Final Report on Expanding Community Wastewater Service in the West Charlotte Village

Submitted to the Charlotte Selectboard for consideration.

July 12, 2016

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Expanding Community Wastewater Service in the West Charlotte Village

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I. Executive Summary

Community discussions regarding expansion of municipal wastewater service in the West Village have been going on for several years. The current Town Plan identifies commercial development in both the West and East Villages as a goal in the Economic Development, Future Pattern of Development, and Specific Community Facilities and Services chapters.

With regard to the West Village, the portion of the Village east of Greenbush Road exhibits native soils with poor to very poor on-site wastewater disposal potential. This has hampered expansion plans of existing businesses and challenged new projects along that portion of Ferry Road from Greenbush Road to Route 7. Public health issues related to failed systems have also motivated the discussions.

In 2009, voters at Town Meeting approved 93 -67 the following advisory question:

"Will the Selectboard explore the construction of a public or community facility or facilities for the purpose of providing wastewater disposal for residential and commercial use in West Charlotte Village?'

At its August 23, 2010 meeting, the Selectboard appointed a citizen task force to examine this issue and report back on the need for such a facility or facilities. The Charlotte Wastewater Committee submitted its findings in a report to the Selectboard on September 10, 2011. In its report, the Committee recommended that: 1) a presentation be made by the Committee at the March 2012 Town Meeting; 2) a proposed Wastewater Master Plan be created; and 3) proposed municipal ordinances be developed for allocation and use.

The Town Meeting 2012 presentation was made by the Committee. Lacking further instruction from the Seletcboard, the Committee disbanded. In August, 2015, a reconstituted Charlotte Wastewater Committee was formed to address the remaining items.

- **<u>Proposed Wastewater Master Plan</u>**

Elements of the proposed Wastewater Master Plan consist of :

- Service Area and Expansion Phases;
- Increase in permitted capacity from 4,999 GPD to 6,499 GPD;
- Policy on allocations to be reserved for municipal uses;

- Policy on allocations of unreserved excess wastewater disposal capacity**;**
- Policy for metering, operating and maintaining expectations for use of the wastewater system;
- Connection fee policy;
- Budget for the wastewater system;
- Wastewater system improvement phases.

1. Service Area and Expansion Phases, Attachment III(a).

The proposed Phase I service area, a priority, is generally located along the section of Ferry Road from Route 7 to Greenbush Road. Failed systems located along Greenbush Road with no reasonable recourse due to small lot size or close proximity to adjacent wells are also eligible to tie into the municipal collection system.

The Phase II portion of the service area is the southern portions of the commercially zoned properties including the Wildflower Farm, Flea Market and southern portion of the Laboeuf property.

The Town controls a number of "satellite" wastewater disposal sites outside of the Village area proper. The use of these facilities by those properties outside of the Phase I and II service areas is not restricted.

The Committee recommends that the means of expanding the municipal collection system should be through the use of a low pressure collection system. Additionally, The expansion of the collection system should be paid for by the new users of the municipal wastewater system

A plan for expansion, along with plans for engineering and construction, have been prepared and show the proposed routing of the low pressure collection system, as well as details on how each private connection is to be made to the existing gravity collection system and proposed low pressure collection system.

2. Increase in permitted capacity from 4,999 gallons per day (GPD) to 6,499 GPD.

This increase can readily be accommodated without any further construction modifications through the submission of a State of Vermont Wastewater Disposal System application, attachment III(b), by the Town which takes advantage of opportunities set forth in the current State Environmental Protection Rules. This application package, and supporting documents, has been prepared by the Committee and is attached with this report.

3. Policy on allocations to be reserved for municipal uses

Population growth in Charlotte will likely continue to level off over the next several decades. However, for planning purposes, adopting a no-growth approach would be short-sighted given the finite capacity of the Town's wastewater disposal sites.

The Committee recommends that a best-fit equation be used which recognizes the projected population trends and also plans for the future. This would mean planning for a population level of 4,850 in 2050 (2010 census was 3,759) which would include the following future wastewater allocations for municipal uses: 1) Town offices, Library, and Fire and Rescue (1,125 GPD); 2) Senior Center (2,600 GPD); 3) Infiltration (237 GPD); Total = 3, 962 (GPD).

4. Policy on allocations of unreserved excess wastewater disposal capacity

Previous work by the Committee indicated that a wastewater ordinance should include priorities for the distribution of the available excess wastewater disposal capacity controlled by the Town.

The proposed Sewer Allocation Ordinance sets forth certain standards for the allocation of wastewater disposal capacity based upon first demonstrating that the property does not have the on-site wastewater disposal capacity to address the proposed use.

As it relates to the Primary District, the Committee recommends that the prioritization program of potential users be put on hold until the Burns Property System is expanded beyond the 6,499 GPD threshold.

Since the unallocated wastewater disposal within the Burns site, or at the satellite wastewater disposal sites, is finite, it is recommended that the allocation of these resources by the Town only be made to those properties that do not have the means of addressing their own wastewater disposal needs.

The proposed Wastewater Master Plan sets forth policies for eligibility in both the primary and secondary service areas, as well as a review process.

5. Policy on metering, operating and maintaining expectations for use of the wastewater system

The proposed Sewer Use Ordinance, Attachment IV(b), addresses the obligations of those existing and future users of the municipal collection and wastewater disposal system. In order for there to be an equitable allocation of costs, the proposed Sewer Use Ordinance requires the use of water meters to document actual water usage. It establishes a process for managing

new connections. It also details issues such as a user charge system; construction standards; fee schedules; billing procedures and a customer inquiry policy.

6. Connection fee policy

In order to determine what future connection fees would be, the Committee prepared estimates of probable construction costs for the expansion of the wastewater system. Discussion of the recommended connection fees includes a number of public policy decisions on whether historic costs should be recovered and whether certain uses should be promoted through reduced connection fees. The proposed Sewer Allocation Ordinance references the method by which the connection fees would be calculated.

The recommended connection fee is $65.69for each GPD of design flow.

7. Budget for the wastewater system

To support an understanding of how the finances of the expanded municipal wastewater collection and disposal system would work, the Committee has developed an outline of the likely operating costs for the system. The proposed Sewer Use Ordinance addresses the rules associated with the use of the system and payment of quarterly sewer use fees.

In order to provide flexibility to adjust for changes in on-going operating costs, the Committee recommends that sinking fund fees be collected as part of the annual use assessment at the initial rate of $0.87/gal ($0.49 short term maintenance costs + $0.38 long-term maintenance costs), which is to be set annually by the Selectboard.

) Proposed Municipal Ordinances

) Sewer Allocation Ordinance (Allocation of unreserved excess wastewater disposal capacity), Attachment IV(a)

The proposed Sewer Allocation Ordinance addresses the methods for the allocation of wastewater disposal capacity from the unreserved capacity (that capacity not encumbered by reservation for future municipal or public health issues) in the existing and future expanded wastewater disposal system. It addresses capacity allocation, pollution abatement, capacity for individual developments, cost recovery for sewer expansion, connection authorization, and monitoring final flows.

- **Sewer Use Ordinance (Operation and maintenance of the wastewater facilities), Attachment IV(b)**

The proposed Sewer Use Ordinance addresses the rules associated with the use of the system and payment of quarterly sewer use fees associated with the maintenance of the system. It references the means by which the proposed connection fees would be calculated. In order to determine what the future connections fees would be, the Committee prepared estimates of probable construction costs to facilitate the future expansion of the wastewater disposal system. The recommended connection fees include a number of public policy decisions on whether historic costs should be recovered and whether certain uses should be promoted through reduced connection fees.

II. Background

In 2009, the voters at Town Meeting approved by a 93 -67 margin the following advisory question:

> *"Will the Selectboard explore the construction of a public or community facility or facilities for the purpose of providing wastewater disposal for residential and commercial use in West Charlotte Village"?*

At its August 23, 2010 meeting, the Selectboard appointed a citizen task force, the Charlotte Wastewater Committee, to examine this issue and report back on the need for such a facility or facilities. The Committee consisted of Dave Marshall, Vince Crockenberg, Dana Hanley and Winslow Ladue.

In September, 2011, the Committee submitted a report to the Selectboard on the potential expansion of community wastewater service in the West Charlotte Village.

The Committee's work was guided by language in the Town Plan which clearly encourages future growth to be centered in the two Villages. The Committee reviewed past Village wastewater planning efforts, made extensive efforts to gauge community interest in the provision of expanded wastewater services, and assessed future municipal wastewater needs. It looked closely at potential non-municipal needs for commercial and residential growth, as well as at the replacement of failing, or potentially failing, wastewater systems in the West Charlotte Village. The report addressed the management of an expanded wastewater system. The report also considered development of policies for allocation, new connections, and the assurance of quality control. A possible fee program was considered, including creating a cost recovery fee and establishing an easement fee and a sinking fund.

The Committee's recommendations to the Selectboard included the following:

- Expand the use of the existing municipal wastewater system to allow new users to be served;
- Adopt a Master Plan for future wastewater system improvements;
- Create and adopt municipal ordinances that address allocation of unreserved excess wastewater disposal capacity, including connection fees, as well as the operation and maintenance of the wastewater facilities.

In August, 2015, based in part on increasing public inquiries about the opportunities to utilize the excess capacity in the existing municipal system, the Selectboard decided to reconstitute the Charlotte Village Wastewater Committee to further examine the recommendations of its report, chiefly creating a Master Plan for future wastewater improvements, as well as municipal allocation and use ordinances.

The new Committee (Dave Marshall, Dana Hanley, and Selectboard liaison Fritz Tegatz) submitted a report to the Selectboard on June 20, 2016 including a proposed **Wastewater Master Plan** addressing:

- Service area and expansion phases;
- Increased permitted capacity from 4,999 GPD to 6,499 GPD;
- Policy on allocations reserved for municipal uses;
- Policy on allocations of unreserved excess wastewater disposal capacity;
- Policy on metering, operating and maintaining the system, as well as on managing expectations for its use;
- Connection Fee policy;
- Budget for the expanded wastewater system.

