Engineer's Report
Proposed New SDS & Water Supply for Kimmel Subdivision

Prepared for:

Timothy Kimmel
5 Forest View Drive
Hopewell Junction, NY 12533

August 12, 2022

Prepared by:
Hudson Land Design
Professional Engineering, P.C.

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APPENDICES

1.0 PROJECT LOCATION

The project site is comprised of the property located at 325 Pine Ridge Drive in the Town of Wappinger, Dutchess Conty, and the two vacant lots adjoining the property's northern boundary. The lots comprising the site are identified as Tax Parcels #'s 6257-04-624259, 6257-04-647304, and 6257-04-608305 on the Dutchess County Parcel Access.

The property located at 325 Pine Ridge Drive (Tax ID# 6257-04-624259) is a developed lot which contains an existing 3-bedroom, single-family dwelling along with a private well and subsurface sewage disposal system (SSDS). The majority of the property's area is composed of maintained lawn along with a wooded area along its western portion.

The vacant lot identified by the Tax ID # 6257-04-647304 (hereto referred to as the northeast lot) extends due northeast from the 325 Pine Ridge lot, and fronts around 250 feet along the north-to-south oriented section of Pine Ridge Drive. An easement for power lines runs east-to-west along the northern portion of the lot. The site is predominantly wooded with the exception of the area along the easement which is clear of trees. The lot also contains existing earth roads used for access to the easement area from Pine Ridge Drive.

The vacant lot identified by the Tax ID # 6257-04-608305 (hereto referred to as the north lot) extends due north from the 325 Pine Ridge lot and fronts along Old Hopewell Road/County Route 28. A set of power lines and their easement cross the lot from east-to-west at around the middle of its north-to-south length. This lot is predominantly wooded with the areas along and around the easement being cleared of trees. The lot also contains existing earth roads that allow access into the lot from both Old Hopewell Road and form the adjacent northeast lot.

2.0 PROJECT DESCRIPTION

The proposed project entails the subdivision of the three lots' combined area in order to create five new residential lots. One of the new lots will retain the existing residence and the remaining four lots will be developed through the construction of a single-family residence along with individual private well and subsurface sewage disposal system (SSDS) on each lot.

The newly created Lot 1 will retain the existing residence at 325 Pine Ridge and its original driveway. The driveway will need to be slightly altered in order to accommodate the new lot's western boundary. A reserve septic absorption field has been designed north of the residence and will only be constructed if the existing septic system fails. The well currently serving the existing residence will end up outside of Lot 1's boundaries after the subdivision and will reside west of the proposed shared driveway for future Lots 2 & 3. The existing well will remain in service and will continue to be the water supply for the 325 Pine Ridge residence. The new driveway will be constructed such that it will not interfere with the well's buried water service line and an easement will be created to allow the Lot 1 residents access to the well and service line.

Lots 2 and 3 will be flagpole lots with frontage/entrances along Pine Ridge Drive. A single-family residence is proposed to be constructed on each lot along with private wells and SSDS to serve the new residences.

Lot 4 will be created from the northeastern lot's eastern portion and will front the north-to-south oriented portion of Pine Ridge Drive. The lot will be developed through the construction of a single-family residence along with a private well and SSDS. For access, the existing earthen road, whose access gate resides on Pine Ridge Drive, will be used in lieu of a paved driveway. The earthen driveway will connect to a paved parking lot that is to be constructed alongside the residence. Due to restrictive circumstances present on the area for new lot 4, the optimal locations for the placement of the proposed residence and absorption fields puts the absorption fields at a higher elevation than that of the outlet for the septic tank. Therefore, a pumping station is required so that sewage effluent can reach the absorption field.

Lot 5 will comprise of the area north of the power lines on the north lot. The lot's frontage will be along Old Hopewell Junction Road/County Route 28 and will be developed through the construction of a single-family residence along with a private well and SSDS. For access, a paved driveway will be constructed from Old Hopewell Junction Road up to the proposed residence near the new lot's southwest corner.

This application is for individual SSDS that are sized to accommodate the wastewater flows for one existing 3-bedroom residence (with pre-1980 water fixtures), three (3) proposed 3-bedroom residences, and one (1) proposed 4-bedroom residence. A well already services the existing residence and is planned to remain in service. Individual wells are proposed to be drilled to service each of the new residence.

Wastewater generated by the project will be disposed of by means of new sewage disposal systems (SDSs). This report summarizes all data and information necessary for the design of the SDS.

The SDS design has been designed in accordance with the following:

- New York State Department of Health (NYSDOH) Standards for Individual Water Supply and Individual Sewage Treatment Systems Appendix 75-A

- Dutchess County Department of Behavioral and Community Health (DCDBCH) Design and Construction Standards Plan Submission Guide for Residential and Commercial Onsite Wastewater Treatment Systems and Sewer Mains for Less Than 1,000 Gallons per Day, Dated September 1, 2016

- New York State Department of Environmental Conservation (NYSDEC) "Design Standards for Wastewater Treatment Works" for Intermediate Sized Sewage Facilities.

- Recommended Standards for Wastewater Facilities (Ten States Standards)

- NYS Plumbing Code

3.0 SEWAGE DISPOSAL SYSTEM

The proposed primary and reserve SDS disposal field locations are shown in the enclosed design plans. The soil test results are provided in the attached Appendix B.

3.1 Estimated Wastewater Quantities

The wastewater quantities calculated for each of the new lots corresponds to the size of the residence (3-bedroom or 4-bedroom) that is proposed for each lot. The maximum residence size for some of the lots varies due to the difference in soil qualities encountered within each lot.

