DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH

ROY COOPER
GOVERNOR

MANDY COHEN, MD, MPH
SECRETARY

DANIEL STALEY
DIRECTOR

COMMON FORM FOR ENGINEERED OPTION PERMIT

See Instructions for Use in Appendix A

Except for "Date received", this Section to be completed by the Professional Engineer licensed in accordance with G.S. 89C

LHD USE ONLY: Initial submittal of this NOI received: 07/17/18 (Date) by RHS (Initials)

PART 1: Notice of Intent to Construct (NOI)

☒ New ☐ Expansion

☐ Repair – LHD Permit Number _____ ☐ Repair – EOP Permit Number _____

1. Facility Owner's name: (Owner, Company Name, Utility, Partnership, Individual, etc.): John Nicol - Owner

Mailing address: 552 Stonemaker Road City: Mooresville State: NC. Zip: 28117

Telephone number: 980-505-0464 E-mail Address: johnjennicol@icloud.com

2. Professional Engineer (PE) name: Michael Lash, PE. License number: NC.#14265

Mailing address: 1104 Cindy Carr Drive City: Matthews State: NC. Zip: 28105

Telephone number: 704-847-3031 E-mail Address: mikel@lashengineering.com

3. Licensed Soil Scientist (LSS) name: Larry Thompson - Thompson Environmental License number: #1287

Mailing address: P.O. Box 541 City: Midland State: NC. Zip: 28107

Telephone number: 704-301-4881 E-mail Address: larry@thompsonenv.com

4. Licensed Geologist (LG) (if applicable) name: N/A License Number: _____

Mailing address: _____ City: _____ State: _____ Zip: _____

Telephone number: _____ E-mail Address: _____

5. On-site Wastewater Contractor name: 1st Choice Septic & Env Services License number: #1879i

Mailing address: 3661 Eaker Road City: Cherryville State: NC. Zip: 28021

Telephone number: 704-447-5500 E-mail Address: info@1stchoiceservicenc.com

6. Proof of Errors and Omissions or other appropriate liability insurance for the following persons is attached that includes the name of the insurer, name of the insured and the effective dates of coverage:

☒ PE ☒ LSS ☐ LG ☒ On-site Wastewater Contractor

7. Property location (physical address, tax parcel identification number or subdivision lot, block number of the property to be permitted): 552 Stonemarker Road, Mooresville, NC.

   County Name: Iredell

8. Type of facility: [X] Place of residence No. Bedrooms: 4 No. Occupants: 4

   [ ] Place of business Basis for flow calculation: _____

   [ ] Place of public assembly Basis for flow calculation: _____

9. Factors that would affect the wastewater load: Standard Residential Wastewater

10. Type, location, and classification (per Rule .1961) of wastewater system: Norweco, TSI treatment with Drip Tubing Treatment Systems are located to rear right side of house, Disposal Area is in front yard to the right (north)

11. Design wastewater flow: 480 gpd *(For flow > 3,000 gpd and industrial process, duplicate plans shall be sent to the State.)*

    Design wastewater strength: [X] domestic [ ] high strength [ ] industrial process

12. A plat as defined in G.S. 130A 334(7a) is attached: [X] Yes [ ] No

13. Owner meets requirements of ownership or control of the system per 15A NCAC 18A .1938(j): [X] Yes [ ] No

14. Easement, right of way or encroachment agreement required per 15A NCAC 18A .1938(j): [ ] Yes [X] No

    If yes, documentation filed in _____ County Register of Deeds in Deed book _____ Page _____

15. Multi-party agreements required, as applicable, pursuant to 15A NCAC 18A .1937(h): [ ] Yes [X] No

    If yes, agreements filed in _____ County Register of Deeds in Deed book _____ Page _____

16. Location of proposed or existing wells (drinking water, irrigation, geothermal, groundwater monitoring, sampling, etc.) and any potable and non-potable water conveyance lines is indicated on attached plans and complies with 15A NCAC 18A .1950: [X] Yes [ ] No

    This is a saprolite system. [ ] Yes [X] No

17. Evaluation(s) of soil conditions and site features in accordance with G.S. 130A-335(a1) signed and sealed by a LSS is attached: [X] Yes [ ] No

18. Evaluation of geologic and hydrogeologic conditions signed and sealed by a LG is attached [ ] Yes [X] NA

19. Proposed landscape, site, drainage, or soil modifications are attached: [X] Yes [ ] NA

Attestation by Professional Engineer licensed in North Carolina pursuant to G.S. 89C

I, Michael Lash, PE. hereby attest that the information required to be included with
Registered Professional Engineer (Print Name)
this Notice of Intent to Construct is accurate and complete to the best of my knowledge and that the proposed system shall meet applicable federal, State, and local laws, regulations, rules and ordinances in accordance with G.S. 130A-336.1(e)(6).

_____ 7/10/2018
Signature of Licensed Professional Engineer *Date*



LHD Reference: 237303

EOP - ATO for Nicol Wastewater

PART 3: Authorization to Operate (ATO)

Except for date received, the Section below is to be completed by the Owner or by the PE designated to act as their legal representative for the EOP.

LHD USE ONLY: Initial submittal of request for ATO received: 1/29/19 (Date) by RHS (Initials)

Date of Post-construction Conference: 2/18/19

The following items are included in this submittal for an Authorization to Operate under an EOP:

1. Signed and sealed copy of the Engineer's report that includes:
   a. Signed and sealed evaluation of soil conditions and site features — [X] Yes [ ] No
   b. Drawings, specifications, plans — [X] Yes [ ] No
   c. Reports on special inspections and final inspection — [X] Yes [ ] No
   d. Management Program manual — [X] Yes [ ] No
   e. On-site Wastewater Contractor's signed statement — [XX] Yes [ ] No
   f. Signed and sealed statement pursuant to 15A NCAC 18A .1938(h) — [X] Yes [ ] No
2. Fee (as applicable) — [X] Yes [ ] No
3. Notarized letter documenting Owner's acceptance of the system from the PE — [X] Yes [ ] No

Attestation by the Owner or the PE for Authorization to Operate

I, Michael Lash, PE. hereby attest that all items indicated above have been provided to the

Print name of Owner or Professional Engineer

Iredell County LHD and the system shall meet applicable federal, State, and local laws, regulations, rules and ordinances in accordance with G.S. 130A-336-.1(e)(6).

NORTH CAROLINA PROFESSIONAL SEAL 14265 ENGINEER MICHAEL W. LASH

Signature of Owner or Professional Engineer — 10/25/2018 *Date*

This section for LHD Use Only.

LHD Review of required information for the ATO

[ ] INCOMPLETE

Based upon review of information submitted by the Owner or PE in the Section above, the following items are missing from the information required for an Authorization to Operate for an EOP: _____.

Copies of this signed form were sent to the design PE and the Owner on _____ (Date) via _____ (Email, FAX, USPS, Hand-delivered).

Print name of authorized Agent of the LHD — *Signature of authorized Agent of the LHD* — *Date*

[✓] COMPLETE

Based upon review of information submitted by the Owner or PE in the Section above, this Authorization to Operate is hereby issued in accordance with G.S. 130A-336.1(m).

A copy of this complete NOI/ATO with tracking information was sent to the State on 02/18/19 (Date) a Email (Email, FAX, USPS, Hand-delivered).

Robert Heath Snow — *Print name of authorized Agent of the LHD*

Signature of authorized Agent of the LHD — 02/18/19 *Date*

ISSUANCE OF CERTIFICATE OF OCCUPANCY: Once the LHD determines completeness based upon the PE submission, the owner may apply to the local permitting agency for permanent electrical service to a residence, place of business or place of public assembly pursuant to G.S. 130A-339.

Re-submittal of NOI with missing items included

This Section is for use by PE to submit items noted as missing during LHD Completeness Review above.
Resubmittals must be accompanied by a cover letter from the PE.

LHD USE ONLY: This NOI resubmittal received: _____ by _____
Date *Initials*

Item # from initial NOI	Resubmittal description

Attestation by Professional Engineer licensed in North Carolina pursuant to G.S. 89C

I, _____ hereby attest that the information re-submitted for this Notice of
Licensed Professional Engineer (Print Name)
Intent to Construct is accurate and complete to the best of my knowledge and that the proposed system shall meet applicable federal, State, and local laws, regulations, rules and ordinances in accordance with G.S. 130A-336-.1(e)(6).

_____ _____
Signature of Licensed Professional Engineer *Date*

The section below is for Local Health Department use after submittal of items noted as missing above.

LHD Follow-up Completeness Review of Notice of Intent to Construct

This follow-up review for completeness of this Notice and Intent was conducted in accordance with G.S. 130A-336.1(c). This NOI is determined to be:

☐ INCOMPLETE
Based upon review of information submitted by the PE in the RESUBMITTAL above, this Notice of Intent remains INCOMPETE because the following items from Part 1 of this form remain missing: _____
_____.

Copies of this signed form were sent to the design PE and the Owner on _____ via _____.
Date *Email, FAX, USPS, Hand-delivered*

_____ _____ _____
Print name of authorized Agent of the LHD *Signature of authorized Agent of the LHD* *Date*

☐ COMPLETE
Based upon review of information submitted by the PE in the RESUBMITTAL above in addition to information provided in Part 1 of this form, this NOI is deemed complete.

Copies of this signed form were sent to the PE and the Owner on _____ via _____.
Date *Email, FAX, USPS, Hand-delivered*

A complete copy of this form with tracking information was sent to the State: _____ via _____.
Date *Email, FAX, USPS, hand-delivered*

_____ _____ _____
Print name of authorized Agent of the LHD *Signature of authorized Agent of the LHD* *Date*

This section for Local Health Department use only.

PART 2: *LHD Completeness Review of the Notice of Intent to Construct*

"(c) Completeness Review for Notice of Intent to Construct. – The local health department shall determine whether a notice of intent to construct, as required pursuant subsection (b) of this section, is complete within 15 business days after the local health department receives the notice of intent to construct. A determination of completeness means that the notice of intent to construct includes all of the required components. If the local health department determines that the notice of intent to construct is incomplete, the department shall notify the owner or the professional engineer of the components needed to complete the notice. The owner or professional engineer may submit additional information to the department to cure the deficiencies in the notice. The local health department shall make a final determination as to whether the notice of intent to construct is complete within 10 business days after the department receives the additional information from the owner or professional engineer. If the department fails to act within any time period set out in this subsection, the owner or professional engineer may treat the failure to act as a determination of completeness."

The review for completeness of this Notice of Intent was conducted in accordance with G.S. 130A-336.1(c). This NOI is determined to be:

☐ INCOMPLETE (If box is checked, Information in this section is required.)

Based upon review of information submitted by the PE in Part 1, the following items are missing: _____

_____

Copies of this form listing missing items were sent to the design PE and the Owner on _____
Date

via _____ with directions to re-submit missing items using Page 5 of this form.
Email, FAX, USPS, hand-delivered

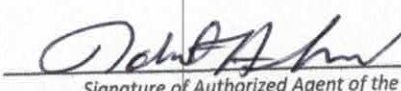
_____ _____ _____
Print Name of Authorized Agent of the LHD *Signature of Authorized Agent of the LHD* *Date*

☑ COMPLETE (If box is checked, information in this section is required.)

Based upon review of information submitted by the PE in Part 1 of this form, this NOI is deemed COMPLETE.

Copies of this signed form were sent to the design PE and the Owner on 7/23/18 via Email.
Date *Email, FAX, USPS, hand-delivered*

A copy of this NOI and tracking information was sent to the State on 7/23/18 via Email.
Date *Email, FAX, USPS, hand-delivered*

Robert Heath Snow  07/23/18
Print Name of Authorized Agent of the LHD *Signature of Authorized Agent of the LHD* *Date*

This section is for Owner use to either designate PE as their legal representative or to self-submit the NOI.

Designation of Registered Professional Engineer as legal representative of Owner for this Notice of Intent:

I, John W Nicol hereby designate Michael Lash, PE.

Print Name of Owner *Print Name of Registered Professional Engineer*

as my legal representative for purposes of this Notice of Intent pursuant to G.S. 130A-336.1.

