding that could be induced while still meeting the vertical separation requirement.

Analysis

A Darcy based table top analysis of the site was utilized in both the original WH&N work and the updated work presented herein. A hydraulic permeability of 160 feet per day was utilized based upon the large scale trench test work completed by WH&N and subsequently approved by the State.

<u>Overall Site Capacity</u> – The Overall Site Capacity analysis originally prepared by WH&N is fairly broad in nature as it looks at a big picture view of the direction of groundwater flow to points. The original study identified the limiting conditions as being generally at elevation 107 some 200 feet east of the primary wastewater disposal system site.

This study includes updated overall hydraulic gradient calculations for both the

primary and replacement systems originally included in the WH&N work. Since the bottom of the stone trenches in the primary disposal system were installed at an elevation higher than what the original study presumed, this enabled a higher potential maximum induced groundwater elevation and in turn an increased hydraulic gradient of 2.63%. This, coupled with the increased transmitting thickness (increased from 1.1 feet to 2.25 feet), yields a maximum design flow of 13,340 GPD (See Attachment B – Overall Site Capacity Analysis).

The analysis of the replacement area showed that if the lowest trench (in a stepped system) was kept above elevation 113.1, the site hydrogeologic conditions could support a flow of 6,499 GPD (See Attachment B – Overall Site Capacity Analysis and Attachment K – CEA Sheet C4 – Trench Elevations).

Localized General Compliance Review - This overall site capacity analysis work has been supplemented with a more detailed analysis of the induced groundwater characteristics at the south, mid-portion and north ends of the existing system (Attachments C, D & E).

This work utilized an overlay of the installed trench locations over the computed seasonal high groundwater table values estimated from the over-spring monitoring of the site (See Attachment F).

The application of the effluent across the system was presumed to be linear and the resulting loading of the mounded effluent is calculated in the analysis. In this analysis, the linear loading begins at 0.0 GPD/LF at the west side of the system and increases to 16.1 GPD/LF at the east end of the system.

The existing SHGWT elevations are assigned at both the west and east ends of the system while the reported interior elevation are interpreted.

The analysis sheets show that at a design flow of 6,499 GPD with the use of the hydraulic gradient calculated from the overall site capacity analysis indicates that the depth from the bottom of the stone to the induced groundwater table varied from 4 to 6 feet (Attachments C, D & E) which exceeds the three (3) foot minimum.

Primary Area Flow Paths Review - A closer review by CEA of the primary and replacement disposal fields overlaid over the SHGWT elevations at the monitoring wells and associated interpreted groundwater contours (Attachment G) showed that the groundwater under the primary site may actually flow in more than one direction, which is divergent from what was originally presumed in the WH&N work.
In this case, the flow paths show that in addition to the originally presumed direction

of flow to the east, that there is also a flow path to the south. Based on the interpreted groundwater contours, sub-watersheds were identified. Based on the watershed divide within the primary wastewater disposal system, approximately 3/8's (38%) of the system initially drains southerly while the remaining 5/8's (62%) flows easterly (Attachment H).

A separate series of hydrogeologic analyses have been completed which assigned the representative flows from each sub-watershed along with the apparent localized hydraulic gradient (Attachment I & J). The hydraulic gradients were found generally to be lessor in value than the numbers calculated by the Overall Site Capacity Analysis approach. In addition, the path in which the flows were directed were found to be on a narrower band than that assigned for the overall system analysis. Despite these more conservative designations, the supplemental localized hydrogeological analyses showed that the vertical separation distance from the bottom of the stone to the induced (mounded) groundwater table still exceeded the three (3) foot minimum with the 6,499 GPD design flow.

Summary

The various general and localized analyses indicate that the disposal capacity at the existing conventional disposal system can be increased from the currently permitted 4,999 GPD to 6,499 GPD while remaining compliant with the vertical groundwater separation requirements associated with the small scale system Environmental Protection Rules based on the existing configuration of the constructed wastewater disposal system and that the replacement area can be readily configured to meet the same requirements.

Attachments:

- A – Original WH&N Hydrogeologic Study
- B - Updated Overall Site Capacity
- C - South End Hydrogeologic Analysis
- D - Mid-Portion Hydrogeologic Analysis
- E - North End Hydrogeologic Analysis
- F - Site Plan/SHGWT Overlay of System
- G - Site Plan/SHGWT Overlay of System with Localized Flow Paths
- H - Site Plan/SHGWT Overlay with Subwatersheds and Study Points
- I – Localized South End Hydrogeologic Analysis
- J - Localized East Side Hydrogeologic Analysis
- K - CEA Sheet C4 Showing Trench Elevations
- L - CEA Sheet C5 Showing Soil & Percolation Test Information
- M - CEA Sheet C7 Showing Bottom of Trench Elevation

End of Study

COMMUNITY WASTEWATER DISPOSAL AREA for the TOWN OF CHARLOTTE

Former Burns Property East of Greenbush Road Charlotte, Vermont

ANALYSIS OF HYDROGEOLOGIC SITE CAPACITY

Dec. 8, 2000

Report prepared by:

Craig D. Heindel, CPG
Senior Hydrogeologist

DEC 14

HEINDEL AND NOYES

Consulting Hydrogeologists, Engineers, and Environmental Scientists

ATTACHMENT A

ANALYSIS OF
HYDROGEOLOGIC SITE CAPACITY

COMMUNITY WASTEWATER DISPOSAL AREA
for the TOWN OF CHARLOTTE

Former Burns Property
East of Greenbush Road
Charlotte, Vermont

Dec. 8, 2000

TABLE OF CONTENTS

Page

I. INTRODUCTION 1

II. PROJECT DEMAND 1

III. SOILS 1

IV. SEASONAL HIGH WATER TABLE 2

V. LIMITING CONDITIONS FOR WASTEWATER DISPOSAL 2

VI. HYDROGEOLOGIC SITE CAPACITY FOR WASTEWATER DISPOSAL 3
- Hydraulic Conductivity 3
- Hydraulic Gradient 3
- Cross-sectional Area 3
- Predicted height of induced groundwater mound at 4,999 gpd 4
- Water Table Separation 4

VII. CONCLUSIONS 4

ATTACHMENT
- See Enclosed Table of Contents
- Map Pocket (3 maps)

U:\PROJECTS\CharlotteTownWW\reportTitleTOC.doc

ATTACHMENT

page

Location Map 1

Hydrogeologic Site Capacity: 2
- Calculation Spreadsheet, Primary and Replacement Trenches 2
- Stepped Replacement Trenches: deepest allowable trench bottom elevation to provide 4,999 gpd capacity 3

Limiting Conditions: Summary Table 4

Test Pit Logs 6

Seasonal High Water Table (Spring 1988) 20
- Summary Table of Critical Depths, per 1996 *SSWTDR* 20
- Calculation spreadsheets for individual wells 21
- 1988 Measurements: Summary Table 29

Hydraulic Conductivity (1989 Trench Test) 30
- Pertinent pages of *Wastewater Disposal System; Hydrogeologic Evaluation; Charlotte Commons Project; Charlotte, Vermont; Vols. I and II;* Wagner, Heindel, & Noyes; February 15, 1990 30

Map Pocket (3 maps) ..... after 32

Town of Charlotte Wastewater Disposal Area; Former Burns Property, Lots #3 and #4, East of Greenbush Road, Charlotte (Heindel & Noyes; October 30, 2000; 1" = 40'):

- *Location Map; Test Pits, Monitor Wells, 1989 Trench Test;*
- *Depth of Limiting Conditions;*
- *Elevation of Limiting Conditions.*

U:\PROJECTS\CharlotteTownWW\report.doc

Heindel and Noyes
• Consulting Hydrogeologists
• Engineers
• Environmental Scientists
P.O. Box 64709 Burlington, Vermont 05406-4709
802-658-0820
Fax 802-860-1014

ANALYSIS OF HYDROGEOLOGIC SITE CAPACITY

COMMUNITY WASTEWATER DISPOSAL AREA for the TOWN OF CHARLOTTE

Former Burns Property
East of Greenbush Road
Charlotte, Vermont

Dec. 8, 2000

I. INTRODUCTION

This report presents the results of our analysis of the hydrogeologic site capacity of the proposed community wastewater disposal area for the Town of Charlotte, located on the former Burns property east of Greenbush Road in Charlotte, Vermont. The wastewater disposal area is shown in detail on site plans and design drawings by Civil Engineering Associates (*Burns Property Wastewater System, Town of Charlotte, CEA Project No. 00271*, dated Dec. 2000).

II. PROJECT DEMAND

The project demand as currently envisioned is 4,999 gallons per day (gpd), per CEA information.

III. SOILS

Numerous rounds of test pit excavations have been performed on this site (see Attachment for test pit logs; locations are shown on CEA site plans). These excavations indicate the presence of a ridge of beach gravels and sands presumably deposited along the shore of the former Champlain Sea, which was an incursion of the North Atlantic Ocean into the Champlain and St. Lawrence Valleys immediately following the retreat of continental glacial ice approximately 12,000 years ago. Underlying these sand and gravels are very low permeability silt-clays, which were also deposited by the Champlain Sea. No bedrock was encountered in any test pits.

IV. SEASONAL HIGH WATER TABLE

This site was monitored by our firm for seasonal high water table (SHWT) conditions in the spring of 1988, as reported in *Wastewater Disposal System; Hydrogeologic Evaluation; Charlotte Commons Project, Charlotte, Vermont* (by Wagner, Heindel, & Noyes, Inc., dated February 15, 1990, two volumes). WH&N made measurements of depths to water on a weekly basis in numerous monitoring wells installed throughout the site (see "MW" on CEA site plans, and on H&N maps in map pocket). This weekly monitoring schedule was in accordance with the Vermont Environmental Protection Rules (EPRs) that were current at that time.

In 1996, ANR made modifications to numerous portions of the EPRs, including changing the required monitoring frequency to 2 times per week (during the "critical period"), and adding a procedure for statistically evaluating the data. In accordance with a telephone conversation that Steve Vock, PE (CEA) reported having with Ernest Christianson (VT DEC) on or shortly before October 4, 2000, which was in response to our fax to Mr. Christianson dated Sept. 18, 2000 (also mailed to him on Oct. 5, 2000), we have conducted an analysis of the 1988 SHWT data following the 1996 ANR procedures.

To bring the 1988 data into compliance with the 1996 procedure, we supplemented the weekly data points with artificially inserted measurements half-way between each actual weekly measurement, using the highest water table measurement of the two real measurements on either side of the inserted data. We then conducted the required statistical analysis on these augmented data (see Attachment).

V. LIMITING CONDITIONS FOR WASTEWATER DISPOSAL

Based on the results of the SHWT statistical analyses, and the test pit logs, we have created a summary table identifying the sub-surface condition at each test pit or monitor well that is most limiting for the disposal of wastewater (impeding soils, indications of seasonal high water table such as mottles or staining, groundwater, or "critical depth" to seasonal high water table based on the monitoring and statistical analyses described in Section IV above).

Using ground surface elevation data provided by CEA and from earlier maps, we have created maps of depths and elevations of limiting conditions throughout the area (see map pocket in Attachment). The elevations of limiting conditions are used as the hydraulic base of the site, in our calculations of the hydrogeologic site capacity for wastewater disposal.

The maps of limiting conditions show an extensive area that is suitable for large-scale community wastewater disposal systems, where the depths to limiting

conditions are at least 5.0 feet below ground surface. This suitable area extends from the currently proposed ridge for approximately 400 feet to the east. Elevation contours of this area indicate that the surface of limiting conditions slopes downward to the east, so treated wastewater will also flow to the east.

VI. HYDROGEOLOGIC SITE CAPACITY FOR WASTEWATER DISPOSAL

We conducted a Darcy's Law analysis of the hydrogeologic site capacity for wastewater disposal on the areas proposed by CEA for trench disposal systems. The following formula and parameters were used for the calculations (see Attachment for details):

$$Q = K \times i \times (L \times h) \times 7.48$$

Where Q = Design Flow, in gallons per day (gpd); 4,999 gpd;
And 7.48 = conversion from cu.ft. to gallons.

- **Hydraulic Conductivity (K):** 160 ft/day. This value was detemined by a large-scale trench test conducted in October 1988 by WH&N in the specific area proposed for wastewater disposal by CEA (details were contained in the WH&N report dated February 1990 mentioned earlier, which was submitted to DEC and the Town of Charlotte in 1990 in conjunction with an earlier proposed project). The results of this trench test indicate a hydraulic conductivity of 160 ft/day for these beach gravels and sands. This is a typical K-value for these types of well-sorted waterlain deposits.

- **Hydraulic Gradient (i):** 2.1% at primary trenches; 3.3% at replacement trenches. Hydraulic gradient values were calculated by determining the elevation of the highest allowable groundwater mound (at 3.0 feet below the bottom of disposal trenches), and calculating the hydraulic gradient from the furthest-west disposal trench to the 107-foot elevation of limiting condition to the east of the trenches.

- **Cross-sectional Area (L x h):**

  - **Cross-sectional Length (L):** 190 feet. Both the primary and replacement systems consist of two sets of 90-foot trenches separated by 10 feet, giving a total effective application length of 190 feet. The 10-foot gap between the two sets of trenches is immaterial to the development and final shape of the induced groundwater mound beneath the disposal trenches, due to the spreading of the groundwater mound as it builds beneath the two sets of trenches.

- **Predicted height (h), induced groundwater mounding at 4,999 gpd:**
  - **Primary trenches:** 1.1 feet;
  - **Replacement trenches:** 0.66 feet.

  These heights of induced groundwater mounds were calculated by solving Darcy's Law for h, for each set of trenches (see Attachment).

Water Table Separation: 3.0 ft. In accordance with the 1996 *Small Scale Wastewater Treatment and Disposal Rules*, wastewater disposal systems must be sited to provide for at least 3.0 feet of unsaturated soil between the bottom of the disposal trenches and the induced groundwater mound. In this case, the proposed elevations of trench bottoms are at least 3.0 feet higher than the elevation of the induced groundwater mounds that are predicted to rise underneath these disposal systems. See calculations in Attachment. Therefore, adequate water table separation will be provided.

VII. CONCLUSIONS

These calculations indicate that the site proposed for these primary and replacement wastewater disposal systems has adequate hydrogeologic site capacity to dispose of at least 4,999 gpd while maintaining at least 3.0 feet of unsaturated soil beneath the bottom of the disposal trenches and the induced groundwater mound, as determined in accordance with the 1996 *Small Scale Wastewater Treatment and Disposal Rules*.

U:\PROJECTS\CharlotteTownWW\report.doc

ATTACHMENT

ATTACHMENT

page

Location Map 1

Hydrogeologic Site Capacity: 2
- Calculation Spreadsheet, Primary and Replacement Trenches 2
- Stepped Replacement Trenches: deepest allowable trench bottom elevation to provide 4,999 gpd capacity 3

Limiting Conditions: Summary Table 4

Test Pit Logs 6

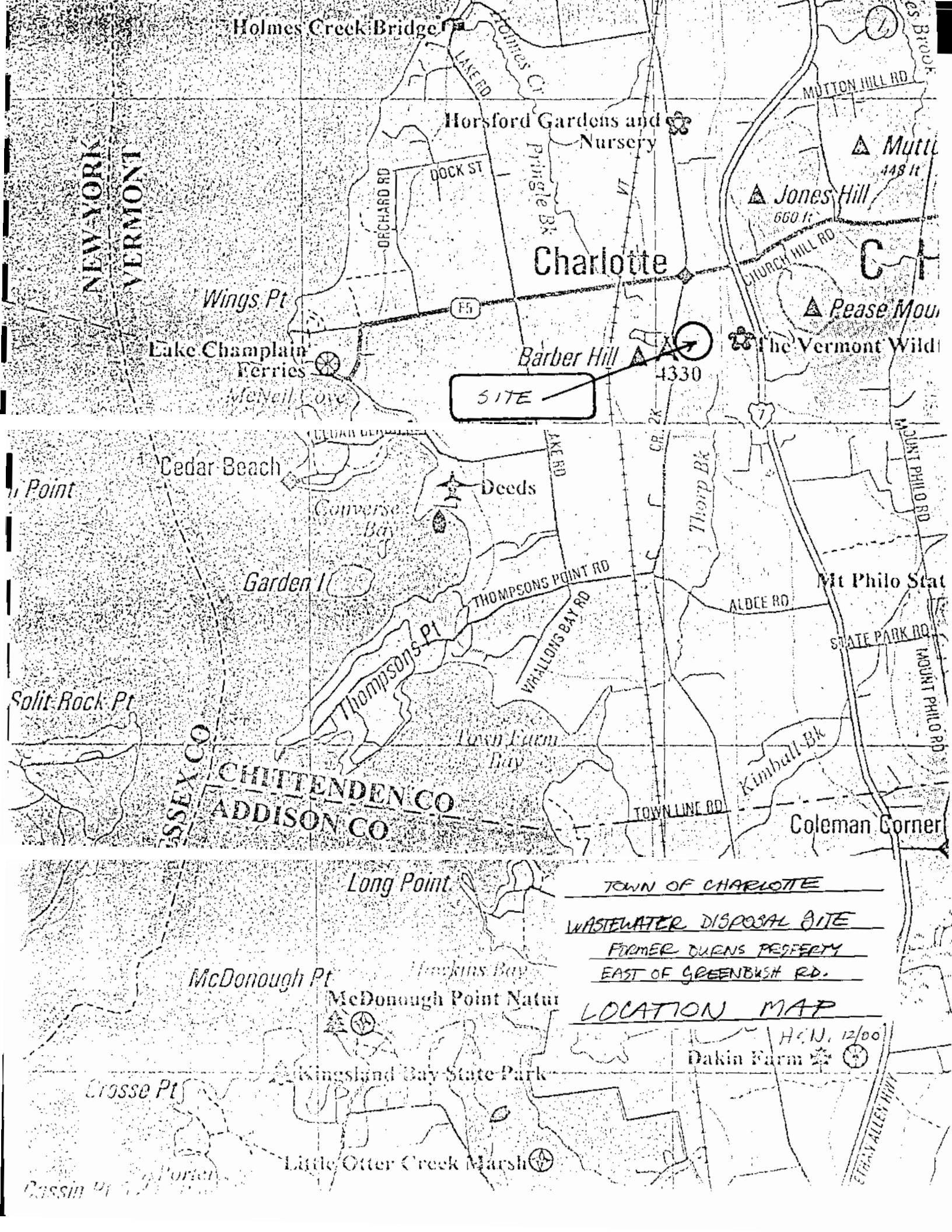
Seasonal High Water Table (Spring 1988) 20
- Summary Table of Critical Depths, per 1996 *SSWTDR* 20
- Calculation spreadsheets for individual wells 21
- 1988 Measurements: Summary Table 29