Lot 1 will retain the existing 3-bedroom residence at 325 Pine Ridge Drive and its existing (primary) SDS system. There are no plans to expand the existing house's bedroom count (size), therefore the current count will be used in the design for the new proposed reserve area on this lot. Because the existing residence was built in 1959, the per bedroom wastewater generation value for Pre-1980 water fixtures of 150 gpd/bedroom will be used in the wastewater generation calculation. Using 150 gpd/bedroom, and a proposed three bedrooms residence, the design maximum daily flow is 150 gpd/bedroom * 3 Bedrooms = 450 gpd. Therefore, a wastewater generation quantity of 450 gpd will be applied for the new reserve SDS design on this lot.

A 4-bedroom residence is proposed to be constructed on Lot 2. Using 110 gpd/bedroom, and a proposed four bedrooms residence, the design maximum daily flow is 110 gpd/bedroom * 4 Bedrooms = 440 gpd. Therefore, a wastewater generation quantity of 440 gpd will be applied for the SDS design on this lot.

A 3-bedroom residence is proposed to be constructed on Lots 3, 4 and 5. Using 110 gpd/bedroom, and a proposed three bedrooms residence, the design maximum daily flow is 110 gpd/bedroom * 3 Bedrooms = 330 gpd. Therefore, a wastewater generation quantity of 330 gpd will be applied for the SDS design on these lots.

3.2 Septic Tanks

Per Table 3 of the DCDBCH Plan Submission Guide for Residential and Commercial Onsite Wastewater Treatment Systems and Sewer Mains for Less Than 1,000 Gallons per Day, Dated September 1, 2016, the minimum required septic tank capacity and the minimum required liquid surface area for a 3-bedroom residence is 1,000 gallons and 27 square feet respectively and the minimum required septic tank capacity and the minimum required liquid surface area for a 4-bedroom residence is 1,250 gallons and 34 square feet respectively.

For Lot 1, the septic tank currently serving the 325 Pine Ridge residence will remain in use unless the existing septic system fails. If the system fails, the existing septic tank will be tested to ensure it is in adequate condition for continued usage. If the tank passes, it will be connected to the

proposed reserve area located north of the residence. If the tank is found to be too degraded and/or of insufficient reliability, a new 1,000-gallon pre-cast concrete septic tanks with a minimum liquid surface area of 27 square feet will be installed and used for the proposed reserve SDS system.

For Lot 2 a 1,250-gallon pre-cast concrete septic tank with a minimum liquid surface area of 34 square feet is proposed to provide initial treatment prior to the distribution of effluent into the disposal field.

For Lots 3, 4, and 5 a 1,000-gallon pre-cast concrete septic tanks with a minimum liquid surface area of 27 square feet are proposed to provide initial treatment prior to the distribution of effluent into the disposal fields.

3.3 Pump Chamber

Lot 4:

Due to the absorption fields being located at a higher elevation with respect to the septic tank, a pump will be required to transmit effluent to the absorption field at dosed intervals. Per DCDBCH guidelines, the volume of effluent to be pumped to the absorption field per each activation of the pump (dose volume) is required to be between 75% and 85% of the absorption field's total pipe volume. The following table shows the values calculated for the pipe volume of lot 4's primary absorption field, the minimum and maximum gallons of effluent that can be pumped per dose to stay within the required 75% to 85% of the pipes' volume, and the proposed dose volume that was calculated for the system:

Proposed System	Absorption Trench Pipe Volume (V, in gallons)	Required Dose Range (75% - 85% V in gallons)	Dose Volume Provided (gallons)
Primary	153.5	115.1 – 130.4	119.9

It is proposed that a Goulds Model 2ED 1/3 HP Submersible Effluent Pump be used for the pumping of effluent to the absorption field laterals. For the pump station, a Woodard's 1,250-gallon precast pump chamber is proposed to be used as the residence's pump tank. The pumping equipment has been sized for a discharge rate to exceed the minimum rate of 11.01 GPM to maintain self-cleansing velocities within a 1-½" pipe. The following table represents the pumping rate and total dynamic head (TDH) for the primary absorption field:

Absorption Field	Pump Rate	TDH	Velocity
Primary	30.0 GPM	20.9 feet	3.1 fps*

*fps = feet per second.

The pump will be single phase 115 volt with an electrical disconnect box located at the control panel. The control panel shall be located within the home. All electrical equipment will be designed and installed to comply with the National Electric Code for Class I, Group C or D, Division I locations.

Slightly more than two days of design flow storage is provided above the high-water alarm in case of pump failure. Three (3) float switches are to be installed: low-level pump off alarm, high-level pump on alarm, and high-level alarm. The alarms shall be located on the home in a clearly visible and audible location.

The proposed dosing volume equates to approximately 78.1% of the absorption field capacity for the primary absorption field. Refer to Appendix C for dosing calculations.

3.4 Disposal Fields

Please refer to the table at the end of this section for a summary of the design percolation rate that applies for each lot's design and the required trench length.

Lot 1 (Lot with existing house):

The proposed subdivision will not impose upon 325 Pine Drive's existing septic system, but it will encroach within the area originally planned for the reserve SSDS. As the area originally set out for the reserve system no longer being available, a new reserve system that could serve the existing residence needed to be designed within the new lot's boundaries. Soil testing conducted on the site indicated that the area north of the existing residence was viable for the construction of an absorption field. The proposed reserve absorption field has been designed using the latest standards present on the Dutchess County Design and Construction Standards Plan Submission Guide.

The proposed reserve field is a fill pad system that will require the import Run-of-Bank fill for the construction of the absorption field area.

For Lot 1, the proposed absorption field area will require the placement of between 2.0 to 3.0 feet of select fill. The size and design for the proposed reserve area is based on an application rate of 0.60 gpd/sf for a design percolation rate of 21-30 minutes/inch.

For the reserve area, a total of 375 feet of 2' wide trench area is required, this equates to a design calling for 7 laterals each 54 linear feet long for a total of 378 linear feet.

