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IN THE TENNESSEE REGULATORY AUTHORITY
AT NASHVILLE, TENNESSEE

IN RE:	)	
	)	
PETITION OF TENNESSEE	)	
WASTEWATER SYSTEMS, INC.,	)	**DOCKET NO. 16-00139**
FOR APPROVAL OF ADJUSTMENT	)	
OF ITS RATES AND NEW TARIFF	)	

SECOND DISCOVERY REQUEST
OF THE CONSUMER PROTECTION AND ADVOCATE DIVISION
TO TENNESSEE WASTEWATER SYSTEMS, INC.

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This Second Discovery Request is hereby served upon Tennessee Wastewater Systems, Inc. (Company or TWSI), pursuant to Rules 26, 33, 34 and 36 of the Tennessee Rules of Civil Procedure and Tenn. Comp. R. & Reg. 1220-1-2-.11. The Consumer Protection and Advocate Division of the Attorney General's Office (Consumer Advocate) requests that full and complete responses be provided pursuant to the Tennessee Rules of Civil Procedure. The responses are to be produced at the Office of the Tennessee Attorney General and Reporter, Consumer Protection and Advocate Division, 315 Deaderick Street, 20th Floor, Nashville, Tennessee 37243, c/o Karen

H. Stachowski, on or before 4:00 p.m. (CDT), March 17, 2017, as ordered by the Hearing Officer in the adoption of a procedural schedule in this TRA Docket.

PRELIMINARY MATTERS AND DEFINITIONS

These Additional Discovery Requests incorporate the same Preliminary Matters and Definitions as set forth in the *First Discovery Request of the Consumer Advocate and Protection Division to Tennessee Wastewater System Inc.* sent to TWSI on January 13, 2017, and are to be considered continuing in nature, and are to be supplemented from time to time as information is received by TWSI which would make a prior response inaccurate, incomplete, or incorrect.

FIRST DISCOVERY REQUESTS

2-1. Refer to the Company's response to TRA1-1 in this docket which request a price-out of revenues by month for all of 2015. In the response, the Company invites the TRA staff to the Company's offices to go over the request and any records. The Consumer Advocate requests access to this information also. In addition, the Consumer Advocate requests the Company provide a price out for all revenues (residential, commercial with food, commercial without food, cabins, capacity reservation, escrow, disconnection, reconnection, convenience fee, non-payment, returned check and decline fees, etc.) by month for the twelve months ending December 31, 2016 as listed on Exhibit 2 in the Direct Testimony of Charles Hyatt. (Excel format).

RESPONSE:

2-2. Refer to the Company's response to Consumer Advocate's *First Discovery Request* (CPAD1) Request 1 regarding the previous annual income statements for the utility. Specifically

refer to Account 521.1 – Residential Flat Sewer which indicates the following revenues from 2010 through 2016.

521.1 – Residential Flat Sewer	
2010	$300,287
2011	303,873
2012	333,238
2013	322,545
2014	353,371
2015	373,741
2016	407, 462

Provide a price-out of these revenues for each year.

RESPONSE:

2-3. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 521.2 – Commercial Flat Sewer which indicates the following revenues from 2010 through 2016.

521.2 – Commercial Flat Sewer	
2010	$308,384
2011	296,552
2012	278,302
2013	270,642
2014	267,014
2015	290,750
2016	337,739

Provide a price-out of these revenues for each year. In addition, explain the reasons for the volatility (decline then rise) of the revenues in this account.

RESPONSE:

2-4. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 536.1 – Sewer Access Fees which indicates the following revenues from 2010 through 2016.

536.1 – Sewer Access Fees	
2010	$199,700
2011	169,254
2012	208,212
2013	204,997
2014	197,208
2015	182,918
2016	198,628

Provide a price-out of these revenues for each year. In addition, explain the reasons for the volatility (decline then rise) of the revenues in this account.

RESPONSE:

2-5. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 536.3 – Operation & Maintenance Revenue which indicates the following revenues from 2010 through 2016.

536.3 Operation & Maintenance Revenue	
2010	$545,890
2011	591,960
2012	666,496
2013	681,767
2014	704,369
2015	756,922
2016	831,932

Provide a price-out of these revenues for each year.

RESPONSE:

2-6. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 536.4 – Billing & Collection Revenue which indicates the following revenues from 2010 through 2016.

536.4 Billing & Collecting Revenue	
2010	$42,002
2011	37,256
2012	38,631
2013	40,171
2014	40,754
2015	46,946
2016	50,159

Provide a price-out of these revenues for each year. In addition, explain the reasons for the volatility (decline then rise) of the revenues in this account.

RESPONSE:

2-7. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 536.5 – Bonding Revenue which indicates the following revenues from 2010 through 2016.

536.5 Bonding Revenue	
2010	$11,959
2011	12,630
2012	11,683
2013	48,172
2014	61,332
2015	43,804
2016	39,228

Provide a price-out of these revenues for each year. In addition, explain the reasons for the volatility (decline then rise) of the revenues in this account.

RESPONSE:

2-8. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 536.6 – Franchise Revenue which indicates the following revenues from 2010 through 2016.

536.6 – Franchise Revenue	
2010	$2,265
2011	2,398
2012	2,403
2013	2,305
2014	2,479
2015	2,502
2016	2,582

Provide a price-out of these revenues for each year.

RESPONSE:

2-9. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 536.7 – Bioxide Revenue which indicates the following revenues from 2010 through 2016.

536.7 – Bioxide Revenue	
2010	$-1,013
2011	-4,994
2012	1,415
2013	9,633
2014	7,611
2015	10,524
2016	902

Provide a price-out of these revenues for each year. In addition, explain the reasons for the volatility (decline then rise) of the revenues in this account. Finally, provide an explanation of the purpose of a charge for "Bioxide".

RESPONSE:

2-10. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 536.9 – Penalty Fee Revenue which indicates the following revenues from 2010 through 2016.

536.9 – Penalty Fee Revenue	
2010	$20,037
2011	16,115
2012	18,688
2013	16,867
2014	13,832
2015	14,216
2016	16,403

Provide a price-out of these revenues for each year. In addition, explain the reasons for the volatility (decline then rise) of the revenues in this account.

RESPONSE:

2-11. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 417 – Interest Revenue which indicates the following revenues from 2010 through 2016.

417 – Interest Revenue	
2010	$710
2011	213
2012	2,265
2013	130
2014	0
2015	0
2016	0

Provide a price-out of these revenues for each year. In addition, provide the bank statements supporting this interest income. Finally, explain why interest income is no longer realized.

RESPONSE:

2-12. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 421.3 – Non-Utility Income-Utility Fee Revenue which indicates the following revenues from 2010 through 2016.

421.3 – NUI Utility Fee Revenue	
2010	$0
2011	1
2012	-63
2013	8,130
2014	0
2015	0
2016	0

Provide a price-out of these revenues for each year. In addition, explain and provide the source and support for this revenue stream. Finally, explain why this revenue is no longer realized.

RESPONSE:

2-13. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 421.5 – Non-Utility Income-Developer Income Revenue which indicates the following revenues from 2010 through 2016.

421.5 – NUI Developer Revenue	
2010	$12,800
2011	2,400
2012	227,800
2013	133,300
2014	65,200
2015	309,550
2016	151,030

Provide a price-out of these revenues for each year. In addition, explain and provide the source and support for this revenue stream. Finally, provide a copy of the developer contracts that produce this revenue.

RESPONSE:

2-14. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 421.0 – Non-Utility Income-Other Revenue which indicates the following revenues from 2010 through 2016.

421.0 – NUI Other Revenue	
2010	$0
2011	29,814
2012	1,229
2013	5,151
2014	3,417
2015	6,041
2016	0

Provide a price-out of these revenues for each year. In addition, explain and provide the source and support for this revenue stream.

RESPONSE:

2-15. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 701 – Salary & Wages-Employees which indicates the following expense from 2010 through 2016.

701 – Salaries and Wages - Employees	
2010	$0
2011	0
2012	0
2013	0
2014	239,588
2015	516,024
2016	450,488

Specifically note that TWSI recorded no expense in this account 2010 through 2013. Explain why no amounts were recorded for this time period. In addition, explain the volatility in this account

for 2014 through 2016. Finally, provide a copy of the payroll register for 2010 through 2016 showing the monthly rates of pay for all employees.

RESPONSE:

2-16. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 703 – Salary & Wages-Officers which indicates the following expense from 2010 through 2016.

703 – Salaries and Wages - Officers	
2010	$0
2011	0
2012	0
2013	0
2014	187
2015	537
2016	875

Specifically note that TWSI recorded no expense in this account 2010 through 2013. Explain why no amounts were recorded for this time period. In addition, provide a copy of the payroll register for 2010 through 2016 showing the monthly rates of pay for all officers.

RESPONSE:

2-17. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 704.2 – Life Insurance which indicates the following expense from 2010 through 2016.

704.2 – Life Insurance	
2010	$0
2011	0
2012	0
2013	0
2014	1,403

2015	2,399
2016	1,917

Specifically note that TWSI recorded no expense in this account 2010 through 2013. Explain why no amounts were recorded for this time period. In addition, provide a copy of the invoices for life insurance from 2010 through 2016.

RESPONSE:

2-18. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 704.1 – Worker's Compensation which indicates the following expense from 2010 through 2016.

704.1 – Worker's Compensation	
2010	$0
2011	0
2012	0
2013	0
2014	19,787
2015	1,354
2016	16,100

Specifically note that TWSI recorded no expense in this account 2010 through 2013. Explain why no amounts were recorded for this time period. In addition, provide a copy of the invoices for worker's compensation from 2010 through 2016.

RESPONSE:

2-19. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 705 – Simple IRA which indicates the following expense from 2010 through 2016.

705 – Simple IRA	
2010	$0
2011	0
2012	0
2013	0
2014	1,781.51
2015	5,966.17
2016	6,320.68

Specifically note that TWSI recorded no expense in this account 2010 through 2013. Explain why no amounts were recorded for this time period. In addition, provide a copy of the invoices for Simple IRA from 2010 through 2016.

RESPONSE:

2-20. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 710 – Purchased Wastewater Treatment which indicates the following expense from 2010 through 2016.

710 – Purchased Wastewater Treatment	
2010	$111,892
2011	99,492
2012	136,839
2013	112,918
2014	115,073
2015	105,897
2016	107,923

Provide a copy of the purchased wastewater treatment invoices from 2010 through 2016.

RESPONSE:

2-21. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 715 – Purchased Power which indicates the following expense from 2010 through 2016.

715 – Purchased Power	
2010	$37,124
2011	38,843
2012	61,113
2013	94,039
2014	121,791
2015	118,441
2016	132,976

Provide a copy of the purchased wastewater treatment invoices from 2010 through 2016.

RESPONSE:

2-22. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 716 – Telemetry Monitoring which indicates the following expense from 2010 through 2016.

716 – Telemetry Monitoring	
2010	$21,165
2011	19,568
2012	37,633
2013	64,378
2014	97,229
2015	124,173
2016	157,838

Provide a copy of the telemetry monitoring invoices from 2010 through 2016.

RESPONSE:

2-23. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 718 – Bioxide which indicates the following expense from 2010 through 2016.

718 – Bioxide	
2010	$0
2011	0

2012	17,267
2013	0
2014	0
2015	0
2016	3,882

Explain the purpose of this Bioxide account. In addition, explain how this account differs from Account 536.7-Bioxide. Finally, provide a copy of the Bioxide invoices from 2010 through 2016.

RESPONSE:

2-24. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 720 – Materials & Supplies which indicates the following expense from 2010 through 2016.

720 – Materials and Supplies	
2010	$3,097
2011	0
2012	92,077
2013	1,520
2014	140,190
2015	179,399
2016	67,969

Provide a copy of the materials & supplies invoices from 2010 through 2016.

RESPONSE:

2-25. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 731 – Contractual Services-Professional which indicates the following expense from 2010 through 2016.

731 - Contractual Services – Professional	
2010	$26,691
2011	55,460

2012	0
2013	100,534
2014	110,435
2015	256,068
2016	48,271

Provide a copy of each contract paid under this account. In addition, provide a copy of the contractual services-professional invoices from 2010 through 2016.

RESPONSE:

2-26. Refer to Company's Response to CPAD 26-1 regarding Contractual Svc – Professional Services. Explain the following titles of columns in the document and what they represent: "Num", "Memo", "Class", and "Split". Also, provide this document in an Excel spreadsheet format rather than the Adobe Pdf format previously provided.

RESPONSE:

2-27. Refer to Company's Response to CPAD 26-1 regarding Contractual Svc – Professional Services. Provide details, explanation and documentation (e.g. invoices) to support each line of the expenses listed. If a line item is a billing for multiple hours, days, events, etc., provide a detailed breakdown with explanation and documentation to support.

RESPONSE:

2-28. Refer to Company's Response to CPAD 26-1 regarding Contractual Svc – Professional Services. Explain what Trivad is, what are the professional services it provides to the Company, and provide a copy of the contract or agreement between it and the Company.

RESPONSE:

2-29. Refer to Company's Response to CPAD 26-1 regarding Contractual Svc – Professional Services. Explain what Geo Jobe is, what are the professional services it provides to the Company, and provide a copy of the contract or agreement between it and the Company.

RESPONSE:

2-30. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 735 – Contractual Services-Testing which indicates the following expense from 2010 through 2016.

735 – Contractual Services - Testing	
2010	$745
2011	150
2012	0
2013	0
2014	3,925
2015	12,677
2016	12,305

Provide a copy of each contract paid under this account. In addition, provide a copy of the contractual services-testing invoices from 2010 through 2016.

RESPONSE:

2-31. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 736.01 – Contractual Services-Sign-up Costs which indicates the following expense from 2010 through 2016.

736.01 – Contractual Services – Sign-up Costs	
2010	$210
2011	375
2012	315
2013	255

2014	195
2015	0
2016	0

Explain the nature of this account. In addition, provide a copy of each contract paid under this account. Finally, provide a copy of the contractual services-sign-up costs invoices from 2010 through 2016.

RESPONSE:

2-32. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 736.02 – Contractual Services-Maintenance which indicates the following expense from 2010 through 2016.

736.02 – Contractual Services – Maintenance	
2010	$546,885
2011	590,506
2012	922,352
2013	846,590
2014	387,211
2015	15,212
2016	48,724

Explain the nature of this account. In addition, provide a copy of each contract paid under this account. Finally, provide a copy of the contractual services-maintenance invoices from 2010 through 2016.

RESPONSE:

2-33. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 736.03 – Contractual Services which indicates the following expense from 2010 through 2016.

736.03 – Contractual Service	
2010	$0
2011	0
2012	$90
2013	5,460
2014	6,143
2015	22,352
2016	376

Explain the nature of this account. In addition, provide a copy of each contract paid under this account. Finally, provide a copy of the contractual services invoices from 2010 through 2016.

RESPONSE:

2-34. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 736.05 – Contractual Services-Access Fees which indicates the following expense from 2010 through 2016.

736.05 – Contractual Service – Access Fees	
2010	$132,514
2011	123,247
2012	-252
2013	0
2014	0
2015	0
2016	0

Explain the nature of this account. In addition, provide a copy of each contract paid under this account. Finally, provide a copy of the contractual services-access fees invoices from 2010 through 2016.

RESPONSE:

2-35. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 736.08 – Contractual Services - Lawn Mowing which indicates the following expense from 2010 through 2016.

736.08 – Contractual Service – Lawn Mowing	
2010	$6,910
2011	8,705
2012	6,715
2013	2,605
2014	19,575
2015	20,947
2016	21,890

Provide a copy of each contract paid under this account. In addition, provide a copy of the contractual services-lawn mowing invoices from 2010 through 2016.

RESPONSE:

2-36. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 736.10 – Contractual Services One-Call Expenses which indicates the following expense from 2010 through 2016.

736.10 – Contractual Service – One-Call	
2010	$2,178
2011	2,564
2012	2,279
2013	5,122
2014	2,552
2015	3,169
2016	5,519

Provide a copy of each contract paid under this account. In addition, provide a copy of the contractual services-one call invoices from 2010 through 2016.

RESPONSE:

2-37. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 736.12 – Contractual Services – AUG-MGMT Fees which indicates the following expense from 2010 through 2016.

736.12 – Contractual Service –AUG-MGMT Fees	
2010	$218,560
2011	139,859
2012	68,274
2013	109,993
2014	81,213
2015	148,788
2016	223,460

Explain the nature of this account. In addition, provide a copy of each contract paid under this account. Finally, provide a copy of the contractual services-AUG MGMT Fees invoices from 2010 through 2016.

RESPONSE:

2-38. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 736.9 – Contractual Services – Adenus Group-MGMT Fees which indicates the following expense from 2010 through 2016.

736.9 – Contractual Service– Adenus Group MGMT Fees	
2010	$23,400
2011	23,400
2012	23,400
2013	23,400
2014	13,650
2015	0
2016	0

Explain the nature of this account. In addition, provide a copy of each contract paid under this account. Finally, provide a copy of the Contractual Services-Adenus Group MGMT Fees invoices from 2010 through 2016.

RESPONSE:

2-39. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 736.13 – Contractual Services – IT Expenses which indicates the following expense from 2010 through 2016.

736.13 – Contractual Service–IT Expenses	
2010	$0
2011	0
2012	0
2013	0
2014	0
2015	0
2016	41,502

Explain the nature of this account. In addition, provide a copy of each contract paid under this account. Finally, provide a copy of the Contractual Services-IT Expense invoices from 2010 through 2016.

RESPONSE:

2-40. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 740 – Rent which indicates the following expense from 2010 through 2016.

740 – Rent	
2010	$7,333
2011	13,890
2012	6,945

2013	6,945
2014	44,945
2015	60,945
2016	60,945

Explain the nature of this account. In addition, provide a copy of each rental contract paid under this account. Finally, provide a copy of the rental invoices from 2010 through 2016.

RESPONSE:

2-41. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 750.3 – Registration Renewal which indicates the following expense from 2010 through 2016.

750.3 – Registration Renewal	
2010	$0
2011	0
2012	0
2013	0
2014	118
2015	1,489
2016	288

Provide a copy of the registration renewal invoices from 2010 through 2016.

RESPONSE:

2-42. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 750.1 – Fuel which indicates the following expense from 2010 through 2016.

750.1 – Fuel	
2010	$0
2011	0
2012	0

2013	0
2014	20,045
2015	35,185
2016	37,055

Specifically note that TWSI recorded no expense in this account 2010 through 2013. Explain why no amounts were recorded for this time period. In addition, provide a copy of the fuel invoices from 2010 through 2016.

RESPONSE:

2-43. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 750.2 – Vehicle Maintenance which indicates the following expense from 2010 through 2016.

750.2 – Vehicle Maintenance	
2010	$0
2011	0
2012	0
2013	0
2014	$4,553
2015	26,941
2016	30,197

Specifically note that TWSI recorded no expense in this account 2010 through 2013. Explain why no amounts were recorded for this time period. In addition, provide a copy of the vehicle maintenance invoices from 2010 through 2016.

RESPONSE:

2-44. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 756 – Insurance which indicates the following expense from 2010 through 2016.

756 – Insurance	
2010	$335
2011	366
2012	231
2013	641
2014	3,031
2015	11,784
2016	17,744

Provide a copy of each insurance policy paid under this account. In addition, provide a copy of the insurance invoices from 2010 through 2016.

RESPONSE:

2-45. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 765.1 – Regulatory Commission Expense-Rate Case Work which indicates the following expense from 2010 through 2016.

765.1 – Regulatory Commission Expense-Rate Case Work	
2010	$0
2011	0
2012	0
2013	0
2014	0
2015	0
2016	2,809

Provide a copy of the rate case invoices from 2010 through 2016.

RESPONSE:

2-46. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Accounts 765.2 – Regulatory Commission Expense-

Filing Fee **and** 765.3 – Regulatory Commission Expense-Inspection Fee which indicates the following **total** expense from 2010 through 2016.

765.2 and 765.3 – Regulatory Commission Expense	
2010	$5,395
2011	5,608
2012	5,583
2013	6,057
2014	6,788
2015	7,032
2016	7,373

Provide a copy of the regulatory commission invoices from 2010 through 2016.

RESPONSE:

2-47. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 770 – Bad Debt Expense which indicates the following expense from 2010 through 2016.

770 – Bad Debt	
2010	$15,345
2011	7,634
2012	2,998
2013	8,413
2014	2,908
2015	38,787
2016	0

Provide a copy of the billing history for each specific account written off as bad debt from 2010 through 2016.

RESPONSE:

2-48. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 775.21 – Miscellaneous Expense-Website Hosting which indicates the following expense from 2010 through 2016.

775.21 – Website and Internet Hosting	
2010	$0
2011	0
2012	0
2013	0
2014	0
2015	15,284
2016	10,950

Provide a copy of the website and internet hosting invoices from 2010 through 2016.

RESPONSE:

2-49. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 775.27 – Miscellaneous Expense-Equipment Maintenance which indicates the following expense from 2010 through 2016.

775.27 – Miscellaneous Expense-Equipment Maintenance	
2010	$0
2011	0
2012	0
2013	0
2014	163
2015	835
2016	6,227

Provide a description of what specific equipment is being maintained through charges to this account. In addition, provide a copy of the equipment maintenance invoices from 2010 through 2016.

RESPONSE:

2-50. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 775.26 – Miscellaneous Expense-Equipment Rental which indicates the following expense from 2010 through 2016.

775.26 – Miscellaneous Expense-Equipment Rental	
2010	$0
2011	0
2012	0
2013	0
2014	$5,609
2015	1,540
2016	5,754

Provide a copy of the equipment rental contracts that are charged to this account. In addition, provide a copy of the equipment rental invoices from 2010 through 2016.

RESPONSE:

2-51. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 775.25 – Miscellaneous Expense-Small Equipment Purchases which indicates the following expense from 2010 through 2016.

775.25 – Miscellaneous Expense-Small Equipment Purchases	
2010	$0
2011	0
2012	0
2013	0
2014	3,047
2015	40,513
2016	47,141

Provide a copy of the small equipment purchase invoices from 2010 through 2016.

RESPONSE:

2-52. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 775.1 – Miscellaneous Expense-Telephone which indicates the following expense from 2010 through 2016.

775.1 – Telephone	
2010	$497
2011	0
2012	0
2013	1,013
2014	3,742
2015	12,238
2016	13,241

Provide a copy of the telephone bills from 2010 through 2016.

RESPONSE:

2-53. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 775.11 – Miscellaneous Expense-Letter of Credit Fees which indicates the following expense from 2010 through 2016.

775.11 – Letter of Credit - Fees	
2010	$6,735
2011	52,165
2012	60,573
2013	47,243
2014	45,037
2015	43,710
2016	43,710

Provide a copy of the letter of credit invoices from 2010 through 2016.

RESPONSE:

2-54. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 775.12 – Miscellaneous Expense-Depreciation Expense which indicates the following expense from 2010 through 2016.

775.12 – Depreciation Expense	
2010	$1,533
2011	1,219
2012	1,219
2013	1,219
2014	12,620
2015	56,997
2016	111,638

Provide a copy of the Company's depreciation expense workpapers supporting the depreciation expense calculations from 2010 through 2016.

RESPONSE:

2-55. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 775.2 – Miscellaneous Expense-Postage which indicates the following expense from 2010 through 2016.

775.2 – Postage	
2010	$4,595
2011	3,728
2012	0
2013	0
2014	3,861
2015	8,049
2016	8,666

Provide a copy of the postage invoices from 2010 through 2016.

RESPONSE:

2-56. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 775.20 – Miscellaneous Expense-Software Licenses which indicates the following expense from 2010 through 2016.

775.20– Software Licenses	
2010	$0
2011	0
2012	0
2013	0
2014	9,400
2015	13,285
2016	12,630

Provide a copy of each software license charged to this account. In addition, provide a copy of the software license invoices from 2010 through 2016.

RESPONSE:

2-57. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 775.3 – Miscellaneous Expense-Licenses & Permits which indicates the following expense from 2010 through 2016.

775.3 – Licenses & Permits	
2010	$14,470
2011	34,150
2012	35,250
2013	42,484
2014	38,762
2015	11,681
2016	77,052

Provide a copy of the license & permit invoices from 2010 through 2016.

RESPONSE:

2-58. Refer to the Company's response to CPAD1-3 regarding the 2015 General Ledger (GL). Respond to the following:

a. Sorting by the column entitled "Name" for "TN Dept of Environment & Conservation", explain why credits and debits are booked in these different accounts: 131.7 Pinnacle Checking, 141 Customer A/R, 231. Accounts Payable, and 775.3 Licenses & Permits.

b. Explain why the following TDEC permits fees are booked in "231 Accounts Payable" and not "775.3 Licenses & Permits":

   a. GL Row 20313, 2/27/15, SOP 04065, Tillium Cove Renewal, $500.00.

   b. GL Row 20314, 2/27/15, SOP 04045, Legacy Preserve Renewal, $750.00.

   c. GL Row 20315, 2/27/15, SOP 04025, Timber Tops Renewal, $500.00.

   d. GL Row 20316, 2/27/15, SOP 04047, Wyndsong Renewal, $500.00.

   e. GL Row 20317, 2/27/15, SOP 99024, Tall Oaks Renewal, $750.00.

   f. GL Row 20318, 4/8/15, Summit View, Plans for expansion of system, $250.00.

   g. GL Row 20321, 7/27/15, Eudailey, Revised Permit App., $3,800.00.

   h. GL Row 20324, 10/27/15, German Creek, SOP Application, $750.00.

   i. GL Row 20325, 11/20/15, SOP 05071, Permit Renewal, $750.00.

   j. GL Row 20326, 11/20/15, SOP 05002, Permit Renewal, $500.00.

c. Are the 2015 expenses in the General Ledger for "775.3 Licenses and Permits" for TDEC permit fees (e.g. initial, annual, modification, renewal) only? If not, what other expenses are booked within "775.3 Licenses and Permits"?

d. Sorting by the column entitled "Name" for "TN Dept of Environment & Conservation", identify in detail (e.g. annual fee, application fee, etc.) for each of the expenses in the 2015 General Ledger.

RESPONSE:

2-59. Refer to the Company's response to CPAD1-3 regarding the 2015 General Ledger. Provide detail and documentation in support for GL Rows 151 and 5840 identified as check 5043 dated 1/9/15 from "231 Accounts Payable" and corresponding entry at for "131.7 Pinnacle Checking" in the amount of $32,880.00.

RESPONSE:

2-60. Refer to the Company's response to CPAD1-3 regarding the 2015 General Ledger. Provide detail and documentation in support for GL Rows 615 and 6269 identified as number 5143 dated 2/27/15 from "231 Accounts Payable" and corresponding entry for "131.7 Pinnacle Checking" in the amount of $3,000.00.

RESPONSE:

2-61. Refer to the Company's response to CPAD1-3 regarding the 2015 General Ledger. Provide detail and documentation in support for GL Rows 981 and 6618 identified as number 5207 dated 4/08/15 "plans for expansion of system" from "231 Accounts Payable" and corresponding entry for "131.7 Pinnacle Checking" in the amount of $250.00.

RESPONSE:

2-62. Refer to the Company's response to CPAD1-3 regarding the 2015 General Ledger. Provide detail and documentation in support for GL Rows 1769 and 7391 identified as number 5372 dated

6/29/15 "collection liens plans Phase V- Grove" from "231 Accounts Payable" and corresponding entry for "131.7 Pinnacle Checking" in the amount of $675.00.

RESPONSE:

2-63. Refer to the Company's response to CPAD1-3 regarding the 2015 General Ledger. Provide detail and documentation in support for GL Rows 7380 and 20319 identified as number Grove Phase V dated 6/29/15 "collection lines plans Phase V- Grove" from "231 Accounts Payable" and corresponding entry for "775. 3 License & Permits" in the amount of $675.00.

RESPONSE:

2-64. Refer to the Company's response to CPAD1-3 regarding the 2015 General Ledger. Provide detail and documentation in support for GL Rows 2089 and 5566 identified as number 48130915 dated 7/30/15 from "141 Customer A/R" and corresponding entry for "131.7 Pinnacle Checking" in the amount of $775.00.

RESPONSE:

2-65. Refer to the Company's response to CPAD1-3 regarding the 2015 General Ledger. Provide detail and documentation in support for GL Rows 3260 and 8783 identified as check 5693 dated 11/20/15 from "231 Accounts Payable" and corresponding entry for "131.7 Pinnacle Checking" in the amount of $1,250.00.

RESPONSE:

2-66. Refer to the Company's response to CPAD1-3 regarding the 2015 General Ledger. Provide detail and documentation in support for GL Row 20320 identified as Enclave, SOP Application dated 7/15/15 from "231 Accounts Payable" in the amount of $750.00. There is no corresponding credit entry in the General Ledger, should there be?

RESPONSE:

2-67. Refer to the Company's response to CPAD1-3 regarding the 2015 General Ledger. Provide detail and documentation in support for GL Row 7547 identified as Enclave, Nolensville-Dove Lake Treatment Facility dated 7/15/15 from "775.3 Licenses & Permits" in the amount of $750.00. There is no corresponding debit entry in the General Ledger, should there be?

RESPONSE:

2-68. Refer to the Company's response to CPAD1-3 regarding the 2015 General Ledger. Provide detail and documentation in support for GL Rows 1923 and 7548 identified as 5403, Nolensville-Dove Lake Treatment Facility dated 7/15/15 from "775.3 Licenses & Permits" and corresponding entry from "131.7 Pinnacle Checking" in the amount of $750.00.

RESPONSE:

2-69. Refer to the Company's response to CPAD1-3 regarding the 2015 General Ledger. Provide detail and documentation in support GL Rows 2064 and 7670 identified as 5448, Revised Permit App dated 7/27/15 from "231 Accounts Payable" and corresponding entry for "131.7 Pinnacle Checking" in the amount of $3,800.00.

RESPONSE:

2-70. Refer to the Company's response to CPAD1-3 regarding the 2015 General Ledger. Provide detail and documentation in support GL Rows 2064 and 20321identified as Eudailey, Revised Permit App dated 7/27/15 from "775.3 Licenses & Permits" and corresponding entry for "231 Accounts Payable" in the amount of $3,800.00.

RESPONSE:

2-71. Refer to the Company's response to CPAD1-3 regarding the 2015 General Ledger. Provide detail and documentation in support for GL Row 8532 identified as 5635, SOP-05045 dated 10/27/15 from "131.7 Pinnacle Checking" in the amount of $750.00. There is no corresponding credit entry in the General Ledger, should there be?

RESPONSE:

2-72. Refer to the Company's response to CPAD1-3 regarding the 2015 General Ledger. Provide detail and documentation in support for GL Rows 8531 and 20324, German Creek dated 10/27/15 from "775.3 Licenses & Permits" and corresponding entry for "231 Accounts Payable" in the amount of $750.00.

RESPONSE:

2-73. Refer to attached Exhibit 2-A regarding Clovercroft Subdivision, TDEC SOP No. 13026. In this exhibit, a fee of $1,125.00 is referenced - $500.00 for the decentralized wastewater system and $25 per 250 linear feet of forcemain. This expense does not appear to be captured in 2015 General Ledger provided by the Company in response to CPAD1-3. How did the Company record this expense?

RESPONSE:

2-74. Refer to attached Exhibit 2-B regarding Fiddlers Glenn Subdivision, TDEC SOP No. 15012. In this exhibit, a fee of $1,000.00 is referenced and a copy of the check provided. This expense does not appear to be captured in 2015 General Ledger provided by the Company in response to CPAD1-3. How did the Company record this expense?

RESPONSE:

2-75. Refer to attached Exhibit 2-C regarding Lookaway Farms Subdivision, TDEC SOP No. 15007. In this exhibit, a copy of a $750.00 check is provided. This expense does not appear to be captured in 2015 General Ledger provided by the Company in response to CPAD1-3. How did the Company record this expense?