Signature of Owner 10 July 2018 *Date*

Owner self-submittal of NOI:

I, _____ hereby submit this NOI prepared by _____

Print Name of Owner *Print Name of Licensed PE*

pursuant to G.S. 130A-336.1.

_____ _____

Signature of Owner *Date*

NOTES:

LIABILITY: The Department, the Department's authorized agents or local health departments shall have no liability for wastewater systems designed, constructed and installed pursuant to an Engineered Option Permit. [(NC General Statute 130A-336.1(f)]

RIGHT OF ENTRY: The submittal of this **Notice of Intent to Construct** *grants right of entry to the Local Health Department and the State to the referenced property.*

ISSUANCE OF BUILDING PERMIT: Once the LHD deems that the Notice of Intent to Construct is complete via signature in the section above, the owner may apply to the local permitting agency for a permit for electrical, plumbing, heating, air conditioning or other construction, location or relocation activity under any provision of general or special law pursuant to G.S. 130A-338.

Lash Engineering, Inc.
Civil/Consulting/Wastewater/Planning
1104 Cindy Carr Drive
Matthews, NC 28105
Phone: 704-847-3031
mikel@LashEngineering.com

Lash Engineering, Inc.

October 25, 2018

John Nicol
552 Stonemarker Road
Mooresville, NC. 28117
Iredell County, NC

Final Submittal Letter for Owner to Health Department

The following is a list of documents that are required for submittal to the Health Department from the Owner or their representative (John Nicol).

Owner shall submit to the Health Department:

1. A copy of the Engineer's Report.
2. The notarized letter stating receipt of Engineer's Report & Acceptance of system.
3. There is no fee required for the Certification process.

The address & contact information for the Health Department is below:

Statesville Environmental Health
349 N Center Street
Statesville, NC 28677
Contact:
Heath Snow
Iredell County Environmental Health - Statesville Office
704-878-5305
Fax: 704-871-3483

The Health Department has 15 calendar days to verify that the information has been submitted in conformance with the EOP process. Upon verification, the Health Department will issue the Owner a letter of confirmation that states the documents and information contained herein have been received and that the wastewater system may operate in accordance with rules adopted by the Commission. This will complete the EOP wastewater permitting process.

If there are any questions, then please do not hesitate to call.

Thanks,
Michael Lash, PE.

Lash Engineering, Inc.
Civil/Consulting/Wastewater/Planning
1104 Cindy Carr Drive
Matthews, NC 28105
Phone: 704-847-3031
mikel@LashEngineering.com

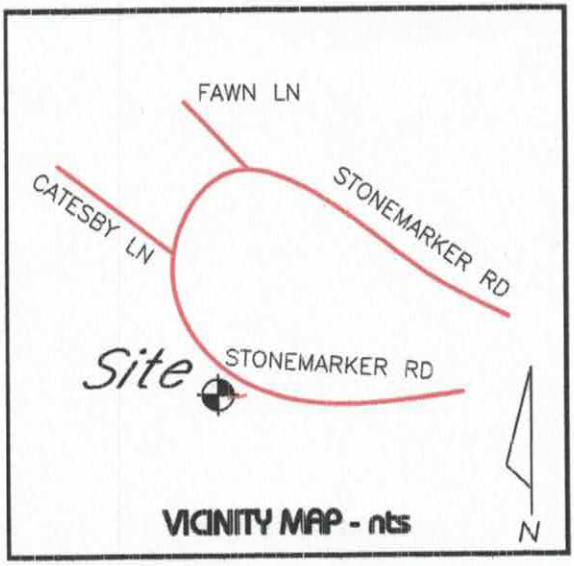
Lash Engineering, Inc.

Nicol Residence Wastewater Facility
Sub-Surface Drip Wastewater System
Owner to Health Department
Submittal 10-25-18

Table of Contents
Post Construction EOP-ATO Submittal

(l) Reporting Requirements. -
The owner of the wastewater system shall submit the following to the local health department:
a. A copy of the professional engineer's report required pursuant to G.S. 130A-336.1(k)(1).
b. A copy of the operations and management program.
c. The fee required pursuant to subsection (n) of this section.
d. A notarized letter that documents the owner's acceptance of the system from the professional engineer.

1. Table of Contents
2. Owner Letter to Health Department
3. EOP-ATO signed & sealed
4. The Engineer's Report
5. Operator's signed Agreement
6. Owner's Notarized Acceptance



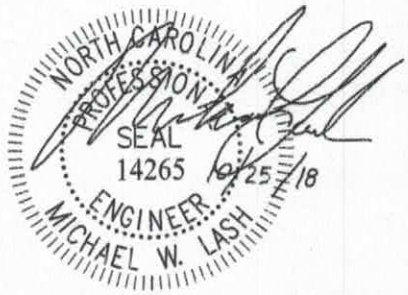
VICINITY MAP - nts

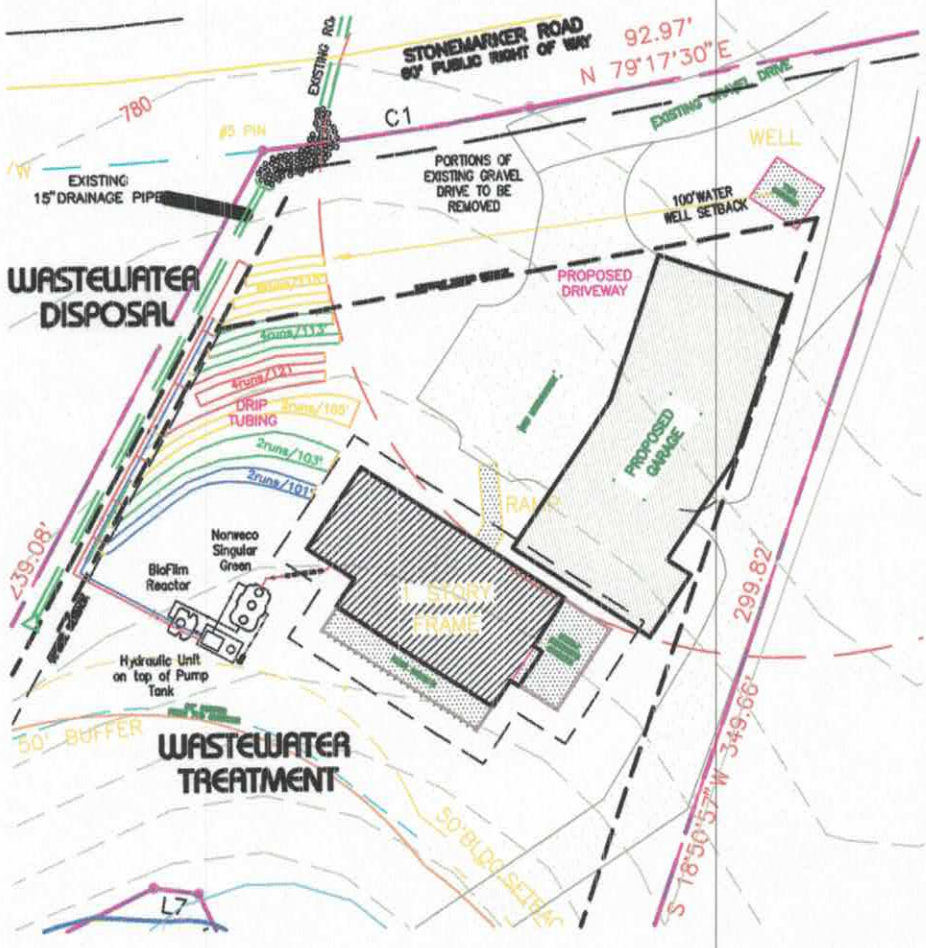
CLIENT:
JENNIFER & JOHN NICOL
552 STONEMARKER RD.
MOORESVILLE, NC 28117

Contact Person:
John Nicol
johnjennicol@icloud.com
980-505-0464

Scale: 1" = 40'
Date: 10-25-2018

AS-BUILT SHEET FOR ENGINEER'S REPORT





Wastewater Facility for:
Nicol Residence
552 Stonemarker Road
Mooresville, NC. 28117
Iredell County, NC.

LASH ENGINEERING
Consulting Civil Engineer/Planner
1104 Cindy Carr Drive
Matthews, N.C. 28105
Phone: 704/847-3031
email: mike@lashengineering.com
License #C-2433

Lash Engineering, Inc.
Civil/Consulting/Wastewater/Planning
1104 Cindy Carr Drive
Matthews, NC 28105
Phone: 704-847-3031
mikel@LashEngineering.com

Lash Engineering, Inc.

Nicol Wastewater Facility
Sub-Surface Drip Wastewater System
Engineer's Report
Submittal 10-25-18

Table of Contents
EOP – Post Construction Engineers Report

Required Documentation. - Engineer's Report - signed, sealed, and dated shall include the following:
a. The evaluation of soil conditions and site features as prepared by either the licensed soil scientist or licensed geologist.
b. The drawings, specifications, plans, and reports of the wastewater system,
- including the statement of special inspections required pursuant to G.S. 130A-336.1(e)(3);
- the wastewater system contractor's signed statement of responsibility required pursuant to G.S. 130A-336.1(e)(4);
- records of all special inspections; and the final inspection report documenting the correction of any identified discrepancies required pursuant to subsection (g) of this section.
c. The operator's management program manual that includes a copy of the contract with the certified water pollution control system operator required pursuant to subsection (i) of this section.
d. Any reports and findings related to the design and installation of the wastewater system.

1. Cover Sheet
2. Table of Contents
3. Soil Scientist Report
4. Wastewater Plans
5. Report on Installer & Special Inspections
6. Installer/Contractor Installation Signed Statement
7. Operator's Management Manual
8. Operator's Signed Contract

HYDRAULIC ASSESSMENT

552 Stonemarker Road
Mooresville, North Carolina 28117

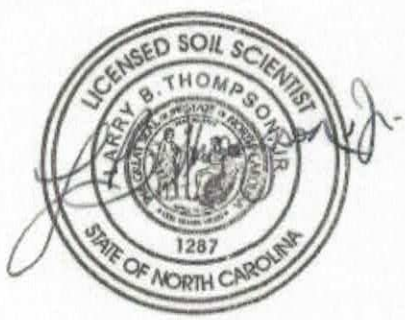
Prepared For:

John Nicol
552 Stonemarker Road
Mooresville, NC 28117

Prepared By:

Thompson Environmental Consulting, Inc.
PO Box 541
Midland, NC 28107

October 20, 2017



INTRODUCTION

A previous soil investigation performed by Thompson Environmental Consulting, Inc. for a proposed septic area on a 0.77-acre lot located at 552 Stonemarker Road, Mooresville, North Carolina (Iredell County Tax Parcel 4614899988.000), identified a potentially useable area for a pretreated subsurface drip dispersal system along the western property line. To determine if a subsurface drip system is feasible, saturated hydraulic conductivity tests (K_{SAT}) need to be performed to assist in determining a conservative long-term acceptance rate (LTAR) for the site.

Pretreated drip systems require that K_{SAT} tests be performed to substantiate the LTAR of the soils. The system LTAR, in this case, is based on the most hydraulically limiting soil horizon within 18 inches of the naturally occurring surface. Based on the previous soil investigations the soil horizons throughout the study area were consistent, with a clay subsurface horizon (Bt) noted as likely the most hydraulically limiting. The K_{SAT} tests were performed at or below 18 inches of the naturally occurring soil surface as shown in the Soil Boring and Ksat Location Figures.

HYDRAULIC CONDUCTIVITY MEASUREMENTS

A constant-head permeameter (Amoozemeter) was used to measure the K_{SAT} at various locations within the study area. Tests were conducted in accordance with the "Recommended Guidance for In-situ Measurements of Saturated Hydraulic Conductivity by the Constant Head Well Permeameter Method and for Reporting Results, August 19, 2014." The soils of the proposed system area consistently exhibited one diagnostic subsurface horizon within and immediately beneath the proposed treatment zone. As such, four K_{SAT} measurements were performed within the proposed drip irrigation areas. All tests were performed in the at or below 18 inches of the naturally occurring soil surface (18", 20", 18" and 21" depths).