Hydraulic Conductivity (1989 Trench Test) 30
- Pertinent pages of *Wastewater Disposal System; Hydrogeologic Evaluation; Charlotte Commons Project; Charlotte, Vermont; Vols. I and II;* Wagner, Heindel, & Noyes; February 15, 1990 30

Map Pocket (3 maps) ..... after 32

*Town of Charlotte Wastewater Disposal Area; Former Burns Property, Lots #3 and #4, East of Greenbush Road, Charlotte (*Heindel & Noyes; October 30, 2000; 1" = 40'):

- *Location Map; Test Pits, Monitor Wells, 1989 Trench Test;*
- *Depth of Limiting Conditions;*
- *Elevation of Limiting Conditions.*


Holmes Creek Bridge
LAKE RD
MUTTON HILL RD
Horsford Gardens and Nursery
DOCK ST
ORCHARD RD
Pringle Bk
VT
NEW YORK
VERMONT
Jones Hill
660 ft
448 ft
CHURCH HILL RD
Charlotte
Wings Pt
F5
Pease Mou
Lake Champlain Ferries
Barber Hill
4330
The Vermont Wildl
SITE
McNeil Cove
Cedar Beach
Deeds
Converse Bay
Garden I
THOMPSONS POINT RD
Thorp Bk
MOUNT PHILO RD
Mt Philo Stat
ALDCE RD
STATE PARK RD
WALLONS BAY RD
Thompsons Pt
Solit Rock Pt
Town Farm Bay
Kimball Bk
CHITTENDEN CO
ADDISON CO
TOWN LINE RD
Coleman Corner
Long Point
McDonough Pt
McDonough Point Natur
Dakin Farm
Kingsland Bay State Park
Crosse Pt
Little Otter Creek Marsh
ETHAN ALLEN HWY
TOWN OF CHARLOTTE
WASTEWATER DISPOSAL SITE
FORMER BURNS PROPERTY
EAST OF GREENBUSH RD.
LOCATION MAP
H.C.N. 12/00

TOWN OF CHARLOTTE: WASTEWATER DISPOSAL SYSTEM
Former Burns Property, East of Greenbush Road (Lots #3 and #4)

Scenario #2: meeting, CDH and SV, Dec. 8, 2000

Design Sewage Flow: 4,999 gpd.

Calculation Method: Darcy's Law: Q = K x i x (L x h) 7.48

A. Primary Trenches:

Number of trenches:	8	(equivalent)
Trench bottom elevation:	114.10	ft.
Design Flow:	4,999	gpd.
Equivalent trench length:	190	ft.

Parameter	Description	Value	units	Calculations; Source of Value Used
K	hydr. conduct.	160	ft/day	Trench test (conducted in Oct. 1989; see Feb. 1990 WH&N report)
i	hydraulic gradient	0.021	ft/ft	estimated hydraulic gradient from induced groundwater mound: trench bottom elev.: 114.10 ft. minus unsat. soil: 3.0 ft. = GW mound elev.: 111.1 ft. Elev. of Limit. Cond. To E: 107.00 ft. Dist. To Limit. Cond.: 200 ft. Hydr. Grad.from GW mound to Limit. Cond. To east: [GW mound - E. Limit. Cond]/Dist.) i = 2.1%
h	available transmitting thickness	1.1	ft.	GW mound elev.: 111.1 ft. minus Limit. Cond. Elev.: 110.0 ft. h = 1.1 ft.
L	cross-slope length	190	ft.	Based on overall trench area including 10-foot gap between, from CEA layout
Solve for Q:				
Q	Hydrogeologic Site Capacity	5,128	gpd	Q = K x i x (L x h) 7.48 gal/cu.ft.

B. Replacement Trenches:

Number of trenches:	8	(equivalent)
Trench bottom elevation:	stepped	
Design Flow:	4,999	gpd.
Equivalent trench length:	190	ft.

Parameter	Description	Value	units	Calculations; Source of Value Used
K	hydr. conduct.	160	ft/day	Trench test (conducted in Oct. 1989; see Feb. 1990 WH&N report)
i	hydraulic gradient	0.033	ft/ft	estimated hydraulic gradient from induced groundwater mound (Trench R-1 = worst-case): trench R-1 bottom elev.: 114.00 ft. minus unsat. soil: 3.0 ft. = GW mound elev.: 111.0 ft. Elev. of Limit. Cond. To E: 107.00 ft. Dist. To Limit. Cond.: 120 ft. Hydr. Grad.from GW mound to Limit. Cond. To east: [GW mound - E. Limit. Cond]/Dist.) i = 3.3%
h	available transmitting thickness	0.66	ft.	Determined by trial-and-error runs, varying the value for h. Because using stepped trenches.
L	cross-slope length	190	ft.	Based on overall trench area including 10-foot gap in middle, from CEA layout
Solve for Q:				
Q	Hydrogeologic Site Capacity	5,003	gpd	Q = K x i x (L x h) 7.48 gal/cu.ft.

Stepped Trenches, Replacement Area:

Trench No.	Highest Elev. of Lim. Cond. ft.	plus GW Mound ft.	plus unsat. soil, ft.	Trench Bottom Elev. Must be this or HIGHER: ft.		
R-1	110.00	0.66	3.00		113.66	
R-2	110.00	0.66	3.00		113.66	
R-3	110.00	0.66	3.00		113.66	
R-4	110.00	0.66	3.00		113.66	
R-5	110.00	0.66	3.00		113.66	
R-6	110.00	0.66	3.00		113.66	
R-7	109.50	0.66	3.00		113.16	
R-8	109.00	0.66	3.00		112.66	

SUMMARY OF LIMITING CONDI ONS:

Town of Charlotte Wastewater Dispos Area;
Former Burns Property, East of Green ush Road; Lots #3 and #4.

Location	Elev. of Ground Surface, ft.	Seas Wa		Depths Below Ground Surface To:						Limiting Condition		
				nal High er Table		Impeding Material		Ground Water				
		Monit., Stats. Anal.	M s	ttles or aining	Depth, ft.	Type	Depth, ft.	Depth, ft.	Elev. ft.	Depth, ft.	Type	Notes
TP-1	111.9	no		yes	0.9	silt, silty fine sand	0.9	none	111.0	0.9	impeding, mottles	no monitor well installed
TP/MW-2	115.5	yes		none	7.5	silt-clay	5.3	none	110.2	5.3	impeding	
TP/MW-3	113.0	yes		none	5.4	silt-clay	5.1	none	107.9	5.1	impeding	
TP-4	109.5	no		none	- -	silt-clay	4.7	none	104.8	4.7	impeding	no monitor well installed
TP-5	105.0	no		yes	2.1	silt-clay	2.3	none	102.9	2.1	mottles	no monitor well installed
TP/MW-6	106.6	yes		none	6.5	silt-clay	9.5	none	100.1	6.5	SHWT	from 1988 monitoring data
TP/MW-7	113.0	yes		none	10.1	silt-clay	11.2	none	102.9	10.1	SHWT	from 1988 monitoring data
TP/MW-8	113.4	yes		none	6.7	silt-clay	6.8	none	106.7	6.7	SHWT	from 1988 monitoring data
TP-9	110.2	no		none	- -	silt-clay	3.1	none	107.1	3.1	impeding	no monitor well installed
TP/MW-10	117.7	yes		none	9.6	silt-clay	11.0	11.0	108.1	9.6	SHWT	from 1988 monitoring data
TP-11	113.0	no		none	- -	silt-clay	3.4	none	109.6	3.4	impeding	no monitor well installed
TP-12	114.0	no		none	- -	silt-clay	4.8	none	109.2	4.8	impeding	no monitor well installed
TP/MW-13	115.0	yes		none	7.0	silt-clay	8.0	none	108.0	7.0	SHWT	from 1988 monitoring data
TP-14	- -											location is off map to north
TP/MW-15	115.0	yes		none	5.5	silt-clay	5.6	none	109.5	5.5	SHWT	from 1988 monitoring data
TP-16	112.5	no		- -	- -	clay	0.9	none	111.6	0.9	impeding	no monitor well installed
TP/MW-A	110.3	no		no	- -	clay	0.3	0.0	110.3	0.0	groundwater	measured before 1989 trench test
TP/MW-B	112.2	no		no	- -	- -	- -	1.3	110.8	1.3	groundwater	measured before 1989 trench test
TP-101	105.1	no		yes	2.0	clay	3.9	none	103.1	2.0	mottles	no monitor well installed
TP-102	103.4	no		yes	0.7	clay	1.0	none	102.8	0.7	mottles	no monitor well installed
TP/MW-103	104.7	no		none	- -	silt	6.0	5.5	99.2	5.5	groundwater	measured before 1989 trench test
TP/MW-104	104.7	no		none	- -	clay	6.0	4.9	99.8	4.9	groundwater	measured before 1989 trench test
TP-105	102.2	no		yes	2.0	clay	2.0	none	100.2	2.0	impeding, mottles	no monitor well installed
TP/MW-106	102.4	no		yes	1.8	clay	3.2	1.9	100.6	1.8	mottles	
TP/MW-107	109.4	no		yes	5.0	clay	8.0	8.6	104.4	5.0	SHWT staining	
TP/MW-108	110.2	no		yes	5.5	clay	9.6	7.8	104.7	5.5	SHWT staining	
TP-109	111.9	no		none	- -	none	to 4.58	none	< 107.3	> 4.58	none	no limiting conditions to 107.3
TP/MW-110	113.4	no		none	- -	none	to 5.0	none	< 108.4	> 5.0	none	no limiting conditions to 108.4
TP-111	101.2	no		yes	0.5	clay	1.3	0.9	100.7	0.5	mottles	no monitor well installed
TP/MW-112	115.5	no		upper	0.8 - 3.9	clay	5.4	5.7	110.1	5.4	impeding	upper mottles not from SHWT

4

Note : Pages 6-17 Test Pit info removed for brevity, See Sheet C5 for Test Pit Info (Attachment L)

Location	Elev. of Ground Surface, ft.	Seas Wat		Depths Below Ground Surface To:						Limiting Condition		
		Monit., Stats. Anal.	Mo S	nal High Table les or ning	Depth, ft.	Impeding Material Type	Depth, ft.	Ground Water Depth, ft.	Elev. ft.	Depth, ft.	Type	Notes
TP/MW-113	111.6	no		--	--	--	--	1.3	110.3	1.3	groundwater	measured before 1989 trench test
TP/MW-114	?											no location on orig. maps
TP-115	101.0	no		es	1.1	clay	1.3	none	99.9	1.1	mottles	no monitor well installed
TP/MW-116	101.9	no		no	--	clay	4.2	2.9	99.0	2.9	groundwater	measured before 1989 trench test
TP/MW-117	110.8	no		no	--	clay	2.3	5.6	108.5	2.3	impeding	
TP/MW-118	115.4	no		one	--	clay	6.3	6.5	109.1	6.3	impeding	
TP/MW-119	116.3	no		pper	0.5 - 2.6	clay	9.9	7.1	109.2	7.1	groundwater	measured before 1989 trench test
TP/MW-120	112.0	no		one	--	clay	5.5	5.3	106.7	5.3	groundwater	measured before 1989 trench test
TP/MW-121	114.1	no		one	--	clay	5.3	5.8	108.8	5.3	impeding	
TP/MW-122	114.9	no		one	--	silt, fine sand	4.0	8.0	110.9	4.0	impeding	
TP/MW-123	113.4	no		one	--	clay	10.0	none	103.4	10.0	impeding	
TP/MW-124	107.9	no		one	--	clay	2.8	none	105.1	2.8	impeding	
TP/MW-125	116.6	no		one	--	clay	7.5	7.1	109.5	7.1	groundwater	measured before 1989 trench test
TP/MW-126	116.2	no		one	--	clay	7.8	7.6	108.6	7.6	groundwater	measured before 1989 trench test
TP/MW-127	115.6	no		one	--	clay	6.7	5.9	109.7	5.9	groundwater	measured before 1989 trench test
TP/MW-128	116.2	no		one	--	clay	7.5	7.6	108.7	7.5	impeding	
TP/MW-129	114.6	no		one	--	none	to 7.75	6.3	108.3	6.3	groundwater	measured before 1989 trench test
TP/MW-130	?	no		one	--	clay	0.5	none	?	?	impeding	no location on orig. maps
TP/MW-131	116.4	no		no	--	clay	6.3	8.5	110.1	6.3	impeding	
TP/MW-132	115.6	no		pper	1.6 - 2.7	clay	5.4	none	110.2	5.4	impeding	upper mottles not from SHWT
TP/MW-133	114.1	no		pper	0.8 - 3.2	clay	5.1	none	109.0	5.1	impeding	upper mottles not from SHWT
TP/MW-134	115.1	no		pper	1.1 - 2.2	clay	7.6	6.6	108.6	6.6	groundwater	measured before 1989 trench test
TP/MW-135	116.2	no		one	--	clay	7.9	7.1	109.1	7.1	groundwater	measured before 1989 trench test

Data Sources:

1. **Elev. of Ground Surface:** field-surveying informa tion shown on maps or data tables in April 1988 WH&N report ("Sewage Disposal Capacit ; Charlotte Commons") and Febr uary 1990 WH&N report ("Wastewater Disposal System, Hydrogeologic Evaluation; Charlo te Commons").
2. **Seasonal High Water Table:**
   Monitoring, Statistical Analysis? Yes = Weekly or bi-weekly measurements of water levels in monitor wells from March through May 31; followed by statistical analyses of measurements using the procedure for calculating "critical depths" in *Small Scale Wastewater Treatment and Disposal Rules*, VT ANR, Aug. 1996.
   Mottles or Staining: As reported in test pit logs contained in above-referenced reports.
   Depth: If spring monitoring results are available, the depth reported is the "critical depth" calculated as described above. if no spring monitoring was conducted, depth reported is depth to mottles or staining.
3. **Impeding Material:** Considered to be silty sand, silty fine sand, silt, silt-clay, or clay; as reported in test pit logs contained in above-referenced reports.
4. **Groundwater:** Highest one-time groundwater level reported, either in test pit logs, or in monitoring associated with Oct. 1989 trench test, as reported in above-referenced reports.
5. **Limiting Condition:** Whichever is highest (shallowest) of:
   - Statistically calculated "critical depth" of SHWT, from artificially augmented 1988 data;
   - Mottles or staining indicating SHWT (not used if statistical data are available);
   - Impeding material;
   - Groundwater (one-time measurement).

Heindel and Noyes;
Oct. 24, 2000;
u\projects\CharlotteTownWW\LimitingConditions.xls

WATER LEVEL VERY CLOSE TO GROUND SURFACE
THROUGHOUT MONITORING PERIOD

PROJECT:CHARLOTTE COMMONS WELL A PROJECT 489-1201-N

LOCATION:CHARLOTTE
WELL #A -OBSERVATION WELL RESPONSE
TOTAL WELL DEPTH: 0.00 FEET STICKUP OF CASING: 3.28 FEET
STATIC WATER LEVEL: 0.00 FEET DATAFILE: CCMWA

DATE	TIME	ETIME	WATERLEVEL	DRAWDOWN
10-18-89	10:31:00AM	21.00	~~3.28~~ 0	~~3.28~~ 0
	11:33:00	83.00	.01	.01
10-18-89	3:20:00PM	310.00	.08	.08
	6:00:00	470.00	0.00	0.00
10-19-89	7:55:00AM	1305.00	0.00	0.00
	9:29:00	1399.00	.03	.03
	11:33:00	1523.00	.08	.08
10-19-89	1:36:00PM	1646.00	.05	.05
	3:20:00	1750.00	.03	.03
	5:41:00	1891.00	.03	.03
10-20-89	6:40:00AM	2670.00	.06	.06
	8:45:00	2795.00	.06	.06
	9:59:00	2869.00	.06	.06
10-20-89	12:38:00PM	3028.00	-.04	-.04
	3:38:00	3208.00	-.05	-.05
	5:27:00	3317.00	-.10	-.10
	10:42:00	3632.00	-.02	-.02
10-21-89	8:58:00AM	4248.00	-.04	-.04
	10:52:00	4362.00	-.02	-.02
10-21-89	12:54:00PM	4484.00	-.04	-.04
	3:05:00	4615.00	-.03	-.03

PROJECT:CHARLOTTE COMMONS PROJECT #89-1201-N

WELL B

LOCATION:CHARLOTTE
WELL #B -OBSERVATION WELL RESPONSE
TOTAL WELL DEPTH: 0.00 FEET STICKUP OF CASING: 3.90 FEET
STATIC WATER LEVEL: 1.33 FEET DATAFILE: COMWB

DATE	TIME	ETIME	WATERLEVEL	DRAWDOWN	
			1.33	0	
10-19-89	9:29:00AM	1399.00	~~5.23~~	~~3.90~~	
	11:33:00	1523.00	1.63	.30	
10-19-89	1:35:00PM	1645.00	1.60	.27	
	3:18:00	1748.00	1.59	.26	
	5:39:00	1889.00	1.61	.28	
10-20-89	6:40:00AM	2670.00	1.62	.29	
	8:45:00	2795.00	1.60	.27	
	9:56:00	2866.00	1.59	.26	
10-20-89	12:36:00PM	3026.00	1.54	.21	
	3:35:00	3205.00	1.18	-.15	
	5:25:00	3315.00	.90	-.43	
	10:41:00	3631.00	.32	-1.01	PEAK
10-21-89	8:55:00AM	4245.00	.36	-.97	
	10:50:00	4360.00	.49	-.84	
10-21-89	12:51:00PM	4481.00	.64	-.69	
	3:03:00	4613.00	.72	-.61	
	5:38:00	4768.00	.82	-.51	
	8:57:00	4967.00	.88	-.45	
10-22-89	5:59:00AM	5509.00	.90	-.43	
	8:11:00	5641.00	.90	-.43	
10-22-89	12:39:00PM	5909.00	1.06	-.27	

Town of Charlotte Sewage Disposal Capacity
1988 Seasonal High Water Table Analysis*
Former Burns Property, East of Greenbush Rd.