RESPONSE:

2-76. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 775.4 – Miscellaneous Expense-Membership Dues which indicates the following expense from 2010 through 2016.

775.4 – Membership Dues	
2010	$105
2011	440
2012	440
2013	3,590
2014	680
2015	4,784
2016	690

Provide a copy of the membership dues invoices from 2010 through 2016.

RESPONSE:

2-77. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 775.5 – Miscellaneous Expense-Deed Registration which indicates the following expense from 2010 through 2016.

775.5 – Deed Registration	
2010	$0
2011	0
2012	12
2013	0
2014	1,000
2015	172
2016	0

Provide a copy of the specific deed registered and charged to this account. In addition, provide a copy of the deed registration invoices from 2010 through 2016.

RESPONSE:

2-78. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 775.6 – Miscellaneous Expense-Franchise Fees which indicates the following expense from 2010 through 2016.

775.6 – Franchise Fees	
2010	$2,279
2011	2,390
2012	2,405
2013	2,449
2014	2,464
2015	2,506
2016	2,580

Provide a copy of the specific franchises that are charged to this account. In addition, provide a copy of the franchise fee invoices from 2010 through 2016.

RESPONSE:

2-79. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 775.8 – Miscellaneous Expense-Interest on Customer Deposits which indicates the following expense from 2010 through 2016.

775.8 – Interest on Customer Deposits	
2010	$961
2011	0
2012	0
2013	29
2014	275
2015	0
2016	0

Provide a copy of the Company's workpapers supporting the interest on customer deposit calculations from 2010 through 2016.

RESPONSE:

2-80. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 775.9 – Miscellaneous Expense-Billing Costs which indicates the following expense from 2010 through 2016.

775.9 – Billing Costs	
2010	$2,884
2011	960
2012	2,099
2013	480
2014	960
2015	960
2016	720

Provide a copy of the billing cost invoices from 2010 through 2016.

RESPONSE:

2-81. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 775 – Miscellaneous Expense which indicates the following expense from 2010 through 2016.

775 – Miscellaneous Expense	
2010	$1320
2011	13,000
2012	10,400
2013	9,400
2014	720
2015	1,033
2016	860

Provide a copy of the miscellaneous expense invoices from 2010 through 2016.

RESPONSE:

2-82. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 408.1 – Taxes Other Than Income-Property Taxes which indicates the following expense from 2010 through 2016.

408.1 – Property Tax	
2010	$56,733
2011	75,451
2012	64,537
2013	65,555
2014	58,787
2015	51,983
2016	77,933

Provide a copy of the property tax invoices from 2010 through 2016.

RESPONSE:

2-83. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 408.2 – Taxes Other Than Income-Franchise & Excise Taxes which indicates the following expense from 2010 through 2016.

408.1 – Franchise & Excise Tax	
2010	$80,704
2011	64,839
2012	48,824
2013	95,096
2014	37,427
2015	53,650
2016	40,240

Provide a copy of the franchise & excise tax invoices from 2010 through 2016.

RESPONSE:

2-84. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 408.12 – Taxes Other Than Income-Payroll Taxes which indicates the following expense from 2010 through 2016.

408.12 – Payroll Tax	
2010	$0
2011	0
2012	0
2013	0
2014	19,089
2015	42,459
2016	37,955

Provide a copy of the payroll tax invoices from 2010 through 2016.

RESPONSE:

2-85. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 409 – Income Taxes which indicates the following expense from 2010 through 2016.

409 – Income Tax	
2010	$0
2011	0
2012	0
2013	136,365
2014	-68,200
2015	0
2016	0

Provide a copy of the income tax returns and invoices from 2010 through 2016.

RESPONSE:

2-86. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to the series of accounts segregated under Account 426 – Miscellaneous Nonutility Expenses. Does the Company consider these "Nonutility" expenses to be "below-the-line" and therefore not appropriate for recovery from utility customers?

RESPONSE:

2-87. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 426.9 – Miscellaneous Nonutility Expense-Lodging which indicates the following expense from 2010 through 2016.

426.9 – Lodging	
2010	$0
2011	0
2012	0
2013	0
2014	0
2015	364

2016	265

Provide a copy of the lodging invoices from 2010 through 2016.

RESPONSE:

2-88. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 426.8 – Miscellaneous Nonutility Expense-Meals & Entertainment which indicates the following expense from 2010 through 2016.

426.8 – Meals & Entertainment	
2010	$0
2011	0
2012	0
2013	0
2014	844
2015	2,402
2016	2,773

Provide a copy of the meals & entertainment invoices from 2010 through 2016.

RESPONSE:

2-89. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 426.1 – Miscellaneous Nonutility Expense-Dues & Subscriptions which indicates the following expense from 2010 through 2016.

426.1 – Dues & Subscriptions	
2010	$1,000
2011	123
2012	0
2013	390
2014	3,840
2015	7,050
2016	939

Provide a copy of the dues & subscription invoices from 2010 through 2016.

RESPONSE:

2-90. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 426.2 – Miscellaneous Nonutility Expense-Bank & NSF Fees which indicates the following expense from 2010 through 2016.

426.2 – Bank & NSF Fees	
2010	$4,446
2011	6,929
2012	7,018
2013	6,191
2014	3,112
2015	5,697
2016	5,378

Provide a copy of the bank & NSF fee invoices from 2010 through 2016.

RESPONSE:

2-91. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 426.3 – Miscellaneous Nonutility Expense-Miscellaneous which indicates the following expense from 2010 through 2016.

426.3 – Miscellaneous	
2010	$11,200
2011	0
2012	0
2013	244
2014	350
2015	623
2016	3,182

Provide a copy of the miscellaneous invoices from 2010 through 2016.

RESPONSE:

2-92. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 426 – Miscellaneous Nonutility Expense-Misc Nonutility Expense which indicates the following expense from 2010 through 2016.

426 – Miscellaneous	
2010	$0
2011	0
2012	-2
2013	44,958
2014	0
2015	-44,958
2016	0

Provide a copy of the miscellaneous invoices from 2010 through 2016.

RESPONSE:

2-93. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 426.7 – Miscellaneous Nonutility Expense-Construction Expense which indicates the following expense from 2010 through 2016.

426.7 – Construction Expense	
2010	$0
2011	0
2012	0
2013	0
2014	0
2015	0
2016	16,709

Provide a copy of the construction expense invoices from 2010 through 2016.

RESPONSE:

2-94. Refer to the Company's response to CPAD1-1 regarding the previous annual income statements for the utility. Specifically refer to Account 427.2 – Interest Expense-Loan Interest

and Account 427 Interest Expense-Other which indicates the following **total** expense from 2010 through 2016.

427 – Interest Expense	
2010	$4,335
2011	2,294
2012	761
2013	0
2014	192
2015	10,116
2016	13,237

Provide a copy of the debt instruments which make up the loans for these interest charges. In addition, provide a copy of the interest expense invoices from 2010 through 2016.

RESPONSE:

2-95. Refer to Exhibit 1 included with the Company's filing. Specifically refer to the $32,421 hard-coded adjustment that the Company has made to Account 521.1 – Residential Flat Sewer. Provide the source and support for this adjustment.

RESPONSE:

2-96. Refer to Exhibit 1 included with the Company's filing. Specifically refer to the $373,831 hard-coded adjustment that the Company has made to Account 521.1 – Residential Flat Sewer. Provide the source and support for this adjustment.

RESPONSE:

2-97. Refer to Exhibit 1 included with the Company's filing. Specifically refer to the $1,061 hard-coded adjustment that the Company has made to Account 521.2 – Commercial Flat Sewer. Provide the source and support for this adjustment.

RESPONSE:

2-98. Refer to Exhibit 1 included with the Company's filing. Specifically refer to the $78,923 hard-coded adjustment that the Company has made to Account 521.2 – Commercial Flat Sewer. Provide the source and support for this adjustment.

RESPONSE:

2-99. Refer to Exhibit 1 included with the Company's filing. Specifically refer to the $13,464 hard-coded adjustment that the Company has made to Commercial Cabin Sewer. Provide the source and support for this adjustment.

RESPONSE:

2-100. Refer to Exhibit 1 included with the Company's filing. Specifically refer to the $304,169 hard-coded adjustment that the Company has made to Commercial Cabin Sewer. Provide the source and support for this adjustment.

RESPONSE:

2-101. Refer to Exhibit 1 included with the Company's filing. Specifically refer to the $-756,924 hard-coded adjustment that the Company has made to Account 536.3 O&M Revenues. Provide the source and support for this adjustment.

RESPONSE:

2-102. Refer to Exhibit 1 included with the Company's filing. Specifically refer to the $-46,945 hard-coded adjustment that the Company has made to Account 536.4 Billing & Collecting Revenues. Provide the source and support for this adjustment.

RESPONSE:

2-103. Refer to Exhibit 1 included with the Company's filing. Specifically refer to the $-309,550 hard-coded adjustment that the Company has made to Account 421.5 Developer Income. Provide the source and support for this adjustment.

RESPONSE:

2-104. Refer to the Company's response to CPAD1-21. This request specifically asked for the Company's source and support for the $206,431 hard coded adjustment to Account 521.1 – Residential Flat Sewer. The Company's response included only an attachment containing the total of this adjustment. Provide a narrative of the Company's rationale supporting this adjustment, along with the source and support for the detail included within the Attachment to CPAD1-21.

RESPONSE:

2-105. Refer to the Company's response to CPAD1-22. This request specifically asked for the Company's source and support for the $53,042 hard coded adjustment to Account 521.2 – Commercial Flat Sewer. The Company's response included only an attachment containing the total of this adjustment. Provide a narrative of the Company's rationale supporting this adjustment, along with the source and support for the detail included within the Attachment to CPAD1-22.

RESPONSE:

2-106. Refer to the Company's response to CPAD1-23. This request specifically asked for the Company's source and support for the $148,244 hard coded adjustment to Cabin Sewer. The Company's response included only an attachment containing the total of this adjustment. Provide a narrative of the Company's rationale supporting this adjustment, along with the source and support for the detail included within the Attachment to CPAD1-23.

RESPONSE:

2-107. Refer to the Company's response to CPAD1-28. This request specifically asked for the Company's source and support for the square footage determinant and rate proposed for Cabin Sewer. The Company's response included only an attachment containing the total of this adjustment. Provide a narrative of the Company's rationale supporting this adjustment, along with the source and support for the detail included within the Attachment to CPAD1-28.

RESPONSE:

2-108. Refer to the Company's response to CPAD1-34. This request specifically asked for the Company's source and support for the Maintenance, B&C, Sewer, Escrow and Square Footage hard-coded details included on Exhibit 6 of the Company's filing. The Company's response included only two attachments containing the total of this adjustment. Provide a narrative of the Company's rationale supporting this detail, along with the source and support for the detail included within the Attachment to CPAD1-34.

RESPONSE:

2-109. Refer to the Company's response to CPAD1-19. This request specifically asked for the Company's source and support for the $81,825 adjustment to Account 731 – Contractual Services-Professional of the Company's filing. The Company's response included only an attachment containing the total of this adjustment. Provide a narrative of the Company's rationale supporting this detail, along with the source and support for the detail included within the Attachment to CPAD1-19.

RESPONSE:

2-110. Refer to Exhibit 1 included with the Company's filing. Provide a narrative of the Company's $44,958 adjustment to Account 426 – Miscellaneous Nonutility Expense that is labelled as "Paris Landing Bond Recover". Specifically provide the nature of this adjustment along with the source and support for the test period amount.

RESPONSE:

2-111. Refer to the Company's 2010 and 2011 balance sheet that was provided in response to CPAD1-2. Specifically refer to Account 232.3 – Notes Payable – Wilson B&T (2) 2016 Chevy Truck. Explain how this loan associated with a 2016 truck was recorded on the Company's books as early as 2010.

RESPONSE:

2-112. Refer to the Company's response to CPAD1-24. This request specifically asked for the Company's source and support for the $33,240 adjustment to Account 775.3 – Licenses & Permits. The Company's response included only an attachment containing the total of this adjustment.

Provide a narrative of the Company's rationale supporting this detail, along with the source and support for the detail included within the Attachment to CPAD1-24.

RESPONSE:

2-113. Refer to the Company's response to CPAD1-25. This request specifically asked for the Company's source and support for the $250,188 adjustment to Account 720 – Materials & Supplies. The Company's response included only an attachment containing the total of this adjustment. Provide a narrative of the Company's rationale supporting this adjustment, along with the source and support for the detail included within the Attachment to CPAD1-25.

RESPONSE:

2-114. Refer to the Company's response to CPAD1-28. This request specifically asked for the Company's source and support for the square footage for Cabin Sewer. The Company's response included only an attachment containing the total of this adjustment. Provide a narrative describing the source of this data and how it was obtained.

RESPONSE:

2-115. Refer to the Company's response to CPAD1-29. This request specifically asked for the Company's source and support for the 2016 Base Wages and Base Adjustments included on Exhibit 3 of the Company's filing. The Company's response included only an attachment containing a total that does not appear to tie to the amounts included on Exhibit 3. Provide a narrative describing how these amounts were determined along with the source of this data that ties to the $531,840 and $24,633 amounts included on Exhibit 3.

RESPONSE:

2-116. Refer to the Company's response to CPAD1-30. This request specifically asked for the Company's source and support for the IRA Percentage included in the Company's filing. The Company's response included only a statement mentioning that the "Company matches 100% of employee contributions…up to 3% of an employee's earning. Provide the support for the historical IRA amounts paid by the Company for each employee from 2010 through 2016.

RESPONSE:

2-117. Refer to the Company's response to CPAD1-32. Provide the source and support for the $546,510 and $589,564 amounts included here for Clovercroft Farms and Clovercroft Preserve.

RESPONSE:

2-118. Refer to the Company's response to CPAD1-33. Provide a copy of the loan agreements referenced in Exhibit 33. In addition, provide a narrative of the particular assets covered by these loan agreements. Finally, provide a copy of the monthly statements related to these loan agreements from 2010 through 2016.

RESPONSE:

2-119. Refer to attached Exhibit 2-D, which is a real estate assessment for a cabin located in the Summit View subdivision. Please state the total sketched square footage the company would use for billing purposes in regards to this cabin. Please provide the company's process for determining total sketched square footage and any other analysis used.

RESPONSE:

2-120. Refer Testimony of Charles Hyatt that was provided with the company's petition. Specifically, refer to page 5 of his testimony. Provide the source and support for the company's proposal of credit card convenience fee of 3%. Provide support that a percentage based charge is more appropriate than a set fee amount.

RESPONSE:

RESPECTFULLY SUBMITTED,

Karen H Stachowski

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CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing was served via U.S. Mail or electronic mail upon:

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This the 24 day of February, 2017.

Karen H Stachowski
KAREN H. STACHOWSKI

Exhibit 2-A_SOP-13026_25-FEB-15

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February 23, 2015

Brad Harris
Municipal Facility Section
Division of Water Pollution Control
TDEC - William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243

TN DEPT OF ENVIRONMENT AND CONSERVATION
FEB 25 2015
DIV OF WATER RESOURCES
RECEIVED

RE: Clovercroft Acres Subdivision (Step System)
TDEC *SOP No 13026*
Williamson County, Tennessee

Dear Brad:

This proposed subdivision has been approved at Williamson County February 12, 2015 and will contain approximately 95 buildable lots that will be served by an proposed centralized treatment facility capable of handling 120 lots. The treatment facility includes a (131.25' x 55') recirculating sand filter with and drip dispersal zones. This project has 6,025 L.F. of forcemain. A $1,125 submittal check is attached for ($500 decentralized wastewater system and $625 for $25 per 250 LF of forcemain).

If you should have any questions or if I may be of further assistance, I can be contacted at 615-890-7901. My email address is jreed@sec-civil.com. Our fax number is 615-895-2567.

Sincerely,

Jamie Reed

Jamie Reed, P.E., R.L.S.
President
SEC, Inc.

enclosed: 8-sets Construction Plan / Specs
Williamson County approval letters

Rogers C. Anderson
Williamson County Mayor

Planning Department
Michael Matteson, Director

WILLIAMSON COUNTY GOVERNMENT

DEPT OF ENVIRONMENT AND CONSERVATION
FEB 25 2015
DIV OF WATER RESOURCES
RECEIVED

December 16, 2014

SEC, Inc
Attn: Jamie Reed
850 Middle Tennessee Blvd
Murfreesboro, TN 37129

RE: Planning Commission Meeting of December 11, 2014

Subdivision/Project: **Clovercroft Acres Nontraditional Treatment and Disposal System**

Agenda Item No.: 9

At referenced meeting the following action took place:

__ Concept Plan -
_X_ **Non-Residential Site Plan - Approved**
__ Preliminary Plat
__ Final Plat
__ Other

Staff recommended approval.

Prior to Final Plat submittal for the first Section of the proposed subdivision, a Zoning Certificate must be obtained for the completed treatment and disposal system. Prior to issuance of the Zoning Certificate, the applicant shall provide the following:

1. A letter from TDEC indicating that the Nontraditional Wastewater Treatment and Disposal System was installed and is functioning;

2. As-built drawings showing the location of all system components and a sealed certification letter from the design engineer indicating that the Nontraditional Wastewater Treatment and Disposal System was constructed in accordance with the approved construction plans and specifications;

3. A letter from the owner/utility provider indicating that it has accepted the Nontraditional Wastewater Treatment and Disposal System and is currently operating same;

4. The posting of a Performance Bond in the amount of $146,600 for the Nontraditional Wastewater Treatment and Disposal System as specified by the County's wastewater consultant; and

5. The posting of a Performance Bond in the amount of $28,750 for landscaping improvements.

FUTURE REQUIREMENTS - Approval contains following requirements/stipulations:

__Zoning Certificate	__Septic Permit	__Driveway Permit	__Sign Permit
__Affidavit of Compliance	_X_Improvement Surety	__Building Permit	__Funds in-lieu
__Land Disturbance Permit	__Stormwater Maintenance	__ Performance Agreements	

GENERAL INSTRUCTIONS:

Land Disturbance Permit - contact Engineering Department at 790-5809. Sketch Plan & Site Plan approval expires in 6 months; **Preliminary Plat approval expires in 2 years. Final Plat approval** requires **surety** be provided from an approved financial institution within 50 miles of Franklin. Separate letters of credit are to be issued for each performance bond required. Section 3.2 (4) (l) of the Subdivision Regulations requires that bonds and surety be posted within sixty (60) days of the approval of the final plat. The plat shall be registered within thirty (30) days after the bond has been posted if required, or if no bond is required, thirty (30) days after approval. Bonds and surety for water and sewer are to be made payable to the utility district, with copies forwarded to Williamson County Planning/Engineering. Contact the appropriate utility district for water and sewer bond forms and information. **Bond form(s) and/or Affidavit of Compliance, if enclosed, are to be notarized and returned**. Cashiers Check required for **funds in lieu**. For **signage permit** information, contact the Codes Compliance Department.

NOTE:
No building permits may be issued until the Engineering Department has confirmed completion of construction of the road subgrade and installation of the stormwater drainage system.

Rogers C. Anderson
Williamson County Mayor

Planning Department
Michael Matteson, Director

February 13, 2015

SEC, Inc
Attn: Jamie Reed
850 Middle Tennessee Blvd.
Murfreesboro, TN 37129

RE: Planning Commission Meeting of February 12, 2015

Subdivision/Project: **Clovercroft Preserve**

Agenda Item No.: 18

TN DEPT OF ENVIRONMENT AND CONSERVATION
FEB 25 2015
DIV OF WATER RESOURCES
RECEIVED

At referenced meeting the following action took place:

_X_ **Concept Plan - Approved**
__ Site Plan
__ Preliminary Plat
__ Final Plat
__ Other

Staff recommended approval of this Concept Plan along with the request for a 40-foot right-of-way width.. It should be noted that once detailed construction and engineering plans are prepared in conjunction with the submittal of a Preliminary Plat, changes to the layout, including the potential for a reduction of lots, may be necessary.

A number of items must be addressed with future submittals.

The Preliminary Plat must address the following:

1. Submission of roads, drainage and erosion control plans for review and approval by the County Engineer. Such would include turn lane improvements on Clovercroft Road. Turn lane improvements must be approved by the County Highway Commission prior to Preliminary Plat submittal;

2. Submission of water plans for review and approval by Nolensville-College Grove Utility District;

3. Sewer lines must be shown outside of road right-of-ways;

4. Submission of construction plans for all required wastewater treatment and disposal facilities to TDEC, the County's consultant, and staff; and

5. Identification of lots requiring engineered site plans per Article 13 of the Zoning Ordinance.

The Final Plat must address the following:

1. Prior to submittal of a Final Plat, the turn lane improvements on Clovercroft Road must be completed in accordance with the approved plans;

2. Prior to Final Plat submittal, a Zoning Certificate must be obtained for the completed wastewater treatment and disposal system. Prior to issuance of the Zoning Certificate, the applicant shall provide the following:

   a) A letter from TDEC indicating that the Nontraditional Wastewater Treatment and Disposal System was installed and is functioning;
   b) As-built drawings showing the location of all system components and a sealed certification letter from the design engineer indicating that the Nontraditional Wastewater Treatment and Disposal System was constructed in accordance with the approved construction plans and specifications;
   c) A letter from the owner/utility provider indicating that it has accepted the Nontraditional Wastewater Treatment and Disposal System and is currently operating same;
   d) The posting of a Performance Bond in the amount of $146,600 for the Non-Traditional Wastewater Treatment and Disposal System as specified by the County's wastewater consultant; and
   e) The posting of a Performance Bond in the amount of $28,750 for landscaping improvements related to the treatment plant;

3. Prior to consideration of Final Plat approval, the applicant shall submit HOA documents for review and approval by the County Attorney's office. The approved HOA documents must be recorded prior to the recording of the Final Plat;

4. Establishment of a performance bond for roads, drainage and erosion control;

5. Establishment of a performance bond for water improvements in favor of Nolensville/College Grove Utility District;

6. Establishment of a performance bond for the wastewater collection system;

7. Submission of landscaping plans and establishment of a performance bond for landscaping;

8. Dedication of right-of-way 36 feet off the centerline of Clovercroft Road;

9. Execution of a Stormwater Maintenance Agreement and submission of an Operation and Maintenance Plan for stormwater improvements; and

10. Submission of the approved Final Plat in .dwg format on recordable media based on the Tennessee State Plane Coordinate System prior to signature and recording of the plat.

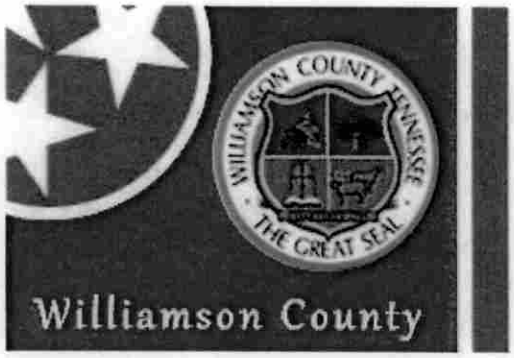
FUTURE REQUIREMENTS - Approval contains following requirements/stipulations:

__Zoning Certificate	__Septic Permit	__Driveway Permit	__Sign Permit
__Affidavit of Compliance	_**X**_Improvement Surety	__Building Permit	__Funds in-lieu
__Land Disturbance Permit	_**X**_Stormwater Maintenance	_**X**_ Performance Agreements	

GENERAL INSTRUCTIONS:

Land Disturbance Permit - contact Engineering Department at 790-5809. Sketch Plan & Site Plan approval expires in 6 months; **Preliminary Plat approval expires in 2 years. Final Plat approval** requires **surety** be provided from an approved financial institution within 50 miles of Franklin. Separate letters of credit are to be issued for each performance bond required. Section 3.2 (4) (I) of the Subdivision Regulations requires that bonds and surety be posted within sixty (60) days of the approval of the final plat. The plat shall be registered within thirty (30) days after the bond has been posted if required, or if no bond is required, thirty (30) days after approval. Bonds and surety for water and sewer are to be made payable to the utility district, with copies forwarded to Williamson County Planning/Engineering. Contact the appropriate utility district for water and sewer bond forms and information. **Bond form(s) and/or Affidavit of Compliance, if enclosed, are to be notarized and returned**. Cashiers Check required for **funds in lieu**. For **signage permit** information, contact the Codes Compliance Department.

NOTE:
No building permits may be issued until the Engineering Department has confirmed completion of construction of the road subgrade and installation of the stormwater drainage system.



TN DEPT OF ENVIRONMENT
AND CONSERVATION
FEB 25 2015
DIV OF WATER RESOURCES
RECEIVED

Engineering Report

Clovercroft Acres Subdivision

SOP - 13026

Septic Tank Effluent Pump (STEP) Sanitary Sewer Collection, Recirculating Sand Filter Wastewater Treatment & Land Drip Dispersal System

for

Landdevelopment.com &
Adenus Operations
Williamson County, TN

SEC, Inc.
SITE ENGINEERING CONSULTANTS
ENGINEERING • SURVEYING • LAND PLANNING
850 MIDDLE TENNESSEE BLVD • MURFREESBORO, TENNESSEE 37129
PHONE (615) 890-7901
WWW.SEC-CIVIL.COM

Section Index

1 General Information

Clovercroft Acres Subdivision (Step System)
TDEC *SOP No 12040*
Williamson County, Tennessee

The proposed Clovercroft Acres Subdivision is located along the southside of Clvercroft Road just east of Tullus Road. Currently the proposed subdivision will contain approximately 96 buildable lots that will be served by a proposed decentralized treatment facility designed for a future capacity of 120 lots; however, the wastewater treatment will consist of recirculating sand filter, recirculating and final tanks, and ultraviolet disinfection. The treatment facility also includes 20 drip dispersal zones @ 4,500 LF per zone. In addition, this site will contain 100% reserve area approximately 4.18 acres

The waste solids are to stay in septic tanks at each home to be pumped out later usually around 10 years of service. The wastewater is then collected from Clovercroft Acres Subdivision via small diameter forcemains. The effluent will first enter the recirculating sand filter for the initial wastewater treatment then to the final dose tank. The effluent is then pumped from the final dose tanks through ultra violet disinfection. Once disinfection has taken place, the effluent is pumped to suitable land for underground drip dispersal for land application for the final treatment of the wastewater.

]

2 Calculations and Nitrogen Loading

Equation 17-2 is used to calculate, on a monthly basis, the allowable hydraulic loading rate based on nitrogen limits:

$$\mathbf{Lwn} = \frac{Cp\,(Pr - PET) + N(4.413)}{(1 - f)(Cn) - Cp} \qquad \textbf{(Equation 17-2)}$$

Where:

Lwn	=	allowable monthly hydraulic loading rate based on nitrogen limits, inches/month
Cp	=	nitrogen concentration in the percolating wastewater, mg/L. This will usually be 10mg/L Nitrate-Nitrogen
Pr	=	Five-year return monthly precipitation, inches/month
PET	=	potential evapotranspiration, inches/month
U	=	nitrogen uptake by cover, lbs/acre/year
N	=	nitrogen uptake by cover, lbs/acre/month
Cn	=	Nitrate-Nitrogen concentration in applied wastewater, mg/L (after losses in preapplication treatment)
f	=	fraction of applied nitrogen removed by denitrification and volatilization.

The values of Lwh and Lwn are compared for each month. The lesser of the two values will be used to determine the amount of acreage needed.

NOTES:

- A "**Cn**" value of less than 23 mg/L will become a permit condition.
- The allowable (default value) vegetative uptake "U" of nitrogen on the drip area will be an uptake rate of 100 pounds per acre per year unless trees or other vegetation are acceptable to, and permitted by WPC.
- The "**f**" values for denitrification have been estimated based upon data supplied by the University of Tennessee and Oak Ridge National Laboratory. Denitrification rates (f) ranging from 25% in January and February to 35% in July and August are very conservative, but are defendable based upon the literature. Denitrification rates are assumed to vary linearly with the temperature and the actual rates are likely to be higher than the default values shown in Table 17-2.
- Conversion Factor - **4.413** mg-acre-inch/liter-lb. The equation and factor are from the TDHE Design Criteria for Sewage Works (April 1989). The factor comes from assuming that one pound of contaminant of concern is diluted within a volume of water equal to one acre-inch. For the derivation of this factor see Appendix 17-C.

Table 17-3 shows the default values for Lwn calculations. Other values may be used provided adequate rationale and documentation is presented to, and approved by the Department of Environment and Conservation.

TABLE 17-3

MONTH	Pr[1] Inches / Month	PET[2] Inches / Month	N Uptake[3] Percent / Month	f Denitrification[4] Percent / Month
JAN	7.62	0.10	1%	25%
FEB	6.72	0.27	2%	25%
MAR	8.85	0.97	4%	27%
APR	6.59	2.30	8%	29%
MAY	6.13	3.59	12%	31%
JUN	5.52	4.90	15%	33%
JUL	6.85	5.44	17%	35%
AUG	4.73	5.00	15%	35%
SEP	5.54	3.79	12%	34%
OCT	4.47	1.98	8%	32%
NOV	6.11	0.82	4%	29%
DEC	7.55	0.27	2%	26%

(1) Based upon Table A-3 of Chapter 16 – 5-year return monthly precipitation

(2) Based upon Table A-2 of Chapter 16 – Potential Evapotranspiration

(3) Based upon Table A-5 of Chapter 16 – Monthly Nitrogen Uptake by Vegetation

(4) Applied Nitrogen Fraction Removed by Denitrification / Volatilization

Note: Appendix 17-B shows Equation 17-2, using the default values.