Table 1 presents the results for the individual tests. The Appendix contains the results of the K_{SAT} tests. K_{SAT} data provided in the Appendix were logged only after providing sufficient time for the Amoozemeters to generally reach steady-state. The value of the K_{SAT} must be modified by an appropriate design factor to determine loading rates. This factor reflects the influence of several parameters including: inherent uncertainty of test values, variation of permeability within a soil, rooting habits of vegetation, drainage characteristics of the site, and long-term changes in soil permeability due to wastewater application.

The adjusted geometric mean of the lowest measured Ksat is 2.810987908. The results of all tests are listed in Table 1. A design factor of 15 percent of the measured K_{SAT} is recommended for the proposed system given that pretreated effluent is being considered. This resulted in a maximum proposed loading rate of 0.4 gal/ft^2/day for the proposed system.

Table 1: Hydraulic conductivity tests results and depth of tests

Test number	Depth of test (inches)	Measured K_{sat} (gal/ft²/day)
1	18	18.48224549
2	20	22.69872736
3	18	20.23911294
4	21	2.810987908
Geometric Mean (all tests)		**12.42944319**
Geometric Mean of Test 4 (lowest)		**2.810987908**

The hydraulic linear loading rate is typically defined by using Darcy's Law: $F = Kd\frac{dX}{dZ}$

F = Wastewater Flow Downslope for Unit Length (per foot of drip line)
K = Saturated Hydraulic Conductivity of the Most Restrictive Soil Horizon
d = Depth of Soil for Horizontal Transmission
$\frac{dx}{dZ}$ = Slope of the Groundwater Surface

The hydraulic linear loading rate per foot is: F = 2.810987908 GPD/SF x 3 FT x .03 = 0.25 GPD/FT. For a 100-foot long drainline the hydraulic linear loading rate is 0.25 GPD/FT x 100 FT = 25 GPD/SF.

CONCLUSIONS

The findings presented herein represent Thompson Environmental Consulting's professional opinion based upon our site evaluation and knowledge of the current laws and regulations governing on-site wastewater systems in North Carolina (Section .1900 of the North Carolina Administrative Code - NCAC).

This hydraulic assessment and report has been provided to assist with a septic system design for the subject property. An Improvement Permit for a subsurface wastewater treatment and disposal would be issued by Iredell County Environmental Health. Any concurrence with the findings of this report would be made by the local health department at the time an Improvement Permit is issued.



The maps prepared for this website are generated from recorded deeds, plats, and other public records. Users of these maps are hereby notified that the information provided herein should be verified. Iredell County assumes no legal responsibilities for any of the information contained on this site. Users are advised that the use of any of this information is at their own risk. All maps on this site were prepared using a 1000â€™ Grid based upon the North Carolina State Plane Coordinate System from the 1983 North American Datum. The delinquent real property tax overlay is updated monthly. The information presented is not intended to be used or relied upon as official notice of tax liens. For additional information regarding delinquent taxes, contact the Iredell County Tax Collector's Office.


456
80
314
Stonemarker Rd
155
43
108
150
74
292
192
542
208
552
159
208
546
239
350
192
103
138
173
165
554
435

SATURATED HYDRAULIC CONDUCTIVITY STUDY
552 Stonemarker Rd

Date: 10/11/2017
Location: B1
Number: 1
Horizon: Bt
Depth(inches): 17.0

Weather Condition: Sunny
Temperature (F): 78

SET UP		cm	in
Hole Depth:		43.2	17.0
Reference:	+	10.2	4.0
Head:	-	15.2	6.0
CHT Tube(s) setting:	=	38.1	15.0

	cm	in
Target Water Level:	15.2	6.0
Beginning Water Level:	15.2	6.0
Ending Water Level:	15.2	6.0

Hole diameter (d): 5.0 cm
Hole radius (r): 2.5 cm
coefficient A: 0.001136

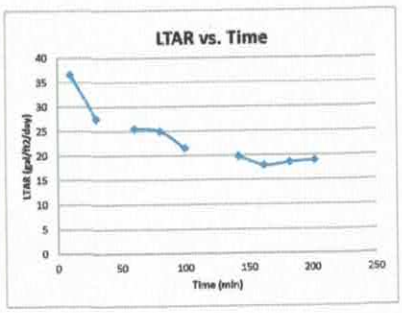
Valve Setting: x
1-ON 2-ON

NOTE: Readings based on Ending Water Level

Coversion Factor (C.F.): 105.0

Water Reading	Change in Water Level	Chamber C.F.	Clock Time (min)	Elapsed Time (min)	Flow Volume (cm3)	Q (cm3/hr)	K (cm/hr)	K (in/hr)	K gal/ft2/day
47	0.0	105.0	10.0						
29.6	17.4	105.0	30.0	20.00	1827.000	5481.0	6.2277	2.4518	36,683
16.5	13.1	105.0	50.0	20.00	1376.500	4126.5	4.6886	1.8459	27,618
Refilled									
47		105.0	60.0	60.00	0.000	0.0	0.0000	0.0000	0.000
34.9	12.1	105.0	80.0	20.00	1270.500	3811.5	4.3307	1.7050	25,510
23	11.9	105.0	100.0	20.00	1249.500	3748.5	4.2591	1.6768	25,088
12.8	10.2	105.0	120.0	20.00	1071.000	3213.0	3.6507	1.4373	21,504
Refilled									
33.6		105.0	142.0	142.00	0.000	0.0	0.0000	0.0000	0.000
24.2	9.4	105.0	162.0	20.00	987.000	2961.0	3.3644	1.3248	19,817
15.7	8.5	105.0	182.0	20.00	892.500	2677.5	3.0422	1.1977	17,920
6.9	8.8	105.0	202.0	20.00	924.000	2772.0	3.1496	1.2400	18,553
2.4	4.5	105.0	212.0	10.00	472.500	2835.0	3.2212	1.2682	18,974
						Final Ksat	3.138	1.236	18,482

*Note: 10L of water run through meter before taking readings.



SATURATED HYDRAULIC CONDUCTIVITY STUDY
552 Stonemarker Rd

Date: 10/11/2017
Location: B2
Number: 2
Horizon: Bt
Depth(inches): 2.0

Weather Condition: Sunny
Temperature (F): 78

SET UP		cm	in
Hole Depth:		45.7	18.0
Reference:	+	10.2	4.0
Head:	-	15.2	6.0
CHT Tube(s) setting:	=	40.6	16.0

	cm	in
Target Water Level:	15.2	6.0
Beginning Water Level:	15.2	6.0
Ending Water Level:	15.2	6.0

Hole diameter (d): 5.0 cm
Hole radius (r): 2.5 cm
coefficient A: 0.001136

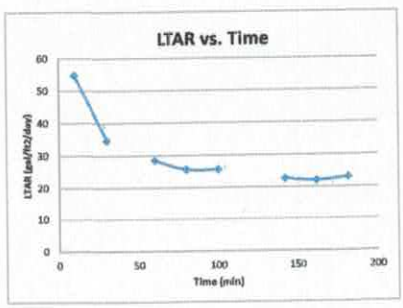
Valve Setting: x
1-ON 2-ON

NOTE: Readings based on Ending Water Level

Coversion Factor (C.F.): 105.0

Water Reading	Change in Water Level	Chamber C.F.	Clock Time (min)	Elapsed Time (min)	Flow Volume (cm3)	Q (cm3/hr)	K (cm/hr)	K (in/hr)	K gal/ft2/day
46.6	0.0	105.0	10.0						
19.6	28.0	105.0	30.0	20.00	2730.000	8190.0	9.3057	3.6637	54,814
3.1	16.5	105.0	50.0	20.00	1732.500	5197.5	5.9055	2.3250	34,786
Refilled									
46.6		105.0	60.0	60.00	0.000	0.0	0.0000	0.0000	0.000
33.2	13.6	105.0	80.0	20.00	1428.000	4284.0	4.8676	1.9164	28,672
21	12.2	105.0	100.0	20.00	1281.000	3843.0	4.3665	1.7191	25,721
8.8	12.2	105.0	120.0	20.00	1281.000	3843.0	4.3665	1.7191	25,721
Refilled									
37.8		105.0	142.0	142.00	0.000	0.0	0.0000	0.0000	0.000
27	10.8	105.0	162.0	20.00	1134.000	3402.0	3.8654	1.5218	22,769
16.5	10.5	105.0	182.0	20.00	1102.500	3307.5	3.7581	1.4796	22,137
5.5	11.0	105.0	202.0	20.00	1155.000	3465.0	3.9370	1.5500	23,191
						Final Ksat	3.854	1.517	22,699

*Note: 10L of water run through meter before taking readings.



SATURATED HYDRAULIC CONDUCTIVITY STUDY
552 Stonemarker Rd

Date: 10/11/2017
Location: B3
Number: 3
Horizon: Bt
Depth(inches): 18.0

Weather Condition: Sunny
Temperature (F): 78

SET UP		cm	in
Hole Depth:		45.7	18.0
Reference:	+	10.2	4.0
Head:	-	15.2	6.0
CHT Tube(s) setting:	=	40.6	16.0

	cm	in
Target Water Level:	15.2	6.0
Beginning Water Level:	15.2	6.0
Ending Water Level:	15.2	6.0

Hole diameter (d): 5.0 cm
Hole radius (r): 2.5 cm
coefficient A: 0.001136

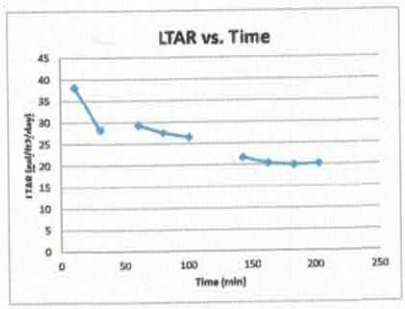
Valve Setting: x
1-ON 2-ON

NOTE: Readings based on Ending Water Level

Coversion Factor (C.F.): 105.0

Water Reading	Change in Water Level	Chamber C.F.	Clock Time (min)	Elapsed Time (min)	Flow Volume (cm3)	Q (cm3/hr)	K (cm/hr)	K (in/hr)	K gal/ft2/day
40.4	0.0	105.0	11.0						
22.3	18.1	105.0	31.0	20.00	1900.500	5701.5	6.4782	2.5505	38,159
8.9	13.4	105.0	51.0	20.00	1407.000	4221.0	4.7960	1.8882	28,250
Refilled									
47.4		105.0	61.0	61.00	0.000	0.0	0.0000	0.0000	0.000
33.5	13.9	105.0	81.0	20.00	1459.500	4378.5	4.9750	1.9587	29,305
20.4	13.1	105.0	101.0	20.00	1375.500	4126.5	4.6886	1.8459	27,618
7.8	12.6	105.0	121.0	20.00	1323.000	3969.0	4.5097	1.7755	26,564
Refilled									
44.5		105.0	143.0	143.00	0.000	0.0	0.0000	0.0000	0.000
34.2	10.3	105.0	163.0	20.00	1081.500	3244.5	3.6885	1.4514	21,715
24.5	9.7	105.0	183.0	20.00	1018.500	3055.5	3.4717	1.3668	20,450
15	9.5	105.0	203.0	20.00	997.500	2992.5	3.4002	1.3386	20,028
5.4	9.6	105.0	223.0	20.00	1008.000	3024.0	3.4360	1.3527	20,239
						Final Ksat	3.436	1.353	20,239

*Note: 10L of water run through meter before taking readings.