Monitor Wells	Ground Elevation (ft)	Critical Depth *		Critical Elevation of Seasonal Highwater Table (ft)
		(inches bgs)	(feet bgs)	
2	115.5	89.7	7.5	108.0
3	113.0	65.1	5.4	107.6
6	106.6	78.2	6.5	100.1
7	113.0	121.4	10.1	102.9
8	113.4	80.0	6.7	106.7
10	117.7	115.6	9.6	108.1
13	115.0	83.8	7.0	108.0
15	115.0	66.3	5.5	109.5

bgs =below ground surface

* The 1988 Seasonal High Water Table at each well is determined using the procedure for calculating the "critical depth" in the August 8, 1996 Small-Scale Wastewater Treatment and Disposal Rules (VT ANR).

"Critical Depth" is defined as the water table elevation which is not exceeded by the following amounts for the following number of days:

not exceeded by these amounts	for more than this number of days
0 - 5.99 inches	30
6.0 - 11.99 inches	20
12.0 - 17.99 inches	10
18 inches	0

Data sources:

1. Heindel and Noyes weekly measurements from March 2 to May 30, 1988;
2. Artificial data points inserted half-way between actual measurements.
   Each inserted artificial value is the same as the highest field measurement either just before or just after it.
   For blank dates due to frozen wells (May 3 and/or 10 in MW-6, 7, and 8), we inserted artificial data points 0.2 ft. higher than the highest reading before or after these blanks.
3. Ground elevations: Taken from topographic survey by Fitzpatrick-Llewellyn, Inc. "Wastewater Disposal Area, Charlotte Commons", sheet 6 of 9, Dec. 1987 and "Groundwater Contour Map, Feb. 1990, WH&N, Inc. Feb. 14, 1990".

Heindel and Noyes;
Oct. 18, 2000;
u:\projects\CharlotteTownWW\Criticaldepth

Town of Charlotte Sewage Disposal Capacity
1988 Seasonal High Water Table
Former Burns Property, East of Greenbush Rd.
Monitor Well # 2

Critical depth (bgs) = 89.7 inches
Maximum well depth (bgs) = 7.48 feet

Number of days allowed to exceed critical depth	0	10	20	30
Total allowable inches above critical depth	18*	12**	6***	0****
Total number of days exceeding critical depth	0.0	0.0	0.0	25.5

Date	Time Increment (days)	Depth to Water (feet bgs)	Depth to Water (inches bgs)	# Days Water Level Exceeds Critical Depth by: 18.0"	# Days Water Level Exceeds Critical Depth by: 12" - 17.99"	# Days Water Level Exceeds Critical Depth by: 6" - 11.99"	# Days Water Level Exceeds Critical Depth by: 0" - 5.99"
2-Mar-88	**0.0**	**7.48**	**89.8**	**0.0**	**0.0**	**0.0**	**0.0**
7-Mar-88	**4.0**	**7.48**	**89.8**	**0.0**	**0.0**	**0.0**	**0.0**
10-Mar-88	**4.0**	**7.48**	**89.8**	**0.0**	**0.0**	**0.0**	**0.0**
13-Mar-88	3.0	7.48	89.8	0.0	0.0	0.0	0.0
15-Mar-88	**3.0**	**7.46**	**89.5**	**0.0**	**0.0**	**0.0**	**3.0**
19-Mar-88	4.0	7.48	89.8	0.0	0.0	0.0	0.0
23-Mar-88	**3.5**	**7.48**	**89.8**	**0.0**	**0.0**	**0.0**	**0.0**
26-Mar-88	3.5	7.48	89.8	0.0	0.0	0.0	0.0
30-Mar-88	**3.8**	**7.46**	**89.5**	**0.0**	**0.0**	**0.0**	**3.8**
2-Apr-88	3.5	7.48	89.8	0.0	0.0	0.0	0.0
6-Apr-88	**3.5**	**7.48**	**89.8**	**0.0**	**0.0**	**0.0**	**0.0**
9-Apr-88	3.5	7.48	89.8	0.0	0.0	0.0	0.0
13-Apr-88	**3.5**	**7.46**	**89.5**	**0.0**	**0.0**	**0.0**	**3.5**
16-Apr-88	3.5	7.48	89.8	0.0	0.0	0.0	0.0
20-Apr-88	**4.3**	**7.48**	**89.8**	**0.0**	**0.0**	**0.0**	**0.0**
25-Apr-88	**3.5**	**7.48**	**89.8**	**0.0**	**0.0**	**0.0**	**0.0**
27-Apr-88	**2.8**	**7.48**	**89.8**	**0.0**	**0.0**	**0.0**	**0.0**
30-Apr-88	3.0	7.48	89.8	0.0	0.0	0.0	0.0
3-May-88	**3.0**	**7.48**	**89.8**	**0.0**	**0.0**	**0.0**	**0.0**
6-May-88	3.5	7.48	89.8	0.0	0.0	0.0	0.0
10-May-88	**3.5**	**7.48**	**89.8**	**0.0**	**0.0**	**0.0**	**0.0**
13-May-88	3.0	7.48	89.8	0.0	0.0	0.0	0.0
16-May-88	**3.0**	**7.39**	**88.7**	**0.0**	**0.0**	**0.0**	**3.0**
19-May-88	3.5	7.39	88.7	0.0	0.0	0.0	3.5
23-May-88	**3.5**	**7.21**	**86.5**	**0.0**	**0.0**	**0.0**	**3.5**
26-May-88	3.5	7.21	86.5	0.0	0.0	0.0	3.5
30-May-88	**1.8**	**7.17**	**86.0**	**0.0**	**0.0**	**0.0**	**1.8**

bgs = below ground surface
Time increment = one-half the time since the prior reading to one-half the time to the next reading.

* Groundwater can not exceed the critical level of the disposal field by 18" at any one time March 1 - May 31.
** Groundwater can not exceed the critical level of the disposal field by 12-17.99" for more than 10 days March 1 - May 31.
*** Groundwater can not exceed the critical level of the disposal field by 6-11.99" for more than 20 days March 1 - May 31.
**** Groundwater can not exceed the critical level of the disposal field by 0-5.99" for more than 30 days March 1- May 31.

Data sources:
1. **Bold: measurements by Heindel & Noyes, 1988;**
2. Un-bolded: Artificial data points, inserted half-way between actual measurements.
   Each inserted artificial value is the same as the highest field measurement either just before or just after it.

Town of Charlotte Sewage Disposal Capacity
1988 Seasonal High Water Table
Former Burns Property, East of Greenbush Rd.
Monitor Well # 3

Critical depth (bgs) =	65.1	inches		
Maximum well depth (bgs) =	7.55	feet		
Number of days allowed to exceed critical depth	0	10	20	30
Total allowable inches above critical depth	18*	12**	6***	0****
Total number of days exceeding critical depth	0.0	0.0	0.0	29.5

Date	Time Increment (days)	Depth to Water (feet bgs)	Depth to Water (inches bgs)	# Days Water Level Exceeds Critical Depth by: 18.0"	# Days Water Level Exceeds Critical Depth by: 12" - 17.99"	# Days Water Level Exceeds Critical Depth by: 6" - 11.99"	# Days Water Level Exceeds Critical Depth by: 0" - 5.99"
2-Mar-88	**0.0**	**6.88**	**82.6**	**0.0**	**0.0**	**0.0**	**0.0**
7-Mar-88	**4.0**	**6.05**	**72.6**	**0.0**	**0.0**	**0.0**	**0.0**
10-Mar-88	**4.0**	**5.54**	**66.5**	**0.0**	**0.0**	**0.0**	**0.0**
13-Mar-88	3.0	6.03	72.4	0.0	0.0	0.0	0.0
15-Mar-88	**3.0**	**6.03**	**72.4**	**0.0**	**0.0**	**0.0**	**0.0**
19-Mar-88	4.0	6.37	76.4	0.0	0.0	0.0	0.0
23-Mar-88	**3.5**	**6.37**	**76.4**	**0.0**	**0.0**	**0.0**	**0.0**
26-Mar-88	3.5	6.37	76.4	0.0	0.0	0.0	0.0
30-Mar-88	**3.8**	**5.95**	**71.4**	**0.0**	**0.0**	**0.0**	**0.0**
2-Apr-88	3.5	5.95	71.4	0.0	0.0	0.0	0.0
6-Apr-88	**3.5**	**5.87**	**70.4**	**0.0**	**0.0**	**0.0**	**0.0**
9-Apr-88	3.5	5.87	70.4	0.0	0.0	0.0	0.0
13-Apr-88	**3.5**	**5.59**	**67.1**	**0.0**	**0.0**	**0.0**	**0.0**
16-Apr-88	3.5	5.59	67.1	0.0	0.0	0.0	0.0
20-Apr-88	**4.3**	**5.12**	**61.4**	**0.0**	**0.0**	**0.0**	**4.3**
25-Apr-88	**3.5**	**5.18**	**62.2**	**0.0**	**0.0**	**0.0**	**3.5**
27-Apr-88	**2.8**	**5.20**	**62.4**	**0.0**	**0.0**	**0.0**	**2.8**
30-Apr-88	3.0	5.20	62.4	0.0	0.0	0.0	3.0
3-May-88	**3.0**	**5.10**	**61.2**	**0.0**	**0.0**	**0.0**	**3.0**
6-May-88	3.5	5.10	61.2	0.0	0.0	0.0	3.5
10-May-88	**3.5**	**5.10**	**61.2**	**0.0**	**0.0**	**0.0**	**3.5**
13-May-88	3.0	5.28	63.4	0.0	0.0	0.0	3.0
16-May-88	**3.0**	**5.28**	**63.4**	**0.0**	**0.0**	**0.0**	**3.0**
19-May-88	3.5	5.43	65.2	0.0	0.0	0.0	0.0
23-May-88	**3.5**	**5.43**	**65.2**	**0.0**	**0.0**	**0.0**	**0.0**
26-May-88	3.5	5.69	68.3	0.0	0.0	0.0	0.0
30-May-88	**1.8**	**5.69**	**68.3**	**0.0**	**0.0**	**0.0**	**0.0**

bgs = below ground surface
Time increment = one-half the time since the prior reading to one-half the time to the next reading.

* Groundwater can not exceed the critical level of the disposal field by 18" at any one time March 1 - May 31.
** Groundwater can not exceed the critical level of the disposal field by 12-17.99" for more than 10 days March 1 - May 31.
*** Groundwater can not exceed the critical level of the disposal field by 6-11.99" for more than 20 days March 1 - May 31.
**** Groundwater can not exceed the critical level of the disposal field by 0-5.99" for more than 30 days March 1- May 31.

Data sources:
1. **Bold: measurements by Heindel & Noyes, 1988;**
2. Un-bolded: Artificial data points, inserted half-way between actual measurements.
   Each inserted artificial value is the same as the highest field measurement either just before or just after it.

Heindel and Noyes;
Oct. 18, 2000;
u:\projects\CharlotteTownWW\Criticaldepth

Town of Charlotte Sewage Disposal Capacity
1988 Seasonal High Water Table
Former Burns Property, East of Greenbush Rd.
Monitor Well # 6

Critical depth (bgs) = 78.2 inches
Maximum well depth (bgs) = 8.85 feet

Number of days allowed to exceed critical depth	0	10	20	30
Total allowable inches above critical depth	18*	12**	6***	0****
Total number of days exceeding critical depth	0.0	0.0	3.8	17.8

Date	Time Increment (days)	Depth to Water (feet bgs)	Depth to Water (inches bgs)	# Days Water Level Exceeds Critical Depth by: 18.0"	# Days Water Level Exceeds Critical Depth by: 12" - 17.99"	# Days Water Level Exceeds Critical Depth by: 6" - 11.99"	# Days Water Level Exceeds Critical Depth by: 0" - 5.99"
2-Mar-88	**0.0**	**8.85**	**106.2**	**0.0**	**0.0**	**0.0**	**0.0**
7-Mar-88	**4.0**	**7.18**	**86.2**	**0.0**	**0.0**	**0.0**	**0.0**
10-Mar-88	**4.0**	**7.01**	**84.1**	**0.0**	**0.0**	**0.0**	**0.0**
13-Mar-88	3.0	7.01	84.1	0.0	0.0	0.0	0.0
15-Mar-88	**3.0**	**6.89**	**82.7**	**0.0**	**0.0**	**0.0**	**0.0**
19-Mar-88	4.0	7.01	84.1	0.0	0.0	0.0	0.0
23-Mar-88	**3.5**	**7.01**	**84.1**	**0.0**	**0.0**	**0.0**	**0.0**
26-Mar-88	3.5	7.01	84.1	0.0	0.0	0.0	0.0
30-Mar-88	**3.8**	**5.96**	**71.5**	**0.0**	**0.0**	**3.8**	**3.8**
2-Apr-88	3.5	6.04	72.5	0.0	0.0	0.0	3.5
6-Apr-88	**3.5**	**6.04**	**72.5**	**0.0**	**0.0**	**0.0**	**3.5**
9-Apr-88	3.5	6.41	76.9	0.0	0.0	0.0	3.5
13-Apr-88	**3.5**	**6.41**	**76.9**	**0.0**	**0.0**	**0.0**	**3.5**
16-Apr-88	3.5	6.56	78.7	0.0	0.0	0.0	0.0
20-Apr-88	**4.3**	**6.56**	**78.7**	**0.0**	**0.0**	**0.0**	**0.0**
25-Apr-88	**3.5**	**6.67**	**80.0**	**0.0**	**0.0**	**0.0**	**0.0**
27-Apr-88	**2.8**	**6.72**	**80.6**	**0.0**	**0.0**	**0.0**	**0.0**
30-Apr-88	3.0	6.52	78.2	0.0	0.0	0.0	0.0
3-May-88	3.0	6.52	78.2	0.0	0.0	0.0	0.0
6-May-88	3.5	6.52	78.2	0.0	0.0	0.0	0.0
10-May-88	3.5	6.52	78.2	0.0	0.0	0.0	0.0
13-May-88	3.0	6.52	78.2	0.0	0.0	0.0	0.0
16-May-88	**3.0**	**6.75**	**81.0**	**0.0**	**0.0**	**0.0**	**0.0**
19-May-88	3.5	6.80	81.6	0.0	0.0	0.0	0.0
23-May-88	**3.5**	**6.80**	**81.6**	**0.0**	**0.0**	**0.0**	**0.0**
26-May-88	3.5	7.08	85.0	0.0	0.0	0.0	0.0
30-May-88	**1.8**	**7.08**	**85.0**	**0.0**	**0.0**	**0.0**	**0.0**

bgs = below ground surface
Time increment = one-half the time since the prior reading to one-half the time to the next reading.

* Groundwater can not exceed the critical level of the disposal field by 18" at any one time March 1 - May 31.
** Groundwater can not exceed the critical level of the disposal field by 12-17.99" for more than 10 days March 1 - May 31.
*** Groundwater can not exceed the critical level of the disposal field by 6-11.99" for more than 20 days March 1 - May 31.
**** Groundwater can not exceed the critical level of the disposal field by 0-5.99" for more than 30 days March 1- May 31.

Data sources:
1. **Bold: measurements by Heindel & Noyes, 1988;**
2. Un-bolded: Artificial data points, inserted half-way between actual measurements.
   Each inserted artificial value is the same as the highest field measurement either just before or just after it.
   For blank dates due to frozen wells (May 3 and/or 10 in MW-6, 7, and 8), we inserted artificial
   data points 0.2 ft. higher than the highest reading before or after these blanks.