Proposed Clovercroft Subdivision
Williamson County

NITROGEN LOADING

USING MASS BALANCE EQUATION

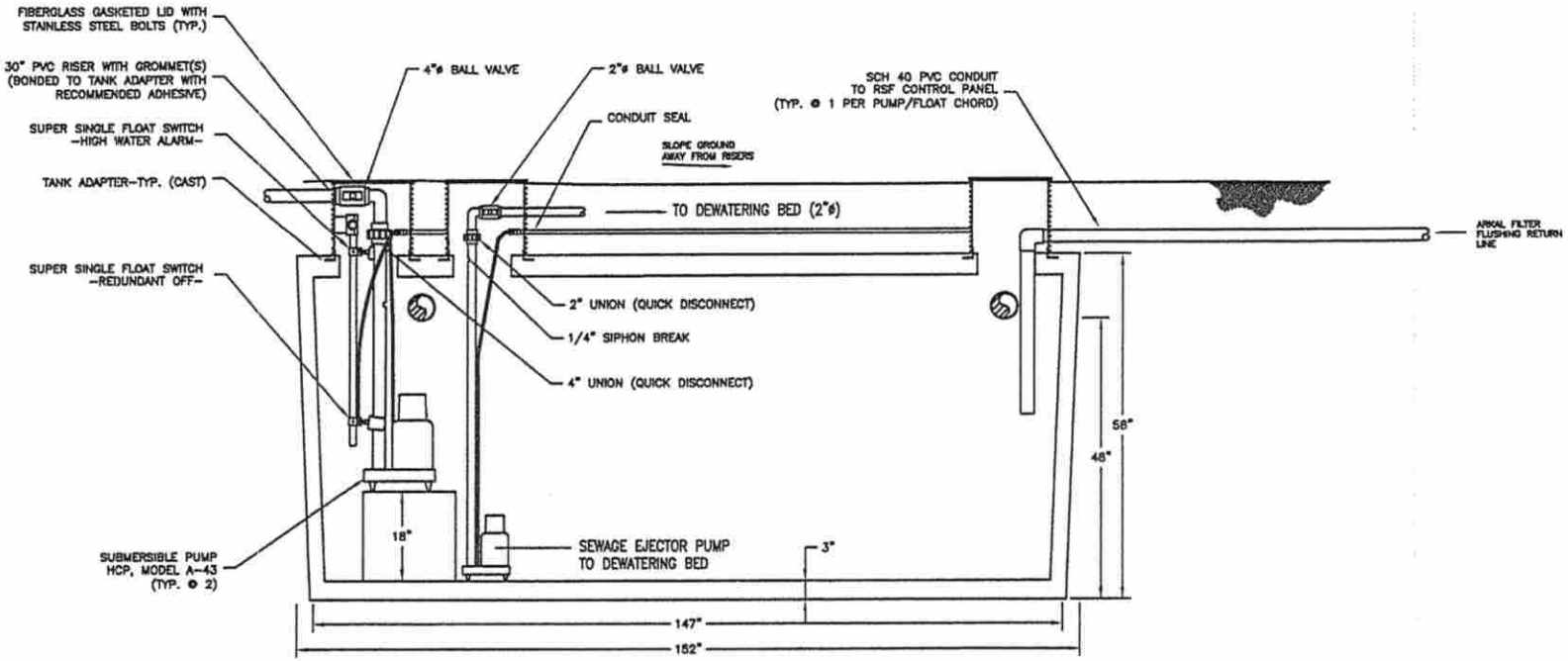
Lwn	=		Allowable Loading rate based on Nitrogen Limits
C_p	=	**10**	maximum nitrogen concentration (mg/l)
Pr	=	table(Chap. 16)	5-year return monthly precipitation, in./mon.
PET	=	table(Chap. 16)	potential evapotranspiration, in./mon. (From Chap. 16)
U	=	100	nitrogen uptake by vegetation (lbs N/acre/year)
C_n	=	23	nitrogen concentration in applied wastewater
f	=	Varies	fraction of applied nitrogen rem. by denitrif. and volatiliz.
constant	=	**4.424**	combined conversion factor

Nutrient Loading Rate = Lwn = $(C_p((PR)-PET))+U(4.424)/(((1-f)*C_n)-C_p)$

	Pr	PET	U(%/mo)	U/mo	% Denitr.	Lwn in/mo	Lwn in/wk	Lwn gal/sf/day
January	7.62	0.10	1	1.0	25	11.09	2.59	0.23
Feb	6.72	0.27	2	2.0	25	10.12	2.36	0.21
Mar	8.85	0.97	4	4.0	27	14.39	3.36	0.29
Apr	6.59	2.30	8	8.0	29	12.27	2.86	0.25
May	6.13	3.59	12	12.0	31	13.24	3.09	0.27
Jun	5.52	4.90	15	15.0	33	13.39	3.12	0.27
July	6.85	5.44	17	17.0	35	17.72	4.13	0.36
August	4.73	5.00	15	15.0	35	12.86	3.00	0.26
Sept	5.54	3.79	12	12.0	34	13.81	3.22	0.28
Oct	4.47	1.98	8	8.0	32	10.56	2.46	0.21
Nov.	6.11	0.82	4	4.0	29	11.06	2.58	0.23
Dec.	7.55	0.27	2	2.0	26	11.46	2.67	0.23

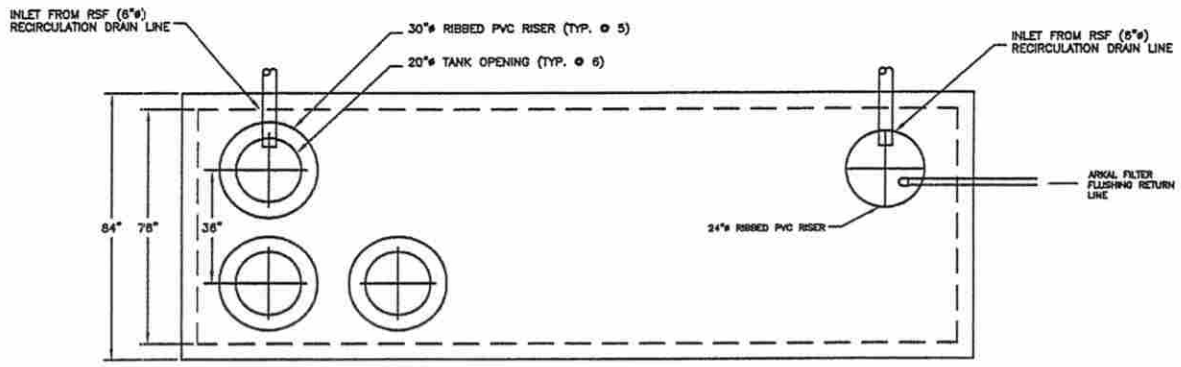
3 Pump Selections

A. 1,500 Gal Recirculating Tank



1,500 GALLON RECIRCULATION CHAMBER

N.T.S.



1,500 GALLON RECIRCULATION CHAMBER - PLAN

N.T.S.

CLOVERCROFT ACRES TREATMENT FACILITY
CLOVERCROFT ROAD
WILLIAMSON COUNTY, TENNESSEE

Overview

Clovercroft Acres Treatment Facility is proposed to be a Recirculating Sand Filter (RSF) treatment system with drip irrigation disposal (drip system). The RSF is designed for 0.036 MGD. The purpose of this project is to construct a new RSF capable of providing wastewater treatment and disposal capacity for a proposed subdivision consisting of approximately 120 single-family residences. The design flow for this project was figured thus:

Design Flow:	**= 36,000 GPD**
Proposed lots (EDU)	= 120 EDU's
Design flow (GPD) per EDU	= 300 GPD
120 EDU's * 300 GPD/EDU	= 36,000 GPD

This RSF will be designed @ 5.0 GPD/SF.

36,000 GPD / 5.0 GPD/SF	**= 7,200 SF media area (min.)**

The nearest standard sizing for this media area requirement is:

131.25 LF X 55 LF	**= 7,218.75 SF media area**

After leaving the proposed EDU's, the effluent wastewater will be forced to the inlet riser of the RSF. There will be storage chambers in the bottom of the RSF to serve as the recirculation chamber. The external recirculation chamber (1500 gallon wet well) will have submersible pumps that will force the effluent to the top of the RSF after it has traveled through the bottom of the RSF. The effluent will be distributed over the entire surface area of the RSF using the two pumps and a PVC distribution piping system.

During normal operation, the final discharge pumps will dispose of 20% of each recirculation cycle. The water will be pumped to the drip irrigation fields. The drip irrigation fields will have automatic flushing capabilities, controlled by the HAWKOS panel. During periods of low, or no flows (when the water level in the recirculation side of the RSF falls below 8" in depth), the HAWKOS panel will turn "off" the final dose pumps and go into standby mode, until the water level in the recirculation side of the RSF returns (rises) to 8" in depth. All component locations, sizing, models, and configurations may be modified at the discretion of the engineer during construction of the system. Modifications will be noted on final As-built drawings, and will be provided to the Utility.

RSF Pump Sizing

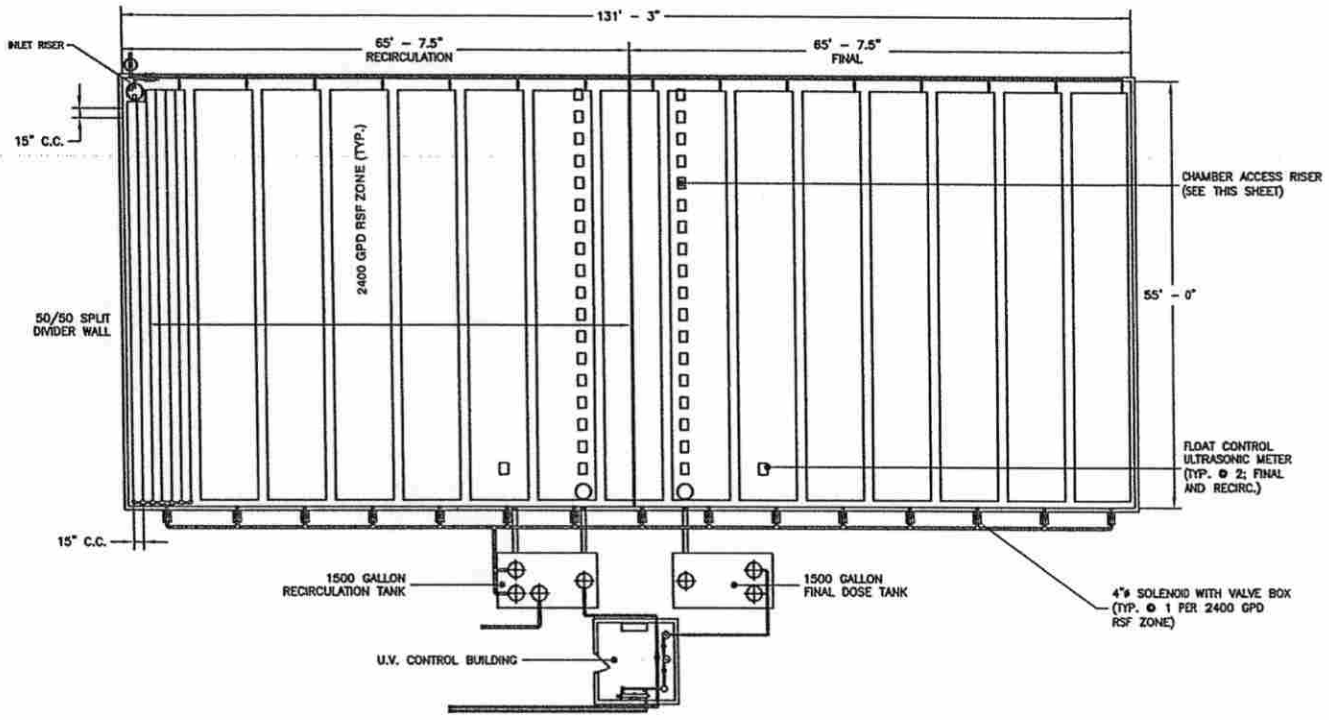
The RSF will be designed in 15-2400 GPD zones. Each zone will have 7 laterals spaced at 15" on cent[illegible] with 1/8" diameter orifices spaced at 15" on center. Therefore:

Lateral length	52.5 feet
Lateral diameter	1.25 inches
Lateral spacing	15 inches
Orifice spacing	15 inches
Orifice diameter	1/8 inch
Minimum flow rate per Orifice	0.75 gpm
Number of Orifice per zone	294 orifices
Number of Laterals per zone	7 laterals
Total actual flow rate (accounting for losses in lateral)	**224.5 GPM**
Losses:	
Minimum residual head at last orifice	**15 feet**
Transport pipe diameter	4 inches
Transport pipe length (pump to zone inlet)	60 feet
Losses in Transport pipe	2.5 feet/100 feet
Total Head loss in Transport pipe	**1.5 feet**
Lateral Distribution header diameter	3 inches
Total head loss in Distribution header	**0.1 feet**
Head loss elevation (pump to zone)	**2.5 feet**
Head loss in laterals	**2.4 feet**
Total Head losses	**21.5 feet**

The recirculation pumps will be sized to produce:

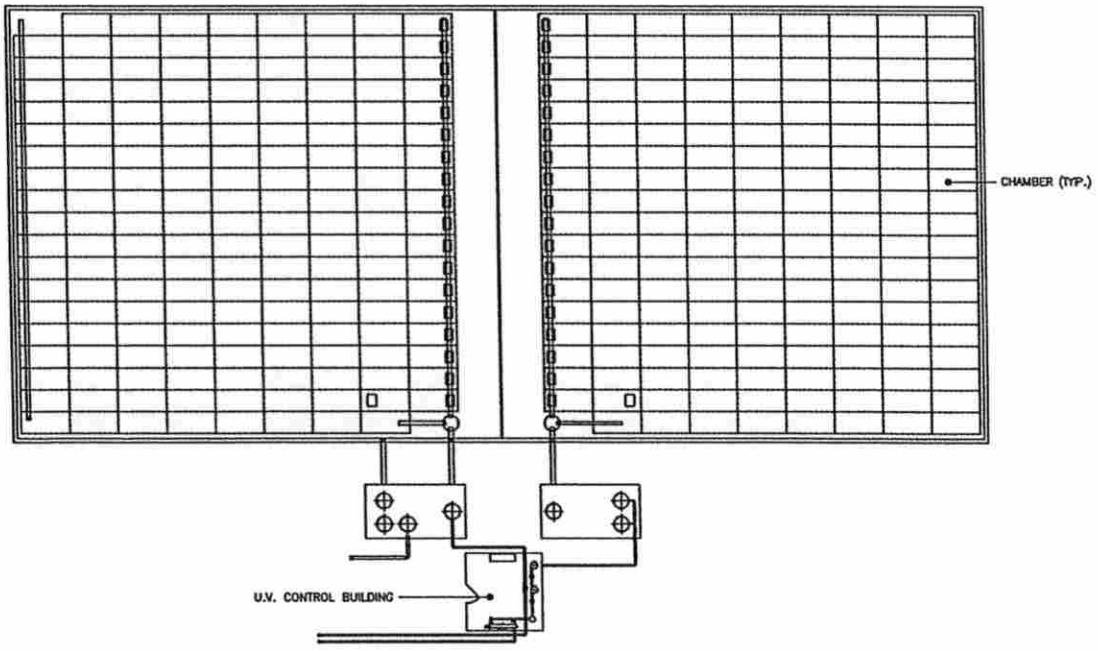
224.5 GPM @ 21.5 feet of head

Use: HCP Model A-43, 4" Discharge, 3HP, 2 pumps total



RECIRCULATING SAND FILTER - PLAN

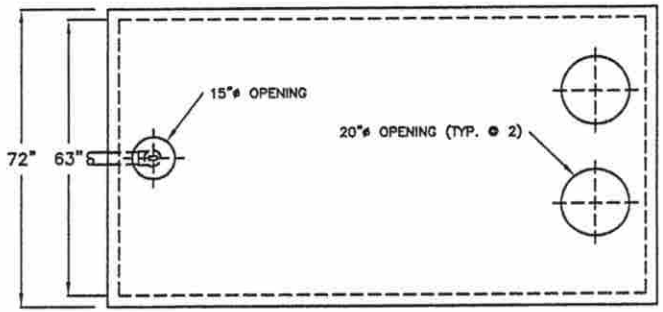
SCALE: N.T.S.



RECIRCULATING SAND FILTER
CHAMBER LEVEL - PLAN

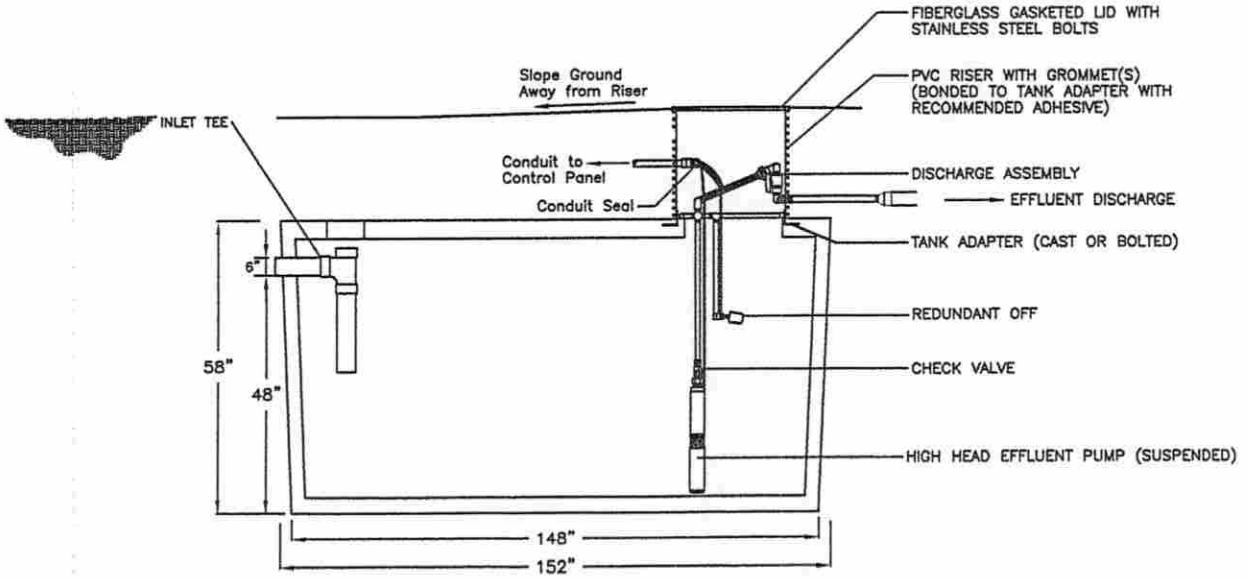
SCALE: N.T.S.

B. 1,500 Gal. Final Dose Tank



PLAN VIEW

N.T.S.



1500 GALLON FINAL DOSE TANK

N.T.S.

THE FINAL DOSE TANK WILL REQUIRE TWO 20" DIAMETER (MINIMUM) OPENINGS ON THE OUTLET END TO INSTALL THE TWO PUMP AND VAULT ASSEMBLIES.

Bioline Drip Emitter Piping Calculations

Bioline piping requires 1.6 GPM per distal end to properly flush the emitters.
This system will be built in 20 cells of 4,500 LF of dripper line (maximum). The maximum lines in one cell shall be 16 lines. Only one cell is dosed at a time.
Therefore:

16 distal ends * 1.6 GPM/distal end = 25.6 GPM minimum to achieve flushing. **Use: 26 GPM**

Using a 24" spacing with the Bioline 0.61 (0.57" I.D.), the head loss in laterals up to 400 LF in length is approximately 7 psi. This number is to be called ΔP. (From Netafim's info.)
Therefore: ΔP = 7 psi

Using ΔP = 7 psi, the minimum inlet pressure required for proper flushing is 30 PSI.

30 PSI * 2.31 (conversion) = *69* feet of head (approx.) at lateral entrance (flushing pressure).

Size pumps for normal operation:
Regular Min dosing flow: (per cell) 4,500 LF / 2' centers = 2,250 emitters
2,250 emitters * 0.61 gph = 1372.5 gph
1372.5 gph / 60 min / hour = 22.9 gpm (**Use: 23 gpm**)
Required Dosing Pressure (from Netafim Chart) = 30 psi =69 ft.
Assume longest run for friction loss (supply line):
Use approx. 450 ft. 2-inch class 200 pipe @ 23 gpm
h_L = 450/100 ft. = 4.5'
Total friction loss = 4.5 * 0.8 = 3.6 ft.
Minimum Pump Requirements for normal dosing:
23 GPM @ 69 ft. (30 psi) normal operating pressure + friction losses in transport pipe (3.6 ft.) + elevation head (11 ft.) + losses thru disc filter (1.6 ft.) = 23 GPM @ 85.2 ft.
The pump must produce at least -
Normal dosing: 23 GPM @ 85.2 ft. (see pump curve)

Size Pumps for Flushing Requirements:
Calculations with **BOTH** pumps on:
Assume longest run for friction loss (supply line):
$Flow_{dose}$ + $Flow_{flush}$ = 23 gpm + 26 gpm = 49 GPM **Use 49 gpm**
Use approx. 450 ft. 2-inch class 200 pipe @ 49 gpm (23 + 26 = 49 gpm)
h_L = 450/100 ft.
Total friction loss (from pump calcs) = 4.2 ft.
Elevation Head – 11 ft.
Disc Filter losses – 1.9 ft
Estimated (high) Total Head required for flushing: 85.4 ft. + 4.2 ft. + 11 ft. + 1.9 ft. = 102.4 ft.
Using both pumps = 25 GPM each (2x25 gpm=50 gpm)
Size pumps for min: 25 GPM each (total combined flow of 50 gpm) @ 102.4 ft. head

Therefore, to adequately dose and flush the Bioline tubing, each pump must produce at least:

25 GPM @ 85.4 feet of head + friction losses in the transport pipe (4.2 ft.) + elevation head (11 ft.) + losses through Disc Filter (1.9 ft.) = **25 GPM @ 102.4 TDH (use two pumps at the same time to get 50 GPM) (see pump curve)**

Use: **(2)-STA-RITE S20P4JP15221, 1.5 HP pumps. Both pumps shall run at the same time for flushing**

Final Dose

Final dose tanks shall house two duplex pump vaults with **(1) - STA-RITE S20P4JP15221, 1.5 HP pump** per vault. A PLC Telemetry panel, with a pressure sensor to monitor the liquid level inside the tank, shall control the pumps.

The following are descriptions of items on the spreadsheet that require clarification. Not all items on the spreadsheet are stated in this description.

(Refer to previous page)

Design flow rate – One half of the total flushing flow required
50 GPM / 2 pumps = 25 GPM/pump

Lift to distribution point – highest elevation to overcome in drip fields
11' lift out of tank
Transport Line Size – 2"∅ (Drip field supply line)
Transport Length – farthest distance between a pump and a Drip field zone on the plans.

'Add-on' Head Loss – an accumulation of the losses not previously allowed for in the table. Figured thus:

30 psi * 2.31 = **69 ft. operating/flushing pressure**

Head loss in transport pipe @ 50 GPM = 15 ft

Head loss in transport pipe @ 25 GPM = 0.8 ft
15 ft. – 3.6 ft. = **11.4 ft.**

Therefore,
69 ft. + 11.4 ft. + 5 ft. (SF) = **85.4 ft. total 'add-on' head loss** (may be rounded on spreadsheet)

Prepared by: SEC. Inc. 11/11/2014

Project: 12040 Clovercroft Acres Sd

1,500 Gal final dose chamber (Dose/Flush)

Design Flow Rate	23.0	
Distributing Valve Model (# of Zones)	none	
Lift to Distribution Point	11.0	feet
Discharge Assembly Size	1.50	
Transport Line Size	2.00	inches
Pipe Class/Schedule	200	
Transport Length	450	feet
Flow Meter	none	
'Add-on' Head Loss	69	feet

Friction Head Losses:

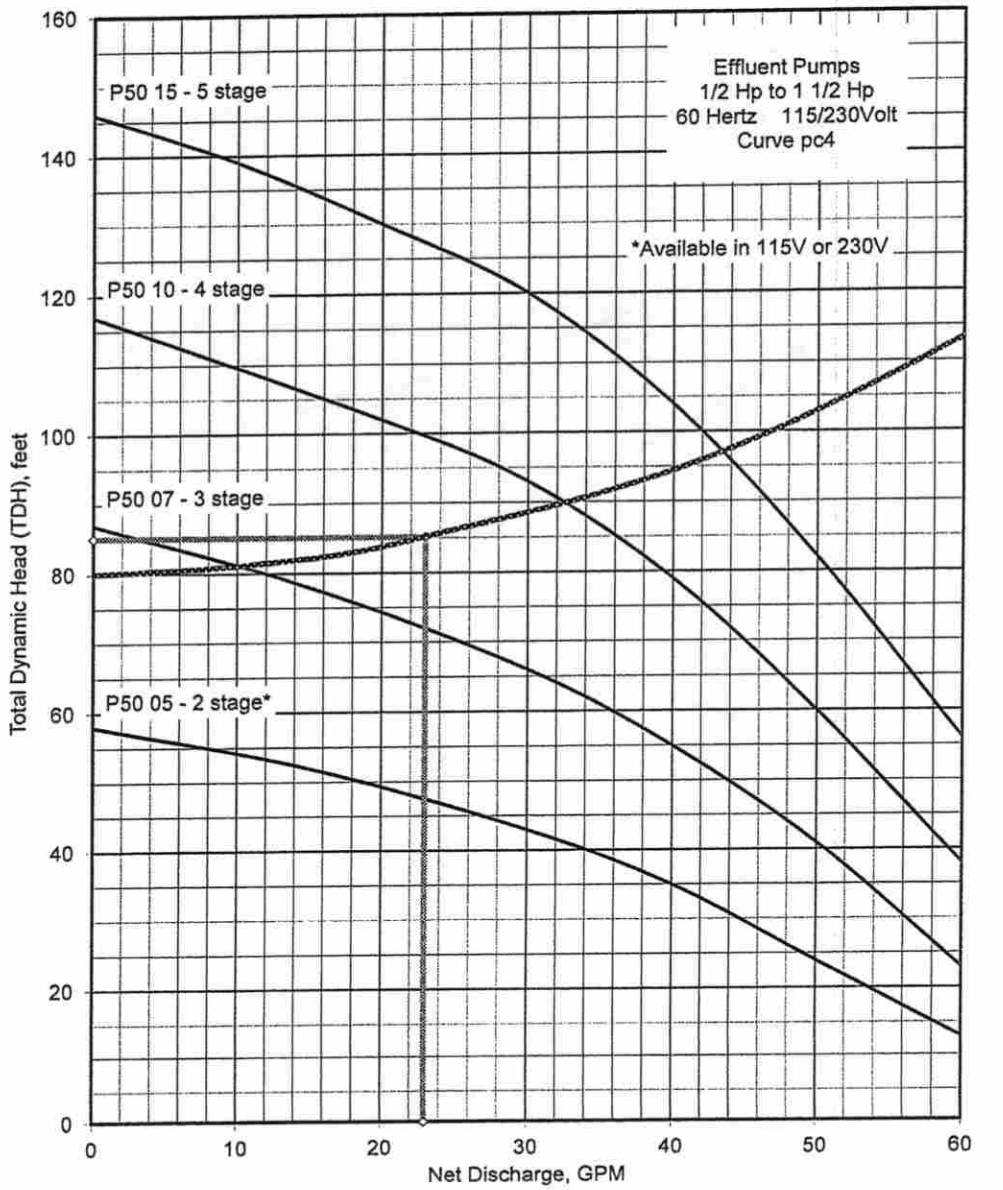
Head Loss in Transport Pipe	3.6 feet
Head Loss through Discharge Assembly	1.6 feet
Head Loss through Distributing Valve	0.0 feet
Head Loss through Flow Meter	0.0 feet

Size Pump for:

DESIGN FLOW RATE **23.0**

@

TOTAL DYNAMIC HEAD **85.2**



Prepared by: SEC. Inc. 11/11/2014

Project: 12040 Clovercroft Acres Sd

1,500 Gal final dose chamber (Dose/Flush)

Design Flow Rate	50.0	
Distributing Valve Model (# of Zones)	none	
Lift to Distribution Point	11.0	feet
Discharge Assembly Size	1.50	
Transport Line Size	2.00	inches
Pipe Class/Schedule	200	
Transport Length	450	feet
Flow Meter	none	
'Add-on' Head Loss	69	feet

Friction Head Losses:

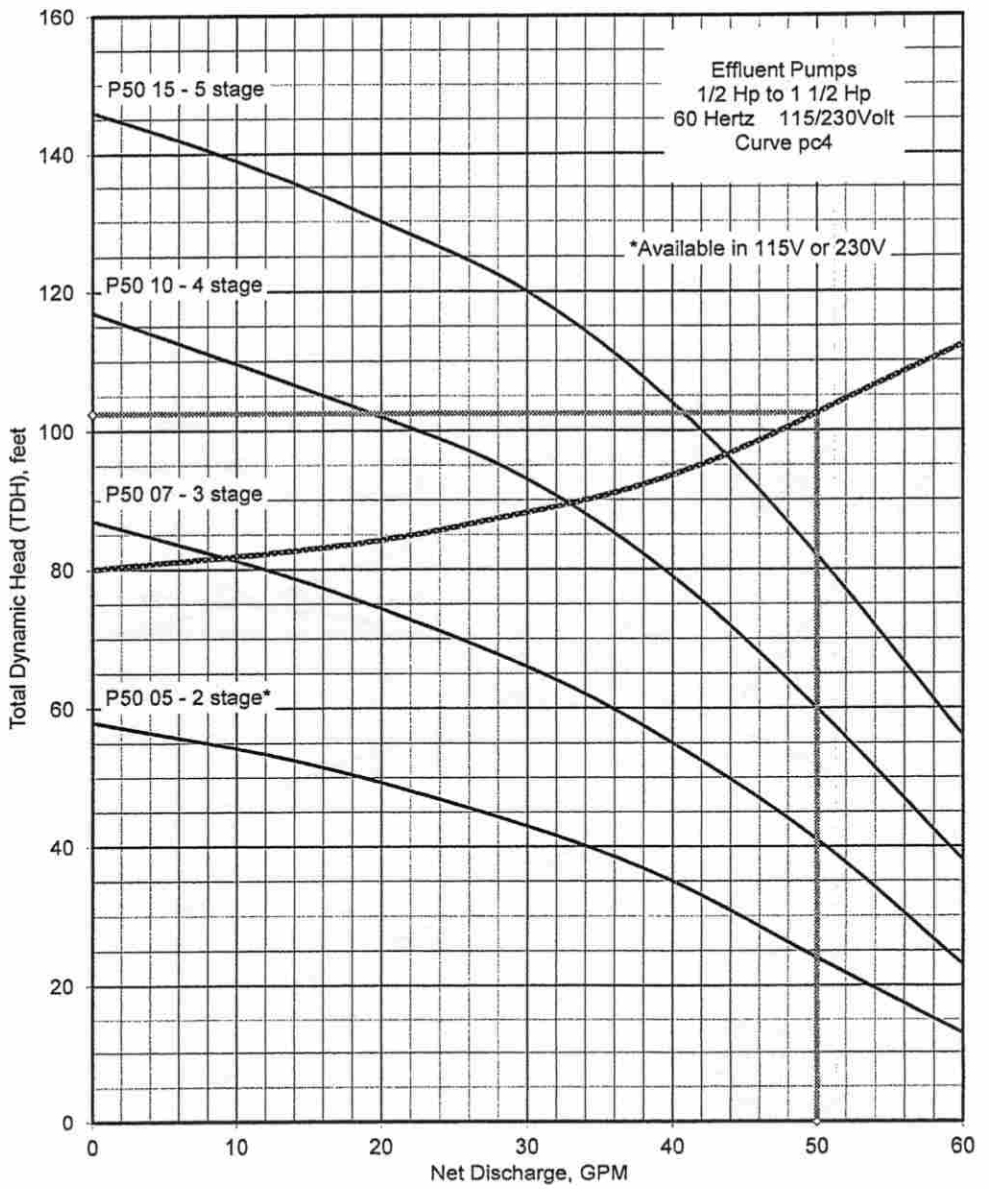
Head Loss in Transport Pipe	15.0 feet
Head Loss through Discharge Assembly	7.5 feet
Head Loss through Distributing Valve	0.0 feet
Head Loss through Flow Meter	0.0 feet

Size Pump for:

DESIGN FLOW RATE **50.0**

@

TOTAL DYNAMIC HEAD **102.5**



Prepared by: SEC. Inc. 11/11/2014

Project: 12040 Clovercroft Acres Sd

1,500 Gal final dose chamber (Dose/Flush)

Design Flow Rate	25.0	
Distributing Valve Model (# of Zones)	none	
Lift to Distribution Point	11.0	feet
Discharge Assembly Size	1.50	
Transport Line Size	2.00	inches
Pipe Class/Schedule	200	
Transport Length	450	feet
Flow Meter	none	
'Add-on' Head Loss	85	feet

Friction Head Losses:

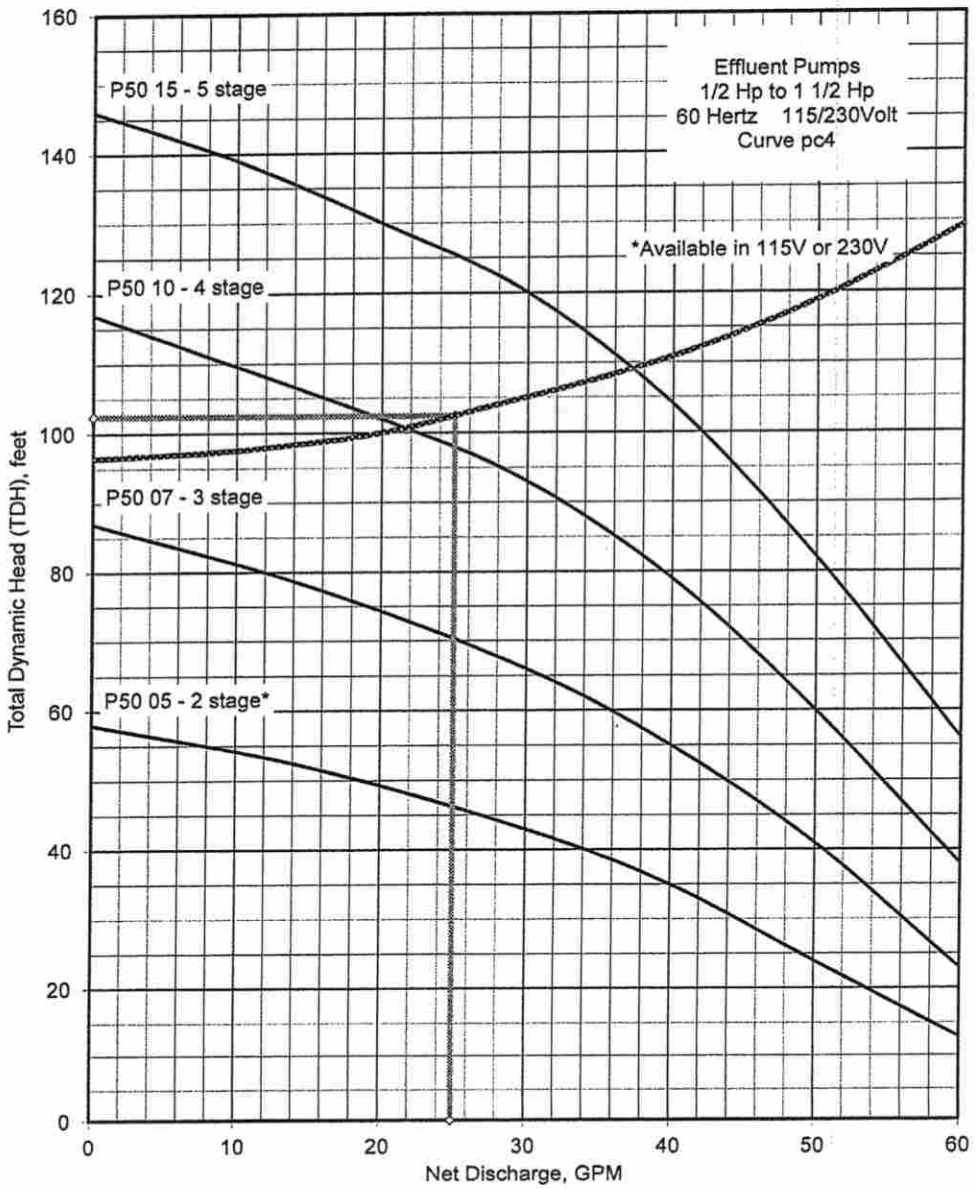
Head Loss in Transport Pipe	4.2 feet
Head Loss through Discharge Assembly	1.9 feet
Head Loss through Distributing Valve	0.0 feet
Head Loss through Flow Meter	0.0 feet

Size Pump for:

DESIGN FLOW RATE **25.0**

@

TOTAL DYNAMIC HEAD **102.4**



4 Effluent Disposal

The effluent will be treated by a recirculating sand filter, ultraviolet disinfection, and pumped to drip dispersal fields. In the RSF, the effluent receives the majority of its treatment. The effluent passes through the RSF five times before it is pumped through a disc filter and ultraviolet light, effectively destroying bacteria and viruses before releasing it in a subsurface drip irrigation system. At this point, the soil continues to provide treatment on an already cleaned effluent.