As previously stated, the material used for the construction of the fill pads shall be R.O.B sand and gravel. The material shall be placed in 6-inch lifts and mechanically compacted such that the material attains an infiltration rate no less than 1 minute per inch and no greater than 15 minutes per inch. The laterals for the absorption trenches will run parallel with the existing contours. The trench bottoms will be constructed level and the ends of the distribution piping will be capped. 6-inches of aggregate gravel will be placed beneath the distribution piping and a minimum of 2-

inches of aggregate will be placed above the piping. Since dosing is not required nor proposed, the distribution laterals will be sloped at between 1/16" to 1/32" per foot. Once construction of the fill pad and laterals is completed, the fill pad shall be covered with a minimum of 6 inches of topsoil. Grass seed and mulch shall be applied on the topsoil and the fill pad shall be developed to full stabilization.

Lot 2:

Both the primary and reserve areas shall be conventional trench systems requiring no fill. Both the primary and reserve areas are based on an application rate of 0.70 gpd/sf for a design percolation rate of 16-20 minutes/inch.

For the primary area, a total of 315 feet of 2' wide trench area is required, this equates to a design calling for 6 laterals each 55 linear feet long for a total of 330 linear feet.

For the reserve area, a total of 315 feet of 2' wide trench area is required, this equates to a design calling for 6 laterals each 55 linear feet long for a total of 330 linear feet.

The laterals for the absorption trenches will run parallel with the existing contours for both the primary and the reserve areas. The trench bottoms will be constructed level and the ends of distribution piping will be capped. 6-inches of aggregate gravel will be placed beneath the distribution piping and 2-inches of aggregate will be placed above the piping. Since dosing is not required nor proposed, the distribution laterals will be sloped at between 1/16" to 1/32" per foot.

Lot 3:

Both the primary and reserve areas shall be fill pad systems that will require the import of Run-of-Bank fill for the absorption field areas. It is estimated that between 1.5 and 2.5 feet of select will need to be placed along the proposed absorption areas for the construction of the fields. Both the primary and reserve areas are based on an application rate of 0.50 gpd/sf for a design percolation rate of 31-45 minutes/inch.

For the primary area, a total of 330 feet of 2' wide trench area is required, this equates to a design calling for 6 laterals each 55 linear feet long for a total of 330 linear feet.

For the reserve area, a total of 330 feet of 2' wide trench area is required, this equates to a design calling for 6 laterals each 55 linear feet long for a total of 330 linear feet.

As previously stated, the material used for the construction of the fill pads shall be R.O.B sand and gravel. The material shall be placed in 6-inch lifts and mechanically compacted such that the material attains an infiltration rate no less than 1 minute per inch and no greater than 15 minutes per inch. The laterals for the absorption trenches will run parallel with the existing contours for both the primary and the reserve area. The trench bottoms will be constructed level and the ends of distribution piping will be capped. 6-inches of aggregate gravel will be placed beneath the

distribution piping and 2-inches of aggregate will be placed above the piping. Since dosing is not required nor proposed, the distribution laterals will be sloped at between 1/16" to 1/32" per foot. Once construction of the fill pad and laterals is completed, the fill pad shall be covered with a minimum of 6 inches of topsoil. Grass seed and mulch shall be applied on the topsoil and the fill pad shall be developed to full stabilization.

Lot 4:

Both the primary and reserve areas shall be fill pad systems that will require the import of between 2.0 and 3.0 feet of Run-of-Bank fill for the absorption field areas. Both the primary and reserve areas are based on an application rate of 0.70 gpd/sf for a design percolation rate of 16-20 minutes/inch.

For the primary area, a total of 236 feet of 2' wide trench area is required, this equates to a design calling for 6 laterals each 40 linear feet long for a total of 240 linear feet.

For the reserve area, a total of 236 feet of 2' wide trench area is required, this equates to a design calling for 4 laterals each 59 linear feet long for a total of 236 linear feet

As previously stated, the material used for the construction of the fill pads shall be R.O.B sand and gravel. The material shall be placed in 6-inch lifts and mechanically compacted such that the material attains an infiltration rate no less than 1 minute per inch and no greater than 15 minutes per inch. The laterals for the absorption trenches will run parallel with the existing contours for both the primary and the reserve area. The trench bottoms will be constructed level and the ends of distribution piping will be capped. 6-inches of aggregate gravel will be placed beneath the distribution piping and 2-inches of aggregate will be placed above the piping. Since dosing (pumping) will be used for the delivery of effluent to the absorption fields, the distribution laterals will be installed fully level along their entire longitudinal length. Once construction of the fill pad and laterals is completed, the fill pad shall be covered with a minimum of 6 inches of topsoil. Grass seed and mulch shall be applied on the topsoil and the fill pad shall be developed to full stabilization.

Lot 5:

Both the primary and reserve areas shall be fill pad systems that will require the import of between 3.5 and over 4.5 feet of Run-of-Bank fill for the absorption field areas. Both the primary and reserve areas are based on an application rate of 0.60 gpd/sf for a design percolation rate of 21-30 minutes/inch.

For the primary area, a total of 275 feet of 2' wide trench area is required, this equates to a design calling for 5 laterals each 55 linear feet long for a total of 275 linear feet.

For the reserve area, a total of 275 feet of 2' wide trench area is required, this equates to a design calling for 5 laterals each 55 linear feet long for a total of 275 linear feet.

As previously stated, the material used for the construction of the fill pads shall be R.O.B sand and gravel. The material shall be placed in 6-inch lifts and mechanically compacted such that the material attains an infiltration rate no less than 1 minute per inch and no greater than 15 minutes per inch. The laterals for the absorption trenches will run parallel with the existing contours for both the primary and the reserve area. The trench bottoms will be constructed level and the ends of distribution piping will be capped. 6-inches of aggregate gravel will be placed beneath the distribution piping and 2-inches of aggregate will be placed above the piping. Since dosing is not required nor proposed, the distribution laterals will be sloped at between 1/16" to 1/32" per foot. Once construction of the fill pad and laterals is completed, the fill pad shall be covered with a minimum of 6 inches of topsoil. Grass seed and mulch shall be applied on the topsoil and the fill pad shall be developed to full stabilization.