The report includes the creation of two **municipal ordinances** including:

- Sewer Allocation Ordinance (of unreserved excess wastewater disposal capacity);
- Sewer Use Ordinance (the operation and maintenance of the wastewater system).

III. Proposed Wastewater Master Plan

1. Service Areas and System Expansion Phases

The existing municipal wastewater system was constructed and completed in the late Fall of 2001 at the total cost of $140,400 for design, permitting and construction. All maintenance costs to date have been incurred by the Town.

The existing municipal system consists of:

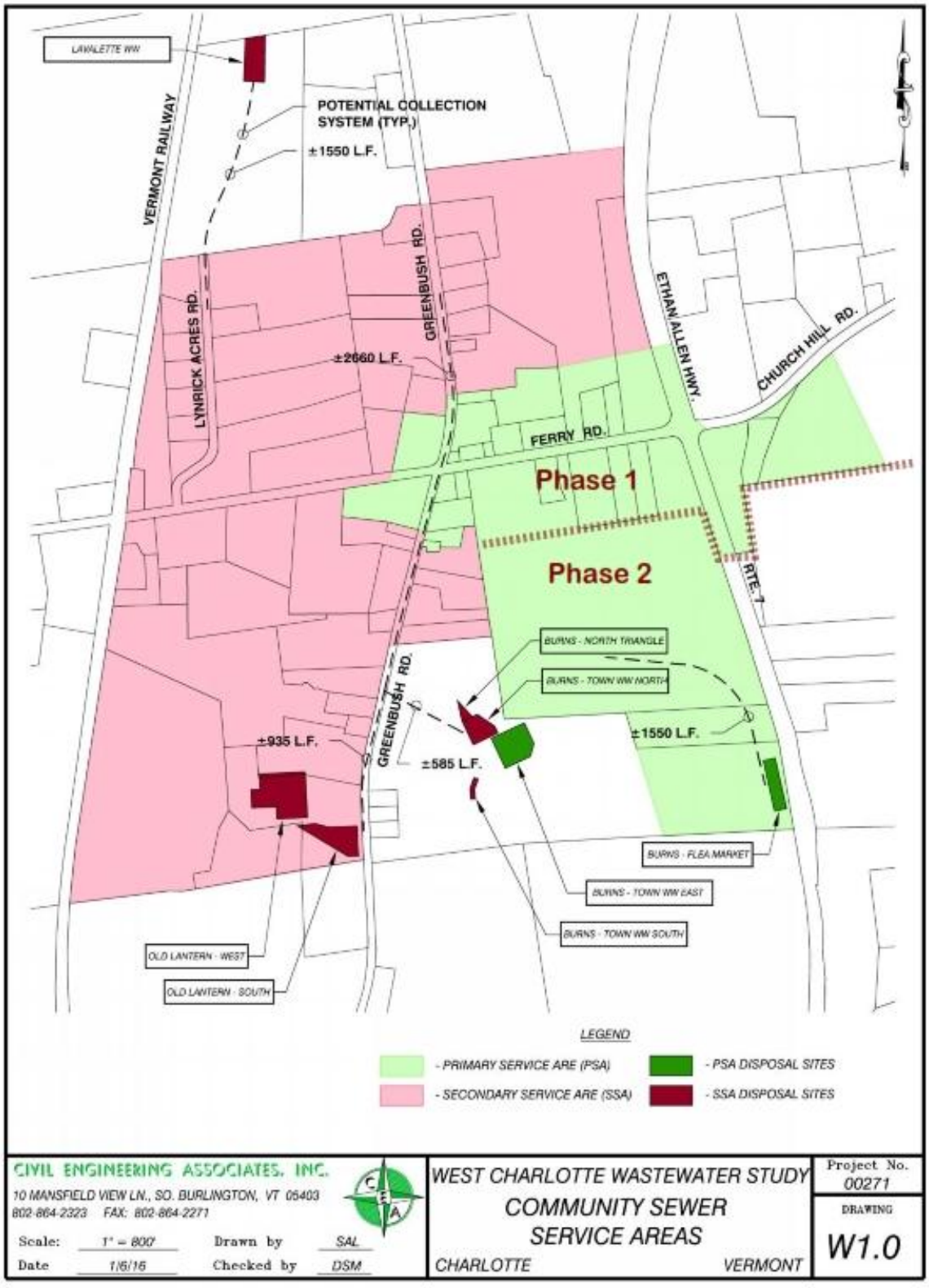
- A conventional subsurface wastewater disposal system located on the Burns property on Greenbush Road near the old Burns gravel pit.
- A gravity collection system serving the:
  a. Charlotte Town Offices
  b. Charlotte Library
  c. Charlotte Senior Center
  d. Charlotte Volunteer Fire Department
- All collected sewage effluent flows to a pump station (located at the north end of the Town Office Lawn), which is then conveyed by a force main (pipe with pressurized fluids) that first runs west along Ferry Road and then southerly along Greenbush Road to the wastewater system.

The Town controls easements for a number of potential "satellite" on-site wastewater disposal sites located both near (Burns Hill Subdivision) or outside (Lavalette on Greenbush Road) of the West Village area.

Service areas

It is recommended that two service areas be created.

- **Primary Service Area** – This area would follow the current limits of the West Village Commercial Zoning District. This would enable properties located within this zoning district to petition the Selectboard for permission to tie into the wastewater disposal system located on the Burns property in accordance with the standards set forth in the proposed Charlotte Sewer Use Ordinance.
- **Secondary Service Area** – This area generally follows along the remaining portions of Greenbush Road located within the West Village Residential Zoning District. These properties are permitted to petition the Selectboard for the use of those remote wastewater disposal system sites for properties with failed systems, for adaptive re-use of existing homes into duplex structures, and for home occupations allowed within that zoning district. The recommended service areas are depicted on the map on the following page.


LAWLETTE WW
POTENTIAL COLLECTION SYSTEM (TYP.)
±1550 L.F.
VERMONT RAILWAY
LYNRICK ACRES RD.
GREENBUSH RD.
±2660 L.F.
ETHAN ALLEN HWY.
CHURCH HILL RD.
FERRY RD.
Phase 1
Phase 2
RTE. 7
BURNS - NORTH TRIANGLE
BURNS - TOWN WW NORTH
GREENBUSH RD.
±935 L.F.
±585 L.F.
±1550 L.F.
BURNS - FLEA MARKET
BURNS - TOWN WW EAST
BURNS - TOWN WW SOUTH
OLD LANTERN - WEST
OLD LANTERN - SOUTH
LEGEND
- PRIMARY SERVICE ARE (PSA)
- SECONDARY SERVICE ARE (SSA)
- PSA DISPOSAL SITES
- SSA DISPOSAL SITES
CIVIL ENGINEERING ASSOCIATES, INC.
10 MANSFIELD VIEW LN., SO. BURLINGTON, VT 05403
802-864-2323 FAX: 802-864-2271
Scale: 1" = 800'
Date 1/6/16
Drawn by SAL
Checked by DSM
WEST CHARLOTTE WASTEWATER STUDY
COMMUNITY SEWER SERVICE AREAS
CHARLOTTE VERMONT
Project No. 00271
DRAWING
W1.0

System Expansion Phases:

The 2011 Charlotte Wastewater Committee report considered an extension of the existing gravity sewer main in the following directions:

- Easterly to the high point of Ferry Road near the driveway to the Library; and
- Westerly along Ferry Road with a short extension south to the high point of Greenbush Road.

However, this "traditional" approach to expanding the wastewater collection system:

- Had a high initial capital expense;
- Created technical challenges and mitigation costs due to the close proximity of private wells along this route;
- Created significant initial construction impacts associated with the deep excavation typical of gravity collection systems; and
- Had higher long term maintenance cost exposures than other collection systems.

With the goal of minimizing the footprint of impact of the proposed collection system in mind, this Committee recommends the use of a low pressure collection system, as its benefits include:

- The use of small diameter pipes which can be installed with directional boring technology which reduces the amount of excavation and surface disturbance required;
- The low pressure collection system can be installed at a shallower depth as it can more readily follow the existing contour;
- A lower potential for leakage as this is installed and tested as a pressure tested system; and
- The use of a pressure rated pipe eliminates the required inclusion of an infiltration allowance which reduces the remaining capacity at the disposal system.

The Committee recommends that the expansion of the collection system be paid for by the new users of the municipal wastewater disposal system. This eliminates any up-front financing or physical improvements that have the potential, in the worst case, to go for years without use. The details of how these costs will be equitably attributed between first time expansion costs

and those tying in to the same collection system installed and paid for by others is reviewed in greater detail in Section III(6).

Phase I

This Committee recommends that the collection system be extended 800 feet to the east to service those properties fronting Ferry Road and the commercial properties located on the east side of Route 7 majority of the existing structures on Ferry Road. The collection system would be extended 560 feet to the west, or to the intersection of Greenbush Road.

Phase II

This Committee recommends utilizing a low-pressure collection system (force main) to enable users outside of the core service area to tie into the system.

Recommendation & Discussion:

The properties located within the commercially zoned district that have the greatest challenges with regard to the creation of expansion of wastewater disposal systems are those that are located east of Greenbush Road. Beyond the retention of the existing gravity collection system, all new connections would utilize a low-pressure collection system that relies upon pump stations to move the wastewater in small-diameter force mains to the gravity collection system.

2. Increase the existing permitted capacity from 4,999 GPD to 6,499 GPD.

This increase can readily be accomplished through the submission of a State Wastewater Disposal System application which allows applicants to take advantage of the opportunities set forth in the current State of Vermont Environmental Protection Rules.

The Vermont Agency of Natural Resources has two different programs for regulating the disposal of sewage to on-site disposal systems.

- **The State Wastewater Disposal and Water Supply Small Scale Program** is managed by the regional Agency of Natural Resources offices and applies to design flows of less than 6,500 GPD (Charlotte is a 'delegated community' which administers the program locally).
- **The State Indirect Discharge Program** is for large scale disposal systems with design flows greater than or equal to 6,500 GPD.

The current municipal system was permitted under the State's Small Scale Program for the site but the original design utilized application rates limited to those consistent with the State Indirect Discharge Program. This program has design values that are more conservative than the Small Scale Program.