Daily Flow

Number of 3-BR Buildable Residential Lots	120 lots
Daily Flow for 3-BR	300 gpd/lot
Daily Flow	36000 gpd

Land Application Area

Land Application Area	0.2 gal/sf/day*
Total Area Required	180000 s.f.
or	4.13 acres

* assummed soil absorption rate

Number of Required Zones

Length per zone (@ 2' o.c.)	4500 L.F.
Number of Zones	20.0 Zones

Land Reserve Area

Area per lot	100% S.F./lot
Total Area Required	180000 S.F.
or	4.13 acres

Total Soils Area Required (Land Application + Reserve)

360000 s.f.	8.26 acres

Sand Filter Size

5 gal/S.F./day	
36000 gpd	
Area Req'd	7200 S.F.
Use Filter No.	P555303131.25

55' x 131.25'

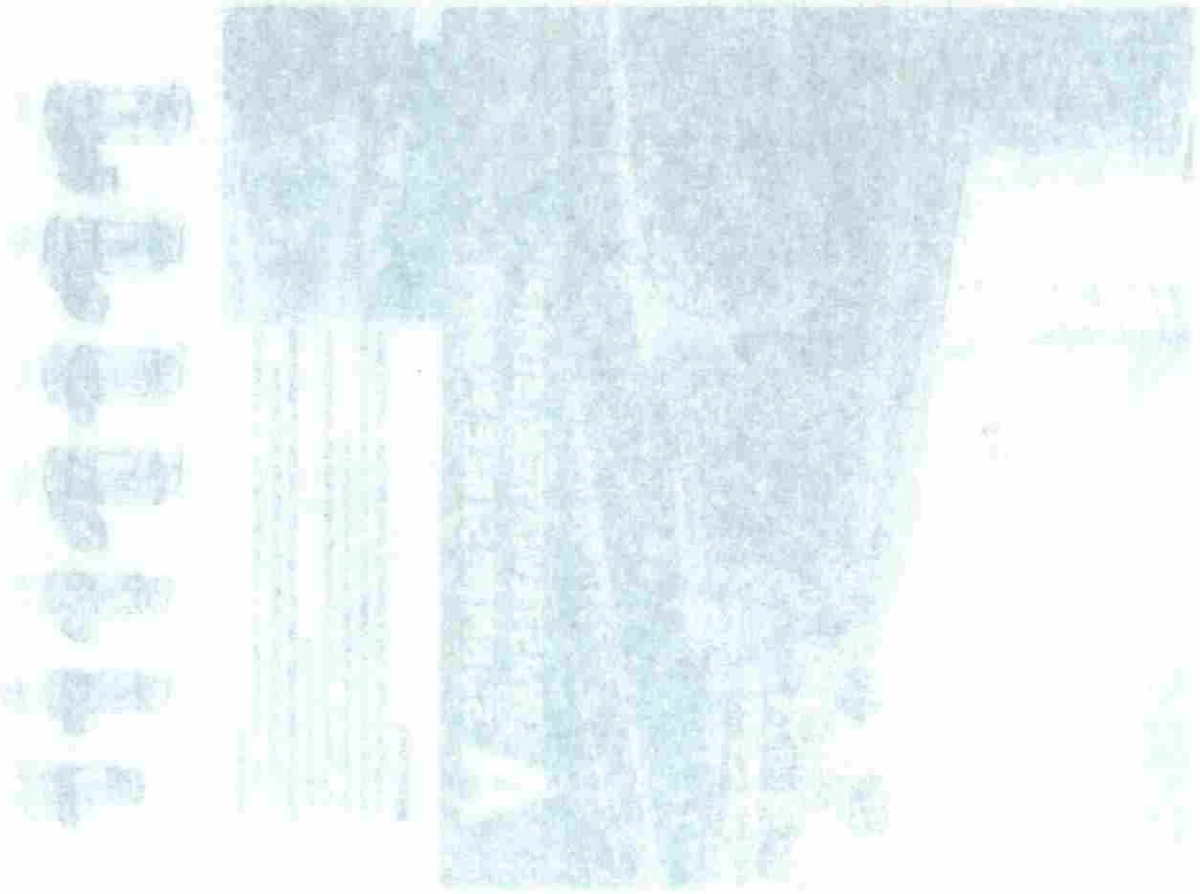
5 Effluent Storage

Tennessee Department of Environment and Conservation (TDEC) require 24 hours of storage volume for drip dispersal. With drip dispersal as the effluent disposal, the project would not be required to have additional effluent storage unlike spray irrigation.

REQUIRED STORAGE	
Single Family residence	120 EDU
Flow per EDU	300 gpd
Required Storage	**36000 gal.**

PROVIDED STORAGE	
Number of Chambers in RSF	320
Volume per Chamber	106 gal.
Volume of Chamber Storage	33920 gal.
Recirculation Tank Size	1,500 gal.
Dose Tank Size	1,500 gal.
Flush Chamber Volume	5,000 gal.
Storage Provided	**40420 gal.**
EXCESS STORAGE	**4420 gal.**

6 Reference Material and Specifications



A WASTEWATER/SUMP SUBMERSIBLE PUMPS

FEATURE

- A precision manufactured motor is achieved by utilizing the highest standard of quality control. All rotors adopt heat treatment methods for drive shaft assembling, and stator winding impregnated with varnish that is heat dried in an industrial oven.
- HCP's professional assembly line, complimented with a synthesized production test, ensures the highest level of pump quality.
- Standard accessories include: cable with an epoxy resin sealed and water resistant cable base; auto-cut, the thermal motor protector; dual mechanical seals and lip seal design.
- The A-05A is a practical pump, with a low temperature, oil filled motor and single seal design (CA/CE).

A-05A/B | A-05L A-21 | A-31 | A-32Y | A-23 | A-33 | A-43

APPLICATIONS

- Waste water.
- Sump drainage.
- Flood control.
- Dewatering for fish pond or basement and cellars.

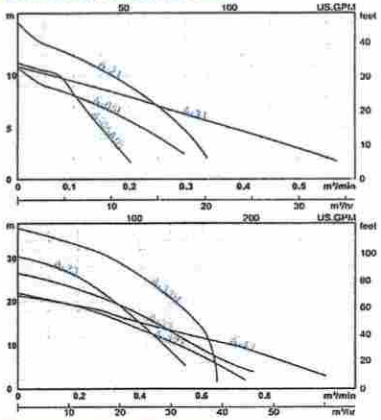
PRODUCT NOMENCLATURE

A – 05 / HP — A / Style

A – 2 / Discharge inch — 1 / HP

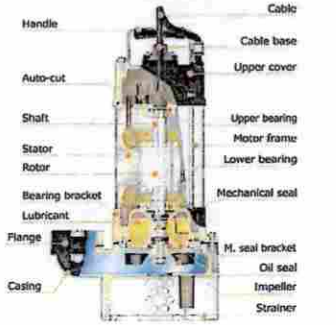
Note: A05-31 3Phase Vortex impeller will cause higher amperage when operated in reverse direction

PERFORMANCE CURVES



SPECIFICATIONS

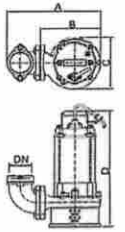
	Discharge (mm)	50 • 80 • 100
Limits Of Use	Liquid Temp.	0~40°C (32~104°F)
	Applications	Wastewater Sewage and Drainage water
	Submersion Depth	30m (100feet)
Type	Frequency	60Hz
	Motor	2P (3600RPM) • Dry Motor (A-05A: Oil motor)
	Insulation	Class B
	Protection	IP68
	Protector	Auto-cut (A-05A 3Ø none, A-05A/B/L 1Ø Overheat)
Material	Bearing	Ball Type
	M.seal	Double M.seals (A-05A: Single M.seal)
	Impeller	Semi-open (A-43: Enclosed-Channel)
	Upper Cover	FC-200
	Motor Frame	SUS304
	Shaft End	SUS410(0.5~1HP) • SUS403(2~3HP)
	M.seal	Upper: Carbon/Ceramic Lower: Silicon/Silicon (A-05A: carbon/ceramic)
	Casing	FC-200
	Impeller	FC-200(A-05A/B: PA)
	Cable	VCT or H07RN-F or SJOW/SOW
	Optional	Pumps can be customized to fit specifications



PERFORMANCE SPEC.

Model	HP(kW)	Discharge Inch(mm)	Phase Ø	Start Method	Standard m - m³/min	Standard ft - GPM	Solid Passage mm(inch)	Weight kg(lb) 1Ø	Weight kg(lb) 3Ø	Dimension (mm) A	B	C	D 1Ø	D 3Ø
A-05B	½ (0.4)	2" (50)	1	Capacitor	8 - 0.1	25 - 26	7.5 (¼")	13 (29)	12 (27)	226	-	161	372	372
			3	Direct										
A-05L	½ (0.4)	2" (50)	1	Capacitor	7 - 0.15	23 - 40	8 (¼")	16 (35)	14 (31)	245	-	173	430	430
			3	Direct										
A-21	1 (0.75)	2" (50)	1	Capacitor	10 - 0.17	32 - 45	10 (⅜")	17 (38)	15 (33)	245	-	173	430	430
			3	Direct										
A-31	1 (0.75)	3" (80)	1	Capacitor	6 - 0.3	20 - 80	10 (⅜")	18 (40)	17 (38)	278	-	173	457	457
			3	Direct										
A-32Y	2 (1.5)	3" (80)	1	Capacitor	13 - 0.4	42 - 106	11 (⅜")	37 (82)	32 (71)	365	245	216	575	495
			3	Direct										
A-23	3 (2.2)	2" (50)	1	Capacitor	25 - 0.2	82 - 52	11 (⅜")	38 (84)	32 (71)	280	242	216	572	493
			3	Direct										
A-33	3 (2.2)	3" (80)	1	Capacitor	16 - 0.4	52 - 106	11 (⅜")	39 (86)	33 (73)	365	245	216	575	495
			3	Direct										
A-33H	4 (3.0)	3" (80)	1	Capacitor	23 - 0.4	75 - 106	11 (⅜")	47 (104)	-	365	245	216	575	-
A-43	3 (2.2)	4" (100)	1	Capacitor	10 - 0.7	32 - 185	11 (⅜")	44 (97)	39 (86)	385	240	216	575	495
			3	Direct										
A-05A	½ (0.4)	2" (50)	1	Capacitor	8 - 0.1	25 - 26	7.5 (¼")	12 (27)	11 (24)	226	-	161	349	349
			3	Direct										

Note: Weight Without Cable & Elbow Set



TECHNICAL DATA

A

Date 3/20/2012

Series A43

MOTOR SPECIFICATIONS

Motor Design	Air Filled
Applications	Effulent water
Insulation Class	Class B
Maximum Liquid Temp	0-40 C (32 - 104 F)
Frequency	60 HZ
RPM	3450

PUMP & MOTOR DATA

Impeller	Enclosed Channel
Solid Size	1/2"
Discharge	4"
Motor	2 Pole
KW /Hp	2.2 / 3 hp
Phase	1 & 3
Cable	VCT or SJOW/SOW 23 Ft
Protection	Auto Cut

MATERIALS OF CONSTRUCTION

Motor Housing		SUS 304
Impeller		FC-200
Volute		FC-200
Rotor		SUS 403
Hardware		316 SS
O-Rings		BUNA"N"
Upper Bearing		Roller Bearing
Lower Bearing		Roller Bearing
Mechanical Seal	Lower	Sillcon /Sillcon
	Upper	Carbon /Ceramic

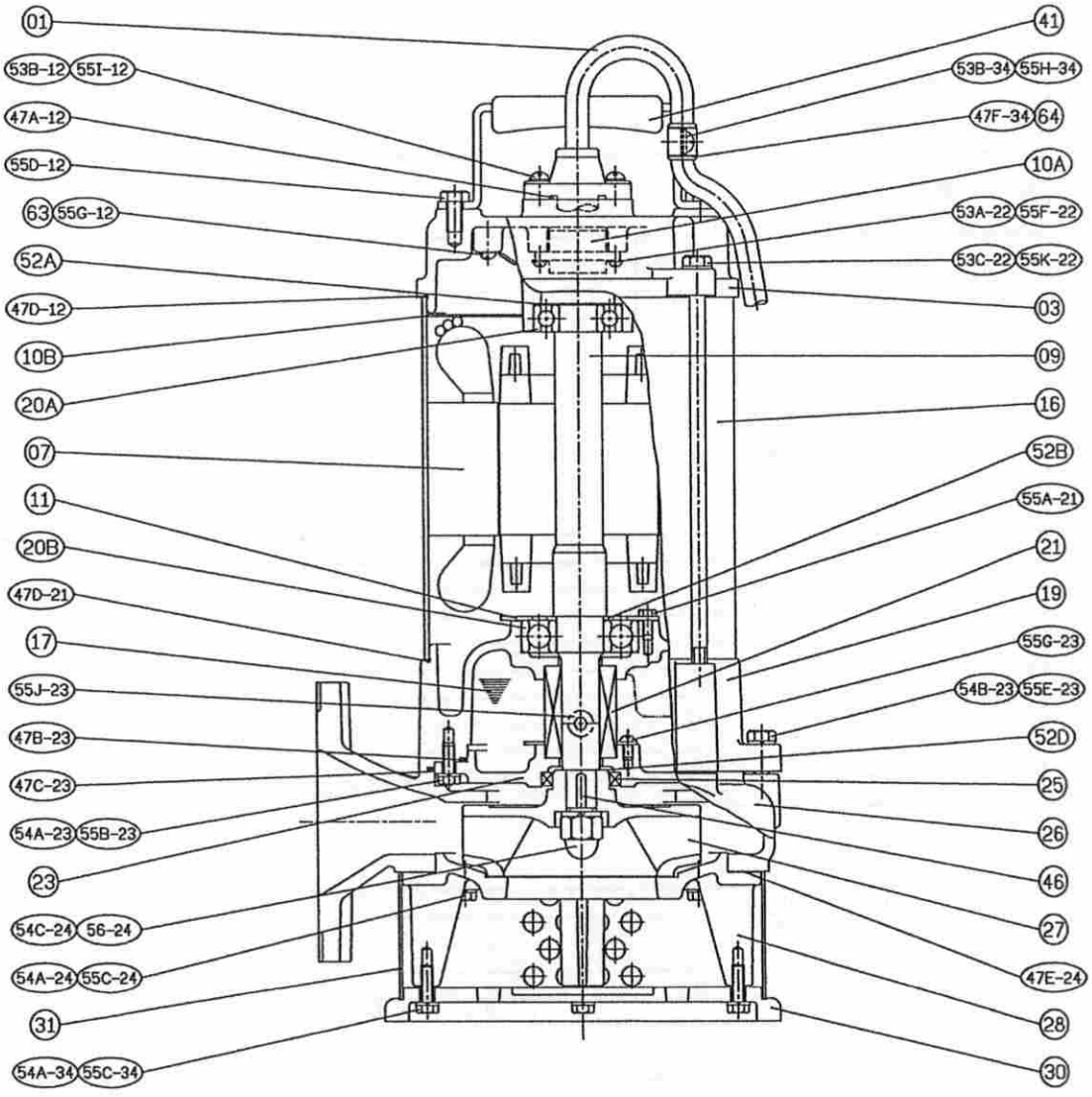
DIMENSIONS, WEIGHT

Pump weight	97 Lbs
Maximum Submergence	100 Ft
Optional	Float Switch

Model	A43	1Ph	1Ph	3 Ph	3 Ph	3 Ph
		115	230	230	460	575
Amps			14.4	8.4	4.2	3.4

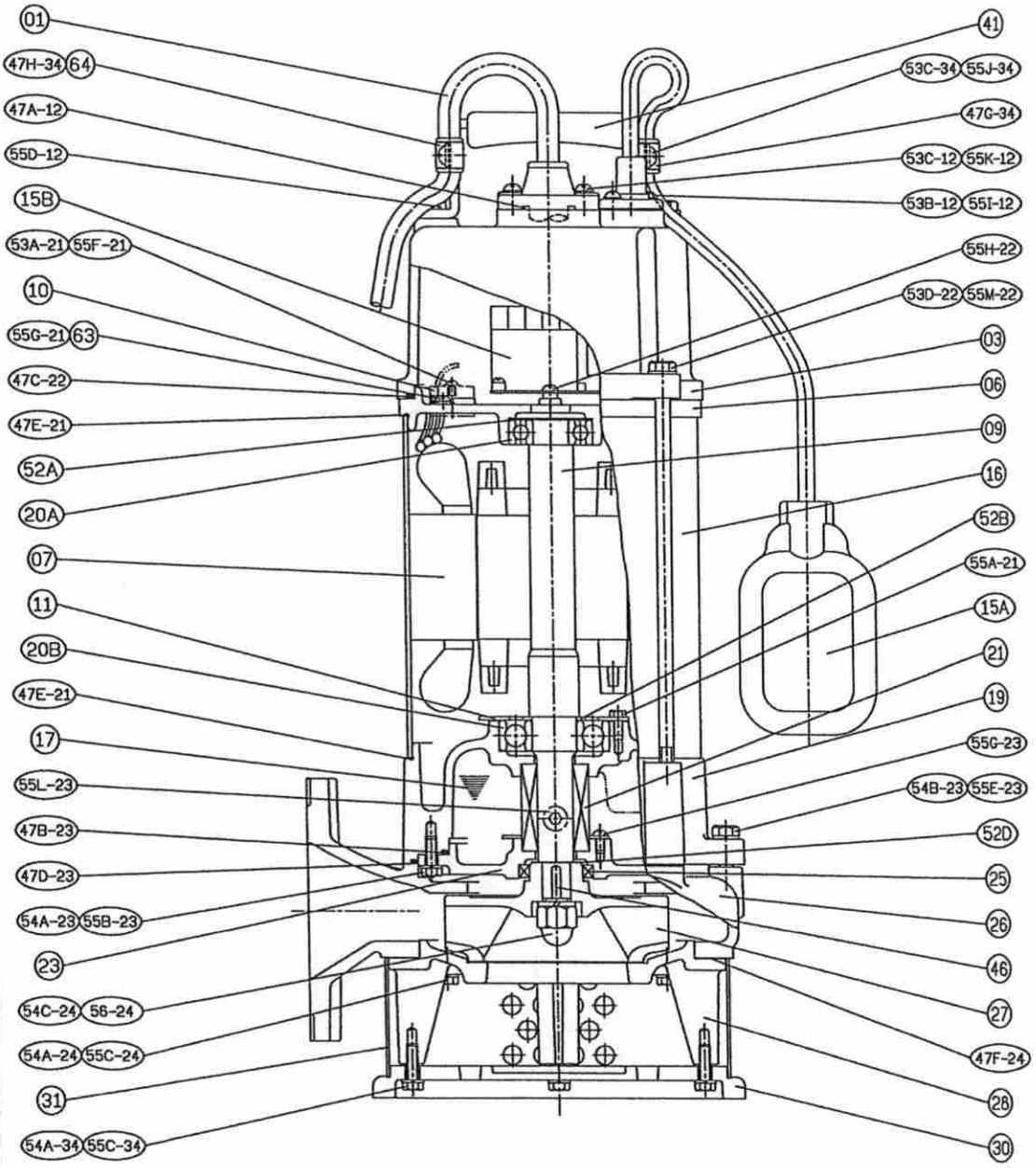
HCP PUMP	SECTIONAL DRAWING	A4A00222030-00 DATE:2012-12

MODEL: A-43 3Ø



HCP PUMP	SECTIONAL DRAWING	A4A00222031-00 DATE:2012-11

MODEL: A-43F 3Ø

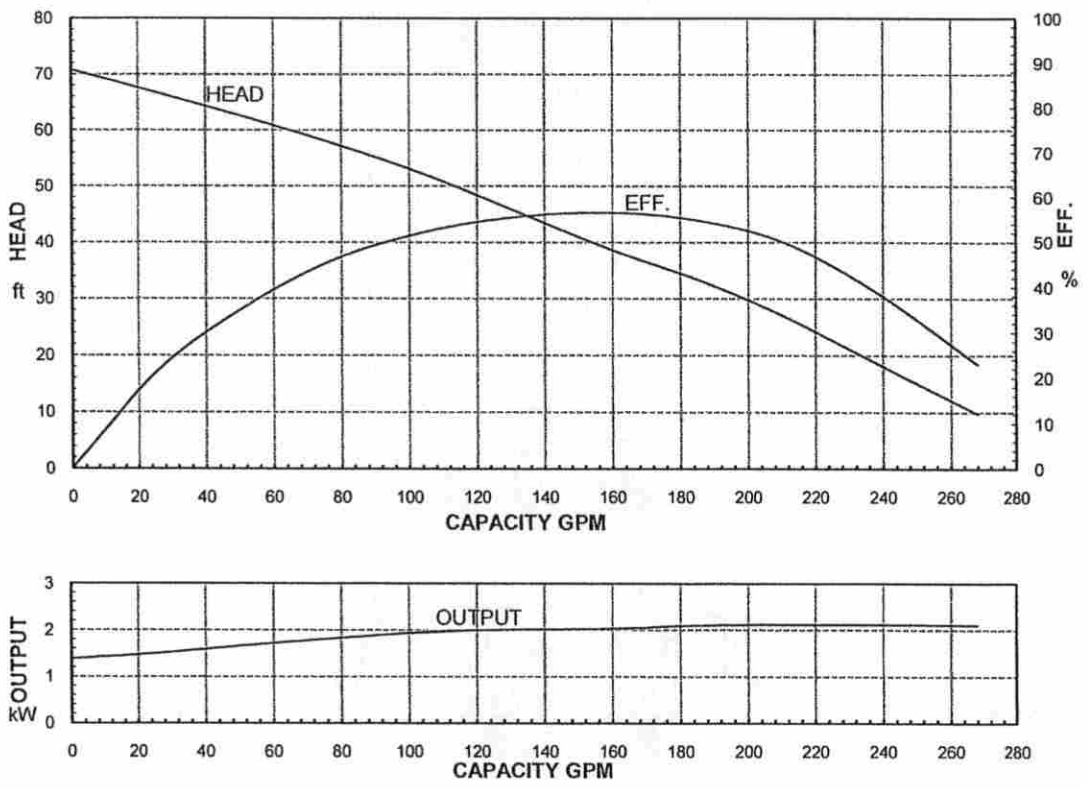


HCP PUMP

FILE NO PC-FT-E6-A433

PUMP PERFORMANCE CURVES

MODEL	A-43						DATE: 2011.1	
	STANDATD SPECIFICATION						REFERENCED SPECIFICATION	
FREQUENCY	60 Hz							
DISCHARGE	4 inch / 100 mm							
OUTPUT	3 HP / 2.2 kW						HP	kW
HEAD	32 ft							
CAPACITY	185 GPM							
PHASE/VOLTAGE	3 ϕ	220 V	230 V	380 V	440 V	460 V	ϕ	V
RATED CURRENT		8.6 A	8.4 A	4.8 A	4.3 A	4.2 A		A
POLE / R.P.M.	2 P / 3450 R.P.M.							
START METHOD	DIRECT							
INSULATION CLASS	B							
REMARK								



HCP PUMP MANUFACTURER CO.,LTD.

SIGNATURE :

AR Series
AIR AND VACUUM RELEASE VALVES
For waterworks, irrigation and turf systems

The exclusive **AR Series**, plastic and metal manufactured products offer outstanding features and advantages:

- Perfect sealing under very low system pressure.
- High flow capacity.
- Patented operation together with smart design.
- Simple, compact and reliable product.

The **BERMAD AR Series** air and vacuum release valves include four basic models:

1" Automatic pressure air release valve (Model 01-ARA), for the automatic release of entrapped air pockets from pressurized systems.

2" Kinetic air and vacuum release valve (Model 02-ARK), with large orifice, for the release of large quantities or air from filling pipelines and for admitting air into quick-draining pipelines to prevent vacuum damage.

2" Combination air and vacuum release valve (Model 02-ARC), in which the features of the two previous models are incorporated in one single valve body, for safe pipeline filling and draining and for releasing air pockets during system operation.

1/2" Vacuum breaker (Model ARV), prevents drip lines from clogging in tough topographic conditions and in sub-surface drip-irrigation system.

FEATURES

- Only one or two moving parts, depending on model.
- Corrosion-resistant construction.
- Pressure-balanced float, free of distortion or collapse.
- Special drip-tight dynamic seal.
- Exclusive kinetic design prevents floats from being blow shut.
- Perfect sealing under system pressure as low as 0.1 bar.