Town of Charlotte Sewage Disposal Capacity
1988 Seasonal High Water Table
Former Burns Property, East of Greenbush Rd.
Monitor Well # 7

Critical depth (bgs) =	121.4	inches		
Maximum well depth (bgs) =	10.96	feet		
Number of days allowed to exceed critical depth	0	10	20	30
Total allowable inches above critical depth	18*	12**	6***	0****
Total number of days exceeding critical depth	0.0	0.0	0.0	26.0

Date	Time Increment (days)	Depth to Water (feet bgs)	Depth to Water (inches bgs)	# Days Water Level Exceeds Critical Depth by: 18.0"	# Days Water Level Exceeds Critical Depth by: 12" - 17.99"	# Days Water Level Exceeds Critical Depth by: 6" - 11.99"	# Days Water Level Exceeds Critical Depth by: 0" - 5.99"
2-Mar-88	**0.0**	**10.96**	**131.5**	**0.0**	**0.0**	**0.0**	**0.0**
7-Mar-88	**4.0**	**10.96**	**131.5**	**0.0**	**0.0**	**0.0**	**0.0**
10-Mar-88	**4.0**	**10.77**	**129.2**	**0.0**	**0.0**	**0.0**	**0.0**
13-Mar-88	3.0	10.77	129.2	0.0	0.0	0.0	0.0
15-Mar-88	**3.0**	**10.60**	**127.2**	**0.0**	**0.0**	**0.0**	**0.0**
19-Mar-88	4.0	10.96	131.5	0.0	0.0	0.0	0.0
23-Mar-88	**3.5**	**10.96**	**131.5**	**0.0**	**0.0**	**0.0**	**0.0**
26-Mar-88	3.5	10.96	131.5	0.0	0.0	0.0	0.0
30-Mar-88	**3.8**	**10.49**	**125.9**	**0.0**	**0.0**	**0.0**	**0.0**
2-Apr-88	3.5	10.72	128.6	0.0	0.0	0.0	0.0
6-Apr-88	**3.5**	**10.72**	**128.6**	**0.0**	**0.0**	**0.0**	**0.0**
9-Apr-88	3.5	10.72	128.6	0.0	0.0	0.0	0.0
13-Apr-88	**3.5**	**10.20**	**122.4**	**0.0**	**0.0**	**0.0**	**0.0**
16-Apr-88	3.5	10.20	122.4	0.0	0.0	0.0	0.0
20-Apr-88	**4.3**	**10.13**	**121.6**	**0.0**	**0.0**	**0.0**	**0.0**
25-Apr-88	**3.5**	**10.16**	**121.9**	**0.0**	**0.0**	**0.0**	**0.0**
27-Apr-88	**2.8**	**10.23**	**122.8**	**0.0**	**0.0**	**0.0**	**0.0**
30-Apr-88	3.0	9.77	117.2	0.0	0.0	0.0	3.0
3-May-88	3.0	9.77	117.2	0.0	0.0	0.0	3.0
6-May-88	3.5	9.77	117.2	0.0	0.0	0.0	3.5
10-May-88	3.5	9.77	117.2	0.0	0.0	0.0	3.5
13-May-88	3.0	9.77	117.2	0.0	0.0	0.0	3.0
16-May-88	**3.0**	**9.97**	**119.6**	**0.0**	**0.0**	**0.0**	**3.0**
19-May-88	3.5	10.01	120.1	0.0	0.0	0.0	3.5
23-May-88	**3.5**	**10.01**	**120.1**	**0.0**	**0.0**	**0.0**	**3.5**
26-May-88	3.5	10.12	121.4	0.0	0.0	0.0	0.0
30-May-88	**1.8**	**10.12**	**121.4**	**0.0**	**0.0**	**0.0**	**0.0**

bgs = below ground surface
Time increment = one-half the time since the prior reading to one-half the time to the next reading.

* Groundwater can not exceed the critical level of the disposal field by 18" at any one time March 1 - May 31.
** Groundwater can not exceed the critical level of the disposal field by 12-17.99" for more than 10 days March 1 - May 31.
*** Groundwater can not exceed the critical level of the disposal field by 6-11.99" for more than 20 days March 1 - May 31.
**** Groundwater can not exceed the critical level of the disposal field by 0-5.99" for more than 30 days March 1- May 31.

Data sources:
1. **Bold: measurements by Heindel & Noyes, 1988;**
2. Un-bolded: Artificial data points, inserted half-way between actual measurements.
   Each inserted artificial value is the same as the highest field measurement either just before or just after it.
   For blank dates due to frozen wells (May 3 and/or 10 in MW-6, 7, and 8), we inserted artificial data points 0.2 ft. higher than the highest reading before or after these blanks.

Heindel and Noyes;
Oct. 18, 2000;
u:\projects\CharlotteTownWW\Criticaldepth

Town of Charlotte Sewage Disposal Capacity
1988 Seasonal High Water Table
Former Burns Property, East of Greenbush Rd.
Monitor Well # 8

Critical depth (bgs) =	80	inches		
Maximum well depth (bgs) =	7.82	feet		
Number of days allowed to exceed critical depth	0	10	20	30
Total allowable inches above critical depth	18*	12**	6***	0****
Total number of days exceeding critical depth	0.0	0.0	0.0	27.0

Date	Time Increment (days)	Depth to Water (feet bgs)	Depth to Water (inches bgs)	# Days Water Level Exceeds Critical Depth by: 18.0"	# Days Water Level Exceeds Critical Depth by: 12" - 17.99"	# Days Water Level Exceeds Critical Depth by: 6" - 11.99"	# Days Water Level Exceeds Critical Depth by: 0" - 5.99"
2-Mar-88	**0.0**	**7.78**	**93.4**	**0.0**	**0.0**	**0.0**	**0.0**
7-Mar-88	**4.0**	**7.82**	**93.8**	**0.0**	**0.0**	**0.0**	**0.0**
10-Mar-88	**4.0**	**7.61**	**91.3**	**0.0**	**0.0**	**0.0**	**0.0**
13-Mar-88	3.0	7.71	92.5	0.0	0.0	0.0	0.0
15-Mar-88	**3.0**	**7.71**	**92.5**	**0.0**	**0.0**	**0.0**	**0.0**
19-Mar-88	4.0	7.71	92.5	0.0	0.0	0.0	0.0
23-Mar-88	**3.5**	**7.71**	**92.5**	**0.0**	**0.0**	**0.0**	**0.0**
26-Mar-88	3.5	7.71	92.5	0.0	0.0	0.0	0.0
30-Mar-88	**3.8**	**6.96**	**83.5**	**0.0**	**0.0**	**0.0**	**0.0**
2-Apr-88	3.5	6.96	83.5	0.0	0.0	0.0	0.0
6-Apr-88	**3.5**	**6.89**	**82.7**	**0.0**	**0.0**	**0.0**	**0.0**
9-Apr-88	3.5	6.89	82.7	0.0	0.0	0.0	0.0
13-Apr-88	**3.5**	**6.54**	**78.5**	**0.0**	**0.0**	**0.0**	**3.5**
16-Apr-88	3.5	6.55	78.6	0.0	0.0	0.0	3.5
20-Apr-88	**4.3**	**6.55**	**78.6**	**0.0**	**0.0**	**0.0**	**4.3**
25-Apr-88	**3.5**	**6.57**	**78.8**	**0.0**	**0.0**	**0.0**	**3.5**
27-Apr-88	**2.8**	**6.63**	**79.6**	**0.0**	**0.0**	**0.0**	**2.8**
30-Apr-88	3.0	6.43	77.2	0.0	0.0	0.0	3.0
3-May-88	3.0	6.43	77.2	0.0	0.0	0.0	3.0
6-May-88	3.5	6.43	77.2	0.0	0.0	0.0	3.5
10-May-88	**3.5**	**6.67**	**80.0**	**0.0**	**0.0**	**0.0**	**0.0**
13-May-88	3.0	6.70	80.4	0.0	0.0	0.0	0.0
16-May-88	**3.0**	**6.70**	**80.4**	**0.0**	**0.0**	**0.0**	**0.0**
19-May-88	3.5	6.78	81.4	0.0	0.0	0.0	0.0
23-May-88	**3.5**	**6.78**	**81.4**	**0.0**	**0.0**	**0.0**	**0.0**
26-May-88	3.5	6.78	81.4	0.0	0.0	0.0	0.0
30-May-88	**1.8**	**6.68**	**80.2**	**0.0**	**0.0**	**0.0**	**0.0**

bgs = below ground surface
Time increment = one half the time since the prior reading to one half the time to the next reading.

* Groundwater can not exceed the critical level of the disposal field by 18" at any one time March 1 - May 31.
** Groundwater can not exceed the critical level of the disposal field by 12-17.99" for more than 10 days March 1 - May 31.
*** Groundwater can not exceed the critical level of the disposal field by 6-11.99" for more than 20 days March 1 - May 31.
**** Groundwater can not exceed the critical level of the disposal field by 0-5.99" for more than 30 days March 1- May 31.

Data sources:
1. **Bold: measurements by Heindel & Noyes, 1988;**
2. Un-bolded: Artificial data points, inserted half-way between actual measurements.
   Each inserted artificial value is the same as the highest field measurement either just before or just after it.
   For blank dates due to frozen wells (May 3 and/or 10 in MW-6, 7, and 8), we inserted artificial
   data points 0.2 ft. higher than the highest reading before or after these blanks.

Town of Charlotte Sewage Disposal Capacity
1988 Seasonal High Water Table
Former Burns Property, East of Greenbush Rd.
Monitor Well # 10

Critical depth (bgs) =	115.6	inches		
Maximum well depth (bgs) =	> 10.66	feet		
Number of days allowed to exceed critical depth	0	10	20	30
Total allowable inches above critical depth	18*	12**	6***	0****
Total number of days exceeding critical depth	0.0	0.0	0.0	28.5

Date	Time Increment (days)	Depth to Water (feet bgs)	Depth to Water (inches bgs)	# Days Water Level Exceeds Critical Depth by: 18.0"	# Days Water Level Exceeds Critical Depth by: 12" - 17.99"	# Days Water Level Exceeds Critical Depth by: 6" - 11.99"	# Days Water Level Exceeds Critical Depth by: 0" - 5.99"
2-Mar-88	**0.0**	**10.57**	**126.8**	**0.0**	**0.0**	**0.0**	**0.0**
7-Mar-88	**4.0**	**10.66**	**127.9**	**0.0**	**0.0**	**0.0**	**0.0**
10-Mar-88	**4.0**	**10.34**	**124.1**	**0.0**	**0.0**	**0.0**	**0.0**
13-Mar-88	3.0	10.34	124.1	0.0	0.0	0.0	0.0
15-Mar-88	**3.0**	**10.24**	**122.9**	**0.0**	**0.0**	**0.0**	**0.0**
19-Mar-88	4.0	10.32	123.8	0.0	0.0	0.0	0.0
23-Mar-88	**3.5**	**10.32**	**123.8**	**0.0**	**0.0**	**0.0**	**0.0**
26-Mar-88	3.5	10.32	123.8	0.0	0.0	0.0	0.0
30-Mar-88	**3.8**	**9.42**	**113.0**	**0.0**	**0.0**	**0.0**	**3.8**
2-Apr-88	3.5	9.70	116.4	0.0	0.0	0.0	0.0
6-Apr-88	**3.5**	**9.70**	**116.4**	**0.0**	**0.0**	**0.0**	**0.0**
9-Apr-88	3.5	9.70	116.4	0.0	0.0	0.0	0.0
13-Apr-88	**3.5**	**9.40**	**112.8**	**0.0**	**0.0**	**0.0**	**3.5**
16-Apr-88	3.5	9.52	114.2	0.0	0.0	0.0	3.5
20-Apr-88	**4.3**	**9.52**	**114.2**	**0.0**	**0.0**	**0.0**	**4.3**
25-Apr-88	**3.5**	**9.59**	**115.1**	**0.0**	**0.0**	**0.0**	**3.5**
27-Apr-88	**2.8**	**9.64**	**115.7**	**0.0**	**0.0**	**0.0**	**0.0**
30-Apr-88	3.0	9.64	115.7	0.0	0.0	0.0	0.0
3-May-88	**3.0**	**9.39**	**112.7**	**0.0**	**0.0**	**0.0**	**3.0**
6-May-88	3.5	9.56	114.7	0.0	0.0	0.0	3.5
10-May-88	**3.5**	**9.56**	**114.7**	**0.0**	**0.0**	**0.0**	**3.5**
13-May-88	3.0	9.72	116.6	0.0	0.0	0.0	0.0
16-May-88	**3.0**	**9.72**	**116.6**	**0.0**	**0.0**	**0.0**	**0.0**
19-May-88	3.5	9.73	116.8	0.0	0.0	0.0	0.0
23-May-88	**3.5**	**9.73**	**116.8**	**0.0**	**0.0**	**0.0**	**0.0**
26-May-88	3.5	10.03	120.4	0.0	0.0	0.0	0.0
30-May-88	**1.8**	**10.03**	**120.4**	**0.0**	**0.0**	**0.0**	**0.0**

bgs = below ground surface
Time increment = one-half the time since the prior reading to one-half the time to the next reading.

* Groundwater can not exceed the critical level of the disposal field by 18" at any one time March 1 - May 31.
** Groundwater can not exceed the critical level of the disposal field by 12-17.99" for more than 10 days March 1 - May 31.
*** Groundwater can not exceed the critical level of the disposal field by 6-11.99" for more than 20 days March 1 - May 31.
**** Groundwater can not exceed the critical level of the disposal field by 0-5.99" for more than 30 days March 1- May 31.

Data sources:
1. **Bold: measurements by Heindel & Noyes, 1988;**
2. Un-bolded: Artificial data points, inserted half-way between actual measurements.
   Each inserted artificial value is the same as the highest field measurement either just before or just after it.

Heindel and Noyes;
Oct. 18, 2000;
u:\projects\CharlotteTownWW\Criticaldepth

Town of Charlotte Sewage Disposal Capacity
1988 Seasonal High Water Table
Former Burns Property, East of Greenbush Rd.
Monitor Well # 13

Critical depth (bgs) = 83.8 inches
Maximum well depth (bgs) = 8.82 feet

Number of days allowed to exceed critical depth	0	10	20	30
Total allowable inches above critical depth	18*	12**	6***	0****
Total number of days exceeding critical depth	0.0	0.0	0.0	24.8

Date	Time Increment (days)	Depth to Water (feet bgs)	Depth to Water (inches bgs)	# Days Water Level Exceeds Critical Depth by: 18.0"	# Days Water Level Exceeds Critical Depth by: 12" - 17.99"	# Days Water Level Exceeds Critical Depth by: 6" - 11.99"	# Days Water Level Exceeds Critical Depth by: 0" - 5.99"
2-Mar-88	**0.0**	**7.54**	**90.5**	**0.0**	**0.0**	**0.0**	**0.0**
7-Mar-88	**4.0**	**7.58**	**91.0**	**0.0**	**0.0**	**0.0**	**0.0**
10-Mar-88	**4.0**	**7.56**	**90.7**	**0.0**	**0.0**	**0.0**	**0.0**
13-Mar-88	3.0	7.56	90.7	0.0	0.0	0.0	0.0
15-Mar-88	**3.0**	**7.43**	**89.2**	**0.0**	**0.0**	**0.0**	**0.0**
19-Mar-88	4.0	7.49	89.9	0.0	0.0	0.0	0.0
23-Mar-88	**3.5**	**7.49**	**89.9**	**0.0**	**0.0**	**0.0**	**0.0**
26-Mar-88	3.5	7.49	89.9	0.0	0.0	0.0	0.0
30-Mar-88	**3.8**	**7.19**	**86.3**	**0.0**	**0.0**	**0.0**	**0.0**
2-Apr-88	3.5	7.30	87.6	0.0	0.0	0.0	0.0
6-Apr-88	**3.5**	**7.30**	**87.6**	**0.0**	**0.0**	**0.0**	**0.0**
9-Apr-88	3.5	7.30	87.6	0.0	0.0	0.0	0.0
13-Apr-88	**3.5**	**6.98**	**83.8**	**0.0**	**0.0**	**0.0**	**3.5**
16-Apr-88	3.5	6.98	83.8	0.0	0.0	0.0	3.5
20-Apr-88	**4.3**	**6.88**	**82.6**	**0.0**	**0.0**	**0.0**	**4.3**
25-Apr-88	**3.5**	**6.86**	**82.3**	**0.0**	**0.0**	**0.0**	**3.5**
27-Apr-88	**2.8**	**6.99**	**83.9**	**0.0**	**0.0**	**0.0**	**0.0**
30-Apr-88	3.0	6.99	83.9	0.0	0.0	0.0	0.0
3-May-88	**3.0**	**6.83**	**82.0**	**0.0**	**0.0**	**0.0**	**3.0**
6-May-88	3.5	6.83	82.0	0.0	0.0	0.0	3.5
10-May-88	**3.5**	**6.83**	**82.0**	**0.0**	**0.0**	**0.0**	**3.5**
13-May-88	3.0	7.14	85.7	0.0	0.0	0.0	0.0
16-May-88	**3.0**	**7.14**	**85.7**	**0.0**	**0.0**	**0.0**	**0.0**
19-May-88	3.5	7.14	85.7	0.0	0.0	0.0	0.0
23-May-88	**3.5**	**7.12**	**85.4**	**0.0**	**0.0**	**0.0**	**0.0**
26-May-88	3.5	7.15	85.8	0.0	0.0	0.0	0.0
30-May-88	**1.8**	**7.15**	**85.8**	**0.0**	**0.0**	**0.0**	**0.0**

bgs = below ground surface
Time increment = one-half the time since the prior reading to one-half the time to the next reading.