Based on current State of Vermont wastewater rules, the existing system disposal capacity can be expanded with no physical modifications. Until the design flows exceed 6,500 GPD, the system can remain under the State's Small Scale Program. The application rate can be increased based on the original percolation rates developed for the project.

Action Items:

- *The preparation of a State Wastewater Disposal and Potable Water Supply permit application which outlines the documentation for this request (This has been completed with the supporting attachments and is awaiting signature by the Selectboard).*
- *An application fee (Current rules call for fees of $500 per unit which would equate to approximately $1,500) would need to be paid to the Town unless waived by the Selectboard.*

It should be noted that there are exceptions to the 6,500 GPD wastewater disposal limit on one property. The primary exemption is when two separate, unrelated users dispose of wastewater on one property. This exception is currently in play at the Burns property in that the Habitat for Humanity currently uses 1,260 GPD of disposal capacity on the property. Since this is not part of the "municipal" system, it does not count against the running total for the property. This would also hold true if a third party (such as a privately operated senior housing project) were to approach the Town for use of the disposal capacity on the property and remains the premise for potential third party use of the secondary disposal sites on the Burns property.

3. Policy on allocations to be reserved for municipal uses

As the existing wastewater collection and disposal system was constructed primarily with service to the town office, library, volunteer fire and rescue department, and Senior Center in mind, it is paramount that the future needs of these facilities be identified, and capacity retained, before sharing any of the capacity with the community at large.

The current design flow for these facilities is 3,102 gallons per day. The design flow for each of these facilities is primarily based on either the number of employees or number of visitors hosted at each one of them. As such, it is likely that increases in demand from these facilities could be influenced by an increase in population, the tourist economy, or use by non-Charlotte residents.

Historic Population Trends

From 1960 to 1980, Charlotte experienced an explosion in growth, with the population increasing at an annual rate of 3.5% per year, followed by an annual growth rate of 2.1% from 1980 to 1990 and 1.25% from 1990 to 2000, at which point the U.S. Census population for Charlotte was set at 3,569.

The U.S. Census results for 2010 shows a population level of 3,754, which is only six residents off the published estimate by the U.S. Census Bureau in 2001. The population change over the past ten years represents an annual growth rate of 0.5%.

Future Population Trends

The population trend over the past 10 years shows a significant reduction from the growth period experienced by the town from 1960 to 2000. The slower growth in Charlotte may be related to overall population shifts away from rural areas toward growth centers and the urban core. The trend in county-wide public policy oriented towards placing new development in established growth areas with the infrastructure to support it will likely place more growth in already built-up portions of Chittenden County than in outlying areas like Charlotte.

Realtors advise that new home owners are looking to be located in areas where multiple shopping, leisure and entertainment opportunities exist, which runs parallel with the efforts to focus housing in established growth areas where these facilities are already in place. Pressures on all Chittenden County towns to meet regional affordable housing targets will remain high.

The Massachusetts Institute for Social and Economic Research has projected the population levels in each one of the towns and cities in Vermont through the year 2020. For Charlotte, it shows no growth (actually a slight decrease) from 2010 to 2020.

When projecting the population of Charlotte out to the year 2050, however, it would be imprudent to take only the last 10 years of projected growth as the sole source of information.

With that in mind, the committee applied a best-fit equation to the historical data to provide a conservative high estimate of the population level in Charlotte over the next 40 years. The results of this show a high population level of 4,850 in the year 2050, or 27 people (0.7%) per year.

Future Municipal Wastewater Needs

In follow-up interviews with the existing users of municipal and quasi-municipal facilities, the Committee identified the following needs:

(a) Town Office Building

Staffing levels fluctuate to meet service needs, both in number of employees and hours worked. While there is no expected expansion of the building, the Selectboard accordingly has expressed that the future wastewater needs of the Town Offices be based on expected future town growth. The Town Administrator has noted that the Town should be aware of the potential impacts of the ongoing decrease in the school-age population.

(b) Town Library

Recent use of the library facilities has increased, but library trustees foresee no immediate need to increase staffing levels. There is a noticeable increase in the use of the sanitary facilities during the summer by tourists, especially cycling groups.

(c) Fire Department and Rescue Services

These organizations have no planned expansions in services; however, the frequency of the use of their services would likely rise with any increase in population levels.

(d) Senior Center

The Senior Center Board of Directors has reviewed the current traffic population of the Charlotte Senior Center and also its planned expansion over the next 10 years. Although the Senior Center currently provides a luncheon for 60 persons, on some occasions it already serves as many as 75. Moreover, it occasionally provides dinners for up to 100 persons during the year and rents its space on behalf of the Town for meals up to 100 persons. The board anticipates that within ten years it will also likely provide regular breakfasts for up to 25 people. In addition

to meal service, daily attendance including evening meetings already reaches a peak rate of 100 per day.

While the board expects that in the next decade an increasing number of people will use its facilities over the course of any given week, it expects that on any given day, use of its facilities will increase by no more than 50 percent over current use.

It should be noted that the Charlotte Senior Center is the only facility of its type in the general area. Although there are a number private senior living communities located in Shelburne, there is no facility in Shelburne (or for that matter, Ferrisburgh or Hinesburg) catering to those seniors not associated with those privately managed facilities. Testimony has been provided which indicates that out-of-town residents are utilizing some of those services offered here in Charlotte. As such, the Committee has recommended that the design flows for the Senior Center be augmented with a line item for program use of the facilities of 50 full time equivalent individuals per day in addition to the meal program offered at the facility. Lastly pressure of outside use, coupled with an increasing senior population in Charlotte has led the Committee to recommend a 70% increase in reserve capacity for this facility.

Accordingly, the board estimates that it will need wastewater capacity of approximately 2025 gallons per day based on the following break-out of uses:

100-person lunch/dinner x 8 gpd/person	= 800 gpd
100-person daily attendance x 5 gpd/person	= 500
25–person breakfast x 8 gpd/person	= 200
50- person Program Attendance x 5 gpd/person	= 200
Sub-total	= **1,700**
Less 10% low-flow fixture credit	= (170)
Total	= 1,530
Future expansion of 70%	= 1,070
Total Reservation Needed	= **2,600 gpd**

Recommendations

The committee recommends that estimates of future design flows for these municipal facilities be tied generally to the higher rather than lower projections of future population growth in Charlotte. The best-fit equation, which recognizes the historical population trends of the town, calls for a planned population level of 4,850 people in the year 2050, a 29% increase over

*current levels. With this in mind, the committee recommends that future municipal needs for the town offices, library, and fire and rescue services be allocated an additional 30% over current design flow values to a total of (**865 x 1.3 =) 1,125 gallons per day.***

*The Senior Center board advised the committee that its long term needs would likely require 2,600 GPD of design flow. As such, the committee recommends that the future allocation reserved for the Senior Center be set **at 600 GPD for a total of 2,600 GPD***

The Committee's previous work in 2010 identified the need to include an increase in the sewer main infiltration allowance. This report recommends the use of a low pressure sewer collection system which eliminates the need to account for future infiltration along the expanded portions of the collection system.

*The Committee accordingly recommends that a total of 3,725 GPD be allocated for future municipal uses, plus the existing 237 GPD infiltration allowance**, for a total of 3,962 GPD**. This value represents a minimum reserve allocation, and new municipal uses should be considered along with other possible future uses.*

Recommended future reserve capacity for municipal uses:

User	**Existing**	**Future Increase**	**Total**
TO, L and F&R*	865 GPD	260 GPD	1,125 GPD
Senior Center	2,000	600	2,600
Infiltration	237	0	237
Total			**3,962GPD**

* TO, L and F&R = town offices, library, and fire and rescue

4. Policy on the allocation of unreserved excess wastewater disposal capacity

As noted above, the Committee recommends that the proposed sewer allocation ordinance include two separate service districts:

- **The Primary District** follows the existing Commercial Zoning District;
- **The Secondary District** is located within the current Village Residential Zoning District.

Previous work by the Committee indicated that a wastewater allocation ordinance should include priorities for the distribution of the available excess wastewater disposal capacity controlled by the Town. As it relates to the Primary District, there is only a moderate amount of capacity that would be available for the public. Coupled with the fact that there are no funds available to enable the expansion of the system to its upper limits, the Committee recommends that the potential prioritization of users be put on hold until the Burns Primary system is expanded beyond the 6,499 GPD threshold. This will enable a broader group of properties and land uses to take advantage of the opportunity to tie into the municipal system while creating seed money for the future expansion of the wastewater disposal system.

Since the available unallocated wastewater disposal capacity within the Burns site or at the satellite wastewater disposal sites is finite, it is recommended that the allocation of these resources by the Town only be made to those properties that do not have the means of addressing their wastewater disposal needs.

General Eligibility

In order to be eligible for a wastewater allocation, applicants must demonstrate that there are no feasible on-site wastewater disposal solutions that are less expensive than the connection fee in place at the time of application.

This process shall be supported by a wastewater report prepared by a professional engineer or site technician licensed by the State of Vermont that summarizes the existing conditions, proposes on-site options and which breaks down the estimated costs.

The analysis would include a review of all properties controlled by the applicant within 500 feet of the proposed land use location.

Eligibility in the Primary Service Area

All Permitted or Conditional Use land uses located within the Village Commercial Zoning District are eligible. All Phase I flows are to be directed to the Burns property Primary wastewater disposal system. Phase II development may utilize the estimated 2,260 GPD disposal capacity for the Flea Market Site. Failed residential systems are not eligible in this district.

Eligibility in the Secondary Service Area

Land uses eligible to utilize the wastewater disposal capacity in the satellite wastewater disposal facilities are limited to:

(a) Failed wastewater disposal systems;
(b) Home occupations;
(c) Conversion of single family homes to duplex structures;
(d) Additions to single family homes for an apartment.

Review Process:

- The Selectboard shall review the application for compliance with allocation standards and the available unreserved excess capacity. The Selectboard has 30 days to review and act on a complete application. If the application satisfies the allocation standards, the Selectboard shall recommend approval of the application. If the application is found to be deficient, the applicant shall be notified by US mail within 15 days of the decision with an explanation of why the application was denied..