01-ARA-I

02-ARC-I

01-ARA-P

02-ARC-P

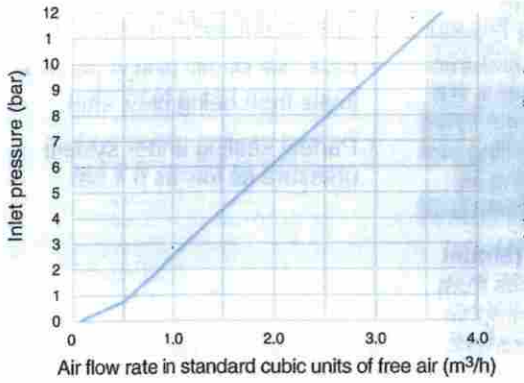
TECHNICAL DATA

Specifications

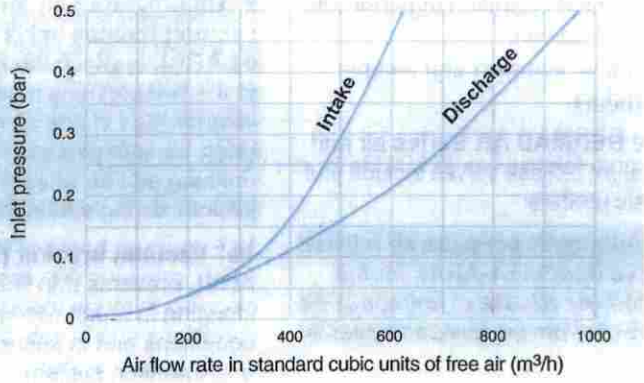
- **Sizes:**
  1" Automatic (Model 01-ARA)
  2" Kinetic (Model 02-ARK)
  2" Combination (Model 02-ARC)
- **End Conection:**
  Threading BSP, NPT
- **Pressure Rating:**
  – Plastic body models:
  ISO: PN 10
  – Cast iron models:
  ISO: PN 16; ANSI: # 125
- **Operating Pressure Range:**
  – Plastic body:
  0,1-10 bar (1.5-150 psi)
  – Iron body:
  0,1-16 bar (1.5-225 psi)
- **Temperature Range:**
  Water, 4-80°C (40-180°F)
- **Materials:**
  Body and cover: Plastic or polyester-coated cast iron
  Floats and kinetic shield: Plastic
  Automatic orifice: Stainless steel
  Seals: Buna-N and NR

Performance Charts

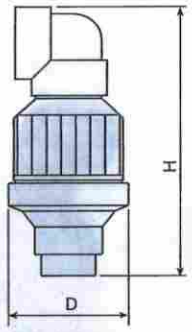
Automatic orifice for the release of air under pressure (Models 01-ARA and 02-ARC)



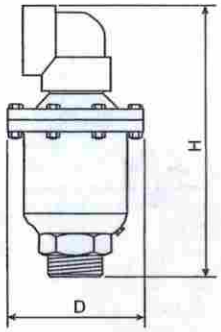
Kinetic large orifice for air and vacuum release (Models 02-ARK and 02-ARC)



Dimensions and Weights



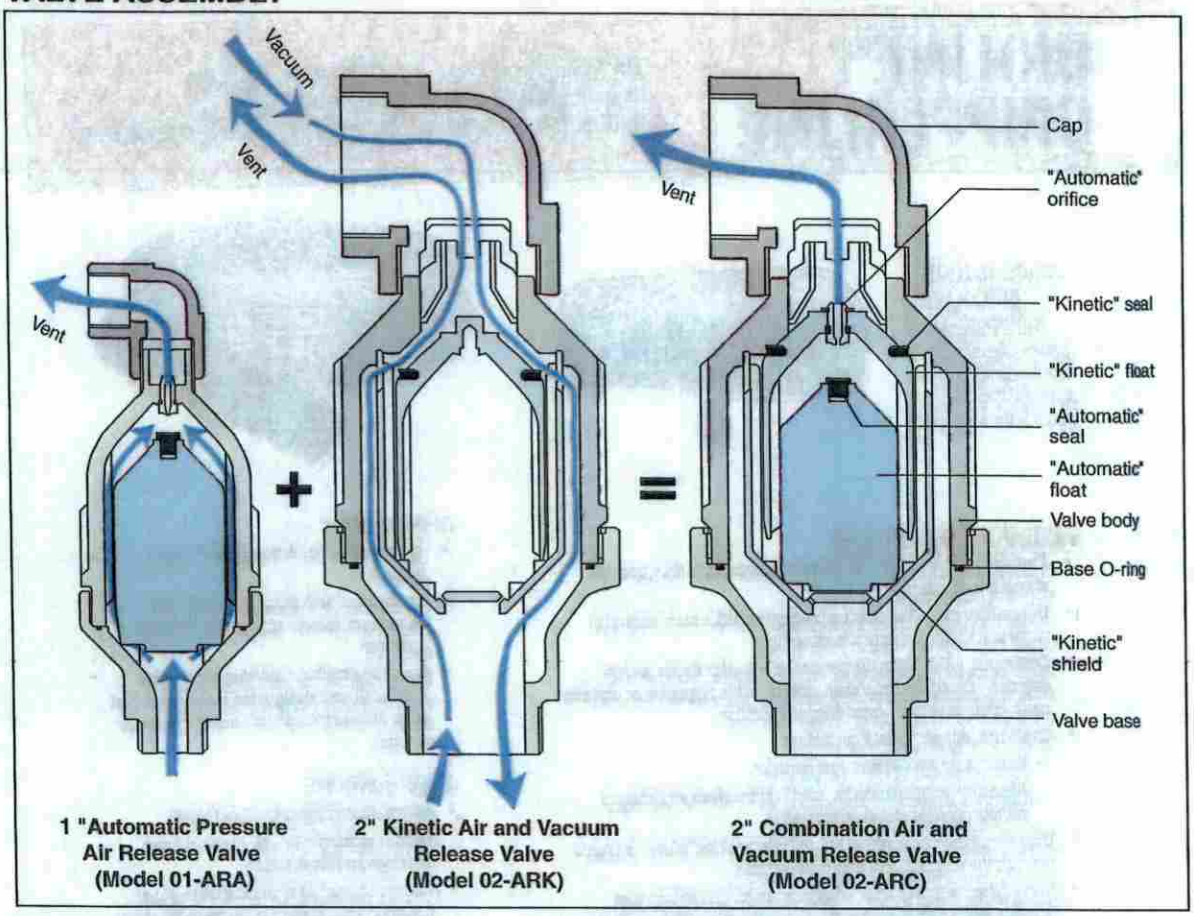
Plastic Body



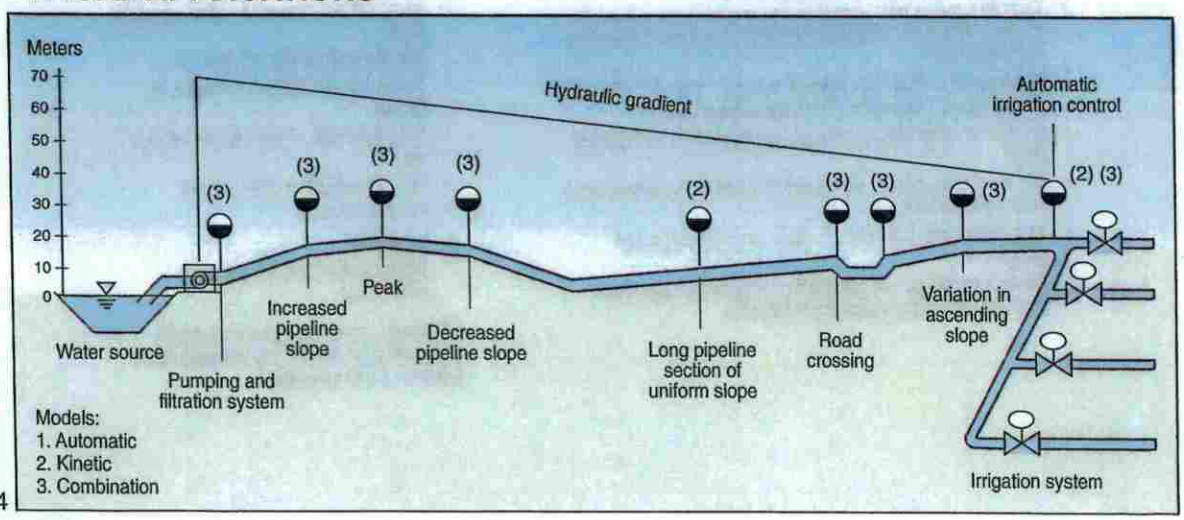
Metallic Body

Valve Model	Size	D (mm)	H (mm)	Weight (kg)	D (mm)	H (mm)	Weight (kg)
Automatic (01-ARA)	1"	85	180	0.9	120	230	3.0
Kinetic (02-ARK)	2"	130	245	2.7	150	290	5.4
Combination (02-ARC)	2"	130	245	2.8	150	290	5.5

VALVE ASSEMBLY



TYPICAL APPLICATIONS



WASTEWATER DIVISION

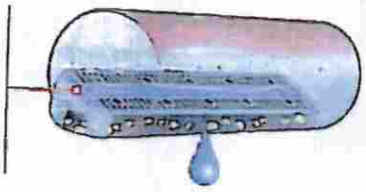
NETAFIM™

BIOLINE® DRIPPERLINE

THE WORLD'S MOST ADVANCED CONTINUOUS SELF-CLEANING, PRESSURE COMPENSATING DRIPPERLINE SPECIFICALLY DESIGNED FOR WASTEWATER

CROSS SECTION OF BIOLINE DRIPPERLINE

Bioline dripper inlets are positioned in the center of flow where water is the cleanest



PRODUCT ADVANTAGES

- Pressure compensation - all drippers deliver equal flow, even on sloped or rolling terrain.
- Unique flow path - Turbonet technology provides more control of water and a high resistance to clogging.
- Continuous self-flushing dripper design - flushes debris, as it is detected - throughout operation, not just at the beginning or end of a cycle. Ensures uninterrupted dripper operation.
- Single hole dripper outlet from tubing:
  - Better protection against root intrusion
  - Allows the dripperline to be used in subsurface applications without need for chemical protection
- Drippers capture water flow from the center of the tubing - ensures that only the cleanest flow enters the dripper.
- Built-in physical root barrier - drippers are protected from root intrusion without the need for chemical protection. Water exits dripper in one location while exiting the tubing in another.
- Three dripper flow rates - provides the broadest range of flow rates available. Allows the designer to match the dripperline to any soil or slope condition.
- Bioline tubing is completely wrapped in purple - easily identifying it for non-potable use, regardless of how the tubing is installed.
- Anti-bacterial-impregnated drippers - prevents buildup of microbial slime.
- Can be used subsurface - Bioline can be installed on-surface, under cover or subsurface.
- No special storage requirements - does not degrade if stored outdoors.
- Techfilter compatible - an optional level of protection, provides a limited lifetime warranty against root intrusion.

APPLICATIONS

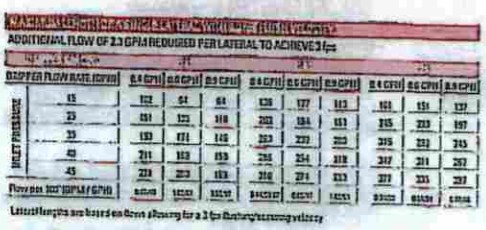
- Typically installed following a treatment process
- Can be used with domestic septic tank effluent with proper design, filtration and operation
- Reuse applications including municipally treated effluent designated for irrigation and other disinfected and non-disinfected water sources.

SPECIFICATIONS

- Dripper flow rates: 0.4, 0.6 or 0.9 GPH
- Dripper spacings: 12", 18" or 24" dripper spacings and blank tubing
- Pressure compensation range: 7 to 70 psi (stainless steel clamps recommended above 50 psi)
- Maximum recommended system pressure: 50 psi
- Tubing diameter: 0.66" OD, 0.57" ID
- Tubing color: Purple color indicates non-potable
- Coil lengths: 500' or 1,000' (Blank tubing in 250')
- Recommended filtration: 120 mesh
- Bending radius: 7"
- UV resistant
- Tubing material: Linear low-density polyethylene

Additional spacing and pipe sizes available by special order. Please contact Netafim USA Customer Service for details.

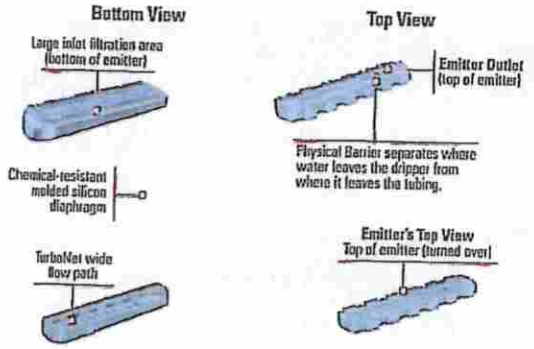
BIOLINE DRIPPERLINE



Netafim recommends flushing velocities capable of breaking free any accumulated bioslimes and debris in the piping network.

Notes:
1. Refer to local regulations for information on flushing velocities that may be written into codes.
2. Netafim does not endorse a specific flushing velocity.
3. Flushing velocities should be determined based on regulations, quality of effluent, and type of flushing control.
4. Using a flushing velocity less than 1 fps does not provide turbulent flow as defined by Reynolds Number.
5. Higher flushing velocities provide more aggressive flushing.

EXPLODED VIEW OF BIOLINE EMITTER



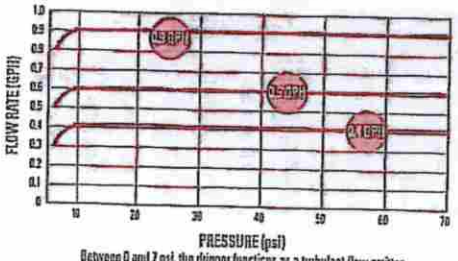
BIOLINE EMITTER OPERATION

Bioline® dripperline emitters are pressure compensating - delivering the water uniformly into the soil for further treatment or for reuse by the landscape. These unique emitters allow the tubing to be installed on flat topography or steep slopes.

Bioline emitters are protected against microbial slime. Each emitter is impregnated with an antimicrobial agent to resist biological build-up.

Netafim emitters are continuously self-cleaning during operation, not just at the beginning and end of a cycle. The result is dependable, clog-free operation, year after year.

DRIPPER FLOW RATE VS. PRESSURE



Between 0 and 7 psi, the dripper functions as a turbulent flow emitter, ensuring that the nominal design flow is not exceeded at system start-up.

FLOW PER 100 FEET

DRIPPER SPACING	0.4 GPH DRIPPER		0.6 GPH DRIPPER		0.9 GPH DRIPPER	
	GPH	GPM	GPH	GPM	GPH	GPM
12"	40.0	0.67	61.0	1.02	92.0	1.53
18"	26.7	0.44	41.0	0.68	61.0	1.02
24"	20.0	0.34	31.0	0.51	46.0	0.77

SPECIFYING INFORMATION

SAMPLE MODEL NUMBER

(A) Bioline Dripperline = 08WRAM

(1) (2) (3) 08WRAM 6-24 V (A)

(1) DRIPPER FLOW RATE
04 GPH = 4
06 GPH = 6
09 GPH = 9

(2) DRIPPER SPACING
12" = 12
18" = 18
24" = 24

(3) COIL LENGTH
500' = V500
1,000' = V

BLANK Tubing Model Number: 250' = 08WRAM-250

ORDERING INFORMATION

FLOW RATE	DRIPPER SPACING	COIL LENGTH	MODEL NUMBER
0.4 GPH	12"	1,000'	08WRAM.4-12V
		500'	08WRAM.4-12V500
0.4 GPH	18"	1,000'	08WRAM.4-18V
		500'	08WRAM.4-18V500
0.4 GPH	24"	1,000'	08WRAM.4-24V
		500'	08WRAM.4-24V500
0.6 GPH	12"	1,000'	08WRAM.6-12V
		500'	08WRAM.6-12V500
0.6 GPH	18"	1,000'	08WRAM.6-18V
		500'	08WRAM.6-18V500
0.6 GPH	24"	1,000'	08WRAM.6-24V
		500'	08WRAM.6-24V500
0.9 GPH	12"	1,000'	08WRAM.9-12V
		500'	08WRAM.9-12V500
0.9 GPH	18"	1,000'	08WRAM.9-18V
		500'	08WRAM.9-18V500
0.9 GPH	24"	1,000'	08WRAM.9-24V
		500'	08WRAM.9-24V500
Blank Tubing 17mm		250'	08WRAM-250

BIOLINE FITTINGS

FITTING APPLICATIONS

- Fits Bioline Dripperline

FITTING SPECIFICATIONS

- Barbed fittings for a secure fit
- Easy installation without glue or tools
- Maximum recommended system pressure without clamps: 50 psi
- Allows for easy on-site inspection of proper fitting installation

TLCOUP
Insert Coupling

TLELL
Insert Elbow

TLTEE
Insert Tee

TLCROS
Insert Cross

TL050MA
½" Male Adapter

TL075MA
¾" Male Adapter

TL075FTEE
Combination Tee
Ins x Ins x ¾" FPT

TL2W075MA
2-Way Insert
¾" MPT x Insert

TLIAPE-B
Insert Adapter for 1" or Larger PE (Requires 11mm or 7/16" drill or punch)

TLIAPVC-B
Insert Adapter with Grommet
1½" or larger PVC Pipe

TDBIT16.5
Drill Bit for TLIAPVC Fitting (16.5mm or 21/32")

TLFIG8
Figure 8 Line End

TLS6
6" Soil Staple

FITTING DEFINITIONS
FPT = Female Pipe Thread
MPT = Male Pipe Thread
Ins x Ins = Insert by Insert

TLSOV
Shut-Off Valve
Ins x Ins

TLCV
Inline Check Valve

- Flow Range: 0.9 to 4.4 GPM
- Opening Pressure: 10.2 psi
- Closing Pressure: 5.8 psi
(13.4 Feet Column of Water)

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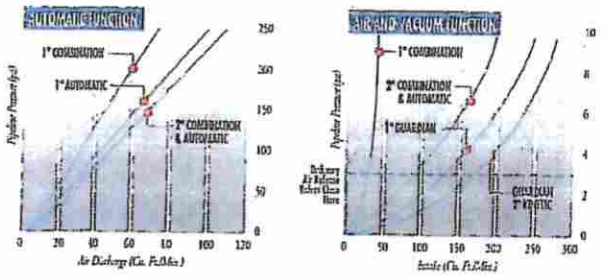
NETAFIM USA

Air Release and Vacuum Valves

Proven Design Provides More Air Release Capacity Than Other Valves of Similar Sizes



Applications

- 1" and 2" Combination Air/Vacuum Relief and Continuous Air Vent
  - For release of large volumes of air: pump and filtration stations, along mains, at the end of mainlines.
  - At high points in pipe network.
  - Every 1,000 feet along mainlines 6 inches and larger.
  - At upstream side of manifolds.
  - 1" Combination size ideal for submains with 2" to 4" diameter.
- 1" Automatic Continuous Acting Air Vent
  - For high spots where air accumulates.
- 1" & 2" Air Release and Vacuum Relief Vent
  - Commonly used at downstream of valves, primarily at manifolds, to break vacuum caused by system draining.
  - On sloping terrain to prevent collapsing of pipes caused by vacuum when pipe networks drain.

Specifications

- Maximum operating pressure:
  - 2" combination: 240 psi, 2" NPT Male Connector
  - 1" automatic: 240 psi, 1" NPT Male Connector
  - 1" & 2" Air and Vacuum Vent: 150 psi, 1" Male Connector, 2" Female Connector

Product Advantages

- Ensures maximum protection of irrigation system with proper sizing and placement.
- Hydrodynamic float design ensures valve closure as water fills the system, remains open when air pressure reaches 12 psi (others quickly close when air pressure reaches 3 psi).
- Large capacity valves dampens water hammer (pipes and fittings from cracking or bursting).
- Unique rolling seal feature allows gradual opening and closing and self cleaning (available on 2" Combination and 1" Automatic).
- Made of corrosion-resistant fiberglass with reinforced UV protected nylon (no metal parts to rust or corrode, no need for spare parts).
- 5 year warranty.

2" Combination
Air/Vacuum and Continuous Acting Air Vent
Part Number 65ARIB2
Now Available in Polypropylene

1" Combination
Air/Vacuum and Continuous Acting Air Vent
Part Number 65ARIB1

1" Automatic
Continuous Acting Air Vent / Part Number 65ARIS1

2" Guardian
Air & Vacuum Vent / Part Number 65ARIA2

1" Guardian
Air & Vacuum Vent / Part Number 65ARIA100

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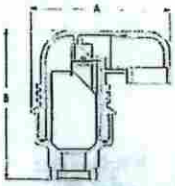
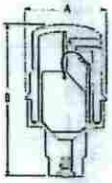
Air Release and Vacuum Valves Specifications



1" and 2" Combination Air/Vacuum Relief and Continuous Acting Air Vent

Stages of Operation

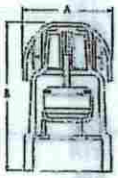
1. During start-up, the valve releases large volumes of air.
2. As the system builds pressure, the body fills with water, forcing the float upwards and closing the valve.
3. While the system is pressurized, the "automatic" function continuously expels accumulated air.
4. At shutdown, the valve's large opening allows air back into the system preventing the pipe and accessories from collapsing, and preventing suction of mud and debris.



1" Automatic Continuous Acting Air Vent

Stages of Operation

1. While the system is pressurized, air accumulates in the body, systematically dropping the rolling seal mechanism releasing the trapped air.
2. After air is expelled, water again enters the body and forces the float to close the valve.



2" Guardian and 1" Air & Vacuum Vent

Stages of Operation

1. The Guardian releases large quantities of air through an opening equal to a large size standard vent. As water enters, the float rises and forces the valve to close.
2. During normal flow, while the line is under pressure, the valve remains closed.
3. As the line empties, or during a drop in pressure, the float drops down and opens the valve. Air is admitted, breaking the vacuum created by the withdrawing water and prevents the collapse of pipelines and suction of soil into dripperlines.

DIMENSIONS & WEIGHT

	Part Number	Nominal Size	Dimensions A	Dimensions B	Weight	Orifice Size (sq. in)	Orifice Size (diameter)
2" Combo (Plastic Base)	65ARIB2	2"	7 3/32	8 11/64	2.2 lbs	1 7/64	0.0613
1" Combination	65ARIB1	2"	3 13/16	5 23/64	0.66 lbs	21/64	0.0336
2" Combo (Brass Base)	65ARIB2-B	2"	7 3/32	8 11/64	5 lbs.	1 7/64	0.0867
1" Automatic	65ARI51	1"	2 41/64	5 23/64	0.65 lbs	9/64	0.0320
2" Guardian	65ARIA2	2"	2 7/8	4 51/64	0.44 lbs	1 7/64	0.0261
1" Guardian	65ARIA100	1"	2 23/64	4 51/64	0.35 lbs	43/64	0.0105

Air Release and Vacuum Valves Accessories

2" Air Release Valve - Rolling Seal	65ARIB2-RS
2" Air Release Valve - Base O-Ring	65ARIB2-OB

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DIMENSIONAL SPECIFICATIONS

Schedule or S.D.R.	Normal Pipe Size Inches	Outside Diameter Inches	Maximum Working Pressure PSI at 73°	Minimum Wall Thickness Inches	Average Inside Diameter Inches	Weight of Pipe per Ft. (lbs.)
SCHD 40	1/2	.840	600	.109	.602	.164
SCHD 80			850	.147	.526	.206
SDR 13.5			315	.062	.616	.106
SCHD 40	3/4	1.050	480	.113	.804	.218
SCHD 80			690	.154	.722	.278
SDR 21			200	.060	.870	.131
SCHD 40	1	1.315	450	.133	1.029	.321
SCHD 80			630	.179	.936	.409
SDR 21			200	.063	1.135	.174
SCHD 40	1 1/4	1.660	370	.140	1.380	.434
SCHD 80			520	.191	1.255	.567
SDR 21			200	.080	1.480	.268
SDR 26			160	.064	1.522	.225
SCHD 40	1 1/2	1.900	330	.145	1.590	.518
SCHD 80			470	.200	1.476	.686
SDR 21			200	.090	1.700	.345
SDR 26			160	.073	1.720	.289
SCHD 40	2	2.375	280	.154	2.047	.695
SCHD 80			400	.218	1.913	.949
SDR 21			200	.113	2.129	.530
SDR 26			160	.091	2.173	.440
SCHD 40	2 1/2	2.875	300	.203	2.445	1.096
SCHD 80			420	.276	2.290	1.449
SDR 21			200	.137	2.581	.768
SDR 26			160	.110	2.635	.663
SDR 32.5			125	.088	2.689	.521
SCHD 40	3	3.500	260	.216	3.042	1.435
SCHD 80			370	.300	2.864	1.938
SDR 21			200	.167	3.146	1.127
SDR 26			160	.135	3.210	.932
SDR 32.5			125	.108	3.264	.764
SDR 41			100	.085	3.310	.620
SCHD 40	4	4.500	220	.237	3.998	2.043
SCHD 80			320	.337	3.786	2.833
SDR 21			200	.214	4.046	1.858

SDR 26		160	.173	4.133	1.521
SDR 32.5		125	.138	4.204	1.234
SDR 41		100	.110	4.260	1.007
SCHD 40	5.563	190	.258	5.016	2.776
SCHD 80		290	.375	4.768	3.938
SDR 21	5	200	.265	5.001	2.830
SDR 26		160	.214	5.107	2.320
SDR 32.5		125	.171	5.199	1.876
SDR 41		100	.136	5.271	1.515
SCHD 40	6.625	180	.280	6.031	3.600
SCHD 80		280	.432	5.709	5.411
SDR 21		200	.316	5.955	4.010
SDR 26	6	160	.255	6.084	3.295
SDR 32.5		125	.204	6.193	2.652
SDR 41		100	.162	6.281	2.126
SDR 64		63	.104	6.417	1.380
SCHD 40	8.625	160	.322	7.941	5.427
SCHD 80		250	.500	7.565	8.219
SDR 21		200	.410	7.756	6.790
SDR 26	8	160	.332	7.921	5.550
SDR 32.5		125	.265	8.063	4.491
SDR 41		100	.210	8.180	3.589
SDR 64		63	.135	8.355	2.320
SCHD 40	10.750	140	.365	9.976	7.683
SCHD 80		230	.593	9.493	12.195
SDR 21		200	.511	9.667	10.540
SDR 26	10	160	.413	9.874	8.600
SDR 32.5		125	.331	10.048	6.992
SDR 41		100	.262	10.195	5.584
SCHD 40	12.750	130	.406	11.888	10.171
SCHD 80		230	.687	11.294	16.765
SDR 21		200	.606	11.465	14.760
SDR 26	12	160	.490	11.711	12.110
SDR 32.5		125	.392	11.919	9.829
SDR 41		100	.311	12.091	7.850
SCHD 40	14	14.000	130	.438	13.072	12.400
SCHD 40	16	16.000	130	.500	14.936	15.916
SCHD 40	18	18.000	130	.562	16.809	20.110

Page updated 06/22/2010

Agricultural Products, Inc.
a Summa Industries company

I.P.S. FLEXIBLE VINYL PIPE

DURABLE RELIABLE PROVEN TRUSTED

Applications

Agriculture

Landscape

Greenhouse/Nursery

Product Features

IPS Flexible vinyl pipe offers more flexibility, durability and shock resistance to an irrigation system than standard PVC pipe can provide.

- Heavy duty pipe for use as risers or swing joints
- Heavy wall thickness makes tight bends possible without kinking
- Available in ½", ¾" and 1" I.P.S. (Iron Pipe Size)
- Coils of 100' and 200' in ½" and ¾" sizes, 100' in 1"
- Pre-cut lengths are also available
- Flexible pipe can be readily assembled using standard Schedule 40 PVC fittings with flexible to rigid PVC adhesive

How I.P.S. Flexible Vinyl Pipe Is Used

I.P.S. Flexible Vinyl Pipe can be used...

- For use in connecting submain to drip hose lateral
- To make flexible swing joints
- To easily and inexpensively repair breaks in rigid PVC pipe
- To easily get around, under or over obstacles
- To carry irrigation water to interior and exterior planters, arbors, waterfalls, etc.

Note: Flexible PVC pipe should be used only on irrigation water systems and downstream of irrigation control valves. Flexible PVC pipe is not recommended for use in applications involving high heat, high pressure or constant pressure situations.

Specifications for 1174 Standard Material

Shore Durometer – "A" Scale (ASTM-D676) ..... Instantaneous...92
10 Second Delay...88
Specific Gravity (ASTM-D792).....1.40 + .02

PHYSICAL PROPERTIES		
	BEFORE WEATHERING	AFTER WEATHERING
Ultimate Tensile Strength (ASTM D-412)	2900 psi	3050 psi
Ultimate Elongation (ASTM D-4120)	265%	240%
100% Modulas (ASTM D-412)	1600 psi	1750 psi
THERMAL PROPERTIES		
Brittle Temperature (ASTM D-746)	(-22¤F.)	
Air Oven Aging - 7 days @ 100¤F. (retention of elongation)	87%	
Outdoor Weathering (500 hours atlas weather-o-meter)	No Change	

FRICTION LOSS CHARACTERISTICS			
SIZE	GPM	LOSS/CFT (psi)	VELOCITY
1/2"	2	2.42	2.74
	4	10.52	5.48
	6	22.26	8.22
	8	37.92	10.95
3/4"	2	0.66	1.48
	4	2.36	2.97
	6	5	4.45
	8	8.52	5.93
	10	12.88	7.41
1"	6	1.46	2.67
	8	2.48	3.57
	10	3.74	4.46
	12	5.24	5.35
	14	6.96	6.24

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P.O. Box 3546 - Haines City, FL 33845 - 800.848.8153 - Fax: 800.533.6421
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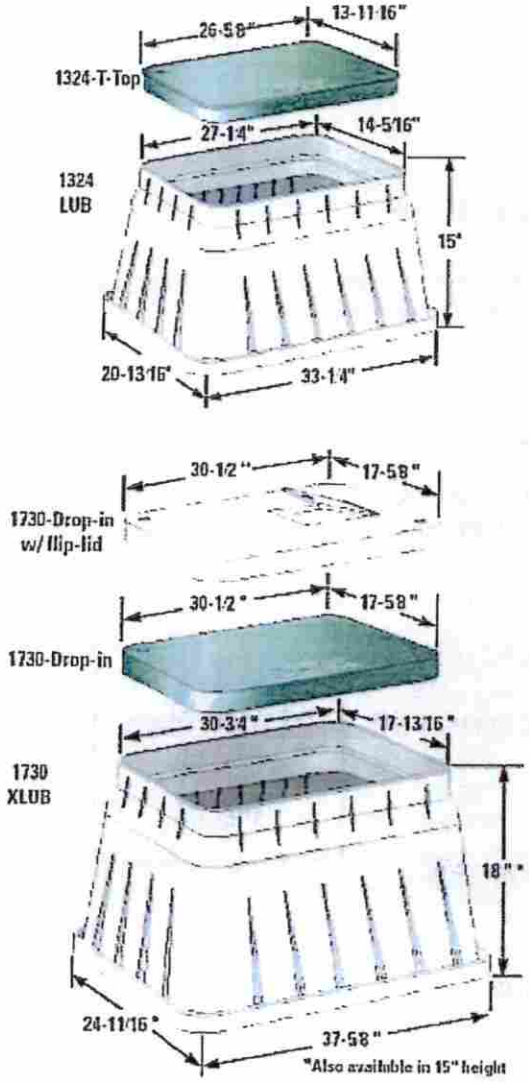

LARGE X XLARGE

- Structural Foam Material
- Lighter than Cast Iron or Concrete Boxes
  - Easier Warehouse Handling
  - Lower Injuring Potential
- Stainless Steel Bolts Secure Lid
  - Discourages Vandalism
  - Keeps Lid Intact in High Water
- Lids Are Easily Interchangeable
- Lids Come in Green
- Boxes Are Available in Black (15" and 18" High)

DESCRIPTION	PART #
LUB ASSEMBLIES	
Control Valve	
Black Box, Green Lid (13" x 24" x 15")	195101
LUB BOXES ONLY	
Black (13" x 24" x 15")	195037
LUB LIDS ONLY	
Control Valve	

DESCRIPTION	PART #
XLUB ASSEMBLIES	
Control Valve	
Black Box, Green Lid (17" x 30" x 15")	195102
Black Box, Green Lid (17" x 30" x 18")	195103
XLUB BOXES ONLY	
Black (17" x 30" x 18")	195035
Black (17" x 30" x 15")	195036

Black w/Washer and Bolt	195050		
		XLUB LIDS ONLY	
		Control Valve	
		Green w/Washer and Bolt	195051

PLYMOUTH SUPERFLEXON BOXES AND COVERS®
A rigid combination of polyolefin and fibrous inorganic components. PLYMOUTH SUPERFLEXON® plastic material is chemically inert and normally unaffected by moisture, corrosion and the effects of temperature changes. PLYMOUTH SUPERFLEXON® also has a relatively high tensile strength with light weight because it is a solid (not foamed) structural material.

PLYMOUTH SUPERFLEXON® covers are NOT traffic covers and should not be used in roadways, etc.

Physical Properties	**ASTM Test Method**	**Minimum Test Value**
Tensil Strength (2.0'/min.)	D-638-82a	3,400 psi
Flexural Modulus	D-790-81	191,000 psi
Compressive Strength (0.05"/min.)	D-695-80	3,350 psi
Impact Strength, Izod	D-256-81	0.6 ft. lb/in
Durometer Hardness, Type D	D-2240-81	50
Deflection Temp @ 66 psi Stress	D-648-82	230° F
Specific Gravity	D-792-66 (1979)	1.15

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Special website features

Product Documentation

Product Fact Sheet
Installation Instructions
Price List
Product Applications
Lab Tests
Drawings
See the TriView in Action

The Rhino TriView™ Marker Post

The Rhino TriView™ Marker Post

The Rhino TriView Marking System's patented design provides 360° visibility, as well as superior functionality you won't find in any other damage prevention marking product.

TriView Features

- 360° visibility - see movie
- Impact resistance - see movie
- Durability
- Weather resistance: UV-stable and temperature-stable

Use the TriView marker post for new damage prevention installations, or to upgrade existing fiberglass posts/U-channel posts to high visibility markers.

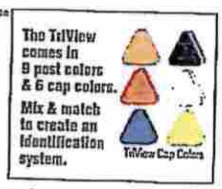
Use TriView's Versatility to Color Code Your Damage Prevention System

The TriView allows utility workers to quickly identify special elements such as:

- Test stations
- Vent guards
- Pipe size
- Valves
- Manholes
- Cable types
- High consequence areas

Use these features and options to customize your utility marking system:

- 9 post colors
- 6 cap colors
- 2 sizes of TriView allow for dual-colored markers
- Custom decals
- Reflective decals
- Vinyl bands



The TriView Marker Post can also be used as:

- Test station
- Tracer Pad
- Vent Guard
- Pedestal Marker
- Hydrant Marker

Visit The TriView Advantage page and TriView Product Applications page for more information on the features and uses of this unique utility marker post.