* Groundwater can not exceed the critical level of the disposal field by 18" at any one time March 1 - May 31.
** Groundwater can not exceed the critical level of the disposal field by 12-17.99" for more than 10 days March 1 - May 31.
*** Groundwater can not exceed the critical level of the disposal field by 6-11.99" for more than 20 days March 1 - May 31.
**** Groundwater can not exceed the critical level of the disposal field by 0-5.99" for more than 30 days March 1- May 31.

Data sources:
1. **Bold: measurements by Heindel & Noyes, 1988;**
2. Un-bolded: Artificial data points, inserted half-way between actual measurements.
   Each inserted artificial value is the same as the highest field measurement either just before or just after it.

Heindel and Noyes;
Oct. 18, 2000;
u:\projects\CharlotteTownWW\Criticaldepth

Town of Charlotte Sewage Disposal Capacity
1988 Seasonal High Water Table
Former Burns Property, East of Greenbush Rd.
Monitor Well # 15

Critical depth (bgs) =	66.3	inches		
Maximum well depth (bgs) =	8.19	feet		
Number of days allowed to exceed critical depth	0	10	20	30
Total allowable inches above critical depth	18*	12**	6***	0****
Total number of days exceeding critical depth	0.0	0.0	10.0	26.5

Date	Time Increment (days)	Depth to Water (feet bgs)	Depth to Water (inches bgs)	# Days Water Level Exceeds Critical Depth by: 18.0"	# Days Water Level Exceeds Critical Depth by: 12" - 17.99"	# Days Water Level Exceeds Critical Depth by: 6" - 11.99"	# Days Water Level Exceeds Critical Depth by: 0" - 5.99"
2-Mar-88	**0.0**	**8.19**	**98.3**	**0.0**	**0.0**	**0.0**	**0.0**
7-Mar-88	**4.0**	**7.11**	**85.3**	**0.0**	**0.0**	**0.0**	**0.0**
10-Mar-88	**4.0**	**7.11**	**85.3**	**0.0**	**0.0**	**0.0**	**0.0**
13-Mar-88	3.0	7.23	86.8	0.0	0.0	0.0	0.0
15-Mar-88	**3.0**	**7.23**	**86.8**	**0.0**	**0.0**	**0.0**	**0.0**
19-Mar-88	4.0	7.23	86.8	0.0	0.0	0.0	0.0
23-Mar-88	**3.5**	**7.13**	**85.6**	**0.0**	**0.0**	**0.0**	**0.0**
26-Mar-88	3.5	7.20	86.4	0.0	0.0	0.0	0.0
30-Mar-88	**3.8**	**7.20**	**86.4**	**0.0**	**0.0**	**0.0**	**0.0**
2-Apr-88	3.5	7.20	86.4	0.0	0.0	0.0	0.0
6-Apr-88	**3.5**	**7.12**	**85.4**	**0.0**	**0.0**	**0.0**	**0.0**
9-Apr-88	3.5	7.12	85.4	0.0	0.0	0.0	0.0
13-Apr-88	**3.5**	**6.23**	**74.8**	**0.0**	**0.0**	**0.0**	**0.0**
16-Apr-88	3.5	6.29	75.5	0.0	0.0	0.0	0.0
20-Apr-88	**4.3**	**6.29**	**75.5**	**0.0**	**0.0**	**0.0**	**0.0**
25-Apr-88	**3.5**	**5.30**	**63.6**	**0.0**	**0.0**	**0.0**	**3.5**
27-Apr-88	**2.8**	**6.39**	**76.7**	**0.0**	**0.0**	**0.0**	**0.0**
30-Apr-88	3.0	6.39	76.7	0.0	0.0	0.0	0.0
3-May-88	**3.0**	**4.71**	**56.5**	**0.0**	**0.0**	**3.0**	**3.0**
6-May-88	3.5	4.88	58.6	0.0	0.0	3.5	3.5
10-May-88	**3.5**	**4.88**	**58.6**	**0.0**	**0.0**	**3.5**	**3.5**
13-May-88	3.0	5.13	61.6	0.0	0.0	0.0	3.0
16-May-88	**3.0**	**5.13**	**61.6**	**0.0**	**0.0**	**0.0**	**3.0**
19-May-88	3.5	5.33	64.0	0.0	0.0	0.0	3.5
23-May-88	**3.5**	**5.33**	**64.0**	**0.0**	**0.0**	**0.0**	**3.5**
26-May-88	3.5	5.53	66.4	0.0	0.0	0.0	0.0
30-May-88	**1.8**	**5.53**	**66.4**	**0.0**	**0.0**	**0.0**	**0.0**

bgs = below ground surface
Time increment = one-half the time since the prior reading to one-half the time to the next reading.

* Groundwater can not exceed the critical level of the disposal field by 18" at any one time March 1 - May 31.
** Groundwater can not exceed the critical level of the disposal field by 12-17.99" for more than 10 days March 1 - May 31.
*** Groundwater can not exceed the critical level of the disposal field by 6-11.99" for more than 20 days March 1 - May 31.
**** Groundwater can not exceed the critical level of the disposal field by 0-5.99" for more than 30 days March 1- May 31.

Data sources:
1. **Bold: measurements by Heindel & Noyes, 1988;**
2. Un-bolded: Artificial data points, inserted half-way between actual measurements.
   Each inserted artificial value is the same as the highest field measurement either just before or just after it.

Wagner, Heindel, and Noyes, Inc.
Consulting Geologists — Burlington, Vermont

PAGE 1 OF 1 Page No.
PROJECT: CHARLOTTE COMMONS
DATE: 5-31-88

CHARLOTTE COMMONS MONITOR WELLS . SPRING 1988

GROUNDWATER DEPTHS (FEET BELOW GROUND SURFACE)

DATE	MONITOR WELL # #2	#3	#6	#7	#8	#10	#13	#15
12/23	(7.49+)	(7.55+)	7.13	(12.88+)	(7.82+)	10.15	(8.82+)	8.17
3/2	(7.48+)	6.88	(8.35+)	(10.96+)	(7.78+)	10.57	7.54	(8.19+)
3/7	(7.48+)	6.05	7.18	(10.96+)	(7.82+)	10.66	7.58	7.11
3/10	(7.48+)	5.54	7.01	10.77	7.61	10.34	7.56	7.11
3/15	(7.46+)	6.03	6.89	10.60	(7.71+)	10.24	7.43	7.23
3/23	(7.48+)	6.37	7.01	(10.96+)	(7.71+)	10.32	7.49	7.13
3/30	(7.46+)	5.95	(5.96)	10.49	6.96	9.42	7.19	7.20
4/6	(7.48+)	5.87	6.04	10.72	6.89	9.70	7.30	7.12
4/13	(7.46+)	5.59	6.41	10.20	(6.54)	9.40	6.98	6.23
4/20	(7.48+)	5.12	6.56	10.13	6.55	9.52	6.88	6.29
4/25	(7.48+)	5.18	6.67	10.16	6.57	9.59	6.86	5.30
4/27	(7.48+)	5.20	6.72	10.23	6.63	9.64	6.77	6.57
5/3	(7.48+)	5.10	—	—	—	(9.39)	(6.83)	(4.71)
5/10	(7.48+)	(5.10)	—	—	6.67	9.56	6.83	4.88
5/16	7.39	5.28	6.75	(9.97)	6.70	9.72	7.14	5.13
5/23	7.21	5.43	6.80	10.01	6.78	9.73	7.12	5.33
5/30	(7.17)	5.69	7.08	10.12	6.68	10.03	7.15	5.53

Ground Elevs.

585

30

CHARLOTTE COMMONS PROJECT

CHARLOTTE, VERMONT

WASTEWATER DISPOSAL SYSTEM HYDROGEOLOGIC EVALUATION

VOLUME I

FEBRUARY 1990

WAGNER, HEINDEL, AND NOYES, INC.

CONSULTING HYDROGEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

Wagner, Heindel, and Noyes, Inc. consulting geologists
P.O. Box 1629 Burlington, Vermont 05402-1629 802-658-0820

CHARLOTTE COMMONS COMMERCIAL CENTER
WASTEWATER DISPOSAL SITE EVALUATION

2/16/90

SUMMARY AND CONCLUSIONS

1. A property in Charlotte, Vermont has been evaluated by Wagner, Heindel, and Noyes, Inc., as a potential wastewater disposal area to serve the Charlotte Commons Commercial Development. This property was the subject of a preliminary report submitted in April of 1988. In this report, the site capacity was estimated to be 4,985 gpd.

2. At the request of the Agency of Natural Resources, spring monitoring data was collected from March through May, 1988. Due to shallow water table conditions this imposed some limitations on the area which could be used for a disposal system. Phase II testing in 1989 was therefore conducted to increase the site capacity and to confirm the type of disposal which could be used on site.

3. Water level measurements collected in October at the start of the trench test revealed that water levels in the spring of 1988 were unusually low. As a result, a mound disposal system is considered necessary to meet operations requirements of the Environmental Protection Rules.

4. Additional test pits and monitoring wells were used to further define the site's geologic and hydrogeologic conditions. A large-scale permeability test was conducted in October 1989 in order to demonstrate a higher hydraulic conductivity and thus increased disposal capacity.

5. The trench test demonstrated a hydraulic conductivity of 160 ft/day. With this new data the hydrogeologic site capacity has been calculated as 15,500 gpd, a significant increase over the 5,000 gpd calculated in 1988. *

6. The constraint to utilizing this capacity is likely to be the engineering layout.

DLT, 1989 TRENCH TEST

CHARLOTTE COMMONS WELL DATA SUMMARY

WELL #	DISTANCE FROM TRENCH	TOP OF PIPE ELEVATION*	GROUND ELEVATION*	STICK-UP (FT)	STATIC (BGS)	STATIC (ELEV)	MAX. W.L. CHANGE (FT)	TIME TO PEAK (MIN)	PEAK W.L. ELEV (FT)	PEAK W.L. (FT BGS)	CLAY (FT BGS)	ELEV OF CLAY
A	150	113.54	110.26	3.28	0	110.26						110.00
B	142	116.06	112.16	3.90	1.33	110.83						
(C) 87-2	133	117.94	115.50	2.44	6.18	109.32	1.64	9100			5.25	110.25
87-3	DESTROYED	115.28	113.00	2.28							5.08	107.92
87-6	DESTROYED	107.59	106.60	0.99							9.50	97.10
87-7	DESTROYED	116.88	113.00	3.88							11.50	101.50
87-8	DESTROYED	115.44	113.40	2.04							6.75	106.65
(D)87-10	110	120.46	117.56	2.90	8.75	108.81	0.74	9100	109.55	8.01	11.00	106.56
87-13	DESTROYED	116.62	115.50	1.12							8.00	107.50
87-15	DESTROYED	116.73	115.00	1.73							5.58	109.42
101	249	110.82	106.12	4.70	1.61	104.51	1.15	4280	105.66	0.46	2.00	104.12
102	354	107.93	103.43	4.50	0.73	102.70	0.48	4280	103.18	0.25	1.00	102.43
103	456	108.69	105.69	3.00	5.50	100.19	0.83	9100	101.02	4.67	6.00	99.69
104	538	105.68	103.68	2.00	4.85	98.83	1.58	4550	100.41	3.27	6.00	97.68
106	453	105.06	102.41	2.65	1.91	100.50	1.22	4280	101.72	0.69	2.00	100.41
107	320	113.38	110.38	3.00	8.58	101.80	0.99	9100	102.79	7.59	8.00	102.38
108	322	112.95	110.20	2.75	7.77	102.43	0.83	9100	103.26	6.94	9.60	100.60
110	DRY 183	116.65	113.40	3.25							>5.00	108.40
112	42	117.50	114.90	2.60	5.68	109.22	2.16	5635	111.38	3.52	5.42	109.48
113	201	112.10	110.10	2.00	1.34	108.76						
116	509	104.81	101.91	2.90	2.88	99.03	0.70	6200	99.73	2.18	4.17	97.74
117	206	114.91	110.81	4.10	5.58	105.23	4.62	5500	109.85	0.96	2.30	108.51
118	68	120.76	116.01	4.75	6.49	109.52	2.32	5500	111.84	4.17	6.33	109.68
119	54	120.57	116.32	4.25	7.14	109.18	1.94	6250	111.12	5.20	9.90	106.42
120	144	115.72	112.72	3.00	5.29	107.43	1.20	5490	108.63	4.09	5.30	107.42
121	98	117.07	114.67	2.40	5.77	108.90	1.17	9100	110.07	4.60	5.30	109.37
122	138	116.39	115.39	1.00	7.95	107.44	1.12	9100	108.56	6.83	6.30	109.09
123	DRY 212	116.39	113.39	3.00							10.00	103.39
124	DRY 230	109.38	106.88	2.50							2.80	104.08
125	61	121.07	116.57	4.50	7.07	109.50	1.21	9100	110.71	5.86	7.50	109.07
126	59	120.04	117.04	3.00	7.59	109.45	1.65	6250	111.10	5.94	7.75	109.29
127	18	116.98	115.23	1.75	5.90	109.33	2.41	5000	111.74	3.49	6.70	108.53
128	30	119.96	117.16	2.80	7.58	109.58	3.00	5500	112.58	4.58	7.50	109.66
129	127	119.63	114.88	4.75	6.30	108.58	1.44	9100	110.02	4.86	>7.75	107.13
131	29	117.21	115.41	1.80	8.53	106.88	4.55	5500	111.43	3.98	6.33	109.08
132	DRY 82	119.21	115.60								5.42	110.18
133	88	118.62	114.12	4.50	I.D.	I.D.	1.42	7450	I.D.	I.D.	5.08	109.04
134	42	117.96	115.76	2.20	6.55	109.21	1.90	5500	111.11	4.65	7.50	108.26
135	31	118.02	116.72	1.30	7.09	109.63	2.91	5500	112.54	4.18	7.92	108.80
1	2	117.80	115.80	2.00	6.58	109.40	3.69	5500	113.09	2.81		
2	3	117.45	115.80	1.65	6.40	109.40		5500	109.40			
3	3	117.88	115.78	2.10	6.38	109.40	4.00	5500	113.40	2.38		
4	12	117.36	115.36	2.00	6.06	109.30	3.12	5500	112.42	2.94		
5	13	117.36	115.36	2.00	6.06	109.30	3.08	5500	112.38	2.98		
6	11	117.63	115.63	2.00	6.33	109.30	2.83	5500	112.13	3.50		
7	20	117.00	115.00	2.00	5.70	109.30	2.62	5500	111.92	3.08		
8	20	116.89	114.89	2.00	5.59	109.30	2.62	5500	111.92	2.97		
9	19	117.44	115.44	2.00	6.14	109.30	2.19	5500	111.49	3.95		
10	30	118.67	116.67	2.00	7.07	109.60	3.15	5500	112.75	3.92		
11	24	118.44	116.44	2.00	6.84	109.60	3.21	5500	112.81	3.63		
12	46	118.06	116.06	2.00	6.46	109.60	2.96	5500	112.56	3.50		
13	47	117.77	115.77	2.00	6.17	109.60	3.15	5500	112.75	3.02		
14	62	116.24	114.24	2.00	4.64	109.60	2.80	5500	112.40	1.84	4.70	109.54
15	65	116.16	114.16	2.00	4.56	109.60	2.62	5500	112.22	1.94	4.70	109.46

WELLS NEAR TRENCH TEST: NOT SHOWN ON 2000 MAP.

TOWN OF CHARLOTTE: MUNICIPAL WASTEWATER DISPOSAL SYSTEM

Former Burns Property, East of Greenbush Road (WW-4-1485)

OVERALL SITE CAPACITY ANALYSIS

Proposed Expansion of Disposal Capacity from 4,999 GPD to 6,499 GPD

Calculation Method: Darcy's Law: Q = K x I x (L x h) x 7.48

A. Primary Trenches:

Number of Trenches:	8
Trench Bottom Elevation:	115.25
Design Flow:	6,499
Equivalent Trench Length:	190

Parameter	Description	Value	Units	Calculations: Source of Value Used
K	Hyd. Conduct.	160	ft/day	Trench Test (conducted in Oct. 1989, see Feb. 1990 WH&N Report)
i	Hydraulic Gradient	0.0263	ft/ft	Estimated hydraulic gradient from induced groundwater mound
				Trench bottom elev.: 115.25 ft. Minus Req'd Unsat. Soil: 3.0 ft. = Max. GW Mound Elev. 112.25 ft. Elev. Of limitibg Cond. To E: 107.00 ft. Distance to Limiting Cond. 200 ft. Hydraulic Gradient from GW to Limiting Condition to East: ((GW mound - E. Limit Cond)/Dist) i = 2.63%
h	Available Transmitting Thickness	2.25	ft	GW Mound Elev. 112.25 ft. Minus Limit. Cond. Elev. 110.00 ft. 2.25 ft.
L	Cross-slope Length	190	ft	Based on overall trench area including 10-foot gap between trenches
Solve for Q:				
Q	Hydrogeologic Site Capacity	**13,430**	**GPD**	Q = K x I x (L x h) x 7.48 gal./cf

B. Replacement Trenches:

Number of Trenches:	8
Trench Bottom Elevation:	113.1 (Lowest Possible Value)
Design Flow:	6,499
Equivalent Trench Length:	190

Parameter	Description	Value	Units	Calculations: Source of Value Used
K	Hyd. Conduct.	160	ft/day	Trench Test (conducted in Oct. 1989, see Feb. 1990 WH&N Report)
i	Hydraulic Gradient	0.0262	ft/ft	Estimated hydraulic gradient from induced groundwater mound
				Trench bottom elev.: 113.1 ft. Minus Req'd Unsat. Soil: 3.0 ft. = Max. GW Mound Elev. 110.1 ft. Elev. Of limiting Cond. To E: 107.0 ft. Distance to Limiting Cond. 120 ft. Hydraulic Gradient from GW to Limiting Condition to East: ((GW mound - E. Limit Cond)/Dist) i = 2.62%
h	Available Transmitting Thickness	1.1	ft	GW Mound Elev. 110.1 ft. Minus Limit. Cond. Elev. 109.0 ft. 1.1 ft.
L	Cross-slope Length	190	ft	Based on overall trench area including 10-foot gap between trenches
Solve for Q:				
Q	Hydrogeologic Site Capacity	**6,584**	**GPD**	Q = K x I x (L x h) x 7.48 gal./cf

ATTACHMENT B

Town of Charlotte
Hydrogeologic Analysis
Municipal Wastewater Disposal Ssystem

Site: Primary Disposal Site - North End - General Conditions

Calculation Method: Darcy's Law

Q = KiA x 7.48

where Q = Design Flow, or Hydrogeologic Site Capacity
or Q/ft = Design Flow per Linear Foot
i = Hydraulic Gradient
A = L x h = Cross Sectional Area, Sq. Ft.
7.48 = Conversion from Cu. Ft. to Gallons

Parameter	Assigned Value	Units	Notes:
K	160	ft/day	Value for Very Fine Sandy Loam
i	0.026	ft/ft	Hydraulic Gradient (Slope of Limiting Conditions)
A	1	Ft	Calculate using Linear Loading Rate
Des Q	36.1	gpd/lf	Design Flow - One 8' wide bed at 1 GPD/SF

6,499	Design Flow (GPD)
180.0	Total width of Trenches (LF)
36.1	Application in Gaa/Day/LF

Solve for: h = height of induced groundwater mound (IGWM)
h = 1.15 Ft

Trench 1 Calculate Trench Bottom Elevations to Provide 3.0 feet of Unsaturated Thickness Below Trench Bottoms.