- The wastewater allocation issued by the Selectboard is valid for one year. The new service shall be placed in operation within one year of Selectboard authorization or the allocation shall be forfeited. The applicant may make a new application to the Selectboard without prejudice if the allocation is forfeited.

- If the applicant requires an extension, the applicant shall make a request to the Selectboard prior to the expiration date. The applicant shall pay 10% of the current connection fee to secure an extension of the wastewater allocation for one additional year. If the service connection is not placed into service within he extension period, the allocation and the partial connection fee payment shall be forfeited.

5. Policy on metering, operating, and maintaining expectations for the wastewater facilities

Meter Existing Flows

The design flows assigned to each use by the State Environmental Protection Rules incorporate a safety factor to protect against system overloads. The state allows for systems to propose alternate wastewater design flows provided that adequate information is available on the actual flows to the wastewater disposal system. This sometimes can result in documentation that the actual flows are less than the design flows, especially when multiple users are tied into one "community" facility.

In order to maximize the number of users that can be tied into the system, the committee recommends that the amount of sewage collected and sent to the disposal field be metered. This can take the form of one master meter at the pump station (this will also account for any infiltration) or by metering the water use at each individual connection. For this alternative to be fully functional, existing and new users would need to have water meters installed. This alternative would not recognize any potential reduction in the estimated infiltration that may be experienced by the collection system. A multi-meter system would require that daily readings be collected at each structure. The master meter approach would enable the use of an automatic flow recorder to record daily flows.

Due to the cost of installing a master meter on the flow out of the pump station ($12,000), it is recommended that the existing buildings be retrofitted with individual meters on the water supply service inside each building. The installation of individual meters will be required anyways to enable the reading of actual usage in support of the quarterly billing, cycle. The daily reading of each meter can be handled administratively by existing staff who open the buildings each day.

New Connections:

When new users have gained permission to connect to the existing system, they will be asked to make payment to the Selectboard in accordance with the current connection fee schedule. The recommended means to finance an expansion of the system is to use connection fees to incrementally extend the system.

Pay for Expansion: If the new connection requires the extension of the master-planned collection system, then each new user will contract for, obtain the necessary permits for, and construct the required extension.

If the cost of this extension is less than the connection fee, the new user will pay the difference into the utility operating fund.

If the cost is greater than the connection fee, the new user will pay the entire cost up front and will be reimbursed the difference by the utility operating fund. If the utility operating fund has adequate funding, this reimbursement will occur upon completion of construction. If the utility operating fund does not have adequate funds, new users will be reimbursed when enough future connection fees from other new users are collected.

The **advantages** of this approach include:

- System expansion is undertaken on an as-needed basis.
- Quality control costs are paid for by new users.
- No municipal bonding is required.

The **disadvantages** to this approach include:

- Construction disruptions in the village area could periodically extend for many years.
- Quality control is not under direct control of the Town.
- First-in users connecting to the system may have to pay more initially with no guarantee on when they will be repaid.
- No well-orchestrated public design and construction process would be in place.

Quality Control: New users, at their own cost, shall retain a professional engineer, licensed in the State of Vermont, to periodically inspect and conduct testing of the improvements to certify the following:

> *In the exercise of my reasonable professional judgement, the installation-related information submitted is true and correct and the wastewater system was installed in accordance with the permitted design and all of the permit conditions, were inspected, were properly tested, and have successfully met those performance tests.*

6. Connection Fee Policy

The expansion of the municipal wastewater disposal system to accommodate more than a moderate number of users has generally two cost components:

1. The cost of expanding the system;
2. The cost of the supporting collection system.

Expansion of the Disposal System:

A. The cost for sharing the existing unallocated capacity is limited primarily to the original construction costs with an adjustment for inflation. The WW report's recommended unallocated capacity to be made available to the public is 1,037 (4,999 – 3,962) GPD.

B. The cost to expand the system from the current 4,999 GPD to 6,499 GPD is rather small as this would simply require the processing of a wastewater disposal system amendment application. This would increase the unallocated reserve non-municipal capacity to 2,517 (6,499 – 3,962) GPD.

C. The cost to expand the existing system to any value greater than 6,500 GPD triggers the need for a State Indirect discharge Permit. This process is fairly conservative in nature and requires more disposal field area per applied gallon than the current Small Scale wastewater disposal system rules that governs the existing system.

There is additional suitable area adjacent to the existing Burns property wastewater disposal system for expansion of the disposal capacity.

It should be noted that this wastewater disposal site is challenged due to the limited amount of dilution caused by the small size of the receiving stream and its contributing watershed. Alternate methods to demonstrate compliance with the State water quality standards will require a large investment in consultant services with a chance that they will not be successful.

Based upon the most conservative siting standard set forth in the State Indirect Discharge (large scale system) rules, the estimated maximum capacity of the system is 15,000 GPD which would yield an unallocated reserve non-municipal capacity to 10,088 GPD.

D. The Town also has easements for potential wastewater disposal systems located at:

a. The Old Lantern
b. Lavalette Property off of Greenbush Road.

Both of these areas could be used to either expand the capacity of the Burns property wastewater disposal field or they could be used to address localized needs but would require supporting design, permitting and construction at a cost greater than the $60 per GPD base fee recommended for the use of the Burns Property wastewater disposal system.

Collection System: The recommended options for collecting wastewater from private properties within the existing core service area includes:

A hybrid of the two types of systems in which:

- The existing gravity based system is retained which uses 6" to 8" diameter pipes to convey flows from high points to the pump station at the system low point; and
- All future expansions of the collection system which will utilize a low pressure collection system with individual private pump stations to move the wastewater from the private property to a common force main which discharges to the gravity collection system

A. Gravity Collection System

The existing system operates by gravity through a series of service lines and a sewer main located on Ferry Road. Flows at the low point in the collection system are sent to an existing pump station which conveys the wastewater through a 2" force main to the Burns property wastewater disposal field.

B. Low Pressure Collection System

This type of system typically has lower first time costs for the conveyance force main as it can be adjusted to follow the contour of the land and can be readily expanded beyond the traditional limitations of a gravity collection system. The drawback of this type of system is that it requires that each property install pump station to move wastewater from the private property into the common conveyance force main. For retrofit systems

where the existing property's wastewater system flows by gravity from the house to the private disposal system, this represents an additional construction cost.
The cost of this system is highly dependent on the areal extent of the collection system.

Discussion
The proposed expansion of the systems will have costs that include the installation of new pump station to convey the wastewater from the individual properties into the existing collection system. They also will require the use of directional boring technology as a means of minimizing impacts on the existing roadway pavement systems and remaining areas within the existing rights-of-way.

Utilizing an estimate of four new service connections within the Phase I service area, an estimate of the probable construction cost of $106,800 was developed. Based upon the remaining 2.537 (6,499 – 3,962) gallons per day of remaining capacity of the system, the per gallon per day cost allocation is $42.10 per gallon of design flow.

Recommendation:
In order to provide an equitable distribution of the costs to expand the system, which are to be paid by the proposed users, and not the Town, an estimate of the costs to complete the low pressure collection system expansion has been undertaken it is recommended that the connection fee include a system expansion cost component of:

$106,800 / 2,537 GPD = $42.10 per GPD of Design Flow.

Existing System Cost Recovery

The Town of Charlotte invested approximately $140,400 in the original wastewater disposal system for the four municipal buildings.

Policy question:

How much of the original system construction costs should be recovered by the future users of this system? The existing system has an easily permitted disposal capacity of 6,499 gallons per day.

A high end recovery would require that each gallon of new discharge be charged $21.60 ($140,400/6,499) per gallon. From this high end, the scale can slide all the way down to zero depending on how much of the system development costs will be charged off in the interest of providing the necessary infrastructure to support the goals of the Town Plan.

Discussion:

The costs of constructing the wastewater collection and disposal system should be recovered in whole or in part. The Town Plan calls for growth to be focused in the village areas (while preserving our surrounding open space areas), and wastewater disposal capacity is a critical component. In addition, the general sentiment of the town's citizens and boards is that they would like to see a more vibrant commercial component in the village.

The general response to the Town Meeting questionnaire indicated that all of the original system costs should be recovered from future users and that a subsidy through non-collection of a portion of these costs should not be implemented.

Recommendation:

Based on the input from citizen respondents, the committee recommends that all of the original system development costs be recovered on a prorated basis. This equates into connection fees of $21.60 per gallon of design flow.

Inflation Adjustment

The original system was installed in 2001. The Consumer Price Index inflation factor from 2001 to 2016 is 1.378, meaning that $1 of goods purchased in 2001 would cost $1.38 today.

Policy question:

On the high end, this will add $8.17 ($21.60 x $0.378) per gallon of capacity used.

Discussion:

Should the time use of money should be recovered as part of the connection fee?

If the system were constructed today, the costs would be higher than they were in 2001 and system users would pay accordingly.

Recommendation:

The full CPI should be integrated into the price adjustment for the cost for the system.

1.378 x $21.60 = $29.78 per gallon

Depreciation

Another factor to be consideration is that the existing system is not brand new. The system is now fifteen years old and its value has depreciated to some degree.

Policy question:

The policy question is whether a connection fee should be adjusted down to reflect the age of the system. Assuming a 30-year design life for the system and straight line depreciation, the high end connection fee would be reduced $10.80 per gallon ($21.60 x 15/30).

Discussion:

New users will buy into a system with a reduced design life. On the one hand, there is a mechanical component, the pump station, which has shown signs of age, and the pumps were recently upgraded at a cost of $10,000. On the other hand, the town has a wastewater disposal field that has been well underutilized. A full depreciation of this system component would be overly conservative. In this case, half of the expanded capacity has been used within a system where the nine-year use period represents approximately one-third of its 30-year design life. The gravity sewer main and force main components typically have design lives of 50-75 years.