Summary Table of the Design Rate and Required Trench Length for each Lot.

Lot #	System Location	Design Percolation Rate (min./in.)	Required Length of Absorption Trenches for Primary System (linear feet)	Required Length of Absorption Trenches for Reserve System (linear feet)
1	Refer to Design Plan	21-30	Existing System	375
2	Refer to Design Plan	16-20	315	315
3	Refer to Design Plan	31-45	330	330
4	Refer to Design Plan	16-20	236	236
5	Refer to Design Plan	21-30	275	275

3.4 Distribution Box

Lot 1:

The existing system on Lot 1 already has a distribution box. In case the current primary system fails, a pre-cast 8-outlet distribution box will be utilized for the proposed reserve system. The proposed distribution box shall be set dead level on a 12-inch bed of pea gravel or clean sand and will be baffled at the inlet side. The cover for the box shall be removable but sealed to the box wall.

There will be a 2-inch minimum drop between the inlet and outlet inverts for each distribution box. In addition, there will be a minimum clearance between the invert of the outlet and the bottom of the distribution box of 2-inches to reduce solids carry over.

Lots 2 through 4:

A pre-cast concrete 8-outlet distribution box will be utilized for both the primary and reserve areas as shown on the plans. The proposed distribution boxes shall be set dead level on a 12-inch bed

of pea gravel or clean sand and will be baffled at the inlet side. The covers for the boxes shall be removable but sealed to the box wall.

There will be a 2-inch minimum drop between the inlet and outlet inverts for each distribution box. In addition, there will be a minimum clearance between the invert of the outlet and the bottom of the distribution box of 2-inches to reduce solids carry over.

Lot 5:

A pre-cast concrete 5-outlet distribution box will be utilized for both the primary and reserve areas as shown on the plans. The proposed distribution boxes shall be set dead level on a 12-inch bed of pea gravel or clean sand and will be baffled at the inlet side. The covers for the boxes shall be removable but sealed to the box wall.

There will be a 2-inch minimum drop between the inlet and outlet inverts for each distribution box. In addition, there will be a minimum clearance between the invert of the outlet and the bottom of the distribution box of 2-inches to reduce solids carry over.

4.0 WATER SUPPLY

4.1 Well Testing

Per DCDBCH requirements, the project needs one test well per every 5 lots. The existing well on Lot 1 will be quality and quantity tested per DCDBCH requirements/guidelines to prove the adequacy of the water supply.

5.0 TESTING

If a tank is delivered to the site in sections, the contractor shall make it watertight. A water tightness test shall be completed by the contractor, witnessed by both the engineer and the DCDBCH, and shall include filling the tank and measuring the water level over a 24-hour period. The force main on Lot 4 will be hydrostatically tested in accordance with AWWA Standard C-600. The pump chamber shall also be tested for water tightness over a 24-hour period, similar to the septic tanks, unless the chamber is seamless. A pump test will be conducted to verify that the tank floaters activate at the correct fluid level and that the pump alarm system gives both a visual and auditory alert when the alarm floater is activated. A fill certification will need to be attained for the fill pads on Lots 1, 3, 4, and 5 before laterals can be installed. A percolation test shall be performed on the fill pads to verify that they have an infiltration rate between 1 to 15 minutes per inch. If the pads' infiltration rate is found to be outside of the acceptable range the fill material shall be reworked and then allowed to settle and stabilize for a period of 6 months (including at least one freeze-thaw cycle) before they are re-tested. The fill pads will be re-tested until the infiltration rate for the pad is within the above referenced range.

Appendix A:

Application Form HD-1

DUTCHESS COUNTY DEPARTMENT OF HEALTH
APPLICATION FOR APPROVAL OF PLANS FOR A WASTEWATER DISPOSAL SYSTEM

1. Name & address of applicant: Timothy Kimmel
5 Forest View Drive, Hopewell Junction, NY 12533

2. Name of Project: Kimmel Subdivision 3. Location: (T) ~~V/C~~ Town of Wappinger

4. Project Engineer Hudson Land Design 5. Address 174 Main Street
Beacon NY 12508

6. Type of Project
X Private/Residential
___ Camp
___ Commercial
___ Apartments
___ Institutional
___ Mobile Home Park
___ Office Building
___ Food Service
___ Other (specify) _____
X Realty Subdivision

7. Is this project subject to State Environmental Quality Review (SEQR)?
Type status (check one) ___ Type I ___ Type II ___ Exempt X Unlisted

8. Is a Draft Environmental Impact Statement (DEIS) required? No

9. Has a DEIS been completed and found acceptable by the Lead Agency? N/A

10. Name of Lead Agency: Town of Wappinger Planning Board

11. Is this project in an area under the control of local Planning, Zoning or other officials, ordinances? Yes

12. If so, have plans been submitted to such authorities? Yes

13. Has preliminary approval been granted by such authorities? Yes

14. Type of sewage disposal system discharge: ___ Surface waters X Ground waters

15. If surface water discharge, what is the stream class designation? _____

16. Waters index number (surface) _____

17. Is project located near a public water supply system? No

18. If yes, name of water supply: _____ Distance to water supply: _____

19. Is project site near a public sewage collection or disposal system? No

20. Name of sewage system: _____ Distance to sewage system: _____

21. Were subsurface soil tests observed by a Health Department representative? Yes

22, Date observed: May 3, 2017 23. Name of Health Inspector: Daniel Keeler

24. Project design flow (gallons per day) Design flow varies by Lot. Proposed Lot 1 = 450 GPD, Proposed Lot 2 = 440 GPD, Proposed Lots 3, 4, & 5 = 330 GPD