Trench No.	Gallons per Day Q/ft	Highest Lim. Cond. Elev. Ft	Add Induced GW Mound, Ft.	Elev. SHGWT Plus IGWM, Ft.	Trench Bottom Elev. Calcs. Inv. Elev.	Below Inv.	Bottom Elev.	Unsat. Thickness Below Trench including Induced Mound, Ft.	Comment
West Edge	0	109.10	0.00	109.1	116.25	1	115.25	6.15	Okay,3.0' or Greater
	9.0	109.13	0.29	109.4	116.25	1	115.25	5.84	Okay,3.0' or Greater
Middle	18.1	109.15	0.57	109.7	116.25	1	115.25	5.53	Okay,3.0' or Greater
	27.1	109.18	0.86	110.0	116.25	1	115.25	5.21	Okay,3.0' or Greater
East Edge	36.1	109.20	1.15	110.3	116.25	1	115.25	4.90	Okay,3.0' or Greater

Attachment C

Town of Charlotte
Hydrogeologic Analysis
Municipal Wastewater Disposal Ssystem

Site: Primary Disposal Site - Middle Portion - General Conditions

Calculation Method: Darcy's Law

Q = KiA x 7.48

where Q = Design Flow, or Hydrogeologic Site Capacity
or Q/ft = Design Flow per Linear Foot
i = Hydraulic Gradient
A = L x h = Cross Sectional Area, Sq. Ft.
7.48 = Conversion from Cu. Ft. to Gallons

Parameter	Assigned Value	Units	Notes:
K	160	ft/day	Value for Very Fine Sandy Loam
i	0.026	ft/ft	Hydraulic Gradient (Slope of Limiting Conditions)
A	1	Ft	Calculate using Linear Loading Rate
Des Q	36.1	gpd/lf	Design Flow - One 8' wide bed at 1 GPD/SF

6,499	Design Flow (GPD)
180.0	Total width of Trenches (LF)
36.1	Application in Gaa/Day/LF

Solve for: h = height of induced groundwater mound (IGWM)
h = 1.15 Ft

Trench 1 Calculate Trench Bottom Elevations to Provide 3.0 feet of Unsaturated Thickness Below Trench Bottoms.

Trench No.	Gallons per Day Q/ft	Highest Lim. Cond. Elev. Ft	Add Induced GW Mound, Ft.	Elev. SHGWT Plus IGWM, Ft.	Trench Bottom Elev. Calcs.			Unsat. Thickness Below Trench including Induced Mound, Ft.	Comment
					Inv. Elev.	Below Inv.	Bottom Elev.		
West Edge	0	108.90	0.00	108.9	116.25	1	115.25	6.35	Okay,3.0' or Greater
	9.0	109.18	0.29	109.5	116.25	1	115.25	5.79	Okay,3.0' or Greater
Middle	18.1	109.45	0.57	110.0	116.25	1	115.25	5.23	Okay,3.0' or Greater
	27.1	109.73	0.86	110.6	116.25	1	115.25	4.66	Okay,3.0' or Greater
East' Edge	36.1	110.00	1.15	111.1	116.25	1	115.25	4.10	Okay,3.0' or Greater

Attachment D

Town of Charlotte
Hydrogeologic Analysis
Municipal Wastewater Disposal Ssystem

Site: Primary Disposal Site - South End - General Conditions

Calculation Method: Darcy's Law

Q = KiA x 7.48

where Q = Design Flow, or Hydrogeologic Site Capacity
or Q/ft = Design Flow per Linear Foot
i = Hydraulic Gradient
A = L x h = Cross Sectional Area, Sq. Ft.
7.48 = Conversion from Cu. Ft. to Gallons

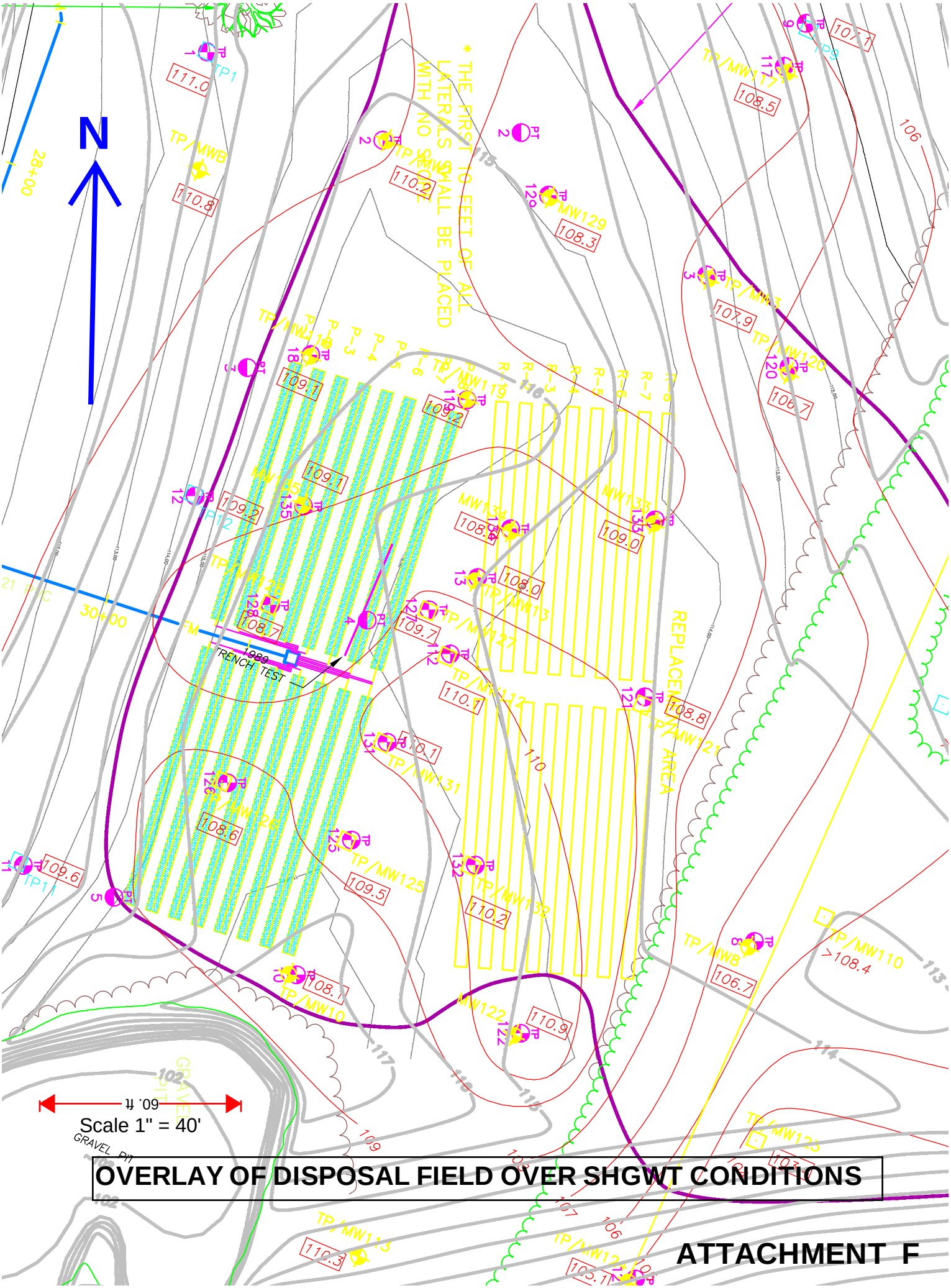
Parameter	Assigned Value	Units	Notes:		
K	160	ft/day	Value for Very Fine Sandy Loam	6,499	Design Flow (GPD)
i	0.026	ft/ft	Hydraulic Gradient (Slope of Limiting Conditions)	180.0	Total width of Trenches (LF)
A	1	Ft	Calculate using Linear Loading Rate	36.1	Application in Gaa/Day/LF
Des Q	36.1	gpd/lf	Design Flow - One 8' wide bed at 1 GPD/SF		

Solve for: h = height of induced groundwater mound (IGWM)
h = 1.15 Ft

Trench 1 Calculate Trench Bottom Elevations to Provide 3.0 feet of Unsaturated Thickness Below Trench Bottoms.

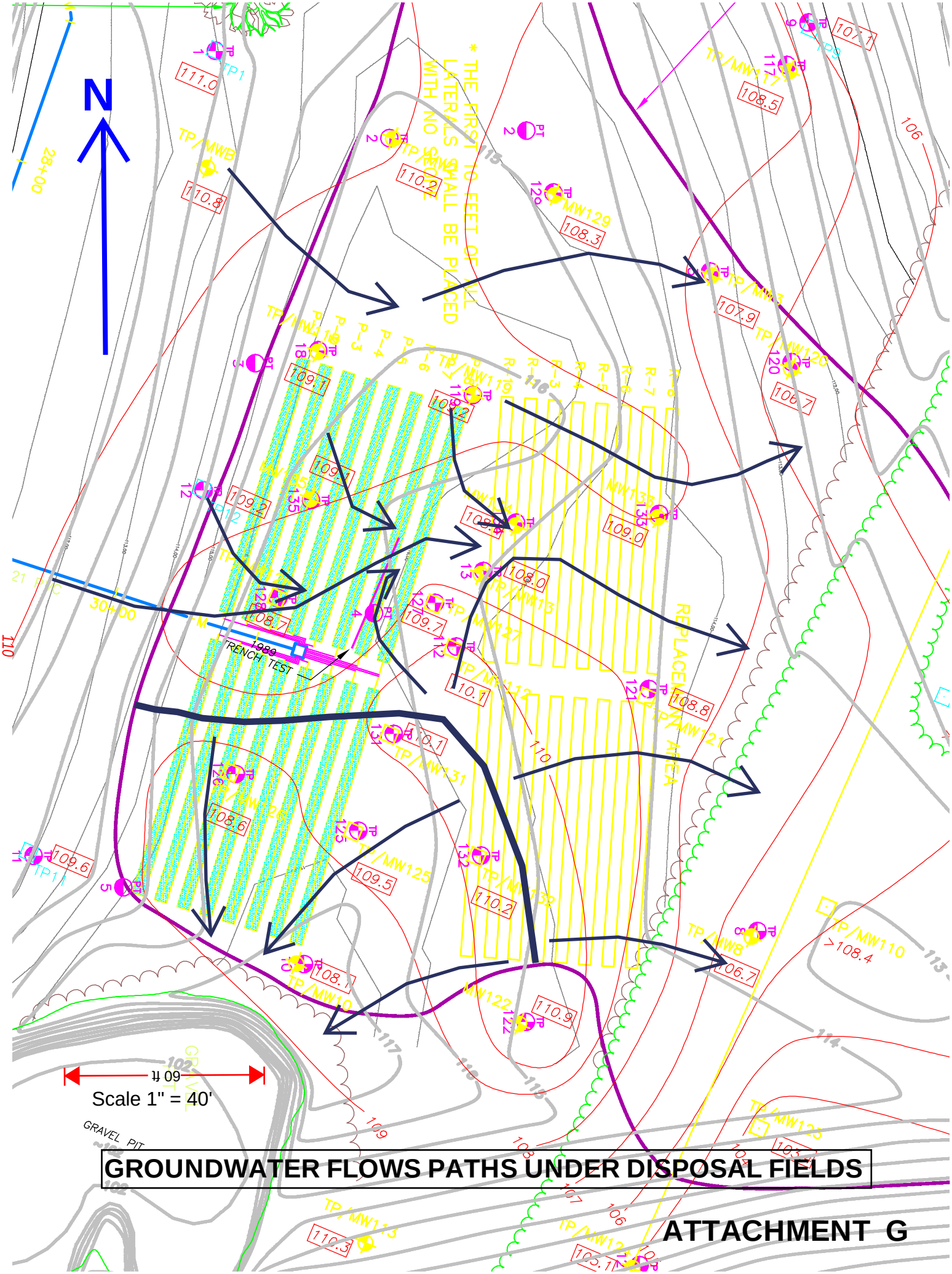
Trench No.	Gallons per Day Q/ft	Highest Lim. Cond. Elev. Ft	Add Induced GW Mound, Ft.	Elev. SHGWT Plus IGWM, Ft.	Trench Bottom Elev. Calcs.			Unsat. Thickness Below Trench including Induced Mound, Ft.	Comment
					Inv. Elev.	Below Inv.	Bottom Elev.		
West Edge	0	109.00	0.00	109.0	116.25	1	115.25	6.25	Okay,3.0' or Greater
	9.0	108.78	0.29	109.1	116.25	1	115.25	6.19	Okay,3.0' or Greater
Middle	18.1	108.55	0.57	109.1	116.25	1	115.25	6.13	Okay,3.0' or Greater
	27.1	108.33	0.86	109.2	116.25	1	115.25	6.06	Okay,3.0' or Greater
East Edge	36.1	108.10	1.15	109.2	116.25	1	115.25	6.00	Okay,3.0' or Greater

Attachment E



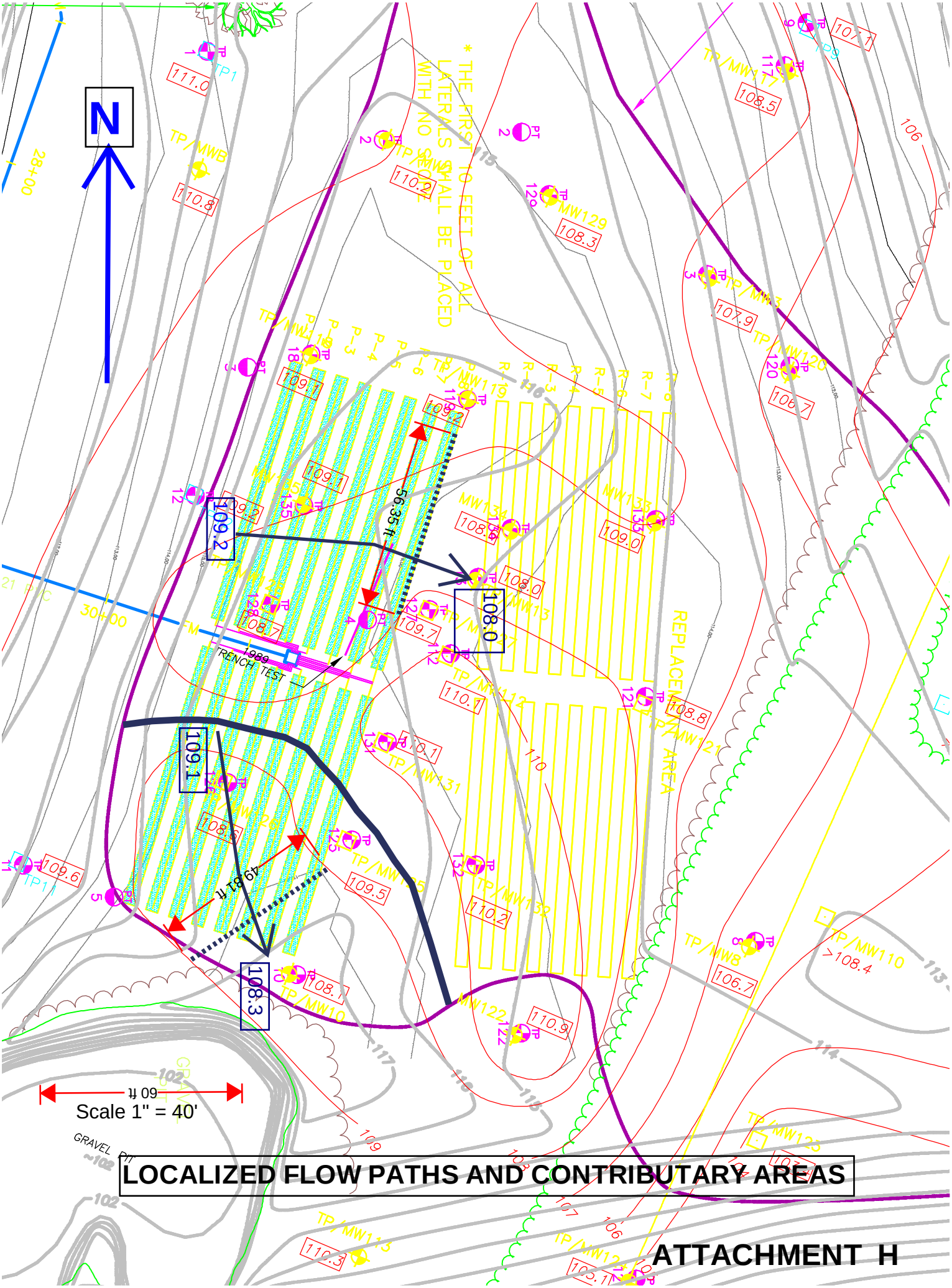
OVERLAY OF DISPOSAL FIELD OVER SHGWT CONDITIONS