SATURATED HYDRAULIC CONDUCTIVITY STUDY
552 Stonemarker Rd

Date: 10/11/2017
Location: 0
Number: 4
Horizon: Bt
Depth(inches): 21.0

Weather Condition: Sunny
Temperature (F): 78

SET UP	cm	in
Hole Depth:	53.3	21.0
Reference: +	10.2	4.0
Head: -	15.2	6.0
CHT Tube(s) setting: =	48.3	19.0

	cm	in
Target Water Level:	15.2	6.0
Beginning Water Level:	15.2	6.0
Ending Water Level:	15.2	6.0

Hole diameter (d): 5.0 cm
Hole radius (r): 2.5 cm
coefficient A: 0.001136

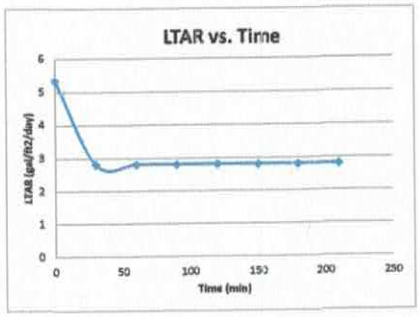
Valve Setting: x

1-ON	2-ON

NOTE: Readings based on Ending Water Level

Coversion Factor (C.F.): 105.0

Water Reading	Change in Water Level	Chamber C.F.	Clock Time (min)	Elapsed Time (min)	Flow Volume (cm3)	Q (cm3/hr)	K (cm/hr)	K (in/hr)	K gal/ft2/day
43.2	0.0	105.0	0.0						
39.4	3.8	105.0	30.0	30.00	399.000	798.0	0.9067	0.3570	5.341
37.4	2.0	105.0	60.0	30.00	210.000	420.0	0.4772	0.1879	2.811
35.4	2.0	105.0	90.0	30.00	210.000	420.0	0.4772	0.1879	2.811
33.4	2.0	105.0	120.0	30.00	210.000	420.0	0.4772	0.1879	2.811
31.4	2.0	105.0	150.0	30.00	210.000	420.0	0.4772	0.1879	2.811
29.4	2.0	105.0	180.0	30.00	210.000	420.0	0.4772	0.1879	2.811
27.4	2.0	105.0	210.0	30.00	210.000	420.0	0.4772	0.1879	2.811
25.4	2.0	105.0	240.0	30.00	210.000	420.0	0.4772	0.1879	2.811
						Final Ksat	0.477	0.188	2.811



Test #	Location	Number	Horizon	Depth	IN/HR	LTAR
1	B1	1	Bt	17	1.235312	18.48225
2	B2	2	Bt	2	1.517132	22.69873
3	B3	3	Bt	18	1.352737	20.23911
4	Slope	4	Bt	21	0.18788	2.810988

Geomean (1-4):	12.42944
Geomean (1-3):	20.4009

Thompson Environmental Consulting, Inc.
PO Box 541
Midland, NC 28107

Property ID: 4614899988
Lot #: 154

SOIL/SITE EVALUATION
for ON-SITE WASTEWATER SYSTEM

Owner: John Nichol
Applicant:
Address: 552 Stonemarker Road, Mooresville, NC 28117
Date Evaluated: 11/3/2017
Proposed Facility: Residence Design Flow (.1949) 480 GPD
Property Size: 0.77 acre
Location of Site: 552 Stonemarker Road, Mooresville, NC 28117
Property Recorded: Map Recorded 1977
Water Supply: [ ] Public [X] Individual [X] Well [ ] Spring [ ] Other
Evaluation Method: [X] Auger Boring [ ] Pit [ ] Cut
Type of Wastewater: [X] Sewage [ ] Industrial Process [ ] Mixed

PROFILE #	.1940 Landscape Position/ Slope%	Horizon Depth (IN.)	SOIL MORPHOLOGY .1941 .1941 Structure/ Texture	.1941 Consistence Mineralogy	b PROFILE FACTORS .1942 Soil Wetness/ Color	.1943 Soil Depth (IN.)	.1956 Sapro Class	.1944 Restr Horiz	Profile Class & LTAR
1	LS	0-18	GR/SL	FR/NS/NP/NE					S
	3%	18-48+	SBK/C	FI/SS/SP/SEXP	N/A	48+"	N/A	N/A	TBD
2	LS	0-20	GR/SL	FR/NS/NP/NE					S
	3%	20-48+	SBK/C	FI/SS/SP/SEXP	N/A	48+"	N/A	N/A	TBD
3	LS	0-19	GR/SL	FR/NS/NP/NE					S
	3%	19-48+	SBK/C	FI/SS/SP/SEXP	N/A	48+"	N/A	N/A	TBD
4	LS	0-21	GR/SL	FR/NS/NP/NE					S
	3%	21-48+	SBK/C	FI/SS/SP/SEXP	N/A	48+"	N/A	N/A	TBD
5	LS	0-18	GR/SL	FR/NS/NP/NE					S
	3%	18-48+	SBK/C	FR/SS/SP/SEXP	N/A	48+"	N/A	N/A	TBD

Description	Initial System	Repair System
Available Space (.1945)	S	N/A
System Type(s)	TBD	TBD
Site LTAR	TBD	TBD

Other Factors (.1946):
Soil Evaluation By: Larry Thompson, LSS
Others Present:
Site Classification (.1948): Suitable
Site Evaluation By:
Others Present:

Report Number: 17-291-0726
Account Number: 10844

Send To: Larry Thompson, LSS
P o Box 541
Midland NC 28107

Waypoint ANALYTICAL

"Every acre...Every year."™

7621 Whitepine Road, Richmond, VA 23237
Main 804-743-9401 ° Fax 804-271-6446
www.waypointanalytical.com

Grower: 552 Stonemarker Rd
Mooresville, NC 28147

SOIL ANALYSIS REPORT

Analytical Method(s):

Date Received: 10/18/2017 **Date Of Analysis:** 10/19/2017 **Date Of Report:** 10/20/2017

Sample ID / Field ID	Lab Number	OM % Rate	W/V Soil Class	ENR lbs/A	Phosphorus ppm Rate	Phosphorus ppm Rate	Phosphorus ppm Rate	Potassium K ppm Rate	Magnesium Mg ppm Rate	Calcium Ca ppm Rate	Sodium Na ppm Rate	pH Soil pH	pH Buffer Index	Acidity H meq/100g	C.E.C meq/100g
Sample 1	10922														
Sample 2	10923														

Sample ID / Field ID	Percent Base Saturation K %	Mg %	Ca %	Na %	H %	Nitrate NO_3 N ppm Rate	Sulfur S ppm Rate	Zinc Zn ppm Rate	Manganese Mn ppm Rate	Iron Fe ppm Rate	Copper Cu ppm Rate	Boron B ppm Rate	Soluble Salts SS ms/cm Rate		
Sample 1															
Sample 2															

Values on this report represent the plant available nutrients in the soil. Rating after each value: VL (Very Low), L (Low), M (Medium), H (High), VH (Very High). ENR - Estimated Nitrogen Release. C.E.C. - Cation Exchange Capacity.

Explanation of symbols: % (percent), ppm (parts per million), lbs/A (pounds per acre), ms/cm (milli-mhos per centimeter), meq/100g (milli-equivalent per 100 grams). Conversions: ppm x 2 = lbs/A, Soluble Salts ms/cm x 640 = ppm.

This report applies to sample(s) tested. Samples are retained a maximum of thirty days after testing.

Analysis prepared by: Waypoint Analytical Virginia, Inc.

by: Pauric McGroary

Pauric McGroary

Waypoint ANALYTICAL
7621 Whitepine Road, Richmond, VA 23237
Main 804-743-9401 ° Fax 804-271-6446
www.waypointanalytical.com

TEXTURE ANALYSIS

Client :
Larry Thompson, LSS
P o Box 541
Midland , NC 28107

Grower :
552 Stonemarker Rd
Mooresville, NC 28147

Farm Id/Name :

Report No : 17-291-0726
Cust No : 10844
Date Printed : 10/20/2017
Page : 1 of 1

Date Received : 10/18/2017

Lab No	Field ID	Sample Identification	Percent Sand	Percent Silt	Percent Clay	Textural Classification
10922		Sample 1	63.6	21.2	15.2	Sandy Loam
10923		Sample 2	55.6	25.2	19.2	Sandy Loam

Analysis prepared by: Waypoint Analytical Virginia, Inc.

THOMPSON ENVIRONMENTAL CONSULTING, INC.
WATER ♦ WASTEWATER ♦ WETLANDS

November 9, 2018

Michael W. Lash, PE
Lash Engineering, Inc.
1104 Cindy Carr Drive
Matthews, NC 28105

Dear Mr. Lash,

The purpose of this correspondence is to confirm that a site visit was made to the property located at 552 Stonemarker Road, Mooresville, NC 28117 prior to the subsurface wastewater treatment and disposal system installation.

Since my original soil and site evaluation, a number of trees had been removed from the proposed drainfield area and the remaining stumps were ground below natural grade. Several soil borings were advanced within the proposed drainfield area at the time of my visit and recommendations were made for minor site modifications (fill material removal) to help facilitate a drip installation in natural soil. Final site preparations were made to my satisfaction.

If you should have any soil or site specific questions regarding this project, please do not hesitate to contact me.

Sincerely,

Larry B. Thompson, Jr.

PO BOX 541 • MIDLAND, NC • 28107-0541
PHONE: 704-301-4881 • FAX: 206-350-8895
E-MAIL: LARRY@THOMPSONENV.COM
WEB: WWW.THOMPSONENV.COM

CONSTRUCTION SEQUENCE

(for installation & inspection of trench)

1. TANK TO BE INSTALLED 6" THICK PEA STONE BED. USE A DEWATERING PIT (IF REQUIRED).
2. USE NATIVE MATERIAL FOR BACKFILL WITH NO ORGANICS, PROPERLY PLACED AND COMPACTED. KEEP EXCAVATION FREE OF WATER AT ALL TIMES.
3. INSTALL FILL IN 8"LIFTS. MATERIAL MUST BE ABLE TO FILL-IN BETWEEN WALLS OF TANK, FILL ON SIDES FIRST; THEN THE BULKHEADS.
4. USE A HAND TAMPER TO ACHIEVE SIDEWALL COMPACTION THROUGH THE COMPACTED BACKFILL.
5. SIDEWALL COMPRESSION IS ESSENTIAL FOR SIDEWALL RESTRAINT.
6. BACKFILL BETWEEN RISERS FIRST. COMPLETE BACKFILLING, GRADE DRAINAGE AWAY FROM TANK.

NOTE:
1. ALL TANKAGE AND CONTROL PANELS SHALL BE SECURED WITH LOCKS.
2. KEYS SHALL BE SECURED WITH OWNER AND SERVICE REPRESENTATIVE.
3. IF THE NATIVE MATERIAL IS NOT SUITABLE FOR FILL – THEN A SUITABLE FILL WILL NEED TO BE ACQUIRED FROM A CERTIFIED LOCATION.

PROPOSED USE: 1

1 – 4 BEDROOM SINGLE FAMILY HOUSES

REQUIRED FLOW CALCULATIONS: 2

1 – 4 BEDROOM HOUSE = 4 bdrms
@ 120 gpd/bdrm = 480 gpd.
TOTAL FLOW FOR SYSTEM = 480 gpd.

LENGTH OF RUN CALCULATIONS 3

480 CPD/0.4 LTAR = 1,200sf.
1,200sf./2 = 600 ft. OF TUBING
600'/35' = 18 runs
Each Run =35 ft.
Total of 18 runs and 2 zones.

SEPTIC & PUMP TANK SIZING CALCULATIONS 4

Septic Tank
Septic Tank not Utilized for Norweco Unit

Pump Tank
Daily Flow = 480gpd + 500 gal
= 980gal use 1,000 gal pump tank

HEADLOSS CALCULATIONS: 5

Length of Longest Lateral = 240'
Dose Flow = 5.1 gpm; Flush Flow = 4.4 gpm
Total Flow = 9.54 gpm
Required Safety Factor = 23.1'
Unit Headloss = (Filter: 11.8', Flow Meter: 2.31') = 13.9'
Elevation Change = 6.8' (Pump ON to Upper Manifold) 6.8'
1"Supply=250' & 1"Return=250'; (7.17'/100')(250') = 17.9'
Headloss through laterals = 27.2'
Minor Losses (use 10') = 10'
Total Headlosses = 98.9'

DOSING FLOW CALCULATIONS 6

* DOSING FLOW CALCULATION PER ZONE:
Dosing Flow Rate = 5.10 gpm
Flushing Flow Rate = 4.44 gpm
Total Flow = 9.54 gpm.
Number of Doses/day = 12 doses
Pump Run time = 7.35 mins
Pump Head Time = 1hr-52mins.
Pump Run Time/day = 1hr-34mins.