25. Is an application for State Pollutant Discharge Elimination System (SPDES) required? No

26. Has application been submitted to local NYSDEC office? N/A

27. Is any portion of this project located within a designated wetland? No

28. Is a Wetland Permit required? No 29. Has application been made to local DEC office? No

30. Does project require a Stream Disturbance Permit? No

31. Is project located within 1000 feet of existence of abandoned landfill, hazardous waste site, salt stockpile or any other potential known source of contamination? No
Describe: _____

32. Does this project involve discharge or storage of industrial or hazardous wastes? No
Describe: _____

33. Is there a local master plan on file with the Town, Village, City? Yes

34. Are community water, sewer facilities planned to be developed within 15 years? Unknown

35. Are any sewage disposal areas in excess of 10% slope? Yes

36. Tax Map I.D. Number: Project site consists of 3 lots, please see list provided for all lots corresponding to this subdivision ---------->>

Tax ID #'s of lots comprising the subdivision site:
6257-04-624259
6257-04-608305
6257-04-647304

37. Approved plans are to be returned to: ___ Applicant X Engineer

If the application is signed by a person other than the applicant shown in Item 1, the application must be accompanied by a letter of authorization. Failure to comply with this provision may be grounds for the rejection of any submission.

I hereby affirm, under penalty of perjury, that information provided on this form is true to the best of my knowledge and belief. False statements made herein are punishable as a Class A Misdemeanor pursuant to Section 210.45 of the Penal Law.

Signatures and official titles: _____

Applicant

Mailing address: 5 Forest View Drive Hopewell Jct N.Y. 12533

Appendix B:

Soil Testing Information

DUTCHESS COUNTY DEPARTMENT OF HEALTH
PERCOLATION TEST DATA

Name: 325 PINE RIDGE ROAD (T) WAPPINGER Date: 05/07/2017
TAX GRID #

S	E	E		N	O	T	E		B	E	L	O	W

By: Hudson Land Design DCHD Inspector: None Present

Lot No.	Test Hole No.	Test Hole Depth	Soil Type	Soaked	TEST RUNS					
					*	1	2	3	4	5
2	2A	24"	Brown Silty-loam	No	Finish	13:04	13:17	13:35	13:55	14:14
					Start	13:16	13:33	13:54	14:14	14:33
					Time	12 min	16 min	19 min	19 min	19 min
3	3A	24"	Brown Silty-loam	No	Finish	12:30	13:03	13:33	14:07	14:42
					Start	13:00	13:33	14:06	14:40	15:15
					Time	30 min	30 min	32 min	33 min	33 min
4	4A	24"	Brown Silty-loam	No	Finish	13:15	13:28	13:48	14:10	14:30
					Start	13:26	13:47	14:07	14:29	14:49
					Time	11 min	19 min	19 min	19 min	19 min
5	5A	24"	Brown Silty-loam	No	Finish	14:54	15:15	16:15	16:43	
					Start	15:12	15:42	16:42	17:10	
					Time	18 min	27 min	27 min	27 min	
					Finish					
					Start					
					Time					
					Finish					
					Start					
					Time					

I, Daniel G. Koehler, the undersigned, certify that these percolation tests were done by myself or under my direction according to the standard procedure. The data and results presented are true and correct.

Dated: 05/07/2017

Signature:
License No. (P.E.) _____

STATE OF NEW YORK * DANIEL G. KOEHLER * 082716 LICENSED PROFESSIONAL ENGINEER

Note: Tax IDs: #6257-04-624259 (±1.3 acres); -608305 (±8 acres); -647304 (±4.3 acres)

DUTCHESS COUNTY DEPARTMENT OF HEALTH
PERCOLATION TEST DATA

Name: 325 PINE RIDGE ROAD (T) WAPPINGER Date: 05/03/2017

TAX GRID #

S	E	E		N	O	T	E		B	E	L	O	W

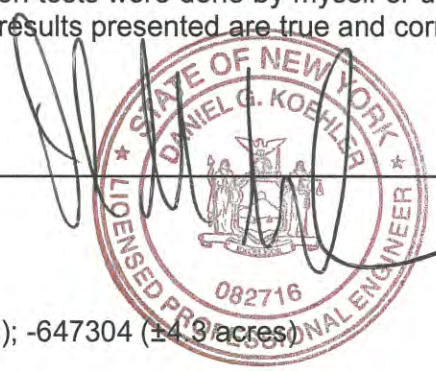
By: Hudson Land Design DCHD Inspector: None Present

Lot No.	Test Hole No.	Test Hole Depth	Soil Type	Soaked	TEST RUNS					
					*	1	2	3	4	5
1	1	24"	Brown Silty-loam	No	Finish	12:54	13:15	13:42	14:11	14:41
					Start	12:36	12:54	13:16	13:44	14:13
					Time	18 min	21 min	26 min	27 min	28 min
2	2	24"	Brown Silty-loam	No	Finish	16:12	16:32	16:54	17:16	
					Start	16:00	16:14	16:36	16:57	
					Time	12 min	18 min	18 min	19 min	
3	3	24"	Brown Silty-loam	No	Finish	16:34	17:20	18:06		
					Start	15:56	16:35	17:21		
					Time	38 min	45 min	45 min		
4	4	24"	Brown Silty-loam	No	Finish	16:17	16:35	16:54	17:14	
					Start	16:01	16:17	16:36	16:54	
					Time	16 min	18 min	18 min	18 min	
5	5	24"	Brown Silty-loam	No	Finish	16:15	16:26	16:40	16:55	
					Start	16:05	16:15	16:26	16:40	
					Time	10 min	11 min	14 min	15 min	
					Finish					
					Start					
					Time					

I, Daniel G. Koehler, the undersigned, certify that these percolation tests were done by myself or under my direction according to the standard procedure. The data and results presented are true and correct.