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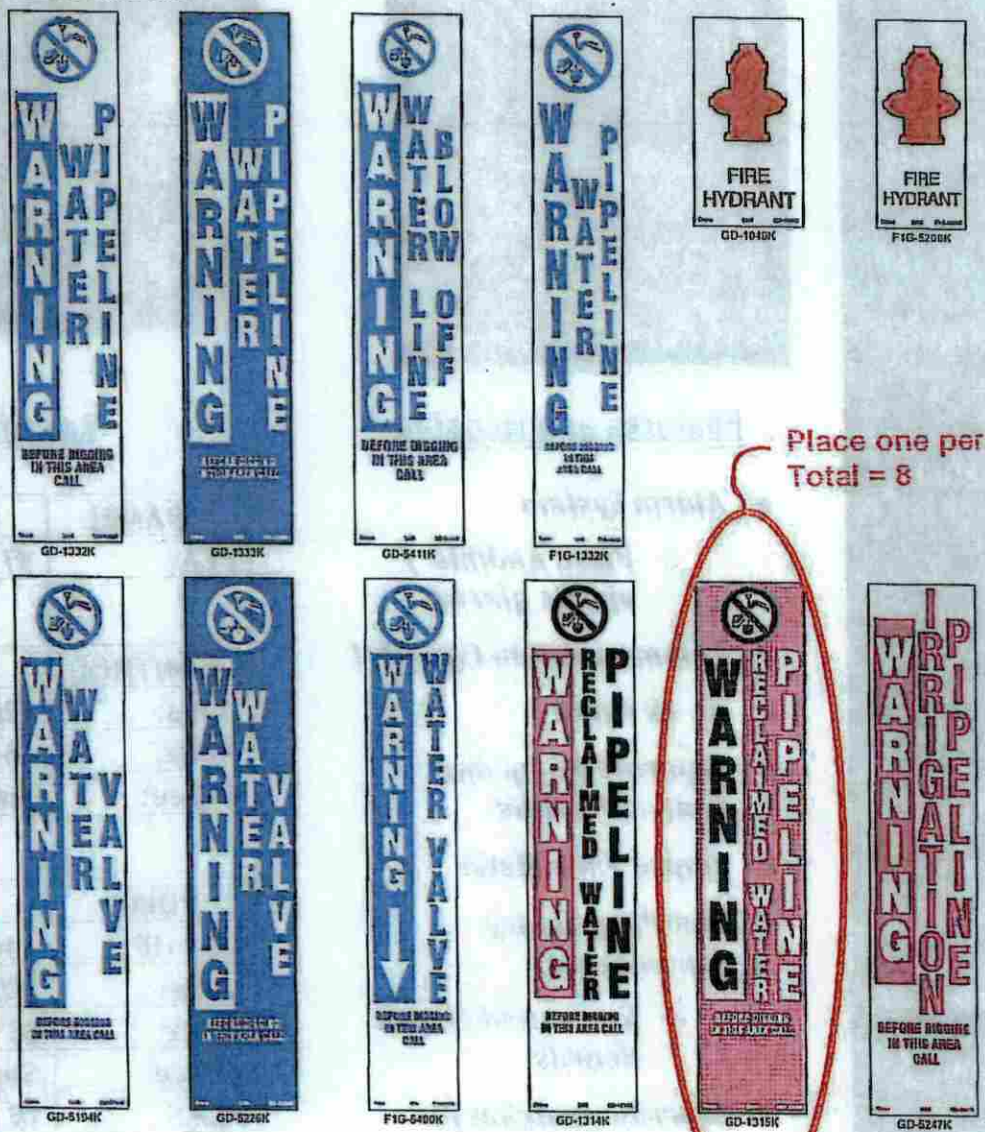
Standard Warning Legends - Decals
Water



Place one per drip zone
Total = 8

DECAL_STWL_WATER • 3-17-08

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DACX Control Panels

Description

Versatile options allow this unit to offer as much or as little as the end user needs.

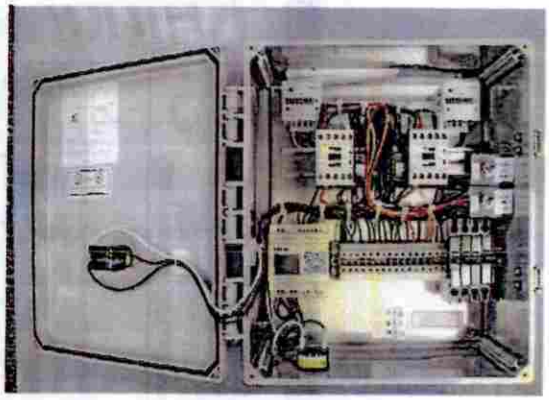
- Stand alone as a Duplex float operated panel.
- Set up Communications in applications where time is essential.

Programmable timers allow control of liquid levels for various applications.

Applications

Adenus Technologies Duplex Control Panels are available in 115v or 220v and are designed for systems requiring the use of dual pumps. Commonly used for commercial or residential water and wastewater.

849 Aviation Parkway
Smyrna, TN 37167
(615-220-7200)



Features and Benefits

- ***Alarm System***
  - ***Piezo Audible / visible alarm***
- ***Communication Capable!***
- ***UL 4X rated***
- ***Separate Pump and Control Circuits***
- ***Elapse Time Meter***
- ***Non-Proprietary Components,***
  - ***No Printed Circuit Boards***
- ***Override switches for manual operation***

All Adenus Technologies Control Panels are quality tested, certified, and UL listed.

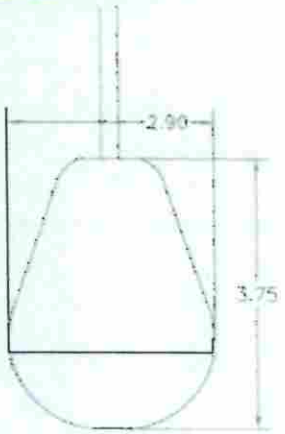
Specifications

PANEL	DAC1	DAC2
FLA:	37 Amps	44 Amp
CONTROL		
Volts:	120 VAC	120 VAC
Hertz:	60 Hz	60 Hz
Phase:	Single	Single
PUMP		
Max HP:	1 HP	3 HP
Volts:	120 VAC	240 VAC
Hertz:	60 Hz	60 Hz
Phase:	Single	Single
FLA:	16 Amps	17 Amps

MountingDimensions(pdf)
TroubleshootingGuide(pdf)

Adenus Technologies

Control/Pump Duty Float Switches



SPECIFICATIONS

- 2.90 x 3.75"
- Min/max temperatures 32-170ºF
- power cord is chlorinated polyethylene type SJOOW- 300v
- 16/2 for N/O or
- 18/2 for N/C and wide angle switches.
- 16/2 N/O 13amps @120-240 VAC ½ H.P 18/2 N/C and Narrow angle N/O 10 AMPS @ 120 VAC, 3 AMPS @ 240 VAC.

FEATURES

- Leak proof, shock proof, and impact resistant
- Durable polypropylene outer shell and a solid polyurethane foam interior

Normally Open (N/O): ***Pump duty. As the float raises 1" (5º) above horizontal, the contact becomes closed and completes the circuit. This float is generally used to turn on pumps.***

Normally Closed (N/C): ***Control duty. As the float falls 1" (5º) below horizontal, the contact becomes closed and completes the circuit. This float is generally used to turn off pumps as a fail-safe method (redundant off).***

Narrow Angle Floats (N/O): ***Control duty. As the float raises 1" (10º) above horizontal, the contact becomes closed and completes the circuit. This float is generally used to turn on pumps. With a narrow-angle activated actuation, these are often used in pump stations and recirculating sand filters (RSFs) where water levels require more precision.***

These floats are constructed of a durable polypropylene outer shell and a solid polyurethane foam interior. They are designed for accurate liquid level control in many applications including sewage and wastewater environments. Adenus float switches can be utilized to signify specific water levels for direct alarm actuation, and can be used as a "pump-on" or "pump off" switch.

Applications

- ***For use with Adenus technologies control Panels***
- ***Pump Stations***
- ***Recirculation Sand Filter Beds.***
- ***STEP and STEG tanks***

849 Aviation Parkway
Smyrna, TN 37167
(888-4-ADENUS)

Adenus Technologies

Self-Cleaning Effluent Pump Vault

SPECIFICATIONS

- Polyethylene.
- 43", 60", 68" 96" and custom sizes.
- Schedule 40 pvc.
- Pex tubing
- Filter Screen 19" or 30". Polypropylene.

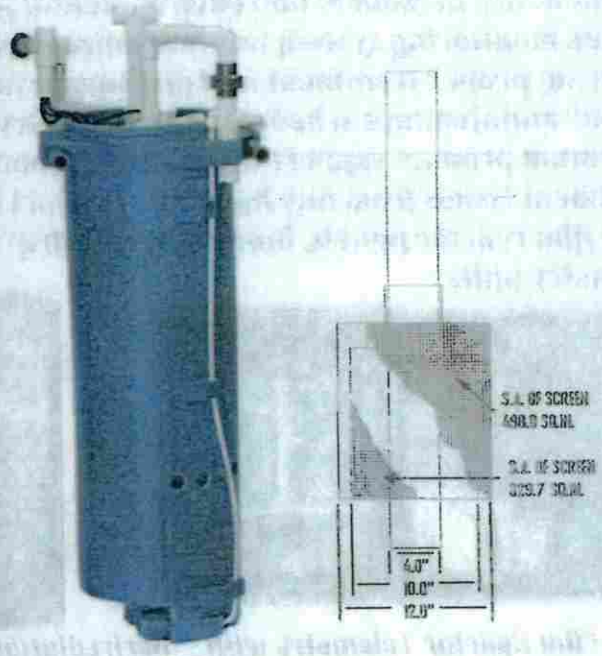
FEATURES

- Pex easy quick disconnect fittings.
- Inlet holes drilled to order.
- 4 inch cap plug to ensure filtration.
- Optional one wire connection.
- Optional external pump chamber - just add XPC to the nomenclature and still receive the same features.

APPLICATIONS

- Effluent collection pumping systems.
- Existing STEP tanks with consistent alarms.
- Recirculation tanks.
- Pump stations.

849 Aviation Parkway
Smyrna, TN 37167
(888-4-ADENUS)



Effluent Collection Vault (ECV)

Vault height (43", 60", 68", 96")

Filter height

Inlet holes

Discharge size

ECV- 68 - 18 - 12 - 2 **XPC (Optional)**

The self-cleaning pump vault is designed to provide the most sustainable wastewater solution for the engineer, the installer, and ultimately the responsible maintenance entity.

The flush tubing creates a slow vortex inside the vault and against the screen in order to clean off solids. Solids are forced out of the vault through a 2" discharge. This feature promotes a cleaner surface area on the screen and in return requires less maintenance on the filter and pump.

Pumps are fully encompassed within the screen in order to ensure filtration, even in high water conditions. Included in the design is a specially molded pump chamber cap that inhibits solids from reaching the pump's screen without filtration.

Modified flow restrictions allow for effluent pumps to run within their optimal performance range on their respective pump curves. This feature leads to longer pump life.

The depth of the intake holes can be changed in order to ensure flow induction from the best quality effluent in the tank.

Adenus Technologies

FFRT Control Panels

Specifications

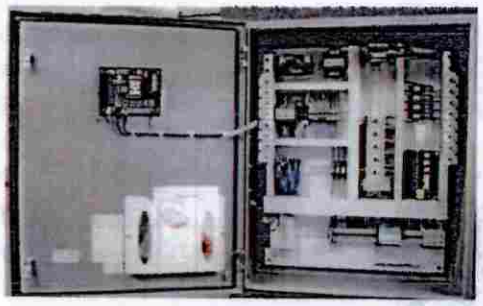
- Touch Screen interface
- Programmable Logic Controller
- Supports multiple protocols
- Configured using Crimson 2.0 Software
- Up to 5 RS-232/422/485 Serial ports
- 10 Base T/100 Base-TX Ethernet Port To network Units, host web pages, and FTP server
- Remote Web Access and Control Facility
- Configuration is stored in non-volatile memory (8 Mbyte Flash)
- Compact Flash socket to Increase memory and for Data logging
- NEMA 4X / IP66 Front Panel
- TVSS protection
- Climate Control
- Current Sensors
- GFCI outlet
- Isolation Relays
- HAWKMS Capable

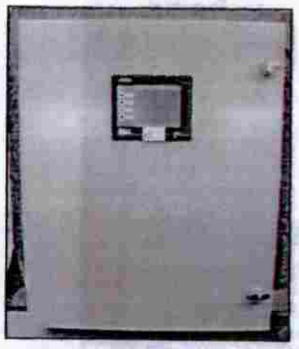
Applications

Adenus Technologies FFRT Control Panels are used in large sand filters, lagoons, and drip fields to control all pumps, zone valves, filters, and UV units.
Monitor flow rates and recirculation schedules from any location.

849 Aviation Parkway
Smyrna, TN 37167
(615-220-7200)

Adenus Technologies smart panels are specifically designed with maintenance personnel and environmental protection in mind. This unique monitoring system will maximize energy savings while ensuring proper treatment and discharge rates, enhancing the value of your maintenance schedule. The telemetry option allows for maximum product support while troubleshooting operational and treatment issues from any location. Product lines include standard fixed film reactor panels, lagoon panels, drip irrigation, and remote telemetry units.





Fixed Film Reactor Telemetry with __ Recirculation pumps __ Discharge pumps and __ Drip zones: STANDARDS =

FFRT-2R2D-5 Drip	*2 Recirculation, 2 Discharge, 5 drip zones with telemetry*
FFRT-4R-2D-10Drip	*4 Recirculation, 2 Discharge , 10 drip zones with telemetry*
FFRT-6R-2D-15Drip	*6 Recirculation, 2 Discharge , 15 drip zones with telemetry*
FFRT-8R-2D-23Drip	*8 Recirculation, 2 Discharge , 23 drip zones with telemetry*

Features / Benefits

- *User friendly Touch Screen LCD*
- *Remote Telemetry ready*
  - *Email/SMS Alert*
  - *Operate with any smart phone*
  - *HAWKMS ready*
- *Intricate data logging*
- *Non proprietary Components*
  - *NO Printed Circuit Boards*
- *UL Type 4 rated*
- *TVSS and isolation relays for lightning protection*
- *Climate Controlled*
- *Manual Operation via maintained switches*

Adenus Technologies

RSF Sizing Chart

RSF Dimensions	50/50 Split RSF Number	80/20 Split RSF Number	RSF Capacity
35' x 30'	AT-3530	I3516430	5,250 gpd
35' x 40'	AT-3540	B3516440	7,000 gpd
35' x 50'	AT-3550	F35210450	8,750 gpd
35' x 60'	AT-3560	C35312460	10,500 gpd
35' x 75'	AT-3575	G35315275	13,125 gpd
35' x 80'	AT-3580	D35416480	14,000 gpd
35' x 90'	AT-3590	K35318490	15,750 gpd
35' x 100'	AT-35100	H354204100	17,500 gpd
35' x 120'	AT-35120	L354244120	21,000 gpd
35' x 150'	AT-35150	M355304150	26,500 gpd
55' x 22.5'	AT-5522.5	M5516322.5	6,187 gpd
55' x 30'	AT-5530	B5528330	8,250 gpd
55' x 37.5'	AT-5537.5	G55210337.5	10,313 gpd
55' x 45'	AT-5545	M55212345	12,375 gpd
55' x 60'	AT-5560	D55416360	16,500 gpd
55' x 67.5'	AT-5567.5	N5531867.5	18,562.5 gpd
55' x 75'	AT-5575	I55420375	20,625 gpd
55' x 90'	AT-5590	O55424390	24,750 gpd
55' x 93.75'	AT-5593.75	J55253993.75	25,781 gpd
55' x 112.5'	AT-55112.5	P555303112.5	30,937.5 gpd
55' x 135'	AT-55135	Q556363135	37,125 gpd
55' x 157.5'	AT-55157.5	R557423157.5	43,312.5 gpd
55' x 180'	AT-55180	S558483180	49,500 gpd
55' x 202.5'	AT-55202.5	T559543202.5	55,690 gpd
55' x 225'	AT-55225	W5562936225	61,875 gpd
55' x 247.5'	AT-55247.5	U5511663247.5	68,062 gpd
55' x 274'	AT-55274	V5512723274	75,350 gpd
55' x 450'	AT-55450	X5562936450	123,750 gpd

SPECIFICATIONS

- 5000gallon – 125,000 gallon designs
- BOD < 5 MG/L
- TSS < 5 MG/L
- FECAL < 500 COL/100ML
- FECAL < 10 WITH DISINFECTION
- NITRATES <15 MG/L (VARIES BY SOURCE)
- AMMONIA <1 MG/L

FEATURES

- Low Maintenance
- Minimal Moving parts
- Aesthetically pleasing and odorless
- Telemetry Ready with HAWKMS capabilities

Applications

- Cluster homes
- Schools
- Commercial Development

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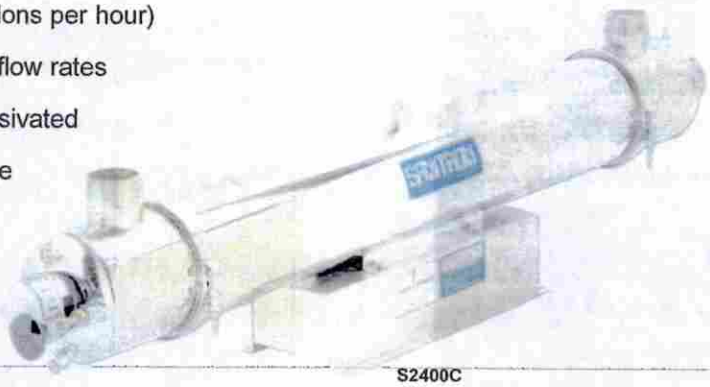
Adenus Technologies

SANITRON®

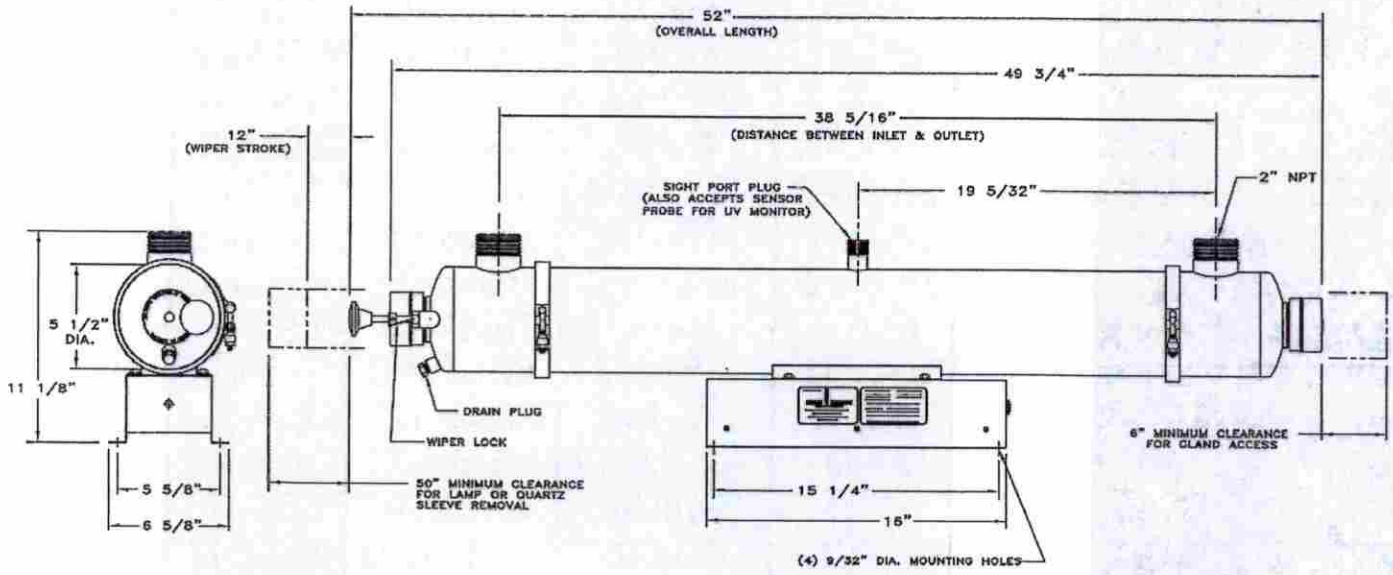
ULTRAVIOLET WATER PURIFIERS

S2400C - 40 gallons per minute/2,400 gallons per hour

- 40 to 416 gallons per minute (2,400 to 25,000 gallons per hour)
- Multiple S2400C units can be plumbed for higher flow rates
- Type 316 Stainless Steel, electropolished and passivated
- Easy Off™ Retainer Cap for effortless lamp change
- Drain Plug for draining the purifier chamber
- Sight port for viewing germicidal lamp operation
- CE Compliant versions available
- Removable flared heads for easy disassembly
- Flared heads can be rotated to accommodate irregular plumbing connections if required.
- Patented wiper mechanism for quartz sleeve cleaning
- UL Approved Ballast



S2400C



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ATLANTIC ULTRAVIOLET CORPORATION®

www.ultraviolet.com

SOLENOID CALCULATIONS

The following table includes cut-sheet specs provided by NETAFIM USA

Solenoid Markings	Coil Voltage (volts)	Rated Power (watts)	Inrush Current (amps)	Holding Current (amps)	Orifice (millimeters)	Maximum Pressure (psi)	TOTAL ALLOWABLE LOSS (volts)
Dorot	24	2.2	0.15	0.15	1.8	140	4.8
GemSol	24	5.5	0.72	0.42	2.0	90	4.8
GemSol	24	8.0	0.93	0.56	1.6	170	4.8

note: total allowable loss is +- 10% of Coil Voltage

The following table includes standard American Wire Gauge sizes and the Ohms per 1000 ft.

AWG#	18	16	14	12	10	8	6	4
OHMS p/m.ft	6.40	4.02	2.52	1.59	1.00	0.63	0.40	0.25

Ra= resistance of wire in Ohms per ft.
AVL= allowable voltage loss
L= length from controller to valve
Iin= Inrush current

$$L = \frac{AVL * 1000}{RA * 2 * Iin}$$

2.2W SOLENOID	
WIRE SIZE	MAXIMUM DISTANCE
18	2500
16	3980
14	6349
12	10063
10	16000
8	25397
6	40000
4	64000

5.5W SOLENOID	
WIRE SIZE	MAXIMUM DISTANCE
18	521
16	829
14	1323
12	2096
10	3333
8	5291
6	8333
4	13333

8.0W SOLENOID	
WIRE SIZE	MAXIMUM DISTANCE
18	403
16	642
14	1024
12	1623
10	2581
8	4096
6	6452
4	10323

STA-RITE

high head multi-stage submersible effluent pumps

NOW AVAILABLE:
- Higher HP
- Higher GPM
- Longer Cords

The STEP Plus® 4" submersible filtered effluent pumps in 10, 20, 30 and 50 GPM models offer dependable performance and value for high pressure filtered effluent applications.

These STEP Plus pumps will handle "dry run" conditions where other manufacturers fail.

The 10, 20, 30 and 50 GPM are industry standard 3-3/4" in diameter.

APPLICATIONS

- **Filtered Effluent...** for residential, commercial, and agricultural use.

SPECIFICATIONS

Shell – Stainless steel

Discharge – 10, 20 and 30 GPM models: fiberglass-reinforced thermoplastic; 50 GPM models: stainless steel

Discharge Bearing – Nylatron®

Impellers – Delrin®

Diffusers – Polycarbonate

Suction Caps – Polycarbonate with stainless steel wear ring

Thrust Pads – Proprietary spec.

Shaft and coupling – Stainless steel 300 grade

Intake – Fiberglass-reinforced thermoplastic

Intake Screen – Polypropylene

Jacketed Cord – 300 Volt "SOOW" jacketed 10' leads (2-wire with ground); optional 20', 30', 50' and 100' lengths available

Delrin® is a registered trademark of E.I. DuPont de Nemours and Co. Nylatron® is a registered trademark of Polymer Corp. ST.E.P. Plus® is a registered trademark of Pentair Water.

In order to provide the best products possible, specifications are subject to change.

ST.E.P. Plus®

STA-RITE EFFLUENT PUMP

FEATURES

Proven "Floating Impeller" Staging System – Incorporates 1st-in-class performance, sand handling and thrust management staging system with the industry exclusive "dry-run" design element. Reinforced engineered composites and stainless steel, offering high resistance to corrosion and abrasion.

Discharge – Tested-tough, fiberglass-reinforced thermoplastic, with proven internal check valve. Large wrench flats and rope hole.

Shell – 300-grade stainless steel pump shell offers high corrosion resistance.

Shaft – Hexagonal 3/8", 300-grade stainless steel pump shaft; offers generous impeller drive surfaces.

Shaft Bearing – Exclusive self-lubricating Nylatron bearing resists wear surface from sand.

Motor Bracket – Tested-tough, fiberglass-reinforced thermoplastic; incorporates an integral suction screen.

STA-RITE

high head multi-stage submersible effluent pumps

ORDERING INFORMATION

Catalog Number	HP	Stages	Max. Load Amps	Volts	Phase/ Cycles	Cord Length
STEP10	1/2	6	10.5	115	1/60	10'
STEP20	1/2	5	10.5	115	1/60	10'
STEP30-05121	1/2	3	9.5	115	1/60	10'
STEP30X20FT-05121	1/2	3	9.5	115	1/60	20'
STEP30X30FT-05121	1/2	3	9.5	115	1/60	30'
STEP30-05221	1/2	3	4.7	230	1/60	10'
STEP30X20FT-05221	1/2	3	4.7	230	1/60	20'
STEP30X30FT-05221	1/2	3	4.7	230	1/60	30'
STEP30-10221	1	5	9.1	230	1/60	10'
STEP30X20FT-10221	1	5	9.1	230	1/60	20'
STEP30X30FT-10221	1	5	9.1	230	1/60	30'
STEP30-15221	1-1/2	6	11.0	230	1/60	10'
STEP30X20FT-15221	1-1/2	6	11.0	230	1/60	20'
STEP30X30FT-15221	1-1/2	6	11.0	230	1/60	30'
STEP50-10221	1	3	9.1	230	1/60	10'
STEP50X20FT-10221	1	3	9.1	230	1/60	20'
STEP50X30FT-10221	1	3	9.1	230	1/60	30'
STEP50-15221	1-1/2	4	11.0	230	1/60	10'
STEP50X20FT-15221	1-1/2	4	11.0	230	1/60	20'
STEP50X30FT-15221	1-1/2	4	11.0	230	1/60	30'

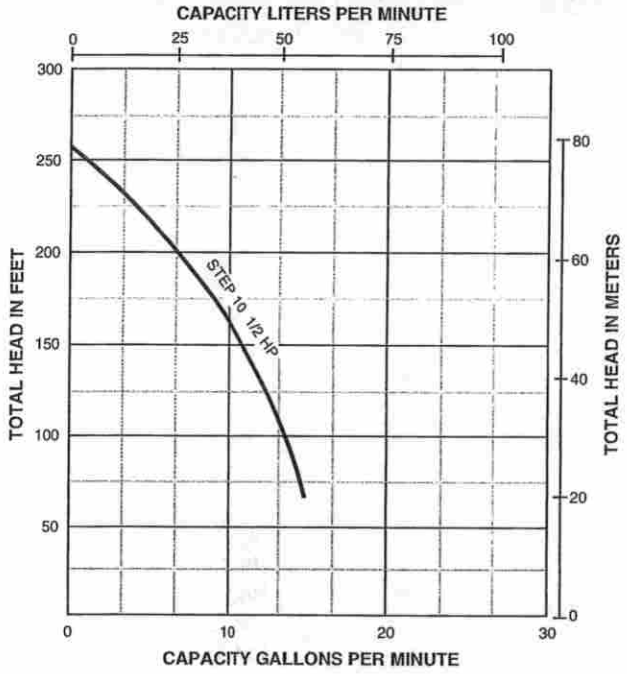
PUMP PERFORMANCE

Catalog Number	Gallons/Liters per Minute	Head (Feet/Meters)	PSI
STEP10	0/0	255/78	110
	5/19	228/69	99
	10/38	170/52	74
	12.5/47	120/37	52
STEP20	0/0	180/55	78
	7.5/28	160/49	69
	15/57	135/41	58
	20/76	115/35	50
	25/95	75/23	32
STEP30-05221 & STEP30-05121	0/0	102/31	44
	8/30	100/30	43
	16/61	97/30	42
	24/91	84/26	36
	30/114	68/21	29
	36/136	47/14	20
STEP30-10221	0/0	171/52	74
	8/30	166/51	72
	16/61	162/49	70
	24/91	140/43	61
	30/114	114/35	49
	36/136	78/24	34
STEP30-15221	0/0	206/63	89
	8/30	203/62	88
	16/61	199/61	86
	24/91	176/54	76
	30/114	146/45	63
	36/136	101/31	44
STEP50-10221	0/0	90/27	39
	10/38	86/26	37
	20/76	83/25	36
	30/114	79/24	34
	40/152	71/22	31
	50/190	62/19	27
	60/227	49/15	21
	70/265	27/8	12
STEP50-15221	0/0	120/37	52
	10/38	115/35	50
	20/76	110/34	48
	30/114	104/32	45
	40/152	95/29	41
	50/190	82/25	35
	60/227	65/20	28
	70/265	36/11	16