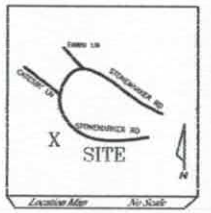
* Times are based on Required Drip Tubing Length of 600'. Adjustments need to be made for Actual Length of Drip Tubing Installed.

SYSTEM NOTES

1. THIS PLAN IS TO SHOW THE LOCATION AND DESIGN OF THE WASTEWATER SYSTEM AND DISPOSAL FIELD ONLY. FOR ALL OTHER IMPROVEMENTS, CONSULT THE ARCHITECT OR OWNER.
2. CONTRACTOR TO INSTALL DRIP TUBING ON CONTOUR WHICH MAY VARY FROM THAT SHOWN ON PLAN.
3. CONVEYANCE AND SUPPLY LINES ARE TO BE INSTALLED BELOW FROST DEPTH.
4. ELECTRICAL CONDUIT, WIRING AND INSTALLATION IS TO BE IN CONFORMANCE WITH THE ELECTRICAL CODE.

CONSTRUCTION NOTES:

1. THE SITE IS EASILY ACCESSIBLE FOR UNLOADING & EXCAVATING EQUIPMENT. THE TANK CAN BE INSTALLED USING AN EXCAVATOR. ALL SYSTEMS AND COMPONENTS SHALL BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE REGULATIONS AND MANUFACTURERS INSTRUCTIONS.
4. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS, BY MANUFACTURERS REPRESENTATIVE, OR THEIR APPROVED REPRESENTATIVE.
5. DISPOSAL CONTRACTOR IS NOT TO DESTABILIZE EXISTING SLOPE.
6. THERE ARE NO WELLS TO BE ABANDONED. THE EXISTING WELL, AS SHOWN ON PLAN, IS FOR A SUPPLY OF DOMESTIC WATER.
7. INSTALLER OF SYSTEM IS TO DEMONSTRATE THAT THEY ARE CAPABLE OF INSTALLING THIS SYSTEM.



North

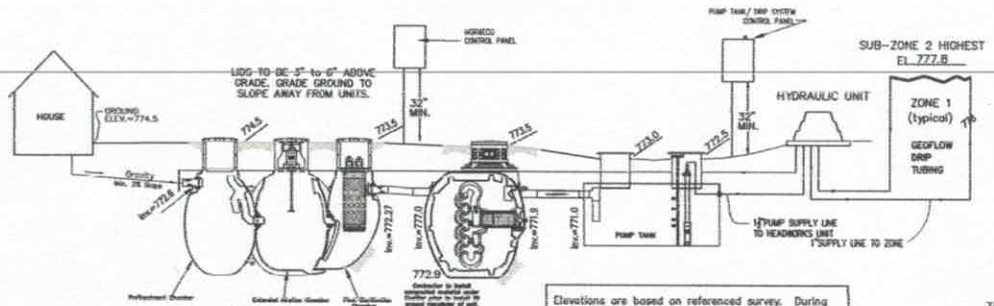
USA NCAC 18A .1950-1957 & .1956(4)(g) SETBACKS Table XII

Minimum horizontal setbacks for ground absorption systems
Where 75-4 Pretreatment Systems are used for ≤ 1000 gallons per day

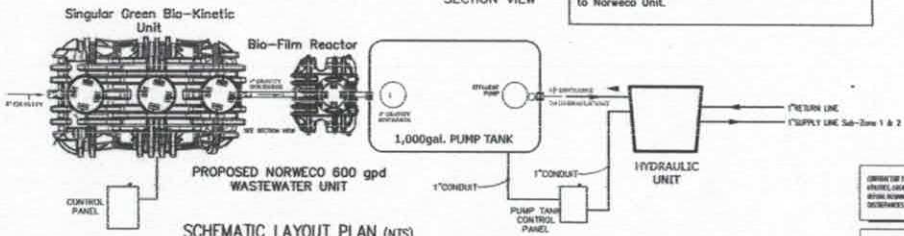
Land Feature or Component	75-4 (feet)
* Any public water supply	100
Streams classified as WS-I, except for aquavilla	70
Waters classified as S-A, from mean high water mark	70
Other coastal waters, from mean high water mark	35
Any other stream, canal, marsh or other surface waters, from normal pool elevation	50
Any Class I or Class II reservoir, from normal pool elevation	70
Any permanent storm water retention pond, from base pool elevation	35
* Any other lake or pond, from normal pool or mean high water elevation	35
* Any building foundation	5
Any basement	15
* Any property line	5
Top of slope of embankments or cuts of 2 feet or more vertical height	15
Any water line	10
Upslope interceptor/foundation drains/diversions	7
Sideslope interceptor/foundation drains/diversions	10
Downslope interceptor/foundation drains/diversions	20
Groundwater lowering ditches or devices	25
Any swimming pool	15
Any other attribution limit (except the system repair area)	10

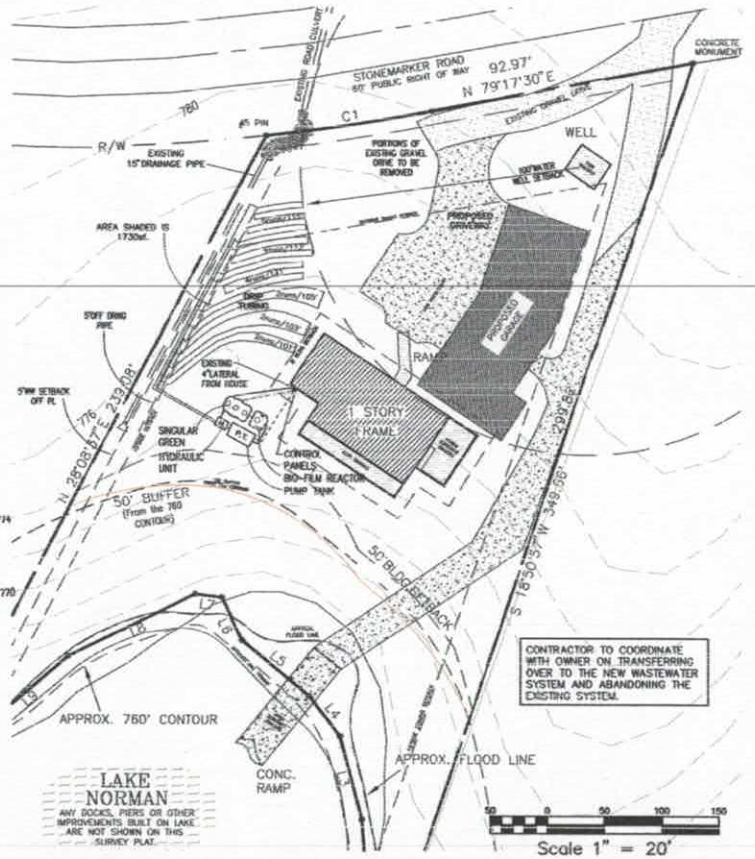
*Setbacks that apply for this site and are shown.

SELF-CLEANING FILTER(S). CLEANING PROCESS SHALL BE AUTOMATIC. GEOFLOW FILTERS, OR APPROVED EQUIVALENT, SHALL BE USED.



Elevations are based on referenced survey. During installation elevations must be checked to verify that system will function as designed. There must be at least 2% gravity fall from House Sewer main to Norweco Unit.





(3) DAYS BEFORE DIGGING IN NORTH CAROLINA CALL: 1 800 632 4949 NORTH CAROLINA 1 CALL CENTER

LASH ENGINEERING
Consulting Civil Engineer/Planner
1104 Cindy Carr Drive
Matthews, N.C. 28105
Phone: 704/847-0051
email: mike@lashengineering.com
License #C-2455

PROJECT ENGINEER: MICHAEL LASH, P.E.

CLIENT: JENNIFER & JOHN NICOL
MOORESVILLE, NC. 28117

Contact Person:
PHONE: 980-505-046464
E-MAIL: johnjnicol@icloud.com

PROJECT: Wastewater Facility for: JENNIFER & JOHN NICOL
MOORESVILLE, NC. 28117

Iredell County
Tax Parcel ID. – 464-489-9988.000

DESCRIPTION: AEROBIC SUB-SURFACE DRIP IRRIGATION WASTEWATER TREATMENT SYSTEM

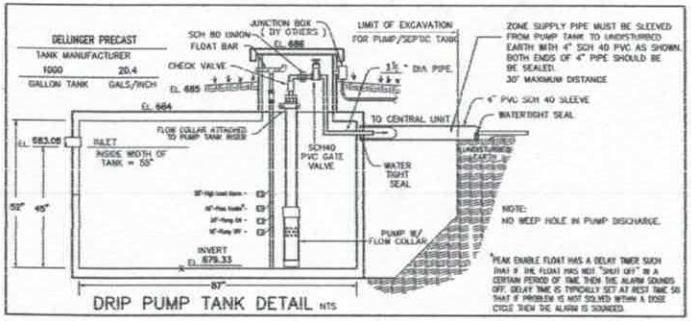
TREATMENT PLAN

STATUS: "FINAL DESIGN" "RELEASED FOR CONSTRUCTION"

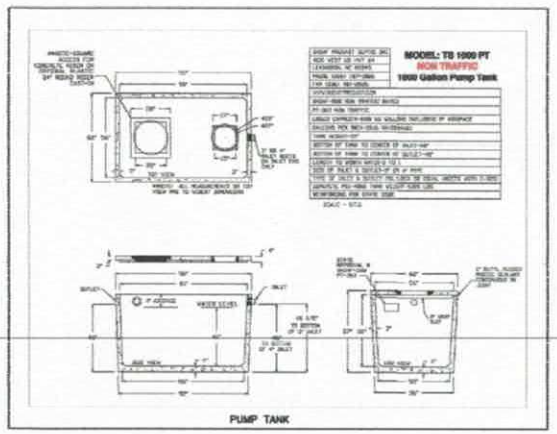
SUBMITTED TO: STATE & CLIENT

Scale: 1" = 20'
Date: 6-10-2016

SHEET NO. 1 OF 3



DRIP PUMP TANK DETAIL NTS



PUMP TANK

NOTE TO CONTRACTOR:
CONVEYANCE LINES (SUPPLY LINES / RETURN LINE) TO BE INSTALLED BELOW FROST DEPTH. ALL PORTIONS OF CONVEYANCE LINES BELOW FROST TO BE BELOW THE ELEVATION OF ALL TOP FEED TUBING MANIFOLDS SUCH THAT THE CONVEYANCE LINES REMAIN FULL AT PUMP SHUT OFF. DEEPER INSTALLATION OF CONVEYANCE LINES MAYBE NECESSARY ON REMOTE ZONE VALVES WILL BE REQUIRED.

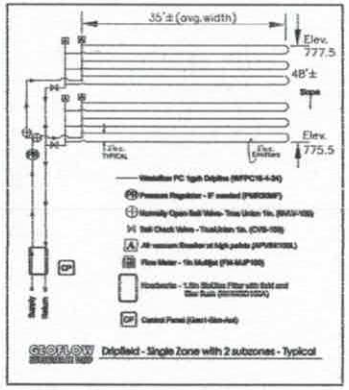
CONTRACTOR TO INSTALL DRIP LINES ON CONTOUR WHICH MAY VARY FROM THAT SHOWN ON PLAN.

SYSTEM NOTES:
1. NORWECO TREATMENT SYSTEMS HAS A CONTROLLED DEMONSTRATION WASTEWATER SYSTEM APPROVAL FOR THIS UNIT: CDNS 2006-01. A COPY IS INCLUDED IN THE SUBMITTAL PACKAGE.
2. GEOFLOW SUBSURFACE DRIP SYSTEM, HAS AN INNOVATIVE WASTEWATER SYSTEM APPROVAL NO. WWD-2000-08.
3. A YARD HYDRANT OR HOSE BIB NEEDS TO BE PROVIDED ON SIDE OF HOUSE FOR MAINTENANCE & CLEANING.
4. FOOTPRINT AND HOUSE INFORMATION WAS PROVIDED BY OWNER/OWNER'S REPRESENTATIVE.
5. THIS PLAN IS TO SHOW THE LOCATION OF THE WASTEWATER SYSTEM AND DRIP FIELD ONLY. FOR ALL OTHER IMPROVEMENTS, CONSULT THE ARCHITECT OR OWNER.
6. ALL ELECTRICAL SYSTEMS NEED TO BE 115v/220v SINGLE PHASE.
7. ALL WIRES AND MARKERS ARE TO BE ROUND with UNJOINABLE OR SCREW-ON LIDS.
8. POTABLE WATER FOR LOT IS SUPPLIED BY AN EXISTING WATER WELL AND IS SHOWN.