Dated: 05/03/2017

Signature:
License No. (P.E.) _____



Note: Tax IDs: #6257-04-624259 (±1.3 acres); -608305 (±8 acres); -647304 (±4.3 acres)

D E E P T E S T R E S U L T S

DUTCHESS COUNTY HEALTH DEPARTMENT

Date: 05/03/2017

Name of property: 325 Pine Ridge Drive (~~C~~)(T)(~~V~~) Wappinger

TAX GRID #

S	E	E		B	E	L	O	W					

Owner of property: Tim Kimmel Engineer: Hudson Land Design

Person directing test: Hudson Land Design DCHD Rep: Daniel Keeler, P.E.

HOLE #	LOT #	TOTAL DEPTH	ROCK DEPTH	WATER DEPTH	MOTTLING DEPTH	SOIL DESCRIPTION
1	4	78”	>78”	>78”	N/A	12” TOP SOIL, 12”- 78” BROWN SILT-LOAM
2	4	66”	>66”	>66”	N/A	2” TOP SOIL, 2”-66” BROWN SILTY-LOAM
2A	4	72”	>72”	>72”	N/A	8” TOP SOIL, 8”-72” BROWN SILTY-LOAM
3	5	42”	42”	>42”	N/A	10” TOP SOIL, 10”- 42” BROWN SILT-LOAM WITH SAND
4	5	54”	54”	>54”	N/A	10” TOP SOIL, 10”- 54” BROWN SILTY-LOAM WITH SAND
5	5	60”	50”	>60”	N/A	10” TOP SOIL, 10”- 50” BROWN SILTY-LOAM WITH SAND, 50”- 60” DIGGABLE SHALE
6	1	60”	60”	>60”	N/A	10” TOP SOIL, 10”- 24” LOOSE SILT-LOAM, 24”- 60” TIGHT SILTY-CLAY LOAM
7	2	36”	36”	>36”	N/A	6” TOP SOIL, 6”-36” BROWN SILTY-LOAM, >36” SHALE BEDROCK
8	2	84”	>84”	>84”	N/A	3” TOP SOIL, 3”-84” BROWN SILTY-CLAY
9	2	84”	>84”	>84”	N/A	3” TOP SOIL, 3”-84” TIGHT SILTY-CLAY WITH SAND
10	3	72”	72”	>72”	N/A	6” TOP SOIL, 6”- 72” BROWN SANDY SILT-LOAM, >60” SHALE BEDROCK
11	3	72”	72”	>72”	N/A	6” TOP SOIL, 6”-72” GRAVELLY SILT -LOAM
12	3	84”	>84”	>84”	N/A	6” TOP SOIL, 6”-84” GRAVELLY SILT -LOAM

General remarks (terrain; weather; springs, streams, etc.)

Tax IDs #6257-04-624259 (±1.3 acres); -608305 (±8 acres); -647304 (±4.3 acres)

Generally Sunny, 65 degree Fahrenheit

HD-185

Appendix C:

SDS Pump Calculations

(Lot 4)

Hudson Land Design
174 Main Street
Beacon, NY 12508

PUMP CALCULATIONS FOR PUMP CHAMBER - LOT 4

I. Design Criteria

A. Minimum velocity of 2 feet per second in forcemain (pg. 40-4 of 10 State Standards For Wastewater Treatment).
B. Shutoff and check valve shall be placed in discharge line of each pump. Check valve shall be located between shutoff valve and pump (pg. 40-5 of Ten States Standards For Wastewater Treatment).
C. For smooth pipe materials such as PVC and polythethylene, a "C" value not to exceed 120 may be allowed for design (pg. 40-15 of Ten States Standards For Wastewater Treatment).
D. The volume of effluent in each dose should be 75 % - to 85% of the volume available in the pipe network (pg. 29 of DCDOH Design and Construction Standards).
E Minimum pipe size used in pressure distribution 1.5", maximum 3.0" (pg. 29 of DCDOH Design and Construction Standards).
F. Minimum 2 days storage between high level alarm and inlet invert (pg. 28 of DCDOH Design and Construction Standards).

II. Knowns

A. Proposed forcemain.	2.0 inch PVC
B. Pump discharges to proposed distribution box with invert elevation of	337.71 ft
C. Lowest Pump Off Elevation Dosing Chamber =	321.54 ft

III. Design Flows

A. Flow (Total) = 330 gpd

B. Size Discharge Line For a Minimum Velocity of 2 fps based upon 2014 Recommended Standards for Wastewater Facilities

Q = VA

- Q = Discharge (cfs)
- V = Velocity (fps)
- A = Area (sf)

PVC Forcemain size: 2 inch

- Area = 3.14 x 2 in. x2 in x 0.25 / (144 in^2 / sf) = 0.02181 sf

Q = VA

- Q = 2 fps x A sf = 0.0436 cfs

Q cfs x 7.48 gal/cf x 60 sec/min = 19.57 gpm (min flow rate)

IV. Pump Calculations

A. Determine Head Requirements

1. Proposed Primary Absorption Field

Proposed length of forcemain pipe = 118 ft.

Proposed length of forcemain in dosing chamber = 5 ft.

Fittings =	45's	2	L_e (Equivalent Length) =	2.6	ft/fitting	=	5.2	ft
	90's	3	L_e (Equivalent Length) =	5.7	ft/fitting	=	17.1	ft

- Equivalent Lengths from Figure 37, pg. 225 of the Handbook for PVC Pipe.
- 90's in lift station and prior to distribution boxes.
- 45's along line.

Valves =	Check -	1	L_e (Equivalent Length) =	19	ft/valve	=	19	ft
	Gate -	1	L_e (Equivalent Length) =	1.5	ft/valve	=	1.5	ft

- Equivalent Lengths from Figure 37, pg. 225 of the Handbook for PVC Pipe.
- Gate Valve will be open.