ATTACHMENT F



GROUNDWATER FLOWS PATHS UNDER DISPOSAL FIELDS

ATTACHMENT G


N
* THE FIRST 10 FEET OF ALL LATERALS SHALL BE PLACED WITH NO SLOPE
REPLACEMENT AREA
TRENCH TEST
1989
55.35 ft
49.81 ft
109.2
108.0
109.1
108.3
60 ft
Scale 1" = 40'
GRAVEL PIT
LOCALIZED FLOW PATHS AND CONTRIBUTARY AREAS
ATTACHMENT H

Town of Charlotte
Hydrogeologic Analysis
Municipal Wastewater Disposal Ssystem

Site: Primary Disposal Site - South End - Localized Conditions

Calculation Method: Darcy's Law

Q = KiA x 7.48

where Q = Design Flow, or Hydrogeologic Site Capacity
or Q/ft = Design Flow per Linear Foot
i = Hydraulic Gradient
A = L x h = Cross Sectional Area, Sq. Ft.
7.48 = Conversion from Cu. Ft. to Gallons

Parameter	Assigned Value	Units	Notes:
K	160	ft/day	Value for Very Fine Sandy Loam
i	0.012	ft/ft	Hydraulic Gradient (Slope of Limiting Conditions)
A	1	Ft	Calculate using Linear Loading Rate
Des Q	48.9	gpd/lf	Design Flow - One 8' wide bed at 1 GPD/SF

2437	Design Flow (GPD)
49.8	Total width of Flow Path
48.9	Application Rate in Gal/LF

Solve for: h = height of induced groundwater mound (IGWM)
h = 3.41 Ft

Trench 1 Calculate Trench Bottom Elevations to Provide 3.0 feet of Unsaturated Thickness Below Trench Bottoms.

Trench No.	Gallons per Day Q/ft	Highest Lim. Cond. Elev. Ft	Add Induced GW Mound, Ft.	Elev. SHGWT Plus IGWM, Ft.	Trench Bottom Elev. Calcs.			Unsat. Thickness Below Trench including Induced Mound, Ft.	Comment
					Inv. Elev.	Below Inv.	Bottom Elev.		
West Edge	0	109.10	0.00	109.1	116.25	1	115.25	6.15	Okay,3.0' or Greater
	12.2	108.90	0.85	109.8	116.25	1	115.25	5.50	Okay,3.0' or Greater
Middle	24.5	108.70	1.70	110.4	116.25	1	115.25	4.85	Okay,3.0' or Greater
	36.7	108.50	2.56	111.1	116.25	1	115.25	4.19	Okay,3.0' or Greater
East Edge	48.9	108.30	3.41	111.7	116.25	1	115.25	3.54	Okay,3.0' or Greater

Attachment I

Town of Charlotte
Hydrogeologic Analysis
Municipal Wastewater Disposal Ssystem

Site: Primary Disposal Site - East Side - Localized Conditions

Calculation Method: Darcy's Law

Q = KiA x 7.48

where Q = Design Flow, or Hydrogeologic Site Capacity
or Q/ft = Design Flow per Linear Foot
i = Hydraulic Gradient
A = L x h = Cross Sectional Area, Sq. Ft.
7.48 = Conversion from Cu. Ft. to Gallons

Parameter	Assigned Value	Units	Notes:
K	160	ft/day	Value for Very Fine Sandy Loam
i	0.017	ft/ft	Hydraulic Gradient (Slope of Limiting Conditions)
A	1	Ft	Calculate using Linear Loading Rate
Des Q	72.0	gpd/lf	Design Flow - One 8' wide bed at 1 GPD/SF

4062	Design Flow (GPD)
56.4	Total width of Flow Path
72.0	Application Rate in Gal/LF

Solve for: h = height of induced groundwater mound (IGWM)
h = 3.54 Ft

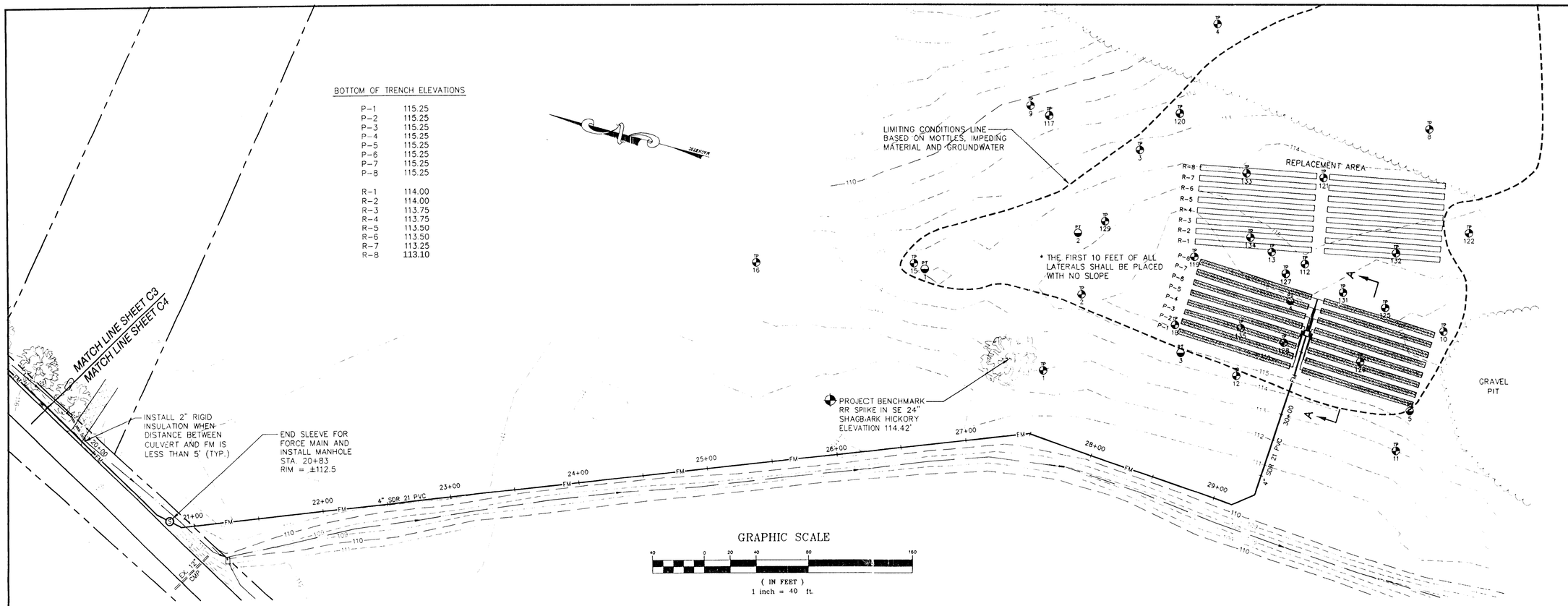
Trench 1 Calculate Trench Bottom Elevations to Provide 3.0 feet of Unsaturated Thickness Below Trench Bottoms.

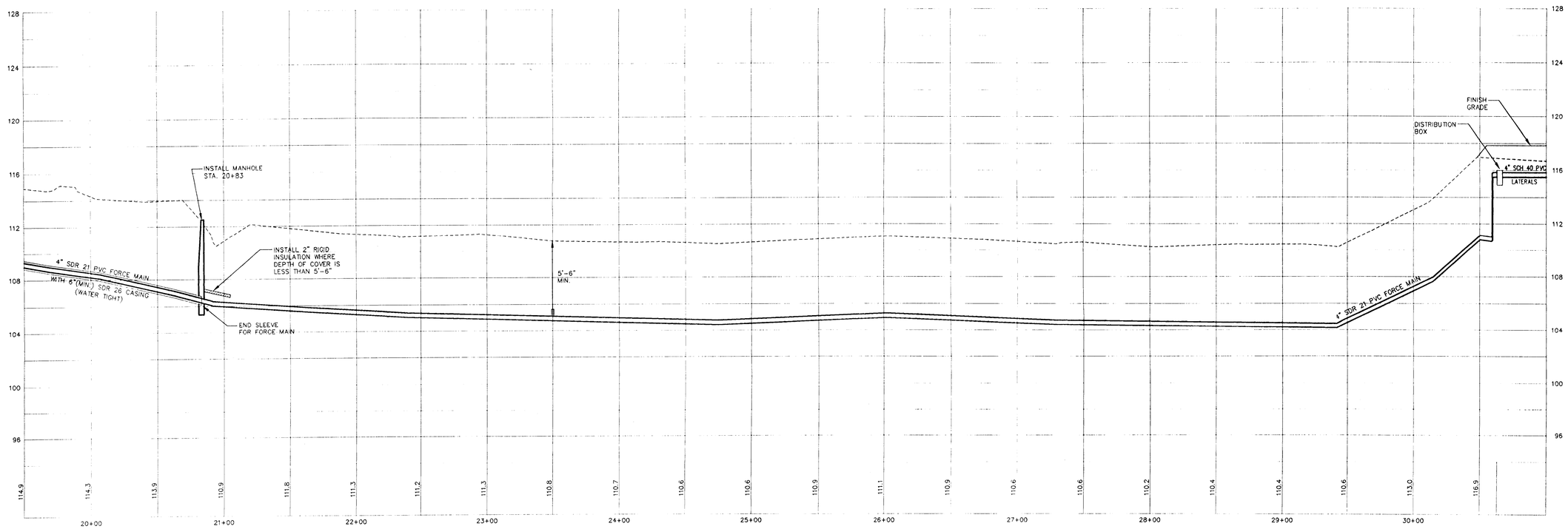
Trench No.	Gallons per Day Q/ft	Highest Lim. Cond. Elev. Ft	Add Induced GW Mound, Ft.	Elev. SHGWT Plus IGWM, Ft.	Trench Bottom Elev. Calcs.			Unsat. Thickness Below Trench including Induced Mound, Ft.	Comment
					Inv. Elev.	Below Inv.	Bottom Elev.		
West Edge	0	109.10	0.00	109.1	116.25	1	115.25	6.15	Okay,3.0' or Greater
	18.0	108.90	0.88	109.8	116.25	1	115.25	5.47	Okay,3.0' or Greater
Middle	36.0	108.70	1.77	110.5	116.25	1	115.25	4.78	Okay,3.0' or Greater
	54.0	108.50	2.65	111.2	116.25	1	115.25	4.10	Okay,3.0' or Greater
East Edge	72.0	108.30	3.54	111.8	116.25	1	115.25	3.41	Okay,3.0' or Greater

Attachment J

BOTTOM OF TRENCH ELEVATIONS

P-1	115.25
P-2	115.25
P-3	115.25
P-4	115.25
P-5	115.25
P-6	115.25
P-7	115.25
P-8	115.25
R-1	114.00
R-2	114.00
R-3	113.75
R-4	113.75
R-5	113.50
R-6	113.50
R-7	113.25
R-8	113.10





FORCE MAIN PROFILE STA. 19+50 TO 30+63

1"=4' VERTICAL
1"=40' HORIZONTAL

WW-4-1485

SITE ENGINEER:

CIVIL ENGINEERING ASSOCIATES, INC.
P.O. BOX 485 SHELBURNE, VT 05482
802-985-2323 FAX: 802-985-2271 e-mail: cea@together.net

DRAWN MJW
CHECKED SAV
APPROVED SAV

STATE OF VERMONT STEPHEN A. VOLK 13328 REGISTERED PROFESSIONAL ENGINEER

CLIENT:

TOWN OF CHARLOTTE
P.O. BOX 119
CHARLOTTE, VT
05445

PROJECT:

BURNS PROPERTY WASTEWATER SYSTEM

GREENBUSH ROAD
AND FERRY ROAD
CHARLOTTE
VERMONT

SCANNED

0 1 2 INCHES

"APPROVED"
Department
of
Environmental Conservation
Approved By: SMP
Permit #: WW-4-1485
DATE: 3-27-01

DATE	CHECKED	REVISION
1/3/16	DSM	Revised Trench R-8 Elevation

FORCE MAIN PLAN & PROFILE STA. 0+00 TO 0+00

DATE DEC., 2000
SCALE 1" = 40'
PROJ. NO. 00271
DRAWING NUMBER C4

TEST PIT DATA

Test pits excavated by backhoe on November 23, 1987
Soils logged by C. Heindel

NLTD = No bedrock to depth
NWTD = No ground water to depth

TP-1	
0 - 11"	Loose brown silty loam topsoil, roots, worm holes, dry
11 - 25"	Very firm tan silt and silty fine sand, mottled, roots
25 - 40"	Firm gray-brown silt-clay
NLTD, NWTD	
TP-2	
0 - 13"	Dark brown loose sandy loam topsoil
13 - 30"	Red-brown friable blocky silt loam B horizon
30 - 63"	Loose, medium gravel, with subangular rock fragments 20-30%, matrix of silty coarse sand and seashells, gray, very dry, no mottles
63 - 90"	Dense gray silt-clay
NLTD, NWTD	
TP-3	
0 - 10"	Loose brown sandy loam topsoil
10 - 40"	Red-brown loose silt loam B horizon
40 - 61"	Loose coarse sand and medium gravel, subangular rock fragments, seashells
61 - 96"	Dense gray silt-clay
NLTD, NWTD	
TP-4	
0 - 6"	Dark brown loose sandy topsoil
6 - 40"	Loose red-brown silty loam B horizon, no mottles
40 - 56"	Gray loose coarse sand and seashells, 5% rock fragments, dry
56 - 75"	Gray firm silt-clay
NLTD, NWTD	
TP-8	
0 - 13"	Dark brown woods duff and topsoil
13 - 34"	Friable red-brown silt-loam B horizon, no mottles
34 - 81"	Loose gray coarse sand, seashells, 10% subangular rock fragments, dry, no mottles
81 - 96"	Firm gray silt-clay
NLTD, NWTD	
TP-9	
0 - 7"	Dark brown loose sandy loam topsoil
7 - 32"	Friable red-brown silt loam B horizon, no mottles
32 - 37"	Friable to firm brown silt loam subsoil with 10% cobbles, no mottles, dry
37 - 50"	Firm gray silt-clay, dry, no mottles
NLTD, NWTD	
TP-10	
0 - 3"	Brown loose sandy loam topsoil
3 - 30"	Loose red-brown silt loam B horizon, no mottles
30" - 11'	Loose to friable gray coarse sand and fine gravel, 40% small subangular rock fragments, dry, no mottles, ground water at 11'
11 - 12'	Gray firm silt-clay
NLTD	
TP-11	
0 - 8"	Loose dark brown silt loam topsoil
8 - 39"	Red-brown friable silt loam B horizon, no mottles
39 - 41"	Discontinuous gray loose coarse sand and shells on one side of pit, no mottles
41 - 58"	Firm gray silt-clay, no mottles
NLTD, NWTD	
TP-12	
0 - 6"	Loose dark brown silt loam topsoil
6 - 27"	Red-brown friable silt loam B horizon with pebbles, no mottles
27 - 58"	Gray loose coarse sand and shells, 30% subangular rock fragments, dry, no mottles
58 - 70"	Firm gray silt-clay
NLTD, NWTD	
TP-13	
0 - 10"	Loose dark brown silt loam topsoil
10 - 30"	Red-brown friable silt loam B horizon, dry, no mottles
30" - 8'	Loose gray coarse sand, shells, 10% rock fragments, dry, no mottles
8 - 8.5'	Firm gray silt-clay
NLTD, NWTD	
TP-14	
0 - 6"	Topsoil
6 - 20"	B horizon
22 - 40"	Firm gray silt-clay
NLTD, NWTD	
TP-15	
0 - 3"	Topsoil
3 - 23"	B horizon
23 - 67"	Loose gray coarse sand, shells, 20% rock fragments, dry, no mottles
67 - 97"	Firm gray silt-clay
NLTD, NWTD	
TP-16	Clay at 23 inches