Recommendation:

The primary increased exposure a new user will have by connecting to the system would typically be the condition of the wastewater pump station, except that it was recently refurbished. Accordingly, the committee recommends a full 15/30 depreciation for this structure, while 1/10 depreciation is recommended for the pump station. The disposal field should be depreciated half of the 15-year use period due to the limited use it has received to date. The remaining system costs should be depreciated over a 60 year period. This yield the following:

Pumps	*1/10 x $10,000 =*	*$1,000*
Pump Station	*15/30 x $20,000 =*	*$10.000*
Disposal Field	*50% x 15/30 x $25,000 =*	*$ 6,250*
Remaining	*15/60 x $70,000 =*	*$17,500*
		$34,750

$34,750 x 1.38 inflation factor / 6,499 gal = $7.37/gal credit

Easement Fee

The existing system utilizes approximately 1.26 acres of the Burns property. The underground force main that crosses the property uses 0.42 acres (920‘ x 20’), and the primary and replacement wastewater disposal fields use 0.84 acres (175’ x 210’).

Policy question:

Should a fee should be charged for the use of the Burns property?

The value of agricultural lands has been set by the Vermont Department of Agriculture at approximately $2,500 per acre in Chittenden County. It is also known that that lands containing wastewater disposal potential are valued more highly than “open space” lands.

The recommended expansion of the wastewater disposal system to 6,499 GPD will not require any additional area when the current replacement area standards are applied.

Using the $2,500 per acre value, the high end allocation of costs would be $0.97 per gallon
(1.26 acres x $2,500/acre /6,499 gpd).

Discussion:

The wastewater disposal field reduces the agricultural potential of the Burns property due to its shallow bury depth (tilling issues). Both the disposal field and the force main are underground. This creates no visual impact on the open space value of the property. Provided that the future needs of the municipality are addressed (a separate planning issue), the impacts are marginal.

The value of the wastewater disposal capacity lands can be of great debate. Without the benefit of professional assistance on this matter, we have assigned a value of four times that of the agricultural open space value or $10,000 (4 x $2,500) per acre.

Recommendation:

The committee recommends no use fee for the force main component, as it has negligible impact on the open space enjoyment of the property. Regarding the disposal field area, the full 0.84 acres should be assigned an easement fee of:

0.84 acres x $10,000/acre = $8,400/6,499 gal = $1.29/gal

Based on the above estimates, the connection and annual operating fees should be set as follows:

Existing System Cost Recovery	$21.60
Inflation Adjustment	$8.17

Depreciation	($7.37)
Easement Fee	$1.29
System Expansion Costs	$42.10
Connection Fee Total	**$65.79 per gallon**

Example: *15 seat restaurant x 30 gpd /seat x $65.79 = $29,606*
Example: *3 bedroom home x 140 gpd /bedroom x $65.79 = $27,632*

7. Budget for the Wastewater System

Sinking Fund

Wastewater systems require periodic maintenance. This involves repairs to the mechanical components of the pump station, corrective measures that may be required for the distribution system at the disposal field, and eventual construction of the replacement disposal field when the existing field no longer functions.

The State of Vermont requires that municipal wastewater treatment facilities begin planning for expansion and continued growth of their service districts when the existing use reaches 80% of the design capacity. The planning costs associated with design and permitting of a system expansion should be included in the sinking fund. In this case, the next step would be to expand the disposal capacity of the existing town wastewater disposal system from the current 4,999 gallons per day to 6,499 GPD. The costs for this work are limited to just the application fee for the amendment to the State wastewater disposal permit, as the Committee has already prepared the technical submittal materials.

As it relates to the operation and maintenance of the existing system components, the estimated long-term costs to be included in the Sinking Fund:

- $3,000 Pump Station Electrical Replacement every 10 years
- $8,000 Pump and Slide Rail Replacement every 12 years
- $30,000 Disposal Field Replacement/Renovation every 30 years
- $5,000 Planning Costs for System Expansion
- $20,000 System expansion for capacity replacement

Recurring short-term costs would include:

- $1,000 Annual inspection and cleaning of the pump station.
- $1,200 Annual inspection of the septic tanks, collection system and wastewater disposal field.
- $1,000 Average annual cost of pumping of system users septic.
- $10 Annual electrical cost for operating the pump station.

***Policy question*:**

Should these costs be collected as part of the initial connection fee or should they should be integrated into an annual users fee?

***Policy question*:**

Who should pay for the cost of pumping the septic tanks? At Thompson's Point, pumping is done on an as-needed basis and is coordinated and paid for by the utility, which then distributes these maintenance costs to all of the system users.

Discussion:

The Committee recommends that the Thompson's Point model be utilized as it relates to the maximizing and pumping of the septic tanks on an as needed basis as this smooths out the annual operating costs for all users and allows for easier annual budgeting.

Another issue is whether increased cash flow in the form of a lump-sum payment as part of the connection fee would be beneficial for the operators of the system, or whether the combination of a reduced connection fee and increased operating costs (to cover the sinking fund) is more beneficial to achieving some of the overarching goals in the village.

The recurring short-term costs of approximately $3,200 per year—or $0.64 ($3,200/6,499 gal) per gallon, which translates into $269 per year ($0.64 X 420 gal) per equivalent unit—should be part of an annual user fee.

The total long-term maintenance and planning costs over a 30-year design life, translated into a one-time connection fee, would be approximately:

Pump Station Electrical	$3,000/10 years x 30 years	=	$9,000
Pumps & Railing	$8,000/12 years x 30 years	=	$20,000
Disposal Field Expansion	$20,000/30 years	=	$667
Disposal Field Renovation	$30,000/30 years x 30 years	=	$30,000
Planning Costs	$5,000/10 years x 30 years	=	$15,000
			$74,667

$74,667/ 6,499 gal

Total **$11.49/gal**

Under the lump-sum payment approach, an equivalent unit would be assessed an additional $4,826 (420 gal x $11.49/gal) at the time of connection to the system.

If these costs are paid as part of an annual assessment, then the annual fee for all users would be roughly $2,485 per year ($74,557/30 years) or $0.38 per gallon ($2,485/6,499 GPD).

The short-term maintenance and planning costs of approximately $3,200 ($96,000/30 years) per year, when paid on an annual basis, are in the same ball park as the short-term costs. These costs would be $0.49 ($3,200/6,499 gal) per gallon, which translates into $206 ($0.49 X 420 gal) per year per equivalent unit.

Recommendation:

In order to provide flexibility to adjust for changes in on-going operating costs, the committee recommends that the sinking fund fees be collected as part of the annual use assessment at the initial rate of $0.87/gal ($0.49 short term maintenance costs + $0.38 long-term maintenance costs), which is to be set annually by the Selectboard.

Annual Operating Fee **$0.87 per gallon**

***Example**: 15 seat restaurant x 30 gpd/ seat x $0.87 = $391.50*

***Example**: 3 bedroom home x 140 / bedroom x $0.87= $365.40*

Proposed Municipal Ordinances (Attachments IV(a) and IV(b))

a. **Attachment IV(a)** : Sewer Allocation Ordinance (Allocation of unreserved excess wastewater disposal capacity)

b. **Attachment IV(b**): Sewer Use Ordinance (Operation and maintenance of the wastewater system)

January 3, 2016

Ms. Jeanine McCrumb, 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 Ms. McCrumb:

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)

- ☒ Water Supply Designer
- ☒ 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.

		Design Flows (Gallons Per Day)		
	(a) Water Supply Name/Identifier	(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
		2	3	4
		2,865	0	2,865

Add Another Water Supply

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

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.

☒ Water Supply Designer

☒ Wastewater Disposal System Designer

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

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		

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_____
>
> 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 _____

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)

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,

Name of Applicant: **Town of Charlotte**

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

Phone Number: **802-425-3533**

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

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		GPM	TDH
Increment	10	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

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.

Overall Site Capacity – 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

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

ATTACHMENT

page

Heindel and Noyes
P.O. Box 64709 Burlington, Vermont 05406-4709
• Consulting Hydrogeologists
• Engineers
• Environmental Scientists
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).

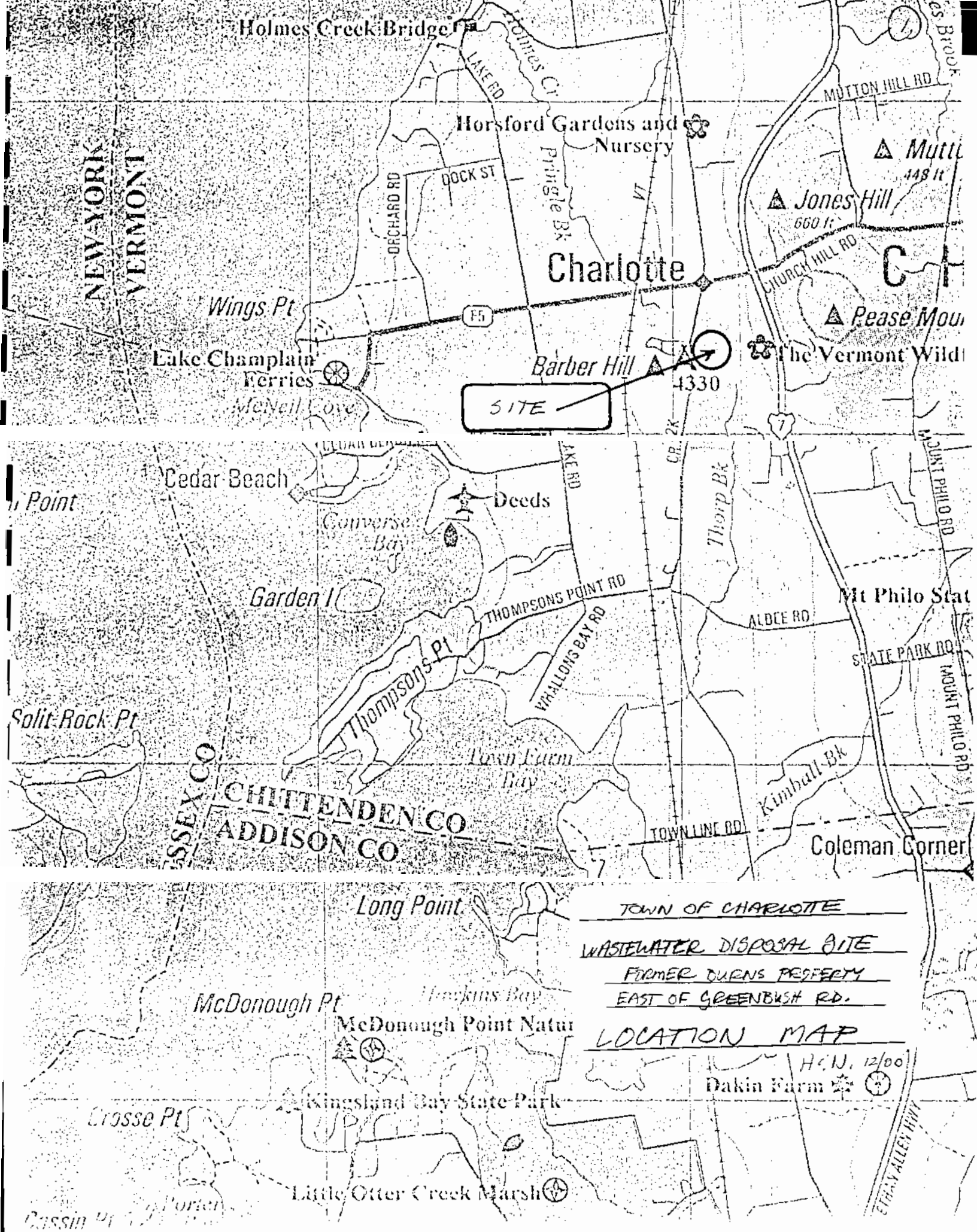
Water Table Separation: 3.0 ft. In accordance with the 1996 *Small Scale Wastewater Treatment and Disposal Rules*, wastewater disposal systems must be sited to provide for at least 3.0 feet of unsaturated soil between the bottom of the disposal trenches and the induced groundwater mound. In this case, 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*.