Total Length = 165.8 ft

Velocity Head = $V^2 / 2g$

Proposed Static Head = (Invert to distribution box) - (Pump off elevation) = 16.17 ft

Pump Performance Curve

Flow Rate (gpm)	Velocity (fps)	Total Static Head (ft)	Velocity Head (ft)	Friction Loss / 100' C = 120	Friction Loss (ft)	TDH (ft)
0	0.00	16.17	0.00	0	0.00	16.17
4	0.41	16.17	0.00	0.07	0.11	16.28
6	0.61	16.17	0.01	0.14	0.23	16.41
10	1.02	16.17	0.02	0.36	0.60	16.79
20	2.04	16.17	0.06	1.31	2.17	18.41
25	2.55	16.17	0.10	1.98	3.28	19.55
30	3.07	16.17	0.15	2.77	4.60	20.92
40	4.09	16.17	0.26	4.73	7.84	24.27
50	5.11	16.17	0.41	7.15	11.85	28.42

Notes:
1) Friction Loss / 100' for C120 from attached chart.
2) Friction Loss = Length of Pipe x Friction Loss (C = 120) / 100'.
3) TDH = Total Static Head + Velocity Head + Friction Loss.

VI. Pump Selection

- 1.5 " Goulds Model PE41 0.4 HP Submersible Effluent Pump
- Flowrate = 30 gpm

Flow Rate (gpm)	Velocity (fps)	Total Static Head (ft)	Velocity Head (ft)	Friction Loss / 100' C = 120	Friction Loss (ft)	TDH (ft)
30	3.07	16.17	0.15	2.77	4.60	20.92

VII. Dosing Calculations

1. Primary Absorption Area

Total sewage flow	330	gallons per day
4" Pipe in Leach Field:	240	feet
Volume of pipe:	153.5	gallons
75% Volume:	115.1	gallons
85% Volume:	130.4	gallons

Pump Chamber (using 1,250 gallon septic tank):

Interior Width:	4.50	feet
Interior Length:	9.50	feet
Volume Per Ft Depth:	319.8	gallons

Dose:

Dose Depth:	4.50	inches
Dose Volume:	119.9	gallons
Dose Percentage:	78.1	%

VIII. Determine Pump Cycle

Pump Running Time :

Dose Volume:	119.9	gallons
Pump Rate:	30.0	gallons per minute
Running Time:	4.0	minutes

IX. Determine Alarm Elevations

Invert In:	325.00	ft	
Depth to Bottom Tank from Invert:	3.96	ft*	*Woodard's 1,250 Gallon Precast
Bottom of Tank:	321.04	ft	Pump Chamber
Low Level Pump Off:	321.54	ft**	**manufacturer recommended
Pump On Elev.:	321.92	ft	effluent level above floor: 6 inches
High Level Alarm:	322.42	ft***	***6" to high level alarm
Storage over high level alarm:	826.72	gallons	
Storage over high level alarm:	2.51	days	Sufficient

TECHNICAL BROCHURE
BPE

FEATURES

- Corrosion resistant construction
- Cast iron body
- Thermoplastic impeller and cover.
- Upper sleeve and lower heavy duty ball bearing construction.
- Motor is permanently lubricated for extended service life.
- Powered for continuous operation.
- All ratings are within the working limits of the motor.
- Quick disconnect power cord, 20' standard length, heavy duty 16/3 SJTW with 115 or 230 volt grounding plug.
- Complete unit is heavy duty, portable and compact.
- Mechanical seal is carbon, ceramic, BUNA and stainless steel.
- Stainless steel fasteners

PE

SUBMERSIBLE EFFLUENT PUMP

GOULDS WATER TECHNOLOGY
a xylem brand

APPLICATIONS

Specially designed for the following uses:

- Mound Systems
- Effluent/Dosing Systems
- Low Pressure Pipe Systems
- Basement Draining
- Heavy Duty Sump/Dewatering

SPECIFICATIONS

Pump – General:

- Discharge: 1½" NPT
- Temperature: 104°F (40°C) maximum, continuous when fully submerged.
- Solids handling: ½" maximum sphere.
- Automatic models include a float switch.
- Manual models available.
- Pumping range: see performance chart or curve.

PE31 Pump:

- Maximum capacity: 53 GPM
- Maximum head: 25' TDH

PE41 Pump:

- Maximum capacity: 61 GPM
- Maximum head: 29' TDH

PE51 Pump:

- Maximum capacity: 70 GPM
- Maximum head: 37' TDH

MOTOR

General:

- Single phase
- 60 Hertz
- 115 and 230 volts
- Built-in thermal overload protection with automatic reset.
- Class B insulation
- Oil-filled design
- High strength carbon steel shaft

PE31 Motor:

- .33 HP, 3000 RPM
- 115 volts
- Shaded pole design

PE41 Motor:

- .40 HP, 3400 RPM
- 115 and 230 volts
- PSC design

PE51 Motor:

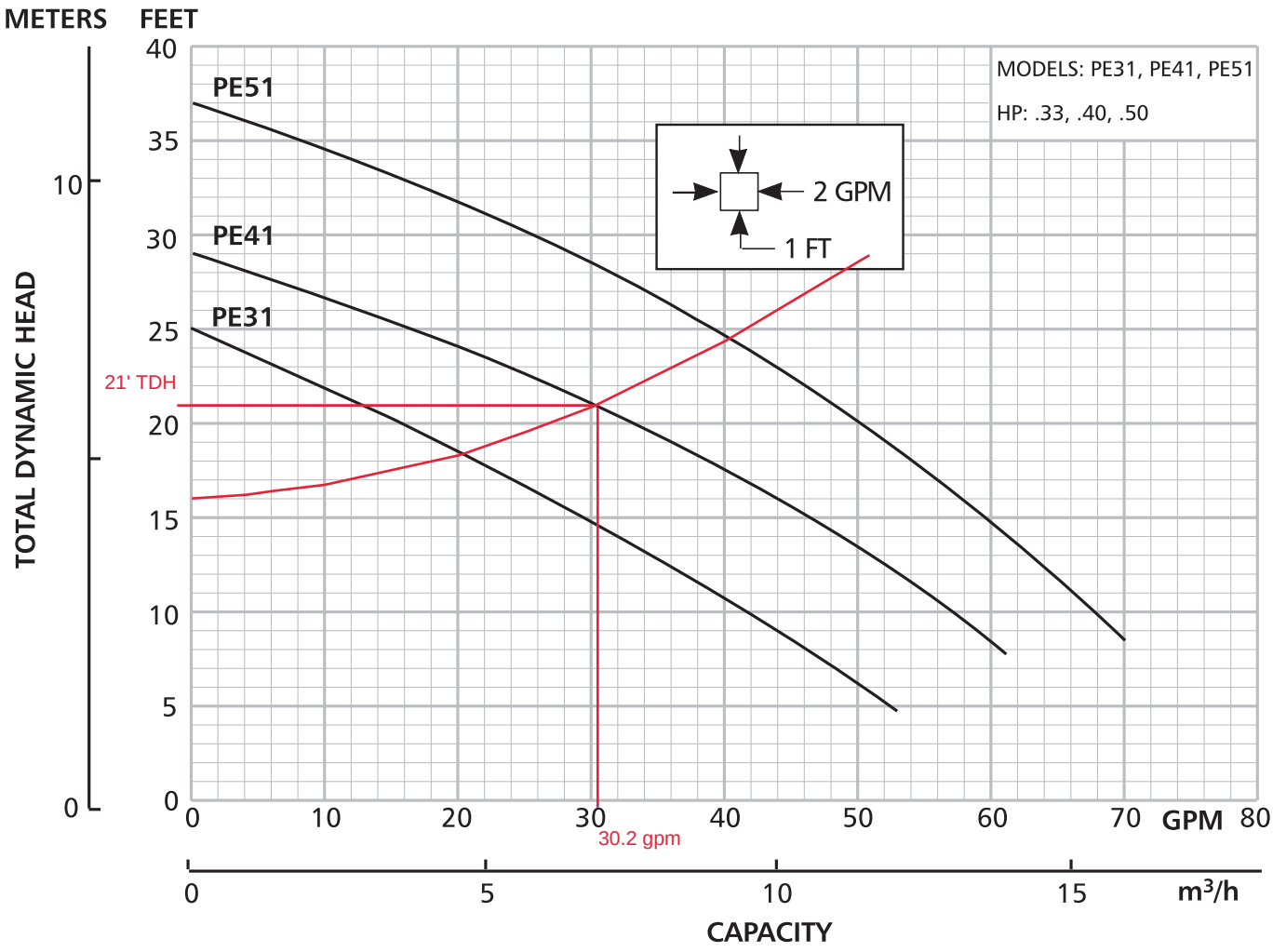
- .50 HP, 3400 RPM
- 115 and 230 volts
- PSC design

AGENCY LISTINGS

Tested to UL 778 and CSA 22.2 108 Standards
By Canadian Standards Association
File #LR38549

PUMP INFORMATION

Order No.	HP	Volts	Amps	Minimum Circuit Breaker	Phase	Float Switch Style	Cord Length	Discharge Connection	Minimum Basin Diameter	Maximum Solids Size	Shipping Weight lbs/kg
PE31M	0.33	115	12	20	1	Manual / No Switch	20'	1.5"	18"	.5"	31 / 14.1
PE31P1						Piggyback Float Switch					
PE41M	0.4		7.5	15		Manual / No Switch					
PE41P1						Piggyback Float Switch					
PE42M		230	3.7	10		Manual / No Switch					
PE42P1						Piggyback Float Switch					
PE51M	0.5	115	9.5	20		Manual / No Switch					
PE51P1						Piggyback Float Switch					
PE52M		230	4.7	10		Manual / No Switch					
PE52P1						Piggyback Float Switch					



PERFORMANCE RATINGS

PE31

Total Head (feet of water)	GPM
5	52
10	42
15	29
20	16
25	0

PE41

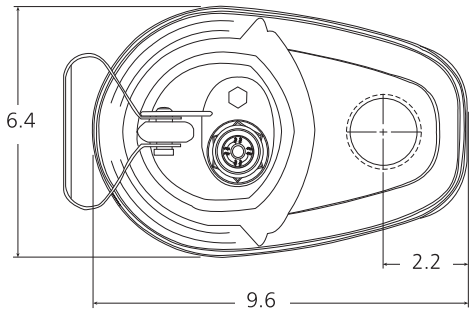
Total Head (feet of water)	GPM
8	61
10	57
15	46
20	33
25	16

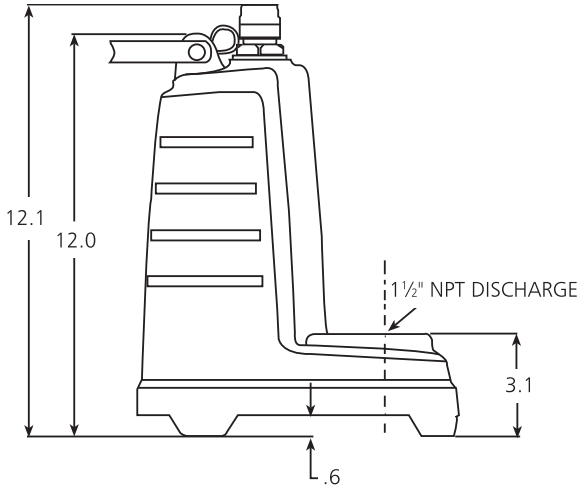
PE51

Total Head (feet of water)	GPM
10	67
15	59
20	50
25	39
30	26
35	8

DIMENSIONS

(All dimensions are in inches. Do not use for construction purposes.)





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