CONSTRUCTION NOTES:
1. THE SITE IS EASILY ACCESSIBLE FOR UNLOADING & EXCAVATING EQUIPMENT. SITE GRADING AROUND TANKS IS TO SHED WATER OFF & AWAY FROM UNITS. THE TANKS CAN BE INSTALLED USING AN EXCAVATOR. THE TUBING CAN BE INSTALLED BY HAND OR BY TRENCHER.
2. ALL MONITOR, CONTROL AND OTHER SYSTEMS AND PARTS SHALL BE INSTALLED ACCORDING TO DIRECTIONS PROVIDED BY THE MANUFACTURER AND NOTES PROVIDED ON THESE PLANS.
3. ALL COMPANIES INSTALLING WASTEWATER SYSTEMS SHALL BE IN POSSESSION OF ALL NECESSARY PERMITS AND LICENSES BEFORE ATTEMPTING ANY PORTION OF THE INSTALLATION.
4. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS, BY MANUFACTURERS REPRESENTATIVE, OR THEIR APPROVED REPRESENTATIVE.
5. MONUMENTATION FIELD IS PERSONALLY STAKED/SET IRON RODS. SITE IS TO BE CLEARED ACCORDING TO CLEARING NOTE ON SHEET 3 (SHALLOW INSTALLATION). INSPECTION CONTRACTOR IS NOT TO DESIGNATE EXISTING SLOPE.
6. CONTRACTOR IS TO ENSURE THAT FINISH FLOOR ELEVATION OF HOUSE PROVIDES FOR GRAVITY FLOW TO NORWECO PRETREAT AND SHOULD SYSTEM.

CONTROL PANEL SETTINGS
1. CONTROLS FOR RUN TIME, REST TIME, FLUSHING SHOULD BE SET ACCORDING TO THE "DOSING FLOW CALCULATION" BOX SHOWN ON SHEET 1 of 3. RUN TIMES AND REST TIME TO BE ADJUSTED ACCORDING TO ACTUAL FIELD MEASUREMENT OF DRIP TUBING.
2. CONTROLS SHALL PROVIDE FOR DELIVERY OF PREPROGRAMMED VOLUMES OF EFFLUENT TO EACH FIELD ZONE AT DESIGNED-SPECIFIED TIME INTERVALS; AUTOMATIC FLUSHING OF INTEGRAL UNIT FILTERS (FILTER FLUSHING), INITIATED BY A TIMER (ADJUSTABLE DURATION); AUTOMATIC FLUSHING (AT LEAST WEEKLY) OF THE DRIP LATERALS (FIELD FLUSHING) WITH FILTERED EFFLUENT FOR A SPECIFIED DURATION; AND MONITOR PUMP CYCLES, RUN TIMES AND FLOW.
3. CONTROLS AND FLOAT LEVELS SHALL BE SYNCHRONIZED TO ASSURE THE MINIMUM DOSE IS AVAILABLE PRIOR TO INITIATING A DOSING CYCLE TO A ZONE OR SUBFIELD. MINIMUM DOSE VOLUME PER ZONE SHALL BE SET AS SHOWN IN "DOSING FLOW CALCULATION" BOX (SHEET 1 of 3).

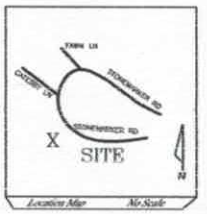
CONTROL PANEL SPECIFICATIONS
1. PUMP AND CONTROL CIRCUITS SHALL BE PROVIDED WITH MANUAL CIRCUIT DISCONNECTS WITHIN A WATERTIGHT, CORROSION-RESISTANT, TEXTURE FACE ENCLOSURE (NEMA 4X OR EQUIVALENT) ADJACENT TO THE PUMP TANK, AND SECURELY MOUNTED AT LEAST 12 INCHES ABOVE THE FINISHED GRADE. THE PUMP(S) SHALL BE MANUALLY OPERABLE WITHOUT REQUIRING THE USE OF SPECIAL TOOLS OR ENTRANCE INTO THE TANK FOR TESTING PURPOSES. CONDUCTORS SHALL BE CONVEYED TO THE DISCONNECT ENCLOSURE THROUGH WATERPROOF, GASPROOF, AND CORROSION-RESISTANT CONDUITS, WITH NO SPLICES OR JUNCTION BOXES PROVIDED INSIDE THE TANK. WIRE GRIPS, DUCT SEAL, OR OTHER SUITABLE MATERIAL SHALL BE USED TO SEAL AROUND WIRE AND WIRE CONDUIT OPENINGS INSIDE THE PUMP TANK AND DISCONNECT ENCLOSURE.
2. THE PUMP TANK SHALL HAVE A PROPERLY FUNCTIONING HIGH-WATER ALARM. THE ALARM CIRCUIT SHALL BE SUPPLIED AHEAD OF ANY PUMP OVERLOAD AND SHORT CIRCUIT PROTECTIVE DEVICES. THE ALARM SHALL BE AUDIBLE AND VISIBLE BY SYSTEM USERS AND WEATHERPROOF IF INSTALLED OUTDOORS IN AN ENCLOSURE (NEMA 4X OR EQUIVALENT).

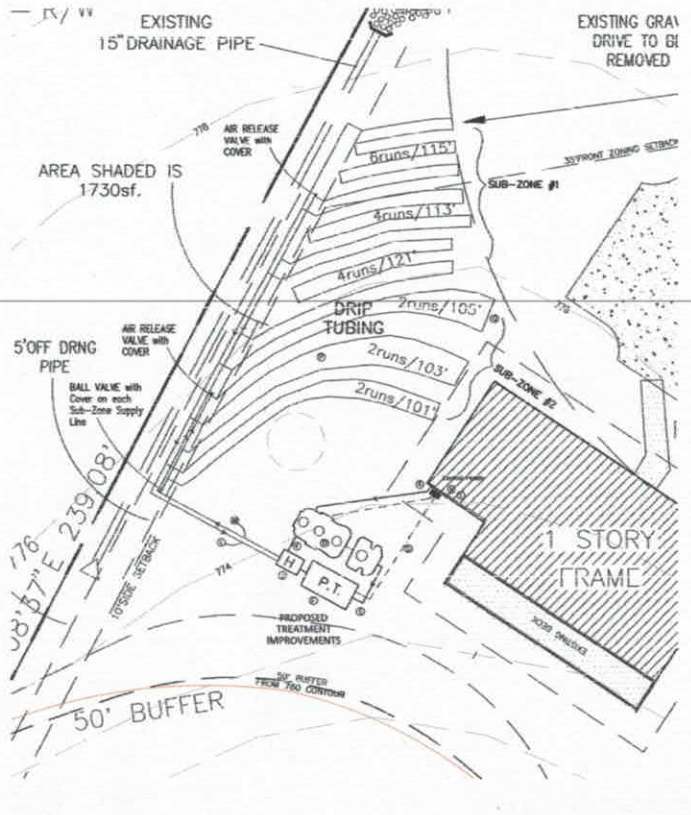


DRAIN FIELD SCHEMATIC FOR DRIP TUBING

SUMMARY FOR INITIAL SYSTEM
1. AEROBIC TREATMENT – 1St.
2. 480 gpd, 4 Bedrooms
3. DRIP TUBING DISPOSAL – GEOFLOW for LTAR of 0.8 with Class 3 Soils.
4. LTAR =0.40 600' Required – 640' Provided

SUMMARY FOR REPAIR SYSTEM
1. AEROBIC TREATMENT – 1St
2. GEOFLOW DRIP IRRIGATION
3. LTAR=0.40





DRIP FIELD: SINGLE ZONE–2 SUBZONES; 6 LATERALS, 2 RUNS/LAT.

SUBZONE 1 Total Length Req'd: 300' Total Length Provided: 348'

LATERAL #1	LATERAL #2	LATERAL #3
Run #1 15'	Run #1 26'	Run #1 36'
Run #2 16'	Run #2 27'	Run #2 38'
Run #3 18'	Run #3 29'	Run #3 37'
Run #4 21'	Run #4 32'	Run #4 36'
Run #5 22'		
Run #6 23'		
Total Lateral = 115'	Total Lateral = 113'	Total Lateral = 121'

SUBZONE 2 Total Length Req'd: 300' Total Length Provided: 348'

LATERAL #1	LATERAL #2	LATERAL #3
Run #1 36'	Run #1 51'	Run #1 53'
Run #2 31'	Run #2 32'	Run #2 53'
Total Lateral = 105'	Total Lateral = 103'	Total Lateral = 105'

Total Length of Drip Line (Required) = 600'
Total Length of Drip Line (Provided) = 640'
All Lateral Lengths are within the Manufacturers' Recommendation of +20%

SEPTIC SYSTEM DRAWING LEGEND
A = 4" Wastewater Pipe from house.
D = Norweco Treatment Unit
E = Discharge Line from Pretreat to Pump Tank.
F = 1,000 gal. precast Pump Tank with Risers.
G = 1½" PVC electrical conduit to House Panel with 1 – 120v, single phase, 20 amp circuit for pump power & 1 – 120v, single phase, 15 amp circuit for Alarm and Controls.
H = Norweco Panel Operator Pretreat Unit (Install next to house)
I = Geoflow Control Panel operator (Pump Tank, Hydraulic Unit & Disposal Valves). The Hydraulic Unit has a 24v field flush valve, 24v backwash valve, and a remote 24v zone valve that the Control Panel will manage. Install Control Panel next to House.
J = Drip system Headworks Unit with installed valves box enclosure.
K = 1½" PVC Backwash Gravity Line from Headworks Unit to Septic Tank.
L = 1" PVC Return Line from Drip System Return Manifold to Headworks Unit.
M = 1" PVC Supply Line from Drip Headworks to Supply Manifold.
P = Drip tubing installed 6" below grade, 2' on center between rows.
Q = Black Sch.40 Flex hose and fittings.

LASH ENGINEERING
Consulting Civil Engineer/Planner
1924 Cindy Carr Drive
Matthews, N.C. 28105
Phone: 704/847-3031
email: info@lashengineering.com
License #C-2455

PROJECT ENGINEER:
MICHAEL LASH, P.E.