ATTACHMENT

ATTACHMENT



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 Disposa 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		
				onal High er Table		Impeding Material		Ground Water			
		Monit., Stats. Anal.	M	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

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 Monit., Stats. Anal.	Mo S	Depths Below Ground Surface To: nal High Table les or ning	Depth, ft.	Impeding Material Type	Depth, ft.	Ground Water Depth, ft.	Elev. ft.	Limiting Condition 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 Capacil "; Charlotte Commons") and Febr uary 1990 WH&N report ("Wastewater Disposal System, Hydrogeologic Evaluation; Charlc 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: COMWA

DATE	TIME	ETIME	WATERLEVEL	DRAWDOWN
10-18-89	10:31:00AM	21.00	3.28	3.28
	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
	5:22:00	3312.00	-.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

LOCATION:CHARLOTTE WELL B

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;
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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.

Heindel and Noyes;
Oct. 18, 2000;
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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.

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;
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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.

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** 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 # 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.

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** 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.

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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

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+)	10.54	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.

CHARLOTTE COMMONS PROJECT

CHARLOTTE, VERMONT

WASTEWATER DISPOSAL SYSTEM HYDROGEOLOGIC EVALUATION

VOLUME I

FEBRUARY 1990

WAGNER, HEINDEL, AND NOYES, INC.

CONSULTING HYDROGEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

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

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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	105.08	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
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

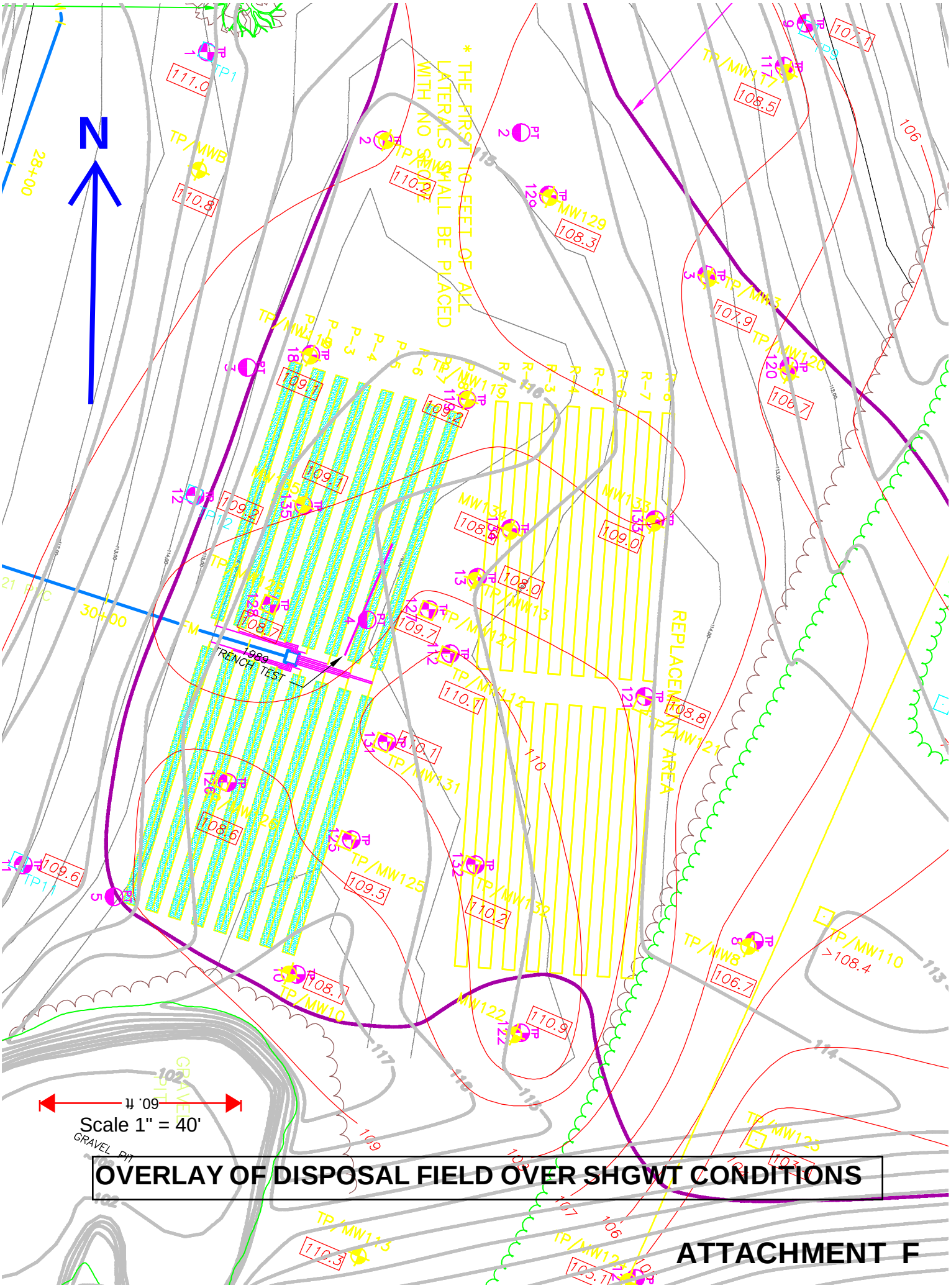
6,499	Design Flow (GPD)	
180.0	Total width of Trenches (LF)	
36.1	Application in Gaa/Day/LF	

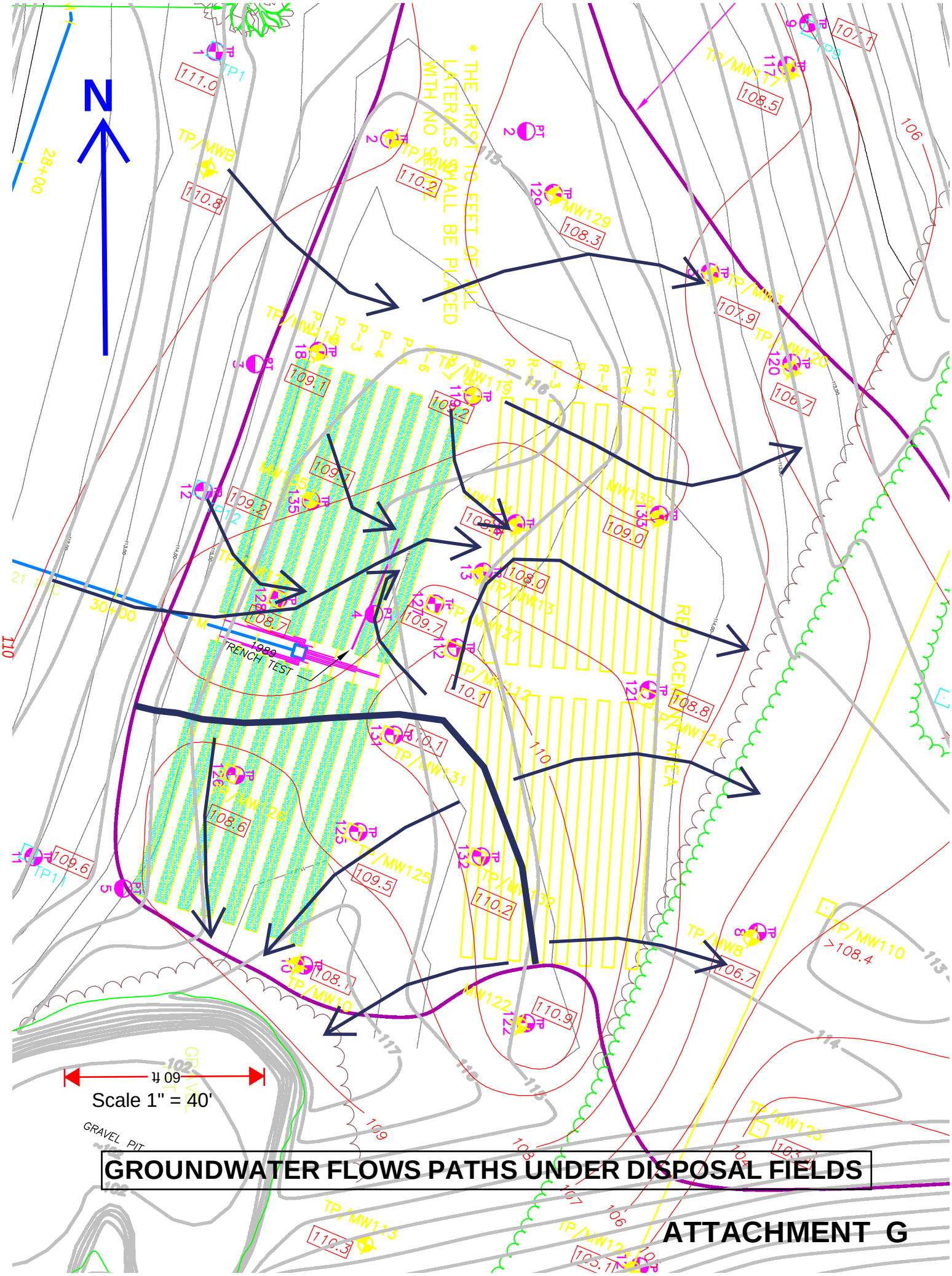
Solve for: h = height of induced groundwater mound (IGWM)
h = 1.15 Ft