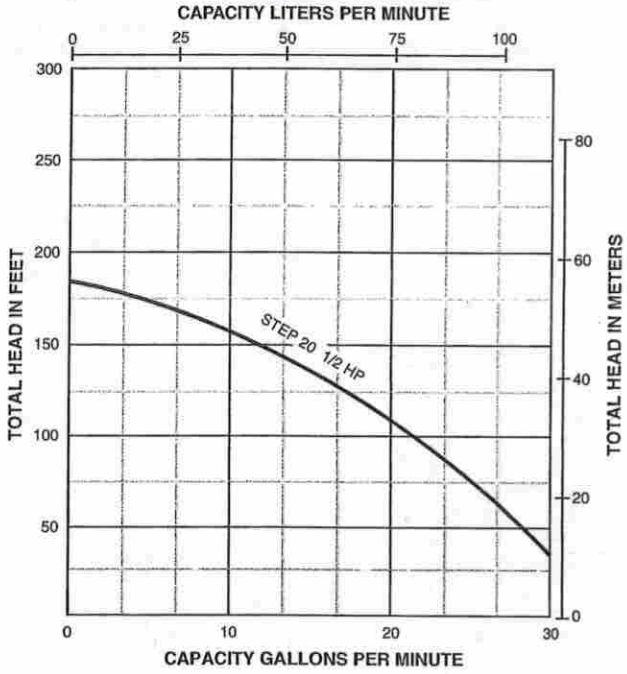
STA-RITE

high head multi-stage submersible effluent pumps

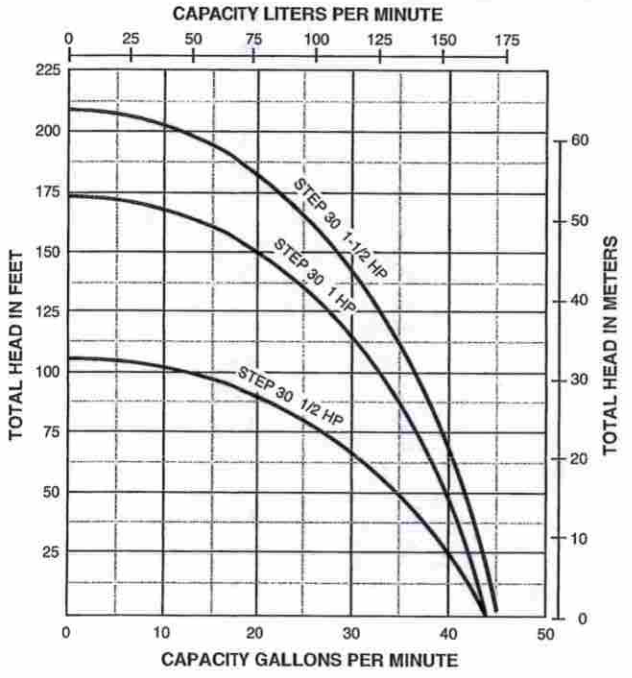
PUMP PERFORMANCE – 10 GPM



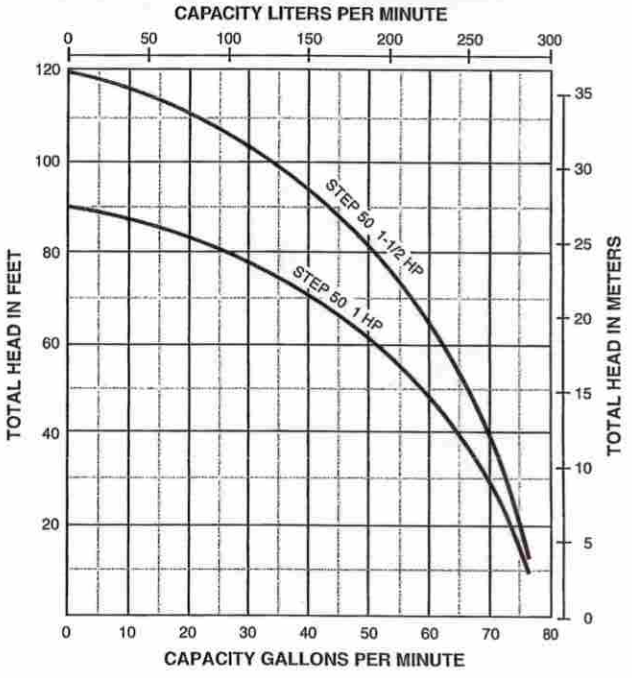
PUMP PERFORMANCE – 20 GPM



PUMP PERFORMANCE – 30 GPM



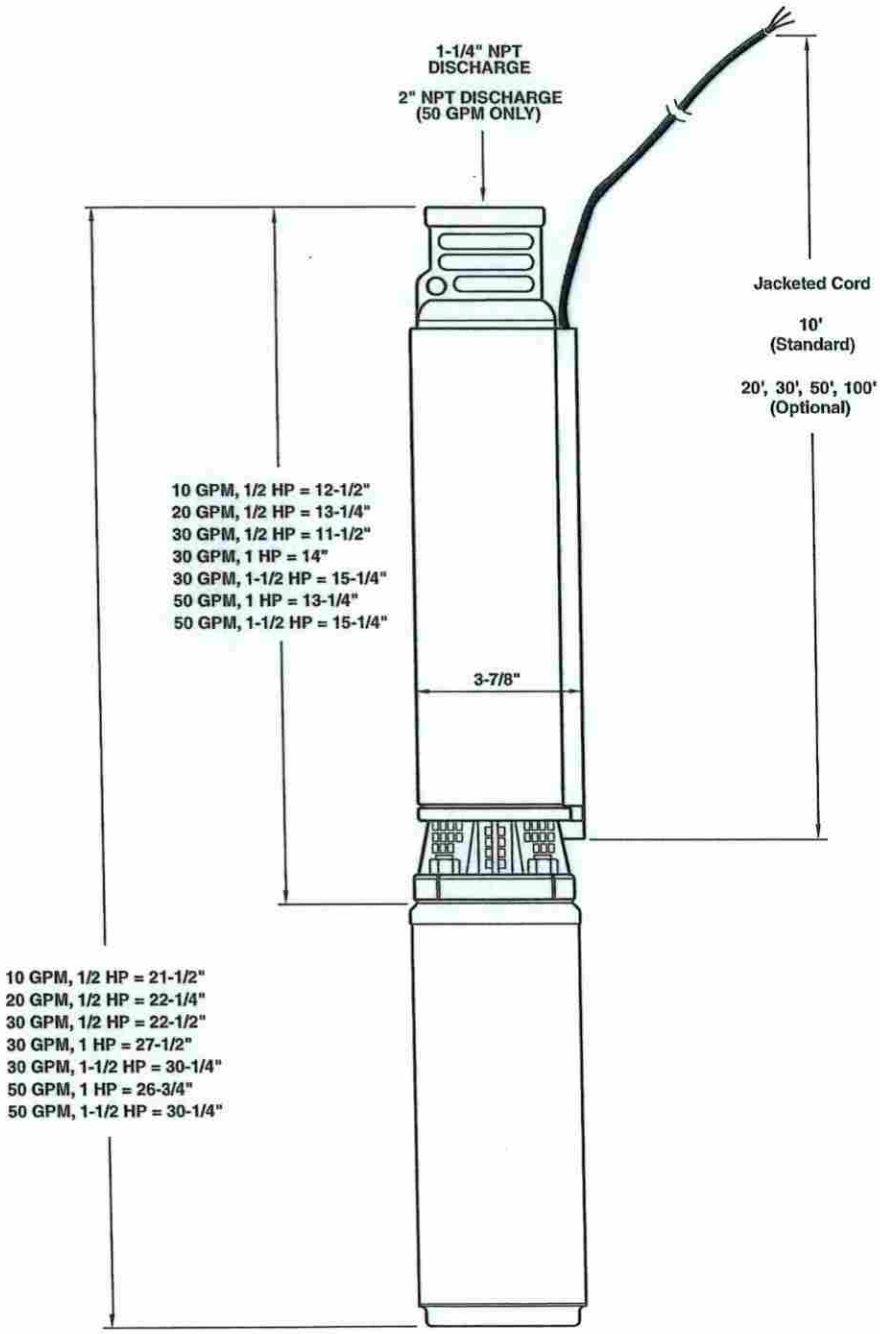
PUMP PERFORMANCE – 50 GPM



STA-RITE

high head multi-stage submersible effluent pumps

OUTLINE DIMENSIONS



Dimensions (in inches) are for estimating purposes only.

True Union Ball Check Valves

1/4″ to 6″ PVC, Corzan® CPVC, PPL

Backflow Prevention

Hayward True Union Ball Check Valves prevent reversal of flow in piping systems. They are ideal where backflow could potentially cause damage to pumps, filters, or process equipment.

Automatic Operation

Hayward True Union Ball Check Valves operate without the need for any adjustments or settings. Line pressure moves the solid plastic ball off the elastomer seat, opening the valve. When the inlet flow stops, back pressure moves the ball back onto the seat – stopping the flow. Additionally, this valve features a unique square-cut elastomer seat to seal at low back pressures.

True Union Design

Sizes 1/2″ to 6″ feature a true union design. This allows for easy removal from a piping system without breaking down piping connections. Just unscrew the two assembly nuts and lift the valve body out of the line. A Trim Check design is used for the 1/4″ and 3/8″ sizes. While not true union, the valves are fully repairable, unlike some other smaller check valves.

No Corrosion Failures

Because of their all-plastic construction, these valves will never jam or stick as a result of rust or corrosion. Also they will not contaminate sensitive fluids that come into contact with them.

Features

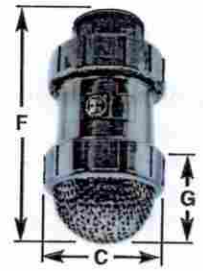
- Full Port Design to 4″
- True Union Design
- Easy Maintenance
- FPM or EPDM Seals
- Unique Square Cut Seat
- Works in Any Position Except Downflow

Options

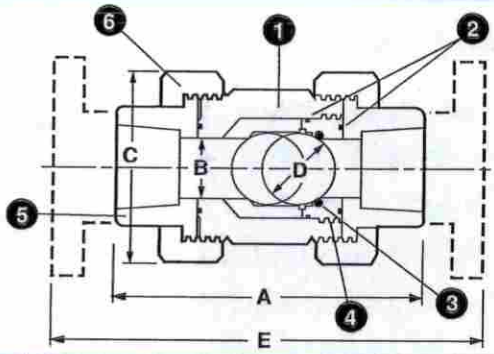
- Foot Valve Screens

Corzan® is a registered trademark of Noveon, Inc.

Technical Information



True Check with foot valve screen installed



Parts List
True Union Ball Check Valves

1. Body
2. O-Ring Seals
3. Square Cut O-Ring Seat
4. Seal Retainer
5. End Connector
6. Union Nut

Dimensions - Inches / Millimeters

Size	A	B	C	D	E	F	G	Weight - (lb / kg) Socket/ Threaded	Weight - (lb / kg) Flanged
1/4″	3.06 / 78	0.31 / 8	1.38 / 35	0.50 / 13	N/A	N/A	N/A	0.13 / .06	N/A
3/8″	3.06 / 78	0.31 / 8	1.38 / 35	0.50 / 13	N/A	N/A	N/A	0.13 / .06	N/A
1/2″ / 20*	4.63 / 118	0.50 / 13	2.25 / 57	0.75 / 19	6.75 / 171	4.88 / 124	2.32 / 59	0.75 / .34	1.00 / .45
3/4″ / 25*	4.75 / 121	0.75 / 19	2.63 / 67	1.0 / 25	7.13 / 181	5.00 / 127	2.60 / 66	0.75 / .34	1.38 / .63
1″ / 32*	5.25 / 133	1.00 / 25	3.00 / 76	1.25 / 32	7.75 / 197	5.88 / 14	2.88 / 73	1.25 / .57	2.13 / .97
1-1/4″ / 40*	6.30 / 160	1.25 / 32	4.00 / 102	1.75 / 44	9.19 / 233	6.94 / 17	3.75 / 95	2.00 / .90	3.75 / 1.70
1-1/2″ / 50*	6.75 / 171	1.50 / 38	4.00 / 102	1.75 / 44	9.75 / 248	7.06 / 17	3.75 / 95	2.00 / .90	3.75 / 1.70
2″ / 63*	8.00 / 203	1.94 / 49	4.75 / 121	2.25 / 57	11.25 / 286	8.56 / 217	4.50 / 114	3.75 / 1.70	5.75 / 2.60
2-1/2″	10.68 / 271	2.88 / 73	6.56 / 167	3.25 / 83	14.38 / 365	11.25 / 286	2.50 / 64	10.00 / 4.54	14.00 / 6.36
3″ / 90*	10.56 / 268	2.88 / 73	6.56 / 167	3.25 / 83	14.38 / 365	11.25 / 286	2.50 / 64	10.00 / 4.54	14.00 / 6.36
4″ / 110*	12.94 / 329	4.00 / 102	8.56 / 217	4.25 / 108	17.00 / 432	14.63 / 372	4.25 / 108	17.00 / 7.72	25.00 / 11.36
6″	N/A	4.00 / 102	N/A	4.25 / 108	19.19 / 487	N/A	N/A	N/A	30.20 / 13.73

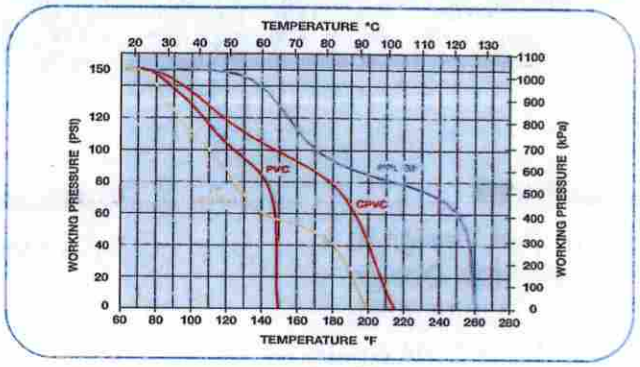
* **Metric End Connections Available in:** BSP – Straight Thread, BSP TR – Tapered Thread and Metric Socket

Selection Chart

Size	Material	End. Conn.	Seals	Pressure Rating
1/4″ - 3/8″*	PVC	Socket or Threaded	FPM	150 PSI @70°F Non-Shock
1/2″ - 4″	PVC or CPVC	Socket, Threaded, or Flanged	FPM or EPDM	
1/2″ - 2″	NAT. PPL***	Threaded	FPM	
6″**	PVC or CPVC	Flanged		

*Trim Check Design
** 4″ Valve Venturied to 6″
*** 2″ Rated at 100 PSI

Operating Temperature/Pressure



Pressure Loss Calculation Formula

$$\Delta P = \left[\frac{Q}{Cv}\right]^2$$

ΔP = Pressure Drop
Q = Flow in GPM
Cv = Flow Coefficient

Cv Factors

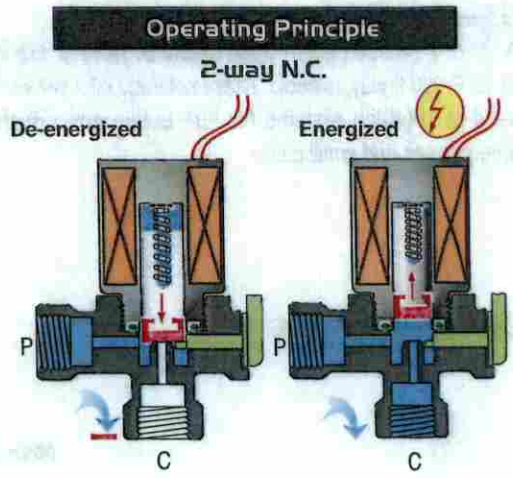
Size	Factor	Size	Factor
1/4″	1.0	1-1/2″	45
3/8″	3.0	2″	130
1/2″	4.8	2-1/2″	170
3/4″	7.7	3″	250
1″	11	4″	400
1-1/4″	25	6″	340

Continuous Current Solenoid Pilot Valves

Model S-390: 2-way Solenoid Pilot Valve

Technical Data and Specifications:

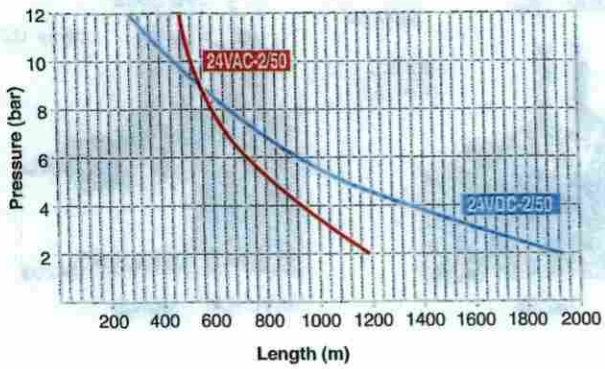
- **Pressure Range:** 0-10 bar
- **Materials:**
  - Seals: NBR
  - Wet parts: Stainless steel 400 and nylon
- **Base Flow Factor:** Kv = 1.3 l/min at ΔP of 1 bar with orifice size 1.8 mm
- **Solenoid to Base Connection:** 3/4" 20 UNEF threaded
- **Leads:** 0.32 mm² x 30 cm



2Way Electrical Data

Actuator Type	Actuator Index	Cable Color	Power (watt)	Current (amp)		Coil Resistance ohm@20°C
				Inrush	Holding	
24VAC-R	AR	Red	1.7	0.28	0.14	35
24VAC-D	ED	Red/Orange	2.2	0.13	0.13	56
24VAC-R	DR	Red	2.2	0.76	0.43	6
24VDC	AO	Black	3.6	0.15	0.15	170
12VDC	HO	Blue	3.8	0.17	0.17	38

Maximum cable length according to coil type (at cable cross section: 0.5 mm², orifice size: 1.8 mm, air gap: 0.8 mm)



For cables longer than shown in diagram...
In order to calculate the cross section of a length other than shown in the diagram, use the following equation:

$$S = \frac{L\,(sol)}{L\,(diagram)} \times 0.5$$

S = Minimum conductor cross-section in mm²
L (sol) = Length of actual cable to solenoid
L (diagram) = Length of cable shown in this diagram

Typical Applications

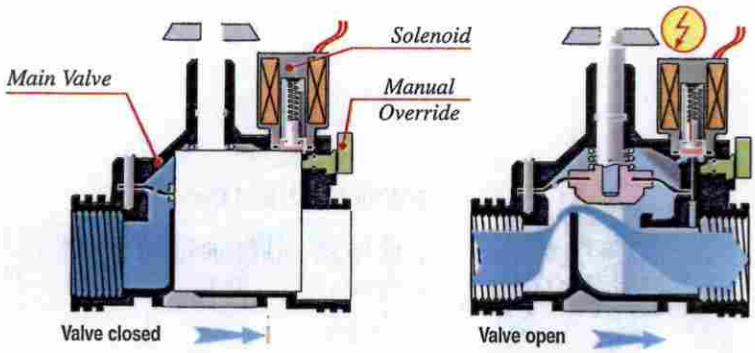
200 Series, Globe Pattern

Description

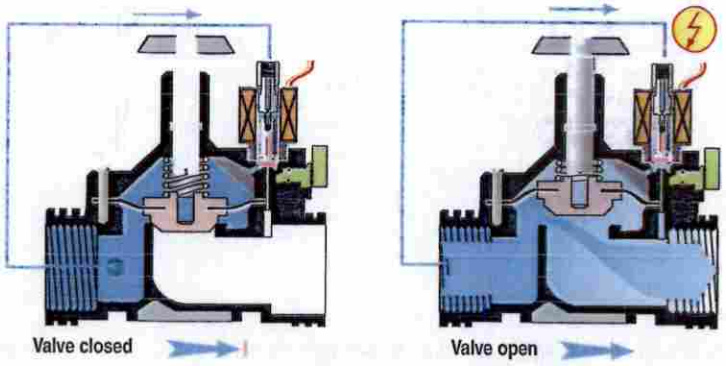
A 3/4" or 1", Globe pattern, main hydraulic valve is directly operated by an S-390 2-way solenoid. These solenoid pilot valves are typically used in irrigation systems for turf, public and private gardens, greenhouses and small plots.

Valve Configuration

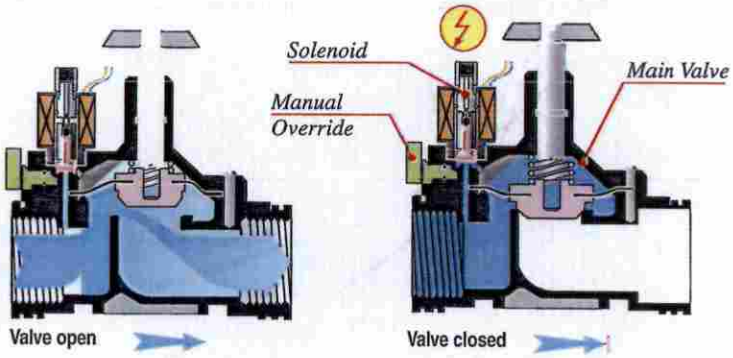
N.C. Valve
(2-way Solenoid Operated)



N.C. Valve
(3-way N.O. Solenoid Operated)
Designed for debris laden water.



N.O. Valve
(3-way N.C. Solenoid Operated)



True Union Ball Check Valve

Specifications

Sizes: True Union : 1 /2" – 2"
Single Union: 3" – 4"
Models: Socket, Threaded, Flanged (ANSI), Butt End
Bodies: PVC, CPVC, PP and PVDF
Seats: EPDM, FKM, PTFE
Seals: EPDM, FKM, PTFE
Option: Foot Valve

Sizes 1/2" - 4" PVC/EPDM/FKM Models are available with NSF-61 Certification

Standard Features (Sizes 1/2" – 2")

- Uniseat/seal of EPDM or FKM
- Ball is the only moving part. It unseats to permit flow in one direction but seals against seat to prevent backflow.
- May be used vertically or horizontally
- Minimum shut-off of 5 psi
- All sizes rated for full vacuum service
- Solid thermoplastic ball

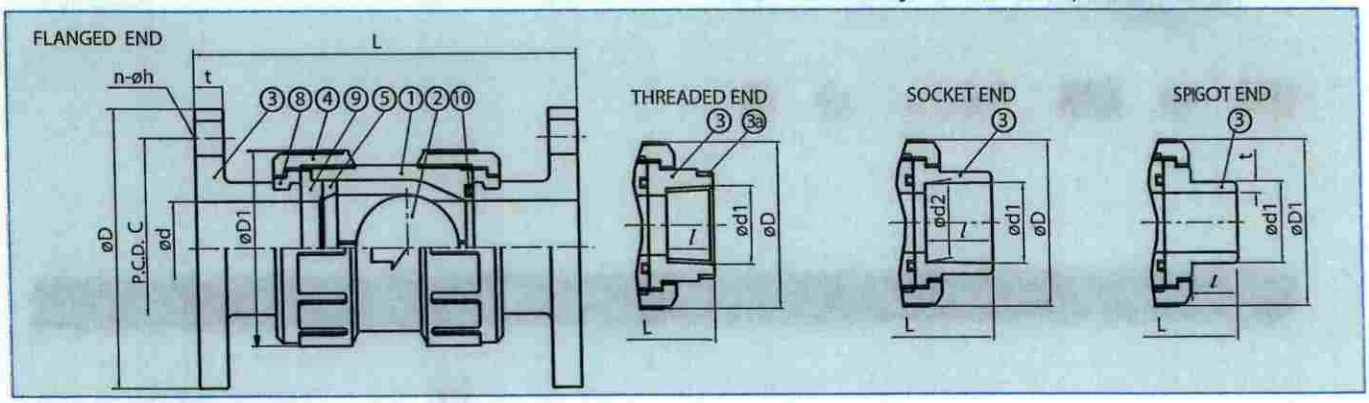
Options:

- PTFE coated FKM uniseat/seal
- Spring-loaded ball to assist ball in seating faster

Parts List – True Union (Sizes 1/2" – 2")

PARTS			
NO.	DESCRIPTION	PCS.	MATERIAL
1	Body	1	PVC, CPVC, PP, PVDF
2	Ball	1	PVC, CPVC, PP, PVDF
3	End Connector	2	PVC, CPVC, PP, PVDF
4	Union Nut	2	PVC, CPVC, PP, PVDF
5	Stop Ring (A)	1	PVC, CPVC, PP, PVDF
8	Stop Ring (B)*	1	PVDF
9	Seat	1	EPDM, FKM, PTFE
10	O-Ring	1	EPDM, FKM, PTFE
3a	Ring**	1	Stainless Steel 304

* Used for flanged end
** Used for CPVC body, threaded end; 1/2" – 1"



Dimensions (Sizes 1/2" – 2")

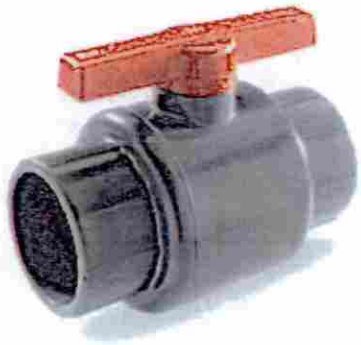
NOMINAL SIZE		FLANGED						THREADED					SOCKET											SPIGOT(BUTT END)				
		ANSI CLASS 150											PVC, CPVC				PP, PVDF (DIN)				PP, PVDF (IPS)			PP, PVDF				
													PP, PVDF				DIN 16962							DIN 3442	PP	PVDF		
INCHES	mm	D	C	n	h	L	t	d1	l	L	d	D1	d1	d2	l	L	d1	d2	l	L	d1	l	L	d1	l	t	t	L
1/2	15	3.50	2.38	4	0.62	5.12	0.47	1/2-14NPT	0.59	3.39	0.59	1.89	0.848	0.836	0.688	3.43	0.768	0.760	0.57	3.19	0.83	0.87	3.31	0.787	0.728	0.098	0.075	4.00
3/4	20	3.88	2.75	4	0.62	6.10	0.55	3/4-14NPT	0.67	4.06	0.79	2.36	1.058	1.046	0.719	3.86	0.965	0.957	0.63	3.70	1.03	1.00	4.43	0.984	0.866	0.106	0.075	4.35
1	25	4.25	3.12	4	0.62	6.50	0.55	1-11½NPT	0.79	4.45	0.98	2.76	1.325	1.310	0.875	4.37	1.240	1.232	0.71	4.13	1.30	1.13	4.35	1.260	0.866	0.118	0.094	4.75
1 1/4	30	-	-	-	-	-	-	1¼-11½NPT	0.87	5.00	1.22	3.78	1.670	1.655	0.938	4.92	-	-	-	-	-	-	-	-	-	-	-	-
1 1/2	40	5.00	3.88	4	0.62	7.56	0.63	1½-11½NPT	0.98	5.94	1.57	3.78	1.912	1.894	1.094	5.94	1.947	1.937	0.93	5.62	1.89	1.37	5.57	1.969	1.260	0.181	0.118	5.75
2	50	6.00	4.75	4	0.75	8.43	0.63	2-11½NPT	1.10	6.97	2.01	4.17	2.387	2.369	1.156	6.77	2.461	2.445	1.08	6.69	2.36	1.50	6.49	2.480	1.417	0.228	0.118	6.50

ASAHI/AMERICA
Rev. D 06-06

Commercial Ball Valves (Solvent)

Features:

- EPDM O'rings.
- Meets/exceeds ASTM schedule 80 dimensional and material standards.
- Precision molded micro-finish ball for long life.
- HMW-HDPE "floating seals" resist sticking.
- High quality series, ideal for all residential, industrial and commercial irrigation applications.
- Pressure rated at 235 psi (tested to 500 psi static @ 73°F).
- Patent pending "Stem-Lock" design.
- Full port design and schedule 80 sockets.
- Molded in the USA by KBI.
- Replacement handles available.
- Listed by IAPMO as meeting the requirements of the Uniform Plumbing Code (UPC).
- NSF Standard 61 listed.



Model	Size	Connection	Case
LT-0500-S	1/2"	Solvent	36
LT-0750-S	3/4"	Solvent	24
LT-0750-S	1"	Solvent	18
LT-1250-S	1 1/4"	Solvent	8
LT-1500-S	1 1/2"	Solvent	6
LT-2000-S	2"	Solvent	4

Some fields might not be applicable for

Arkal Sanitron Units

AT-2" ARKAL

SPECIFICATIONS

- 2"
- Schedule 80 PVC
- See Specifications Chart below
- Designed for use in with Adenus FFRT panels

FEATURES

- Automatic Backwash for self-cleaning operation
- Compact Design
- Regulated Volume
- Flow meter
- Optional UV Sanitation

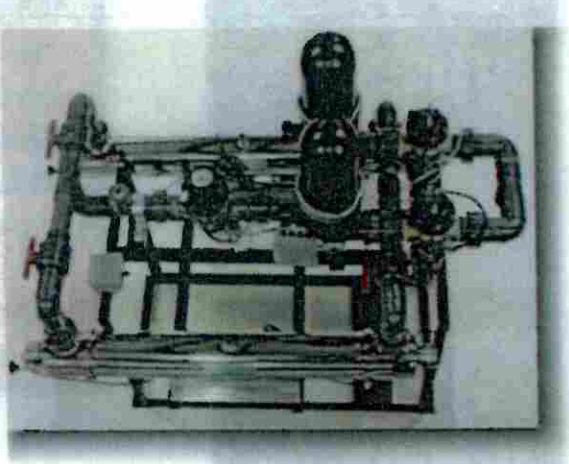
Applications

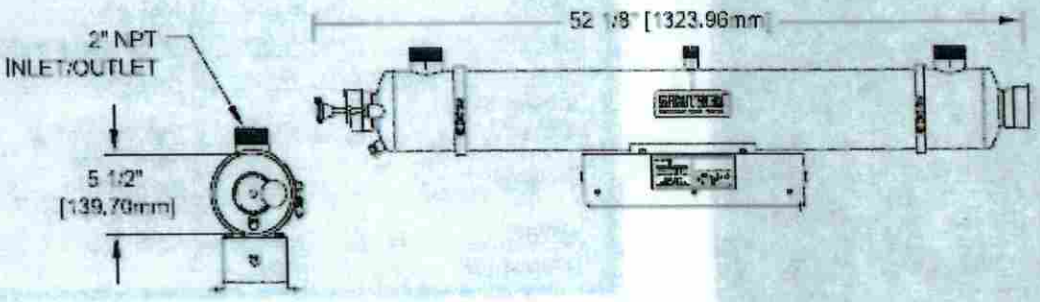
- Effluent and water land discharge
- Drip Field protection
- RSF final treatment
- Lagoon final Treatment

The Arkal Filter is the state of the art technology for removing fine particles from cleaned effluent before disposal to drip irrigation.

Dual Arkal Filters from Adenus require minimum maintenance and add an extra level of protection to your drip field.

Forward movement of wastewater through the Sanitron ultraviolet units expose fecal coliform colonies to lethal UV light. Arkal Filters utilize clean-water technologies to provide cost-effective filtration solutions for industrial, municipal, and commercial applications.





www.adenus.com

Adenus Technologies

Arkal Sanitron

2" Arkals

DATA	2 UNITS
Max. pressure:	10 bar; 145 psi
Min. pressure:	2.8 bar 38 psi
Flow rate	(40-140 mesh, 100-400µ): 40 m³/h;176gpm
Flow rate(55µ):	26 m³/h;114 gpm
Flow rate(20µ):	15 m³/h; 66 gpm
Filtration S.A.:	1760 cm2; 272 in²
Filtration Vol.:	2640 cm³; 160 in³
Filter L:	545 mm; 21-15/32"
Filter H:	815 mm; 32-3/32"
Filter W:	720 mm; 28-11/32"

S2400C Sanitron

Model:	S2400C	Power Consumption:	140 Watts
Flow Rate (GPM):	40	Lamp Watts:	110 Watts
Flow Rate (GPH):	2400	Max Operating Press.:	100 PSI
Inlet\Outlet Size:	2"m NPT	Ambient Temp.:	33° F - 100° F
Number of Lamps:	1	Quartz Sleeve:	1
Lamp Model No.:	GX48L	Drain Plug:	¼" NPT
Length:	52-1/8"	Lamp Out Indicator:	Translucent Sight Port
Width:	6-9/16"	Indicator:	Sight Port
Height:	11-1/8"	Ultraviolet Monitor:	Optional
Chamber Diameter:	5-1/2"	Audio Alarm:	Optional
Shipping Wt. (Gross):	49 Lbs	Solenoid Valve:	Optional
Voltage:	120V	Time Delay Mechanism:	Optional
Amps:	1.17A	Elapsed Time Indicator:	Optional
Frequency:	60Hz		

849 Aviation Parkway
Smyrna, TN 37167
(888-4-ADENUS)

Adenus® Technologies

N Nolensville/College Grove Utility District
C P.O. Box 127, 2000 Johnson Industrial Blvd., Nolensville, TN 37135
G Phone No. 615-776-2511 - Fax No. 615-776-2591

Quality On Tap!

November 11, 2014

Williamson County Planning Commission
Williamson County Administrative Complex
1320 West Main St., Suite 400
Franklin, TN. 37064

Re: Water Availability for Clovercroft Acres
Map 81, Parcel 5.00

Dear Sir or Madam:

Nolensville/College Grove Utility District is a municipal corporation authorized to furnish water service in certain portions of Williamson County. The District has adopted Rules, Regulations, and Standard Operating Procedures, which prescribe the conditions under which the District will furnish water service. In addition, certain state laws delegate authority to the Tennessee Department of Environment and Conservation, various planning commissions, cities and counties, which may affect the availability of service.

Subject to the payment of all charges and fees imposed by the District and the approval of any and all required governmental agencies, N/CG Utility District will make water service available on a first come, first-served basis with adequate pressure and volume to serve 185± lots in Clovercroft Acres, provided the applicant complies with all of the District's rules and regulations.

The project will require will require extensive off-site improvements prior to build out.

If I can provide any additional information please call me at 776-2511.

Sincerely,

Charles Strasser

Charles Strasser
General Manager

http://www.ascr.usda.gov/complaint_filing_cust.html

N Nolensville/College Grove Utility District
C P.O. Box 127, 2000 Johnson Industrial Blvd., Nolensville, TN 37135
G Phone No. 615-776-2511 - Fax No. 615-776-2591

Quality On Tap!

October 9, 2013

Jamie Reed, P.E., R.L.S.
President
Site Engineering Consultants
850 Middle Tennessee Blvd.
Murfreesboro, TN 37129

RE: Clovercroft Acres Subdivision
Williamson County

Dear Mr. Reed,

I presented your request for information on the surcharge fee per lot for Clovercroft Acres Subdivision to the Board at our meeting on 10/8/13. The Board voted to set the surcharge fee at $1000.00 per lot. The fee, along with the other fees, will need to be paid prior to the start of each section that is developed.