CLIENT:
JENNIFER & JOHN NICOL
692 STONEMARKER RD
MOORESVILLE, NC. 28117

Contact Persons:
PHONE: 980-505-0464
E-MAIL: johnjwnicol@icloud.com

PROJECT:
Wastewater Facility for:
JENNIFER & JOHN NICOL
692 STONEMARKER RD
MOORESVILLE, NC. 28117

Iredell County.
Tax Parcel ID. – 464-480-0988.000

DESCRIPTION:
AEROBIC SUB-SURFACE
DRIP IRRIGATION
WASTEWATER TREATMENT SYSTEM

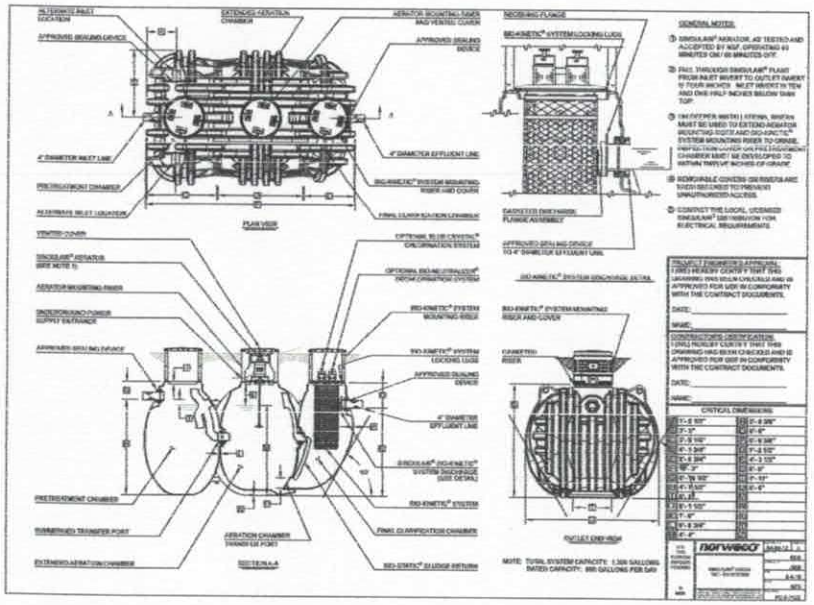
DISPOSAL PLAN

STATUS: "PRELIMINARY"
"NOT RELEASED FOR CONSTRUCTION"

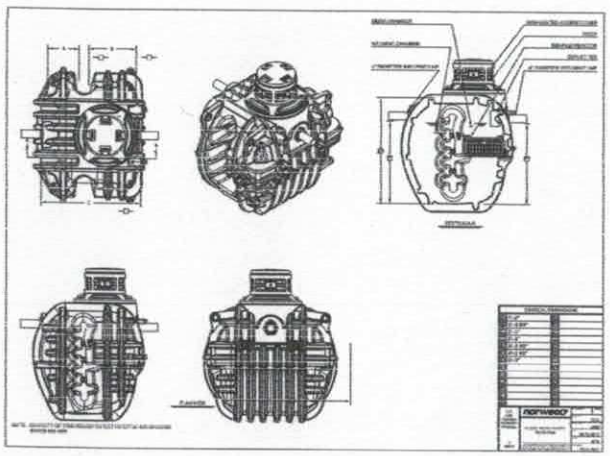
SUBMITTED TO: STATE & CLIENT

Scale: 1" = 10'
Date: 4-27-2016

SHEET NO.
2 OF 3



NORWECO SINGULAR GREEN - TNT 800



BIOFILM REACTOR

GEOFLOW DRIP TUBING

DEPTH AND SPACING

1. WASTEFLOW systems usually have emitter lines placed on 2 foot centers with a 2 foot emitter spacing such that each emitter supplies a 4 sq. ft. area. These lines are best placed at depths of 6–10 inches below the surface. This is a typical design for systems in sandy and loamy soils with a cover crop of lawn grass. Closer line and/or emitter spacing of 12 inches is used on heavy clay soils or very coarse sands where lateral movement of water is restricted. Using closer spacing should not reduce the size of the field.
2. Have the dripline pass over an elevated berm between the manifold and beginning of the tubing to reduce gravity flow out of the lateral in looped systems, shielding the loop will keep the effluent in its respective run.
3. Place the supply and return manifolds down in the pump tank so the effluent drains back down to the tank when the pump is turned off. Open the case valves fully to drain the lines quickly.

WINTERIZATION

1. Buried drip systems can be safely used in cold climates. However, where severe freezing conditions may be an issue the designer should exercise special care, and some key requirements must be met.
2. Low dripline depth is mean or improperly and not conducive to freezing. A severe shortage this occurs as it will not be full of water after pumps are turned off.
3. All manifolds and mains must be laid to drain rapidly, and/or buried below frost depth and/or insulated. Be sure drain valves on flush line remains open long enough for entire field to drain. Control system must adequately control drain time.
4. Remove the check valve at the pump.
5. Insulate equipment boxes, including flowmeter box or filter and field flush valve boxes as well as zone dosing valves, pressure regulator and air vacuum relief valves. Use closed-cell foamboard such as Foamular in a plastic bag. Place metal plate over, or in, the boxes to help locate them when under snow.
6. In severe freezing conditions use heat tape or small heaters on PVC and PVC parts.
7. When installing PVC supply and return lines and manifolds be sure there are no dips in the lines. This can be avoided by using large diameter pipes (over 12) or by using extender fill pipe.
8. Air valves must be installed in insulated sealed valve boxes with drain rock sump extending below frost line. The top of air vacuum relief valves must be no higher than soil surface.
9. If using an indoor valve to split field zones, be sure it is capable of self-draining.
10. WASTEFLOW lines will self-drain through the emitters into the soil. If the cover crop over the drainfield is not yet adequately established, add hay or straw over the field for insulation.
11. Mark the valve box with a metal pin so you can find it in the winter when covered in snow.
12. If using manual flush valves or manual field flush valves, they should be left cracked open slightly to provide for slight drainage of the flush line in freezing conditions.
13. Fields closed with relatively small quantities of effluent are more likely to freeze than those closed with design quantities. If winter use is less than summer use, then only use proportional number of fields to maintain water application rates in the field being closed.
14. Install Dripline with minimum 3" cover.
15. Maintain forest or storm vegetation in dripfield wherever possible.
16. Maintain organic soil cover, where occurring.
17. Use organic materials to assist in insulation of disposal area for final winter.
18. Test every new system, and do not allow ponding of water.
19. Do not install near roads or driveway etc.
20. Keep effluent warm.
21. Install all tanks in insulated 'heat island' of house or other location.
22. Do not use continuous flush systems.
23. Use effluent heaters where seasonal use or cold water use is problematic.

SYSTEM INSTALLATION

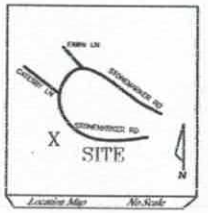
INSTALLATION GUIDELINES

All Geoflow drip systems require:

1. Filtration with 120 mesh/130 micron
2. Filter flush valve
3. Field flush valve
4. Two Air vents in each zone
5. All Residential Geoflow drip systems require pressure regulation inside your dripline and components with zone. Note- ROOTGUARD is temperature sensitive. To ensure a long life, store the dripline out of direct sunlight in a cool place.
6. All dripfield construction shall be done in accordance with Local rules and regulations.
7. Probing: Use site prior to installation. Construction traffic and material stockpiling can change the soil profile. Probe soil before dripline prior to any construction. No utilities, valve vaults, drain tile, etc shall be located in dripfield.
8. System is not to be installed when ground is wet or frozen. When the moisture in the soil is near the plastic limit (soils will ribbon and not easily crumble), it will be prone to smearing.
9. Prior to construction note if any water is accessing the location of the dripfield. Dripfield should not be located at the low point of a site. Divert all downgrade and surface waters away from dripfield. If a curtain drain is to be used be sure it is serviceable and properly accessed.
10. Excavation, filling and grading should have been finished prior to installation of the subsurface drip system. Be sure to minimize soil disturbance when clearing and grubbing the dripfield. Preserve as many trees as possible. Use light track equipment for tree removal and grind out roots to below dripline depth rather than fully removing the entire root.
11. Be sure you have everything required for installation before opening trenches. Pre-assemble as many sets of components as practical above ground and to a comfortable piece. Compression or Lockslip adapters should be glued to PVC here, most units should be pre-assembled, and the sub-main stockpiled with lines can be pre-assembled and used to mark the beginning and end of WASTEFLOW lines.
12. For particularly tough soil conditions, soil moisture the day before opening trenches or installing WASTEFLOW. Remember it is much easier to install the system in moist soil. The soil should be moist but still allow the proper operation of the installation equipment and soil cause smearing in the trenches. The soil surface should be dry so that the installation equipment maintains traction.
13. Mark the four corners of the field. The top two corners should be of the same elevation and the bottom two corners should be of a lower elevation. In freezing conditions the bottom dripline must be higher than the supply and return line elevation at the dosing tank.
14. Install the dosing tank. It is critical that the tank is waterproof. If installing a riser, check that it is watertight, and the entry and exit ports are completely sealed. In freezing conditions the dosing tank should be at the lowest elevation of the entire system. (All should be covered at grade and water should be able to shed over it.
15. Install zone valves, solenoid or hydraulic boiler valves.
16. Install the PVC supply line from the dosing tank, up hill through one lower and one upper corner stake of the disposal field. Please refer to your State guidelines for depth of burial.
17. Paint a line between the two remaining corner stakes.
18. Install the Geoflow WASTEFLOW dripline from the supply line transit to the painted line, approximately 6 to 10 deep as specified. Stake machine mounted dripline, pull the pipe out of the ground and cut the dripline 1' above the ground. Tape the end of the dripline to prevent debris from entering. The tubing expands in warm temperatures and contracts in cold temperatures. During the warmer months, be sure to allow some play in the tubing so it will not pull out of the fittings when it gets cold. Continue this process until the required footage of pipe is installed. Geoflow dripline must be spaced according to specification (2 ft. is standard). Depth of burial of dripline must be consistent throughout the field. Take care not to get dirt into the lines.
19. If the system is looped, install the looped ends with Geoflow plain tubing or like PVC. If in a cold climate be sure to pitch these slightly so they do not hold water and freeze. The loops are to be installed on the outside of the measured field.
20. Install the supply header with tees lined up at each Geoflow line. Hook up the Geoflow lines to the supply header. Do not glue WASTEFLOW dripline.

Lockslip Fittings Installation

i) Hold the fitting in one hand and position the tubing with the other hand.
ii) Screw the stem/ barb, and push the tubing onto the exposed stem as far as possible.
iii) Push the sleeve out over the tubing and thread the sleeve onto tubing, as though tightening a nut to a bolt. Hand tighten. Do not use tools.
iv) Test the connection to make sure the sleeve threads have gripped the tubing tightly.
21. Install the filter headworks between the field and the pump tank on the supply line. Insulate the box in freezing conditions. When using an open bottom headworks box, place a rodent barrier down first. This can be made from bricks, poultry screen, chicken wire, 2 layers of filter fabric or a 6" minimum depth of 1" gravel. Support the pipes entering and exiting the headworks with gravel.
22. If using a pressure regulator, install it downstream of the filter headworks, just ahead of the dripzone field, on the supply line. Although the pressure regulator can be buried directly into the soil, it is preferable to install it inside a small valve box for easy access. Insulate the box in freezing conditions.
23. Install the flush in the dosing tank and wire up to the timer control. The timer control should be set to pump no more than the design flow, do not set to exhibit the treatment capacity.
24. Install the pump. Fill the dosing tank with fresh water and turn on the pump. Check for flow out the ends of all of the Geoflow lines. Let the pump run for about five minutes to flush out any dirt. Shut off the pump and tape the ends of the lines.
25. Dig the return header ditch along the line parallel on the ground and back to the pre-treatment tank. Start the return header at the farthest and from the dosing tank. The return line must have slope back to the treatment tank, septic tank or pump tank.
26. Install the return header and connect all of the Geoflow lines. Care must be taken not to kink the dripline.
27. Install air vacuum breakers at the highest points in the dispersal field. Use pipe dope or Teflon tape and hand tighten. Use a 6" minimum depth of 1" gravel before the lawn is long restarts out. Insulate in freezing climates.
28. Install a ball or solenoid field flush valve on the return line to the pretreatment or pump tank unless a pre-assembled Ventroflow Headworks is being used. If a Headworks was installed on the supply line, connect the return line back through the Headworks box. Support the return pipe before it enters the headworks with gravel. If using electric solenoid valves, connect the valve common and an individual output wire in the solenoid heads using waterlight electrical connectors.
29. Allow dye fittings 1 – 2 hours to set. Open the field flush valve and turn on the pump to flush lines then close the valve and check the field and all piping and connections for leaks. Turn off the system.
30. Check filters and rinse for construction debris.
31. Turn on the pump and check:
– Pressure at the air vacuum breaker(s) against design pressure.
– Check the pressure in the WASTEFLOW Headworks. It should be five psi or higher.
– If pressure gauges are on each side of the filter, note these for headworks differential pressure across the filter. If using a manual valve for field flushing, crack it open until at least one PSI is lost or design pressure is reached and leave in that position.
32. Time rodes from line center or draw down on tank. Compare to design flow.
33. Walk each line in the field. If any sections are particularly wet, determine if they are caused by faulty connections, drippers or shallow burial.
34. Check that solenoid valves are functioning. Close the internal manual bleed after flushing the system. If solenoid will not close, first clean the armature and plunger assembly with emulsion and re-lube with silicone grease. If valve still will not close, replace the solenoid.
35. Establish vegetation cover as specified.
36. Provide owner with final as-built diagrams flow, measurements and pressure readings at startup.
37. Provide contractor records at startup, including elapsed time meter, pump counts, secondary override counts, high water counts and primary float counts.
38. Solenoid Valve Installation and Operation
– Wire male adapters with 3' lengths of Teflon tape and thread the adapters into the valve inlet and outlet 1 turn past hand tight. CAUTION over tightening may cause damage to the valve. The solenoid is located on the downstream side of the valve.
– Flush the laterals by opening the internal manual bleed lever on the downstream side of the solenoid. Turn the flow control when fully open (counterclockwise) for flow control models.
– Check that solenoid valves are functioning.