Test pits excavated September 15, 1989
Logged by N.J. Caplow and C. Aldrich

TP-112	
0 - 12"	Dark brown sandy loam with grassy roots. Faint reddish mottles at 9"
12 - 23"	Red-brown loamy sand with brown mottles throughout, roots, worm burrows
23 - 37"	Red-brown firm sandy loam with rusty and bleached mottles throughout
37 - 47"	Firm red-brown/olive-brown sandy pebbly loam, mottled (Transitional horizon)
47 - 58"	Beach deposit: pebbles to 1/2", fine-medium-coarse sand, white shell fragments, fairly loose, overall dark gray-brown in color
58 - 65"	Massive olive-brown medium sand with occasional small pebbles, firm
65"	Dark brown smooth moist clay
TP-117	
0 - .8'	Topsoil
.8 - 1.7'	Red-brown sandy loam
1.7 - 2.3'	Brown silty sand with some gravel, moist
2.3'+	Dark brown clay
TP-118	
0 - 8"	Dark brown loam with fine grass roots
8 - 15"	Moist red-brown heavy loam, mottled throughout
15 - 20"	Transitional pebbly sandy loam
20 - 76"	Sand and gravel: stones to 6" (more commonly to 3") in matrix of medium sand with some fines, some coarse
76"	Smooth brown clay
TP-119	
0 - 6"	Dark brown moist loam
6 - 16"	Red-brown loose moist sandy loam with mottles throughout, faint roots to 16"
16 - 28"	Red-brown mottled firm sandy loam with occasional pebbles
28 - 31"	Undulating transitional contact; heavy sandy loam/dark uniform medium sand
31" - 9.9'	Sand and gravel; at 50" layer contains possible carbonate precipitation
9.9'	Clay, seep at 9.2'
TP-120	
0 - .8'	Topsoil
.8 - 1.8'	Red-brown sandy loam
1.8 - 2.7'	Beach deposit
2.7 - 3.8'	Brown silty sand
3.8 - 5.5'	Beach deposit
5.5'	Clay, wet at 4.6'
TP-121 (C.A.)	
0 - .8'	Topsoil
.8 - 2.0'	Red-brown sandy loam
2.0 - 2.7'	Light brown wet sand and fine gravel
2.7 - 3.1'	Dark brown sand and gravel
3.1 - 3.9'	Beach deposit
3.9 - 5.3'	Brown silty sand
5.3'	Clay
TP-122 (C.A.)	
0 - .8'	Topsoil
.8 - 1.8'	Red-brown sandy loam
1.8 - 4.0'	Beach deposit interbedded with lenses of sand
4.0 - 6.3'	Brown fine sand and silt
6.3'	Clay
TP-124 (C.A.)	
0 - .7'	Dark organic-rich sandy loam
.7 - 1.3'	Red-brown sandy loam
1.3 - 2.8'	Fine sand and gravel, very compact
2.8'	Clay
TP-125 (C.A.)	
0 - .8'	Topsoil
.8 - 1.5'	Red-brown sandy silty loam
1.5 - 5.0'	Beach deposit
5.0 - 7.5'	Gray silty and
7.5'	Clay
TP-126	
0 - 22"	Dark brown loam
22 - 60"	Beach sand and gravel: pebbles generally to 3" in diameter in a medium sandy matrix
60 - 93"	Medium brown medium sand
93"	Clay
TP-127 (C.A.)	
0 - .9'	Topsoil
.9 - 3.0'	Red-brown silty sand loam and fine gravel
3.0 - 3.9'	Dark gray sand and gravel
3.9 - 5.5'	Silty sand and gravel, light gray in color
5.5 - 6.7'	Beach deposit: pebbles and stones, shell fragments, less silt
6.7'	Clay
TP-128	
0 - 22"	Loam
22" - 7.5'	Sand and gravel
TP-129	
0 - 22"	Loam
22 - 93"	Sand and gravel; at 57" light-colored horizon containing possible carbonate precipitate
93"	Heavy seepage in sand and gravel
TP-131	
0 - 10"	Dark brown loam
10 - 31"	Red-brown slightly moist silty loam; possibly very faint mottles at 15"; sandy and red-brown below 22"
31 - 50"	Grey-brown pebbly sand with white shells
50 - 76"	Grey-brown sand with some pebbles
76 - 90"	Dark grey-brown clay
TP-132	
0 - 10"	Dark brown loam
10 - 32"	Red-brown firm pebbly loam, with medium brown mottles at 19"
32 - 65"	Grey-brown sand and gravel with white shells especially in top half
65"	Clay
TP-133	
0 - 9"	Dark brown loam
9 - 19"	Red-brown moist loam with occasional pebbles
19 - 27"	Medium brown slightly red fine to medium sand with some silt
27 - 52"	Olive brown medium to fine sand; 1" thick, tighter silty layer occurs at 31" (not a significant impeding layer)
52 - 61"	Medium grey-brown sand with occasional pebbles and white shells
61 - 63"	Grey clay

Notes: Reddish mottles occur at 21 - 38", grey-brown mottles from 10 - 16" mostly along routes.

TP-134	
0 - 7" Dark brown loam	
7 - 26"	Medium brown sandy loam with dull brown mottles starting at 13 - 16"
26 - 82"	Olive brown medium sand with pebbles and white shells; standing water at 80"; final bucket of saturated gravel revealed clay at bottom of pit at approximately 91"
TP-135	
0 - 7" Dark brown loamy topsoil	
7 - 27"	Red-brown firm loam
27 - 95"	Sand and gravel with abundant cobbles 4-6" in diameter; heavy seep at 92"
95"+	Clay

PERC TEST DATA

Tests done by C.E.A.
November 21, 2000

PERC #1	4	MINUTES/INCH
PERC #2	7	MINUTES/INCH
PERC #3	1	MINUTES/INCH
PERC #4	10	MINUTES/INCH
PERC #5	6	MINUTES/INCH

DESIGN DATA

Loading Rate:

- (2nd slowest percolation rate = 7 minutes/inch)
- $Q = 3/\sqrt{T} = 3/\sqrt{7} = 1.13$ gal/sf

Use Absorption Rate of 0.9 gallons/square foot for future consideration under the Indirect Discharge Rules

Absorption Trench Area:

- 4,999 gpd @ 0.9 gallons/square foot = 5,554 square feet required
- Use sixteen 4' x 90' trenches = 5,760 square feet provided

Actual Absorption Rate = 4,999/5,760 = 0.87 gallons/square foot for

Design Flow	4,762	GPD
Infiltration	237	GPD
Total Design Flow	4,999	GPD
Average Daily Flow	5.21	GPM
Peaking Factor	5.00	
Peak Flow	26.04	GPM
Required Storage(Emergency)	1,250	gallons
Force Main Dia.	4.00	Inches
Min. Cleansing Velocity	2.00	FPS
Min. Pumping Rate	78.29	GPM
Selected Pumping rate	80.00	GPM
Length of FM	3,020	feet
Friction Losses	-15.00	feet
High Point of FM	115.50	feet
Low elev. in PS	87.50	feet
Elevation Change	-28.00	feet
Minor headlosses	-10.00	feet
TDH	53.00	feet
Pump Cycle Storage	940	Gallons
Run Cycle (5 Min. min.)	12.57	Minutes
Wet Well Detention Time	180.52	Minutes

Pump Requirements:
80 gpm @ 53' TDH (min.)

WW-4-1485

SITE ENGINEER:

CIVIL ENGINEERING ASSOCIATES, INC.
P.O. BOX 485 SHELBURNE, VT 05482
802-985-2323 FAX: 802-985-2271 e-mail: cea@together.net

DRAWN MJW
CHECKED SAV
APPROVED SAV

STATE OF VERMONT — STEPHEN A. JENKINS — 15226 — REGISTERED PROFESSIONAL ENGINEER

CLIENT:

TOWN OF CHARLOTTE
P.O. BOX 119
CHARLOTTE, VT
05445

PROJECT:

BURNS PROPERTY WASTEWATER SYSTEM

GREENBUSH ROAD AND FERRY ROAD
CHARLOTTE
VERMONT

SCANNED

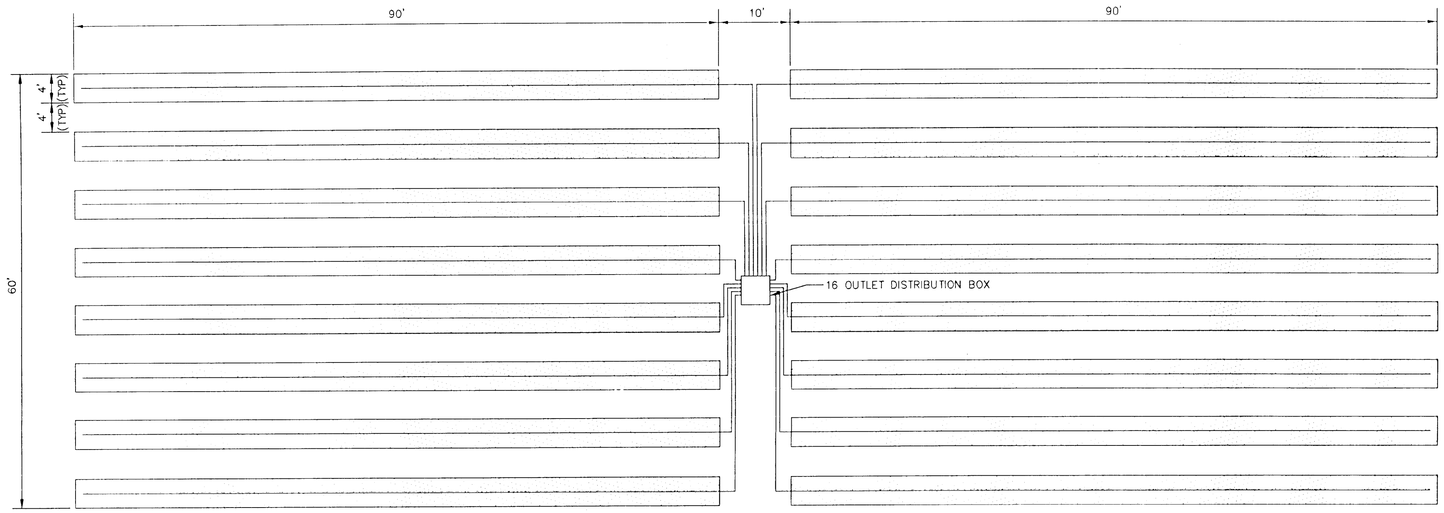
0 1 2 3 INCHES

"APPROVED"
Department of Environmental Conservation
Approved By: GMC
Permit #: WW-4-1485
DATE: 3-27-01

DATE	CHECKED	REVISION

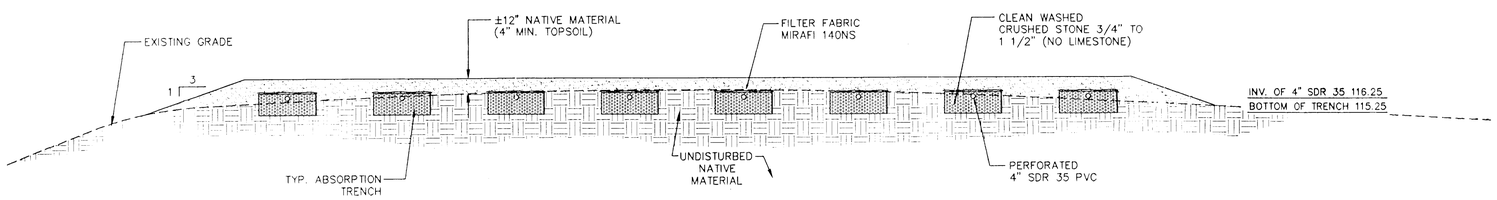
TEST PIT AND PERC TEST LOGS, DESIGN DATA

DATE DEC., 2000
SCALE AS SHOWN
PROJ. NO. 00271
DRAWING NUMBER C5



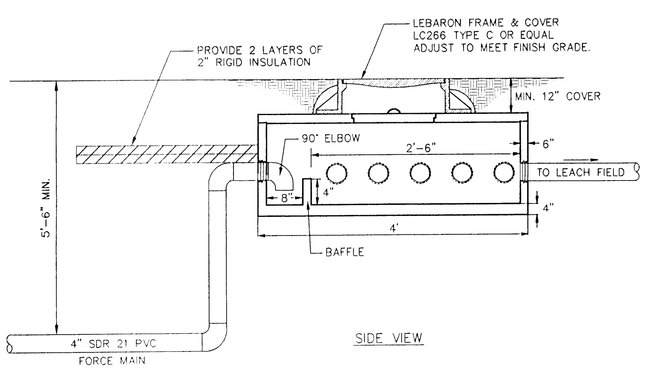
TRENCH PLAN

1" = 10'

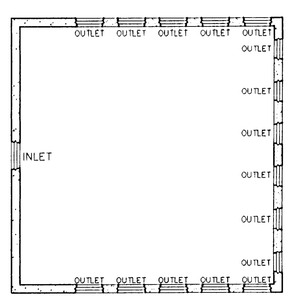


TYPICAL TRENCH SECTION A–A

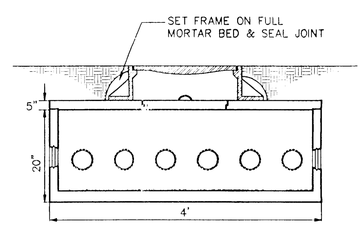
1" = 5'



SIDE VIEW



TOP VIEW



FRONT VIEW

4" LOW PRESSURE SEAL
TYPICAL AT ALL OPENINGS

16 OUTLET DISTRIBUTION BOX

NTS

DISPOSAL FIELD CONSTRUCTION SPECIFICATIONS

MATERIALS

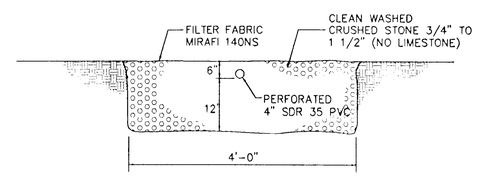
1. Perforated SDR 35 OVC pipe meeting the requirements of the latest revision of ASTM shall be used. Fittings used in the disposal fields shall be compatible with distribution lines material.
2. Crushed stone shall be clean, durable and no smaller than 3/4" or larger than 1 1/2" in diameter.

CONSTRUCTION

1. The disposal field shall be inspected during critical stages of construction by a qualified consultant from Civil Engineering Associates. This shall include the staking of the disposal field, the trenches after stone placement and installation of the distribution piping, and a final inspection of the entire system. The Contractor will be responsible for contacting the Engineer to set up the inspection schedule.
2. When the trenches have been excavated, the sides and bottom shall be raked to scarify any smeared soil surfaces. Construction equipment not needed to construct the system should be kept off the area to be utilized for the absorption trench system to prevent undesirable compaction of the soils. Construction of the system shall not take place when the soil moisture is high in the system area. If the soil at 9 inches below grade can be rolled into the shape of a wire, the soil moisture content is too high for construction to begin.
3. The distribution box shall be installed level and arranged so that effluent is evenly distributed to each distribution line. Adequate provisions shall be taken to assure stability and provide access for inspection of the distribution box.
4. Each distribution line shall connect individually to the distribution box and exit at the same slope for the first 10' from the box.
5. The pipe connecting the distribution box to the distribution line shall be of tight joint construction laid on undisturbed soil or properly bedded throughout its length.
6. Where cover over the sewer lines to the distribution box is less than 4 feet, install 2" rigid insulation over pipe.
7. At least 12" of crushed stone shall be placed in the bottom of the trench.
8. The distribution line shall be carefully placed on the bedding at a uniform slope. The ends of the dist. lines shall be capped, and the lines covered with at least 2" of stone.
10. The stone aggregate shall be covered with filter fabric mirafi 140NS and a minimum of 12 inches of soil, but not more than 18 inches, with the upper 4 to 6 inches of soil being loam and the remainder of the fill being of a fine sandy loam to medium sand texture. The soil cover shall be placed at a maximum slope of 3:1. A vegetated cover free of large brush and trees shall be maintained over the system.
11. All work shall be done in accordance with the State of Vermont Environmental Protection Rules.
12. Prior to use of the system, the qualified consultant shall submit a written report to the Division stating that the system has been installed according to the approved plans and permit. The report shall specifically address the inspection of the site preparations and include results of the force main pressure test.

LEAKAGE TESTING

Each tank, such as septic or pump chamber, shall be tested for water tightness by filling to a point at least two inches, but not more than three inches, above the point of the riser connection to the top of the tank. During the test, there shall not be a measurable leakage over a 24 hour period.



TYPICAL DISPOSAL FIELD TRENCH SECTION

N.T.S.

WW-4-1485

SITE ENGINEER:

CIVIL ENGINEERING ASSOCIATES, INC.
P.O. BOX 485 SHELBURNE, VT 05482
802-985-2323 FAX: 802-985-2271 e-mail: cae@together.net

DRAWN MJW
CHECKED SAV
APPROVED SAV

STATE OF VERMONT SHELBY A. KOLB No. 5226 Registered PROFESSIONAL ENGINEER

CLIENT:

TOWN OF CHARLOTTE
P.O. BOX 119
CHARLOTTE, VT
05445

PROJECT:

BURNS PROPERTY WASTEWATER SYSTEM

GREENBUSH ROAD
AND FERRY ROAD
CHARLOTTE
VERMONT

0 1 2 3 INCHES

SCANNED

"APPROVED"
Department
of
Environmental Conservation
Approved By: GMC
Permit #: WW-4-1485
DATE: 3-27-01

DATE	CHECKED	REVISION

DISPOSAL FIELD DETAILS AND SPECIFICATIONS

DATE DEC., 2000
SCALE AS SHOWN
PROJ. NO. 00271
DRAWING NUMBER C7