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	109.00	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

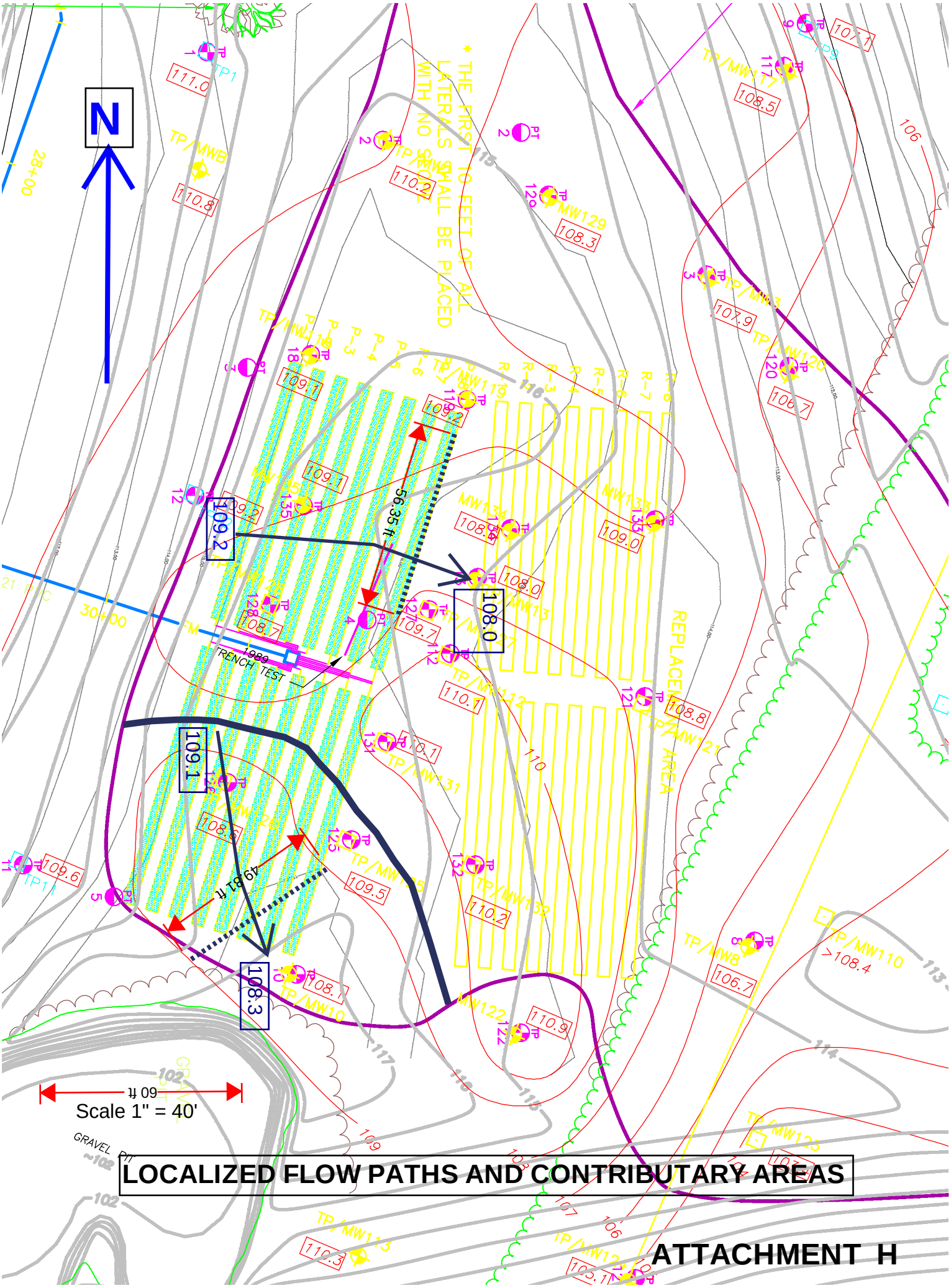
Attachment E


N
* THE FIRST 10 FEET OF ALL LATERALS SHALL BE PLACED WITH NO SLOPE
1989 TRENCH TEST
REPLACEMENT AREA
Scale 1" = 40'
GRAVEL PIT
OVERLAY OF DISPOSAL FIELD OVER SHGWT CONDITIONS
ATTACHMENT F



GROUNDWATER FLOWS PATHS UNDER DISPOSAL FIELDS

ATTACHMENT G


N
Scale 1" = 40'
LOCALIZED FLOW PATHS AND CONTRIBUTARY AREAS
ATTACHMENT H
* THE FIRST 10 FEET OF ALL LATERALS SHALL BE PLACED WITH NO SLOPE
REPLACEMENT AREA
1989 TRENCH TEST
56.35 ft
29.81 ft
109.2
108.0
109.1
108.3
28+00
30+00
TP/MW1
TP/MW2
TP/MW3
TP/MW4
TP/MW5
TP/MW6
TP/MW7
TP/MW8
TP/MW9
TP/MW10
TP/MW11
TP/MW12
TP/MW13
TP/MW110
TP/MW111
TP/MW112
TP/MW113
TP/MW114
TP/MW115
TP/MW116
TP/MW117
TP/MW118
TP/MW119
TP/MW120
TP/MW121
TP/MW122
TP/MW123
TP/MW125
TP/MW126
TP/MW127
TP/MW128
TP/MW129
TP/MW131
TP/MW132
TP/MW133
TP/MW134
TP/MW135
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
TP11
TP12
R-1
R-2
R-3
R-4
R-5
R-6
R-7
R-8
GRAVEL PIT

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	4062	Design Flow (GPD)
i	0.017	ft/ft	Hydraulic Gradient (Slope of Limiting Conditions)	56.4	Total width of Flow Path
A	1	Ft	Calculate using Linear Loading Rate	72.0	Application Rate in Gal/LF
Des Q	72.0	gpd/lf	Design Flow - One 8' wide bed at 1 GPD/SF		

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

h = 3.54 Ft

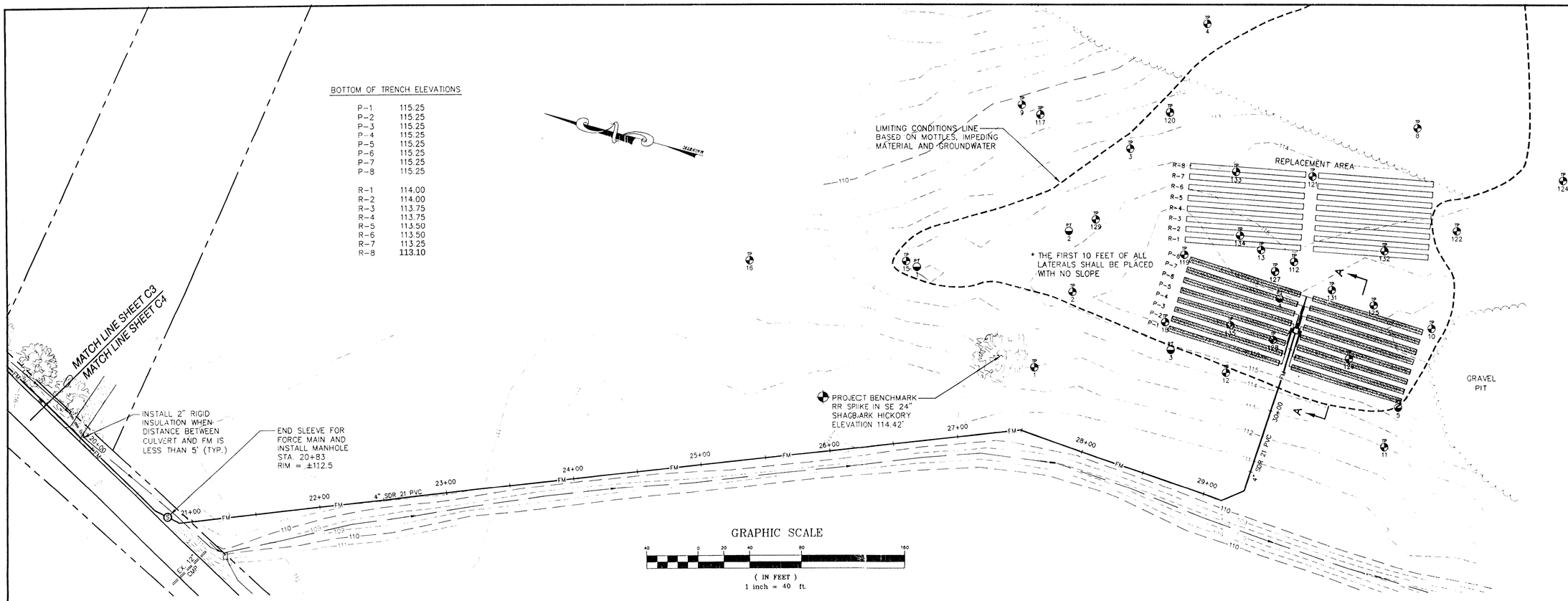
Trench 1 Calculate Trench Bottom Elevations to Provide 3.0 feet of Unsaturated Thickness Below Trench Bottoms.