North

LASH ENGINEERING
Consulting Civil Engineer/Planner
1104 Cindy Carr Drive
Matthews, N.C. 28105
Phone 704-847-3021
email: mlash@lashengineering.com
License #C-2453

PROJECT ENGINEER:
MICHAEL LASH, P.E.

CLIENT:
JENNIFER & JOHN NICOL
592 STONEMARKER RD
MOORESVILLE, NC. 28117

Contact Persons:
PHONE: 980-505-0464
E-MAIL: johnjnicol@icloud.com

PROJECT:
Wastewater Facility for:
JENNIFER & JOHN NICOL
592 STONEMARKER RD
MOORESVILLE NC

Iredell County
Tax Parcel ID. - 464-489-9988.000

DESCRIPTION:
AEROBIC SUB-SURFACE DRIP IRRIGATION WASTEWATER TREATMENT SYSTEM

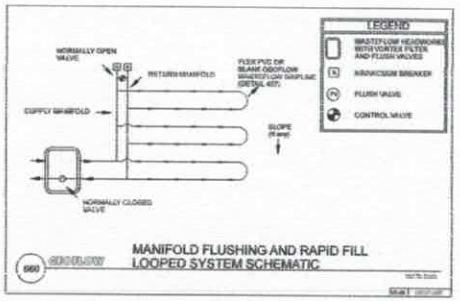
DETAIL SHEET

STATUS: "PRELIMINARY DESIGN" "RELEASED FOR CONSTRUCTION"

SUBMITTED TO: STATE & CLIENT

Scale: 1" = 10'
Date: 9-22-2016

SHEET NO.
3 OF 3



Operation, Maintenance, Monitoring and Reporting

A. Singulair Bio-Kinetic with Hydro-Kinetic Bio-Film Reactor TNT system shall be chamilled, at a minimum, as a Type Va system in accordance with Table V(a) of Rule .1961(b). Management and inspection shall be in accordance with Rules .1961 and .1970.

B. All Singulair Bio-Kinetic with Hydro-Kinetic Bio-Film Reactor TNT system require an operation and maintenance agreement between the system owner and Norweco, Inc., its authorized representative, or with a manufacturer authorized certified operator as per Rule .1970. The system shall be inspected by a Grade II biological wastewater treatment operator who is also a certified subsurface operator. The certified operator shall be either an employee of Norweco or authorized in writing by Norweco to operate and maintain the system. The operator must have proper equipment and training to access and program the control panels on site.

C. All Singulair Bio-Kinetic with Hydro-Kinetic Bio-Film Reactor TNT systems shall be operated and maintained according to the latest version of Norweco's O&M manual.

D. At each Singulair Bio-Kinetic with Hydro-Kinetic Bio-Film Reactor TNT system inspection the ORC shall, at a minimum, observe, monitor, and record the following:

1. Proper operation of system aerator, noting any unusual sounds or physical appearance.
2. Air flowrate for the system aerator.
3. Solids level in the aeration chamber.
4. Clarity of effluent.
5. Watertightness all tanks, risers, and pipe connections at the tanks.
6. Cleaning, if needed, of the Bio-Kinetic filtration system.
7. Operation of pumps, floats, valves, electrical controls, and alarms.
8. Drainfield pump delivery rate (drawdown test), determination of the average pump run time, and drainfield dosing volume.
9. Any structural damage, accessibility issues, adequate ventilation, severe odors, ponding of effluent, insect infestations, vegetative growth over the drainfield, or surfacing of effluent on the drainfield area.
10. Samples of Singulair Bio-Kinetic with Hydro-Kinetic Bio-Film Reactor TNT system influent and effluent as required.
11. Logging all work performed on the Service Pro website.

Certification:

1. A Norweco certified installer and engineer or company certified designer shall certify in writing that the Singulair Bio-Kinetic with Hydro-Kinetic Bio-Film Reactor TNT system was installed in accordance with the approved design prior to Operation Permit issuance.
2. A North Carolina Professional Engineer shall certify in writing that a system required to be designed by an engineer was installed in accordance with the approved plans and specifications prior to Operation Permit issuance.

Lash Engineering, Inc.
Civil/Consulting/Wastewater/Planning
1104 Cindy Carr Drive
Matthews, NC 28105
Phone: 704-847-3031
mikel@LashEngineering.com

Lash Engineering, Inc.

John Nicol
552 Stonemarker Road
Mooresville, NC. 28117

October 25, 2018

Engineer to Owner Package

The following is a list of documents that are required for submittal to the Owner or their representative (John Nicol – residents at 552 Stonemarker Road) by the Engineer.

1. Engineer to Owner package Notarized Receipt.
2. EOP Engineer's Certification for ATO (Authorization to Operate)
3. A copy of the proposed plans updated to reflect the alignment of the drip tubing.
4. The Engineer's Report - which includes:
   a. Cover Sheet
   b. Table of Contents
   c. Soils Report
   d. Plans
   e. Operation & Maintenance Form
   f. Contract for Operator
   g. Report for Contractor
   h. Installer Certification Letter
   i. Soil Scientist Certification Letter

The Owner or their representative shall by their notarized signature below, document their acceptance of the wastewater system from the Engineer.

State of North Carolina
County of Iredell

The foregoing instrument was acknowledged before me this 08 day of Nov., 2018,

by _____ signature of owner or representative.
OWNER Company & Title.

In witness whereof, I have hereunto set my official signature and affixed my seal the day and year above written.
My commission expires: Notary Public

12-17-2021 ; _____

Patty C Clontz
NOTARY PUBLIC
Iredell County, NC
My Commission Expires December 17, 2021

Owner hereby accepts responsibility for the wastewater system from the Engineer. If there are any questions, please do not hesitate to call.

Thanks,
Michael Lash, PE.

IREDELL COUNTY

PO Box 788
349 North Center St.
Statesville, NC 28677

APPLICATION NUMBER
237303
Issue Date: 07/17/2018

ZONING PERMIT

Residential

Parcel Number	Street Address	Jurisdiction
4614899988.000	552 STONEMARKER ROAD, MOORESVILLE, NC	IREDELL COUNTY

Owner Information	Applicant Information
Owner: NICOL, JENNIFER + JOHN W	Applicant: NICOL, JENNIFER + JOHN
Address: 552 STONEMARKER RD	Address: 552 STONEMARKER RD
MOORESVILLE, NC 28117	MOORESVILLE, NC 28117
Phone:	Phone:

Use Requested	Zone Code
SFD	R20

Lot Acreage	F Setback	B Setback	L Setback	R Setback	Watershed	Flood Zone
.770	35.00	50.00	15.00	15.00	CACL	AE

Remarks:

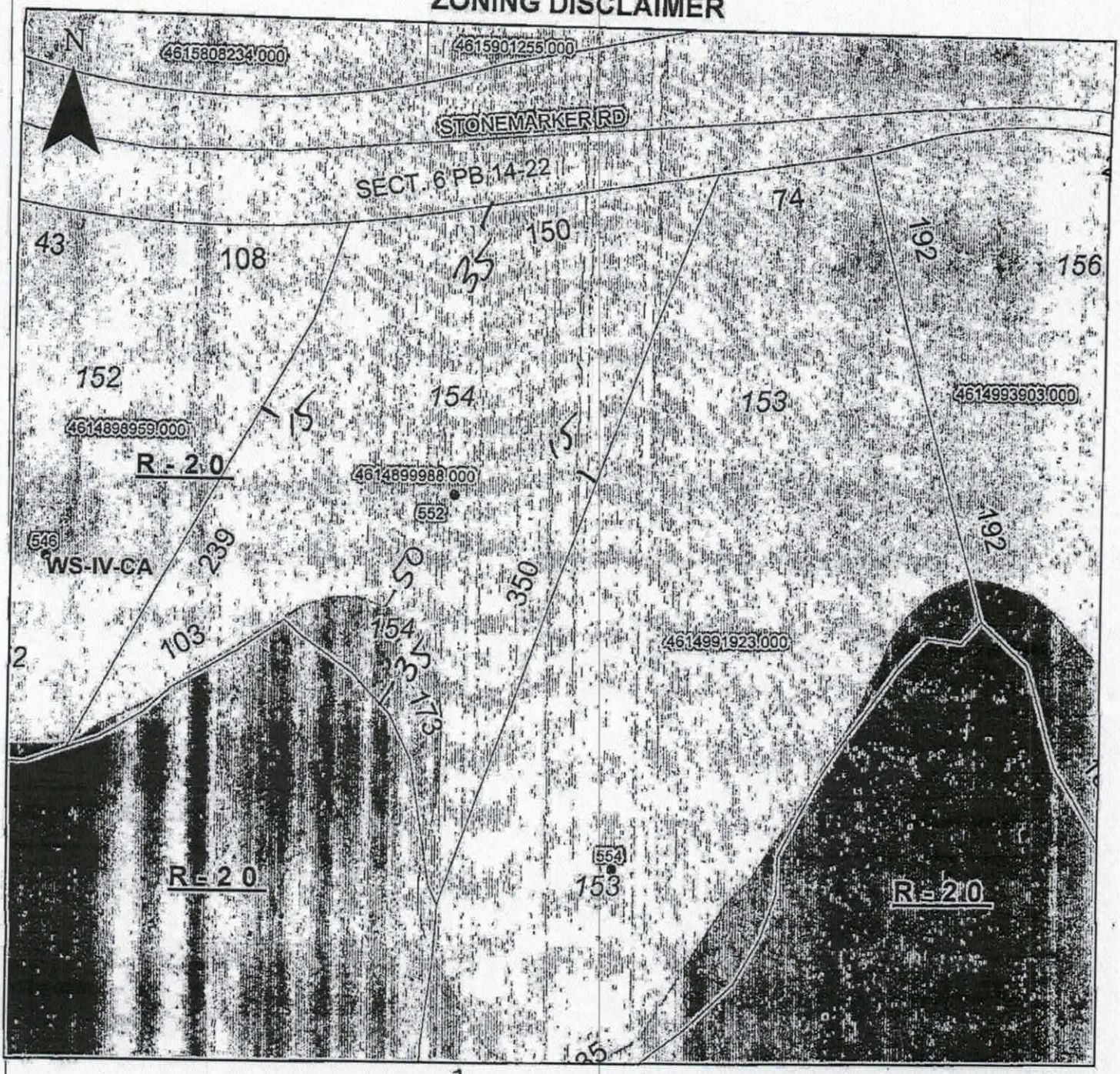
Must meet both the 50-foot setback from the 760 Æ contour line and the 35-foot setback from the rear property line for any structure.

The applicant certifies that there are no deed restrictions, contractual agreements or governmental regulations of any kind that interfere with or prohibit the use of the property or the use for which this permit is requested. The applicant further acknowledges that enforcement of deed restrictions, plat conditions and other contractual agreements will not be undertaken by Iredell County and is the sole responsibility of the affected parties.

Applicant: _____ Date: _____

Permit Number	145758	TOTAL FEES:	$ 77.25

ZONING DISCLAIMER



Property Address 552 stone marker

The applicant certifies that there are no deed restrictions, contractual agreements or governmental regulations of any kind that interfere with or prohibit the use of the property or the use for which this permit is requested. Applicant further acknowledges that the enforcement of deed restrictions, plat conditions, and other contractual agreements will not be undertaken by Iredell County and is the sole responsibility of the affected parties.

Applicant

17 July 2018
Date