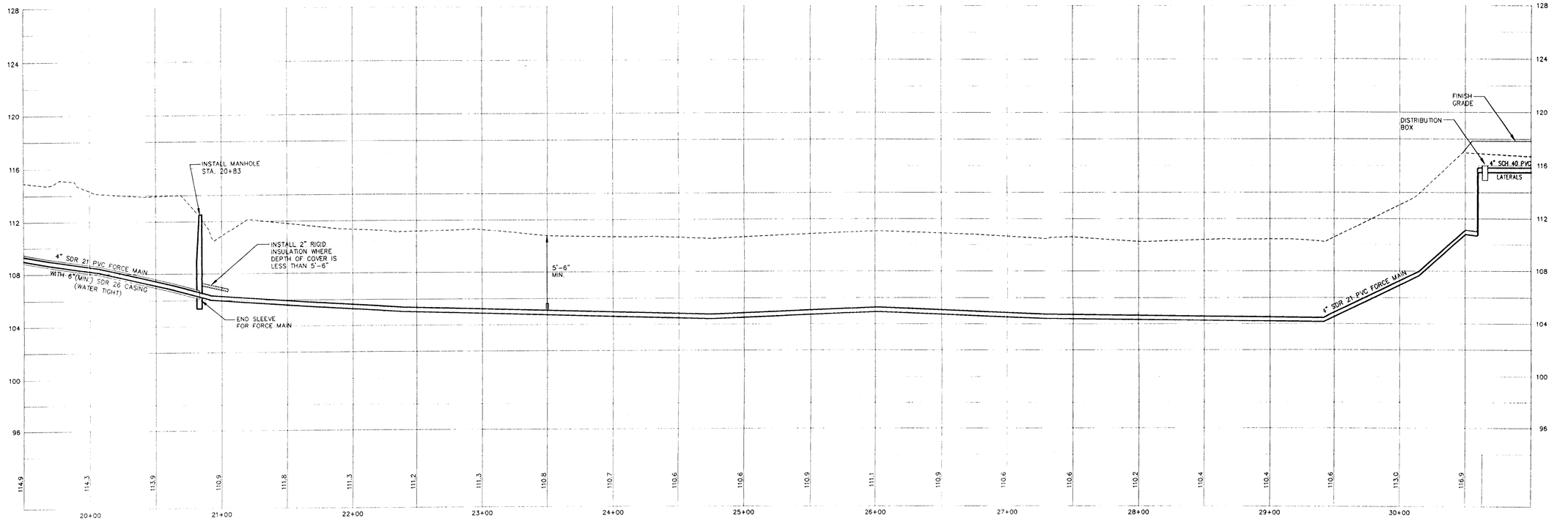
Trench No.	Gallons per Day Q/ft	Highest Lim. Cond. Elev. Ft	Add Induced GW Mound, Ft.	Elev. SHGWT Plus IGWM, Ft.	Trench Bottom Elev. Calcs.			Unsat. Thickness Below Trench including Induced Mound, Ft.	Comment
					Inv. Elev.	Below Inv.	Bottom Elev.		
West Edge	0	109.10	0.00	109.1	116.25	1	115.25	6.15	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

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. SAVAGE 13226 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

"APPROVED"
Department
of
Environmental Conservation
Approved By: SAV
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

WW-4-1485

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/√T = 3/√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. JR. SAV 05226 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

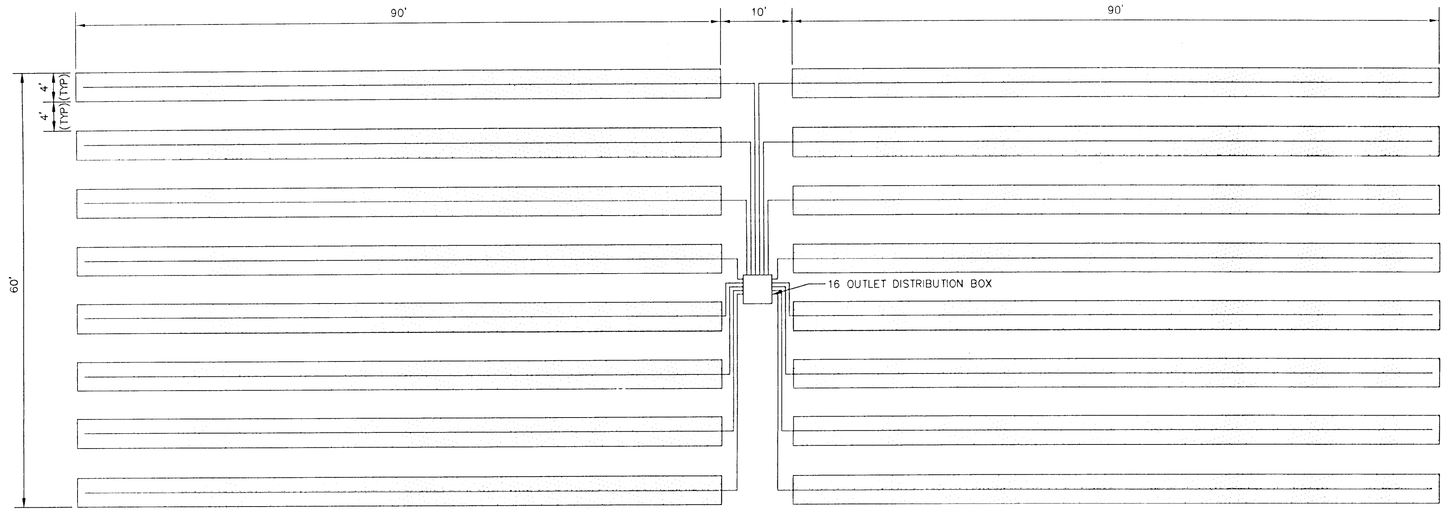
0 1 2 3 INCHES

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

DATE	CHECKED	REVISION

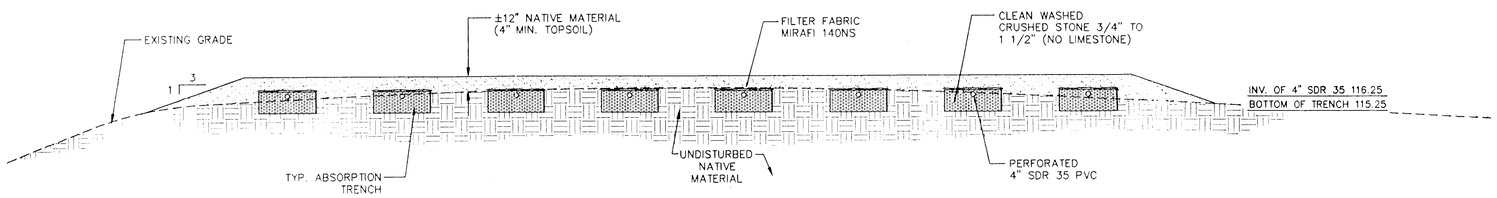
TEST PIT AND PERC TEST LOGS, DESIGN DATA

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



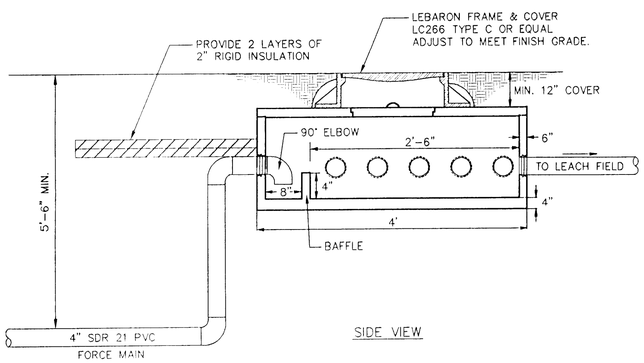
TRENCH PLAN

1" = 10'

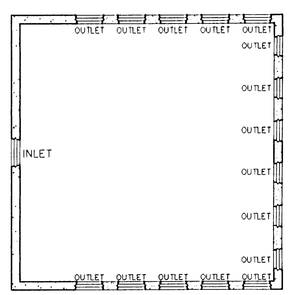


TYPICAL TRENCH SECTION A–A

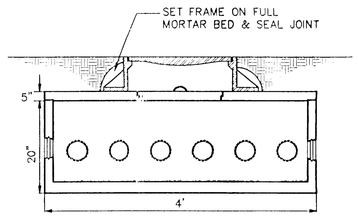
1" = 5'



SIDE VIEW



TOP VIEW



FRONT VIEW

4" LOW PRESSURE SEAL
TYPICAL AT ALL OPENINGS

16 OUTLET DISTRIBUTION BOX

NTS

DISPOSAL FIELD CONSTRUCTION SPECIFICATIONS

MATERIALS

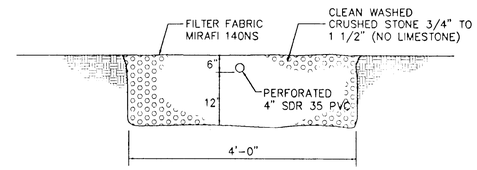
1. Perforated SDR 35 OVC pipe meeting the requirements of the latest revision of ASTM shall be used. Fittings used in the disposal fields shall be compatible with distribution lines material.
2. Crushed stone shall be clean, durable and no smaller than 3/4" or larger than 1 1/2" in diameter.

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: cea@together.net

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CLIENT:

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CHARLOTTE, VT
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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

Town of Charlotte

Phase I Collection System Expansion

Estimate of Probable Construction Cost

June 18, 2016

Item	Qty	Unit		Unit Price		Cost
1000 Gallon Septic Tank	4	EA	x	$ 2,500	=	$ 10,000
Simplex Pump Station	4	EA	x	$ 4,200	=	$ 16,800
2" Force Main - Open Cut	250	LF	x	$ 30	=	$ 7,500
Direction Bore Pits	8	EA	x	$ 800	=	$ 6,400
Direct. Bore Mob & Demob.	3	EA	x	$ 1,500	=	$ 4,500
2" Directional Bore	1450	LF	x	$ 20	=	$ 29,000
Connection to Existing SMH	2	EA	x	$ 1,500	=	$ 3,000
Incremental Serv. Connection	3	EA	x	$ 1,600	=	$ 4,800
Directional Bore Site Repair	2700	SF	x	$ 4	=	$ 10,800
				Subtotal		*$ 92,800*
		6499	-	3962	=	*$ 2,537*
Estimated cost per gallon for system expansion					**=**	***$ 36.58***