Prior to construction, the developer will need to fill out an application for service. Our engineer will design the water system improvements and get them approved by TDEC. Once I have the application and the engineer's estimate of the cost of construction, I can have the contract drawn up which will spell out the terms and conditions along with the fees. This can be done in phases as they are developed.

Please contact me if you have any questions.

Sincerely,

Charles Strasser

Charles Strasser
General Manager

NOLENSVILLE/COLLEGE GROVE UTILITY DISTRICT
CLOVERCROFT AREA IMPROVEMENTS
JULY 2013
(PARTIAL SYSTEM MAP - NOT ALL MAINS SHOWN)

Connect to Bent Creek 8"

Proposed 12" Main (Upgrade from 8")

Proposed 1000 GPM Pump Station

Existing Clovercroft 650,000 Gal Tank
Overflow El 848

Proposed 12" Main to Replace 4" Main

Proposed 12" Main to Replace 6" Main

Jenkins Test Points

Tollgate Tanks
Overflow El 952

Jenkins
E & F Scales
J & S Scales
J & S Scales
L G Scales
Pulley
Galdos
Flippen
Flippen
McMahon
McMahon
Mosely
Rogers
Arnold
naron
naron
Mosely
Woolsey
Jones

Legend
Water Mains
Diameter
1" to 3"
4"
6"
8"
10"
12"
16"
18"
20"
Fire Hydrant

Joel B. Spaulding & Company, Inc.
2402 Winford Avenue
Nashville, Tennessee 37211

Exhibit 2-B_SOP-15012_25-JUN-15

SITE ENGINEERING CONSULTANTS
850 Middle Tennessee Boulevard Murfreesboro, Tennessee 37129
Ph. 615-890-7901 FAX 615-895-2567

SEC, Inc.

LETTER OF TRANSMITTAL

Date:	6-24-15	TO:	Brad Harris
Project :	Chrisman Property		TDEC - William R. Snodgrass Tennessee Tower
Project No.:	15064		312 Rosa L. Parks Avenue, 11th Floor
Re:	SOP		Nashville, Tennessee 37243

WE ARE SENDING YOU THE ATTACHED VIA___courier THE FOLLOWING:

☐ Shop Drawings ☐ Original Plans ☑ Plan Prints ☐ Specifications

☑ Copies ☐ Other_____

NO.	COPIES	DATE	DESCRIPTION
1	1	6-24-15	SOP application
2	1	6-24-15	$1000 permit check fee
3	1	6-24-15	Pit Descriptions
4	1	6-24-15	Soils map
5	1	6-24-15	Preliminary master plan layout

TN DEPT OF ENVIRONMENT AND CONSERVATION
JUN 25 2015
DIV OF WATER RESOURCES
RECEIVED

These are transmitted as checked: ☑ For approval ☐ For your use ☐ As requested ☑ For review and comment

☐ Approved as submitted ☐ Approved as noted ☐ Returned for corrections ☐ Resubmit_____copies for approval ☐ Submit___ copies for distribution ☐ Return ___ corrected prints ☐ Prints returned after loan to us ☐ Other

_____

Remarks: Brad, please call if you have any questions regarding the information submitted.

Thanks for the help

Signed Jamie Reed P.E., R.L.S.

President

2364

PARKS HOLDINGS, LLC
8119 ISABELLA LANE, SUITE 105
BRENTWOOD, TN 37027
PH.(615) 370-8669

MIDSOUTH BANK

87-887-641

6/23/2015

PAY TO THE ORDER OF TDEC

$**1,000.00

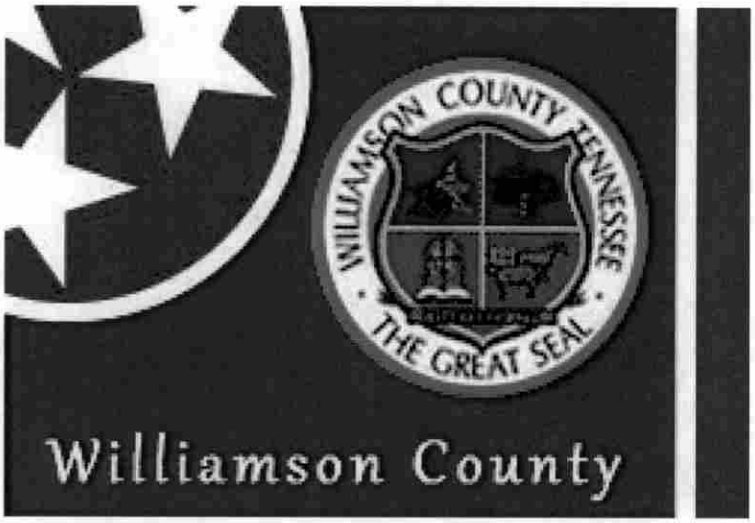
One Thousand and 00/100********** DOLLARS

TDEC

AUTHORIZED SIGNATURE

MEMO Submittal Fee for SOP

[redacted] [redacted] [redacted]



STATE OPERATING PERMIT APPLICATION
FIDDLERS GLENN SD

WILLIAMSON COUNTY, TN

TN DEPT OF ENVIRONMENT AND CONSERVATION
JUN 25 2015
DIV OF WATER RESOURCES
RECEIVED

SEC, Inc.
SITE ENGINEERING CONSULTANTS
ENGINEERING • SURVEYING • LAND PLANNING
850 MIDDLE TENNESSEE BLVD • MURFREESBORO, TENNESSEE 37129
PHONE (615) 890-7901
WWW.SEC-CIVIL.COM

SEC Project No. 15064

Table of Contents

1.0 SOP Permit Application

SOP APPLICATION – page 1

Permit Number: SOP-_____

Type of application: ☒ New Permit ☐ Permit Reissuance ☐ Permit Modification

Permittee Identification: (Name of city, town, utility, industry, corporation, individual, etc., applying, according to the provisions of Tennessee Code Annotated Section 69-3-108 and Regulations of the Tennessee Water Quality Control Board.)	
Permittee Name (applicant)/Facility Name	**Tennessee Wastewater Systems, Inc.**
Permittee Address:	**851 Aviation Parkway Smyrna, TN 37167**

Official Contact: **Charles Hyatt**	Title or Position: **President**		
Mailing Address: **851 Aviation Pkwy**	City: **Smyrna**	State: **TN**	Zip: **37167**
Phone number(s): **(615) 220-7200**	E-mail:		

Optional Contact: **Brian Carter**	Title or Position: **Operator**		
Address: **849 Aviation Pkwy**	City: **Smyrna**	State: **TN**	Zip: **37167**
Phone number(s): **office (615) 220-7200**	E-mail:		

Application Certification (must be signed in accordance with the requirements of Rule 1200-4-5-.05)

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name and title; print or type	Signature	Date
Charles Hyatt - President	C. R. H.	8-18-15

OFFICIAL STATE USE ONLY

Received Date	Permit Number **SOP**	Field Office	Reviewer

Permit Number: SOP-_____

Facility Identification:		**Existing Permit No.**	
Facility Name:	**Murfreesboro Road Fiddlers TF**	County:	**Williamson**
Facility Address or Location:	**Along Murfreesboro Road just east of Meadowbrook Drive**	Latitude:	**N 35° 51'27"**
		Longitude:	**W 86° 41'07"**

Name of Engineer for the project: **James F. Reed III P.E., R.L.S.**

Engineer address and phone number: **850 Middle Tennessee Blvd. 615-890-7901**

Name and distance to nearest receiving waters: **Tributary to Arrington Creek and Wilson Branch splits the property**

If any other State or Federal Water/Wastewater Permits have been obtained for this site, list their permit numbers:
None

Name of company, utility, or governmental entity that will operate the permitted system: **Tennessee Wastewater**

Operator address: **851 Aviation Pkwy**
Smyrna TN 37167

Has the owner/operator filed for a Certificate of Convenience & Necessity (CCN), or an amended CCN, with the Tennessee Regulatory Authority (TRA) (may be required for collection systems and land application treatment systems)? ☒ Yes ☐ No ☐ N/A

If the applicant listed above does not yet own the facility/site or if the applicant will not be the operator, explain how and when the ownership will be transferred or describe the contractual arrangement and renewal terms of the contract for operations. **Tennessee Wastewater Systems Inc. will own the facility and site.**

Name of Public Water Provider: **Milcrofton Utility District**
Mike Jones 615-794-5947
mike@milcrofton.com

List Standard Industrial Codes (SIC)/ North American Industrial Code (s) (NAIC) for proposed activity (these are located at http://www.census.gov/epcd/www/naicstab.htm) **4941 - water system, 4959 – Sewage treatment, 4971 - Irrigation**

Complete the following information explaining the entity type, number of design units, and daily design wastewater flow:

Entity Type	Number of Design Units		Flow (gpd)
☐ City, town or county	No. of connections:		
☒ Subdivision	No. of homes: **175**	Avg. No. bedrooms per home: **3-4 @ 300gpd/home**	**52,500**
☐ School	No. of students:	Size of cafeteria(s): No. of showers: **0**	
☐ Apartment	No. of units:	No. units with Washer/Dryer hookups: No. units without W/D hookups:	
☐ Commercial Business	No. of employees:	Type of business:	
☐ Industry	No. of employees:	Product(s) manufactured:	
☐ Resort	No. of units:		
☐ Camp	No. of hookups:		
☐ RV Park	No. of hookups:	No. of dump stations:	
☐ Car Wash	No. of bays:		
☐ Other			

Describe the type and frequency of activities that result in wastewater generation.

The treatment and land application of typical domestic waste.

Permit Number: SOP-_____

Engineering Report (required for collection systems and/or land application treatment systems):	☐ N/A
☒ Prepared in accordance with Rule 1200-4-2-.03 and Section 1.2 of the Tennessee Design Criteria (see website for more information)	
☒ Attached, or	
☐ Previously submitted and entitled: Approved? ☐ Yes. Date: ☐ No	

Wastewater Collection System:	☐ N/A
System type (i.e., gravity, low pressure, vacuum, combination, etc.): **Watertight effluent pressure collection system**	
System Description: **2", 3", and 4" diameter SDR 21 PVC pressure pipe and required fittings**	
Describe methods to prevent and respond to any bypass of treatment or discharges (i.e., power failures, equipment failures, heavy rains, etc.): **Each home has a minimum of 24-36 hours storage in the STEP tank. Heavy rains have a minimal impact on a watertight collection system. Small generators can be connected to the pump stations and treatment system as necessary during an extended power outage.**	
In the event of a system failure describe means of operator notification: **All pumps have redundancy & alarms.**	
List the **emergency** contact(s) (name/phone): **Brian Carter /615-220-7200**	
For low-pressure systems, who is responsible for maintenance of STEP/STEG tanks and pumps or grinder pumps (list all contact information)? **STEP tanks – Tennessee Wastewater, 849 Aviation Parkway, Smyrna, TN 37167 (615) 220-7200**	
Approximate length of sewer (excluding private service lateral): **7,000 LF**	
Number/hp of lift stations: / Number/hp of lift pumps /	
Number/volume of low pressure and or grinder pump tanks **Proposed 1-1500 gal Recirc Tank, 1-1500 gal Final Dose Tank** Number/volume septic tanks **175~1,500 STEP tanks**	
Attach a schematic of the collection system. ☒ Attached	
If this is a satellite sewer and you are tying in to another sewer system complete the following section, listing tie-in points to the sewer system and their location (attach additional sheets as necessary):	

Tie-in Point	Latitude (xx.xxxx°)	Longitude (xx.xxxx°)
None		

Land Application Treatment System:	☐ N/A
Type of Land Application Treatment System: ☒ Drip ☐ Spray ☐ Other, explain:	
Type of treatment facility preceding land application (recirculating media filters, lagoons, other, etc.): **Recirculating media filter**	
Attach a treatment schematic. ☒ Attached	
Describe methods to prevent and respond to any bypass of treatment or discharges (i.e., power failures, equipment failures, heavy rains, etc.): **The existing septic tank and proposed STEP tanks are sized for peak daily flow storage for the purpose of power failures and equipment failures.**	
For New or Modified Projects: **Fiddlers Glenn SD** Name of Developer for the project: **Bob Parks**	
Developer address and phone number 640 Broadmor Blvd., Suite 100 **Murfreesboro, TN 37129 (615-890-4045)**	
For land application, list: ☒ Proposed acreage involved: **approx. 12 acres total** ☒Inches/week gpd/sq.ft loading rate to be applied: **6 acre required with additional 6 acre of soils area, approximately 0.2 gpd/sf loading rate**	
Is wastewater disinfection proposed?	
☐ Yes Describe land application area access:	
☒ No Describe how access to the land application area will be restricted **fence with access gates**	

Permit Number: SOP-_____

Attach required additional Engineering Report Information (see website for more information)
☒ Topographic map (1:25,000 scale presented at a six inch by six inch minimum size) showing the location of the project including quadrangle(s) name(s) GPS coordinates, and latitude and longitude in decimal degrees should also be included.
☒ Scaled layout of facility showing the following: lots, buildings, etc. being served, the wastewater collection system routes, the pretreatment system location, the proposed land application area(s), roads, property boundaries, and sensitive areas such as streams, lakes, springs, wells, wellhead protection areas, sinkholes and wetlands.
☒ Soils information for the proposed land disposal area in the form of a Water Pollution Control (WPC) Soils Map per Chapter 16 and 17 State of Tennessee Design Criteria for Sewage Work. The soils information should include soil depth (borings to a minimum of 4 feet or refusal) and soil profile description for each soil mapped.
☒ Topographic map of the area where the wastewater is to be land applied with no greater than ten foot contours presented at a minimum size of 24 inches by 24 inches.
☒ Describe alternative application methods based on the following priority rating: (1) connection to a municipal/public sewer system, (2) connection to a conventional subsurface disposal system as regulated by the Division of Groundwater Protection, and/or (3) land application.
For Drip Dispersal Systems Only: Unless otherwise determined by the Department, sewage treatment effluent wells, i.e, large capacity treatment/drip dispersal systems after approval of the SOP Application, will be issued an UIC tracking number and will be authorized as Permit by Rule per UIC Rule 1200-4-6-.14(2) and upon issue of a State Operating Permit and Sewage System Construction Approval by the Department. Describe the following:
The area of review (AOR) for each Drip Dispersal System shall, unless otherwise specified by the Department, consist of the area lying within a one mile radius or an area defined by using calculations under 1200-4-6-.09 of the Drip Dispersal System site or facility, and shall include, but not be limited to general surface geographic features, general subsurface geology, and general demographic and cultural features within the area. Attach to this part of the application a general characterization of the AOR, including the following: (This can be in narrative form) see 2.0
☒ A general description of all past and present groundwater uses as well as the general groundwater flow direction and general water quality. see 3.0
☒ A general description of the population and cultural development within the AOR;i.e. ☒ agricultural, ☐ commercial, ☐ residential or ☐ mixed. see 4.0
☒ Nature of injected fluid to include physical, chemical, biological or radiological characteristics. see 5.0
☒ If groundwater is used for drinking water within the area of review, then identify and locate on a topographic map all groundwater withdrawal points within the AOR, which supply public or private drinking water systems. Or supply map showing general location of publicly supplied water for the area(this can be obtained from the water provider) see 6.0
☐ If the proposed system is located within a wellhead protection area or source water protection area designated by Rule 1200-5-1-.34, show the boundary of the protection area on the facility site plan.
☒ Description of system, Volume of injected fluid in gallons per day based upon design flow, including any monitoring wells see 7.0
☒ Nature and type of system, including installed dimensions of wells and construction materials see 8.0

Pump and Haul:	☒ N/A
Reason system cannot be served by public sewer:	
Distance to the nearest manhole where public sewer service is available:	
When sewer service will be available:	
Volume of holding tank: gal.	
Tennessee licensed septage hauler (attach copy of agreement):	
Facility accepting the septage (attach copy of acceptance letter):	
Latitude and Longitude (in decimal degrees) of approved manhole for discharge of septage:	
Describe methods to prevent and respond to any bypass of treatment or discharges (i.e., power failures, equipment failures, heavy rains, etc.):	

Holding Ponds (for non-domestic wastewater only):	☒ N/A
Pond use: ☐ Recirculation ☐Sedimentation ☐Cooling ☐Other (describe):	

Permit Number: SOP-_____

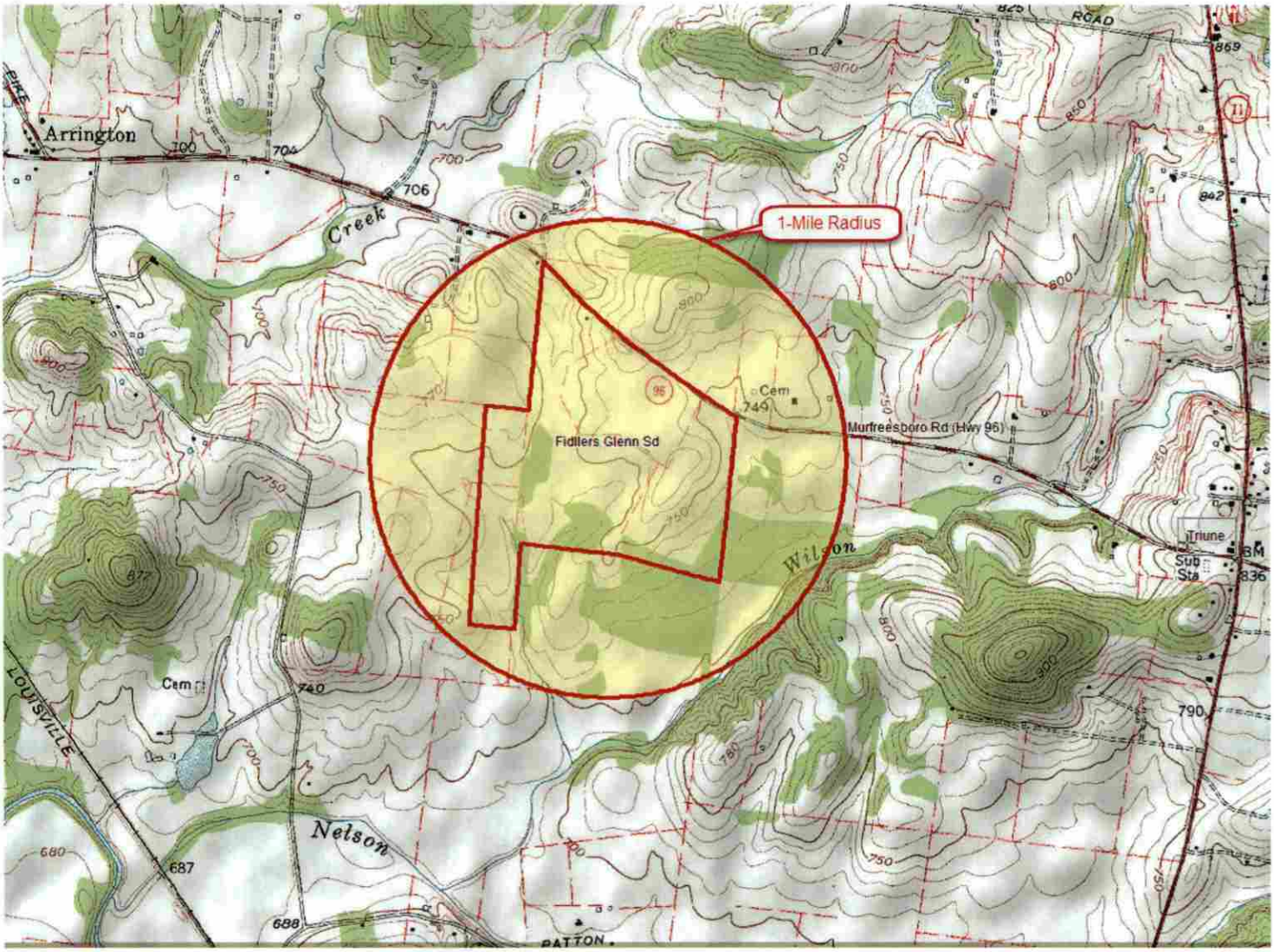
Describe pond use and operation:
If the pond(s) are existing pond(s), what was the previous use?
Have you prepared a plan to dispose of rainfall in excess of evaporation? ☐ Yes ☐ No
If so, describe disposal plan:
Is the pond ever dewatered? ☐ Yes ☐ No
If so, describe the purpose for dewatering and procedures for disposal of wastewater and/or sludge:
Is(are) the pond(s) aerated? ☐ Yes ☐ No
Volume of pond(s): gal. Dimensions:
Is the pond lined (Note if this is a new pond system it must be lined for SOP coverage. Otherwise, you must apply for an Underground Injection Control permit.)? ☐ Yes ☐ No
Describe the liner material (if soil liner is used give the compaction specifications):
Is there an emergency overflow structure? ☐ Yes ☐ No
If so, provide a design drawing of structure.
Are monitoring wells or lysimeters installed near or around the pond(s)? ☐ Yes ☐ No
If so, provide location information and describe monitoring protocols (attach additional sheets as necessary):
Attach required additional Information
☐ Topographic map (1:24,000 scale presented at a six inch by six inch minimum size) showing the location of the project including GPS coordinates, latitude and longitude in decimal degrees quadrangle name should also be included.
☐ Scaled layout of facility showing the following: lots, buildings, etc. being served, the wastewater collection system routes, the pretreatment system location, roads, property boundaries, and sensitive areas such as streams, lakes, springs, wells, wellhead protection areas, sinkholes and wetlands.
The area of review (AOR) for each holding pond shall, unless otherwise specified by the Department, consist of the area lying within and below a one mile radius of the holding pond site or facility, and shall include, but not be limited to surface geographic features, subsurface geology, and demographic and cultural features within the area. Attach to this part of the application a complete characterization of the AOR, including the following: (This can be in narrative form)
☐ Description of all past and present uses of groundwater within the AOR, as documented by public record.
☐ Description of the groundwater hydrology within the AOR, including characteristics of all subsurface aquifers, presence or absence of solution development features, general direction of groundwater movement, and chemical characteristics of the ground waters in the AOR..
☐ Description of the population and cultural development within the AOR, including the number of persons living within one mile of the well or facility, land uses within the AOR, and the existence of any community, state, regional or national parks, wildlife refuges, natural or wilderness areas, recreational or other public-use areas, or any other environmentally sensitive features within the area of review.
☐ If groundwater is used for drinking water within the area of review, then identify and locate on a topographic map all groundwater withdrawal points within the AOR, which supply public or private drinking water systems..
☐ Identify any surface water intake, which supplies a public water distribution system and is located within the AOR or within three miles topographically down gradient from the well or facility. If any such intake(s) wells or springs exist, then locate on map

Permit Number: SOP-_____

Mobile Wash Operations:	☒ N/A
☐ Individual Operator	☐ Fleet Operation Operator
Indicate the type of equipment, vehicle, or structure to be washed during normal operations (check all that apply):	
☐ Cars	☐ Parking Lot(s): sq. ft.
☐ Trucks	☐ Windows: sq. ft.
☐ Trailers (Interior washing of dump-trailers, or tanks, is prohibited.)	☐ Structures (describe):
☐ Other (describe):	
Wash operations take place at (check all that apply):	
☐ Car sales lot(s)	☐ Public parking lot(s)
☐ Private industry lot(s)	☐ Private property(ies)
☐ County(ies), list:	☐ Statewide
Wash equipment description:	
☐ Truck mounted	☐ Trailer mounted
☐ Rinse tank size(s) (gal.):	☐ Mixed tanks size(s) (gal.):
☐ Collection tank size(s) (gal.):	Number of tanks per vehicle:
Pressure washer: psi (rated) gpm (rated)	Pressure washer: ☐ gas powered ☐ electric
Vacuum system manufacturer/model:	Vacuum system capacity: inches Hg
Describe any other method or system used to contain and collect wastewater:	
List the public sewer system where you are permitted or have written permission to discharge waste wash water (include a copy of the permit or permission letter):	
Are chemicals pre-mixed, prior to arriving at wash location? ☐ Yes ☐ No	
Describe all soaps, detergents, or other chemicals used in the wash operation (attach additional sheets as necessary):	

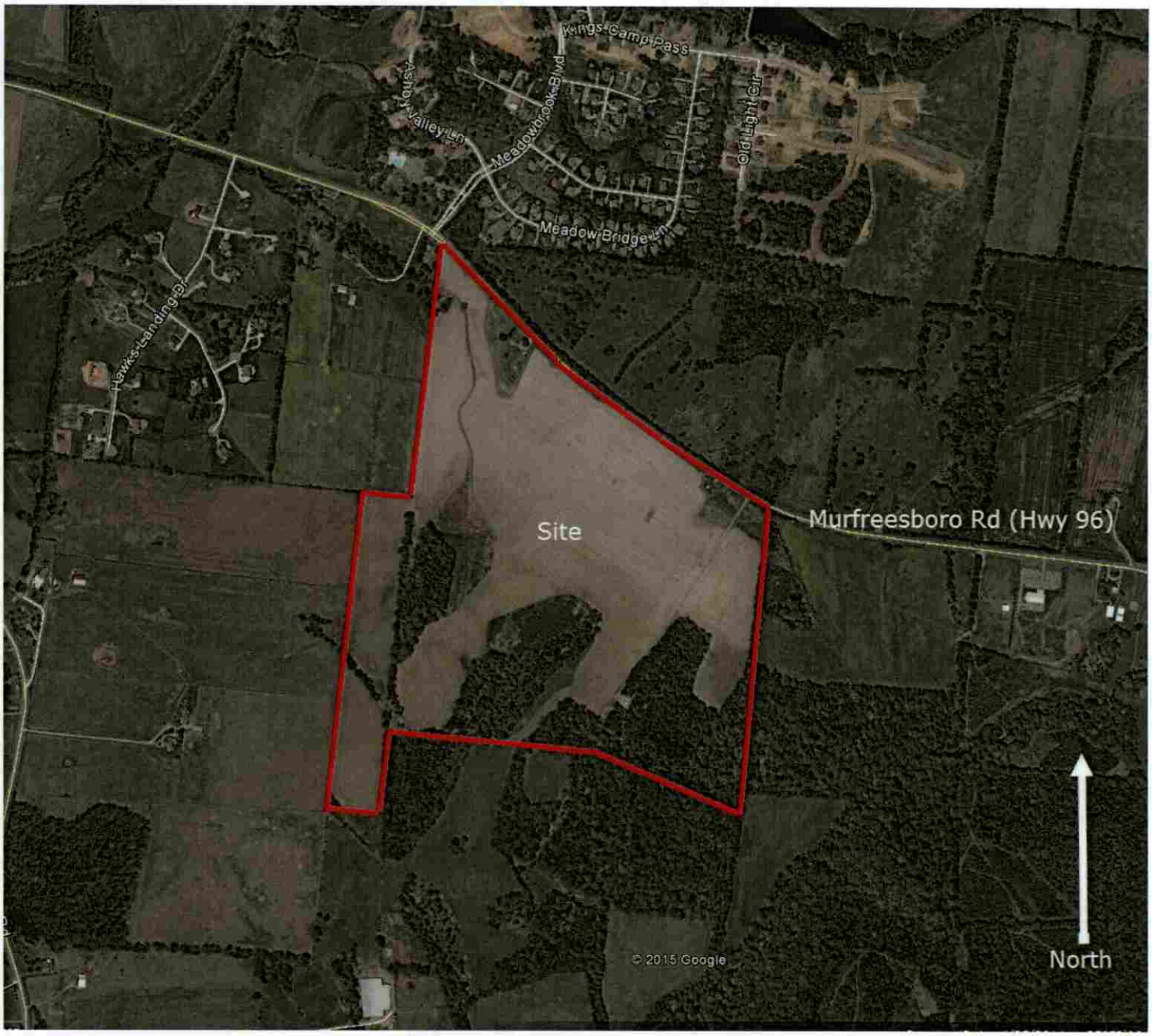
Chemical name:	Manufacturer:	Primary CAS No. or Product No.

2.0 Area of Review



Area of Review

SEC Project No. 15064



Aerial Map

SEC Project No. 15064

FEMA MAP

100-Year Floodplain and Elevations

SEC Project No. 15064

MAP SCALE 1" = 1000'

500 0 500 1,000 1,500 2,000 FEET

METE

0 300 600

NFIP

PANEL 0385F

FIRM

FLOOD INSURANCE RATE MAP

WILLIAMSON COUNTY, TENNESSEE

AND INCORPORATED AREAS

PANEL 385 OF 485

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
WILLIAMSON COUNTY	470204	0385	F

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
47187C0385F

MAP REVISED
SEPTEMBER 29, 2006

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

USDA Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

6/4/2015
Page 1 of 3

USDA MAP
National Cooperative Soil Survey

SEC Project No. 15064

Map Unit Legend

Williamson County, Tennessee (TN187)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
ArB	Armour silt loam, 2 to 5 percent slopes	5.8	3.2%
ArB2	Armour silt loam, 2 to 5 percent slopes, eroded	8.3	4.6%
ArC2	Armour silt loam, 5 to 12 percent slopes, eroded	2.1	1.2%
AwC	Ashwood silty clay loam, 5 to 12 percent slopes	1.1	0.6%
DnB	Donerail silt loam, 2 to 5 percent slopes	34.2	18.9%
DnB2	Donerail silt loam, 2 to 5 percent slopes, eroded	12.3	6.8%
DnC2	Donerail silt loam, 5 to 12 percent slopes, eroded	2.1	1.1%
DoC2	Donerail silt loam, concretionary, 5 to 12 percent slopes, eroded	4.2	2.3%
Du	Dunning silt loam, phosphatic	21.3	11.7%
Eg	Egam silt loam, phosphatic	6.3	3.5%
HbB2	Hampshire silt loam, 2 to 5 percent slopes, eroded	0.3	0.2%
Lp	Lindell silt loam, 0 to 2 percent slopes, occasionally flooded	3.4	1.9%
MbA	Maury silt loam, 0 to 2 percent slopes	0.1	0.1%
MbB2	Maury silt loam, 2 to 5 percent slopes, eroded	23.5	13.0%
MbC2	Maury silt loam, 5 to 12 percent slopes, eroded	16.5	9.1%
McC3	Maury silty clay loam, 5 to 12 percent slopes, severely eroded	8.7	4.8%
Me	Melvin silt loam, phosphatic	21.2	11.7%
MoD	Mimosa and Ashwood very rocky soils, 5 to 20 percent slopes	1.6	0.9%
Rb	Robertsville silt loam, phosphatic	0.1	0.0%
StB2	Stiversville silt loam, 2 to 5 percent slopes, eroded	4.3	2.4%
StC2	Stiversville silt loam, 5 to 12 percent slopes, eroded	3.8	2.1%
Totals for Area of Interest		181.2	100.0%

SEC Project No. 15064

3.0 Groundwater General Description

The attached USGS maps indicate the Fiddlers Glenn Subdivision wastewater treatment area drainage flow path is to the northwest discharging into a tributary to Arrington Creek watershed and to the south to a tributary of Nelson Branch. The site is comprised of approximately 180 acres. The topography is mainly gently rolling to rolling slopes of 5 - 15 %. The property is bordered by Murfreesboro Road to the north, to the west, east and south by large tracts of land. Roughly 30% of the site is wooded and the 12 acres for drip dispersal is mostly cleared with some minor underbrush.

The above mentioned property has typically been used for pasture land. Groundwater was used historically to provide water. At this time the area is served by Milcrofton Utility District for water.

It is assumed that the groundwater movement and surface flows are to the northwest to Arrington Creek and south toward Wilson Branch.

See attached maps and USDA soils info under Section 2 Area of Review.

4.0 Population General Description

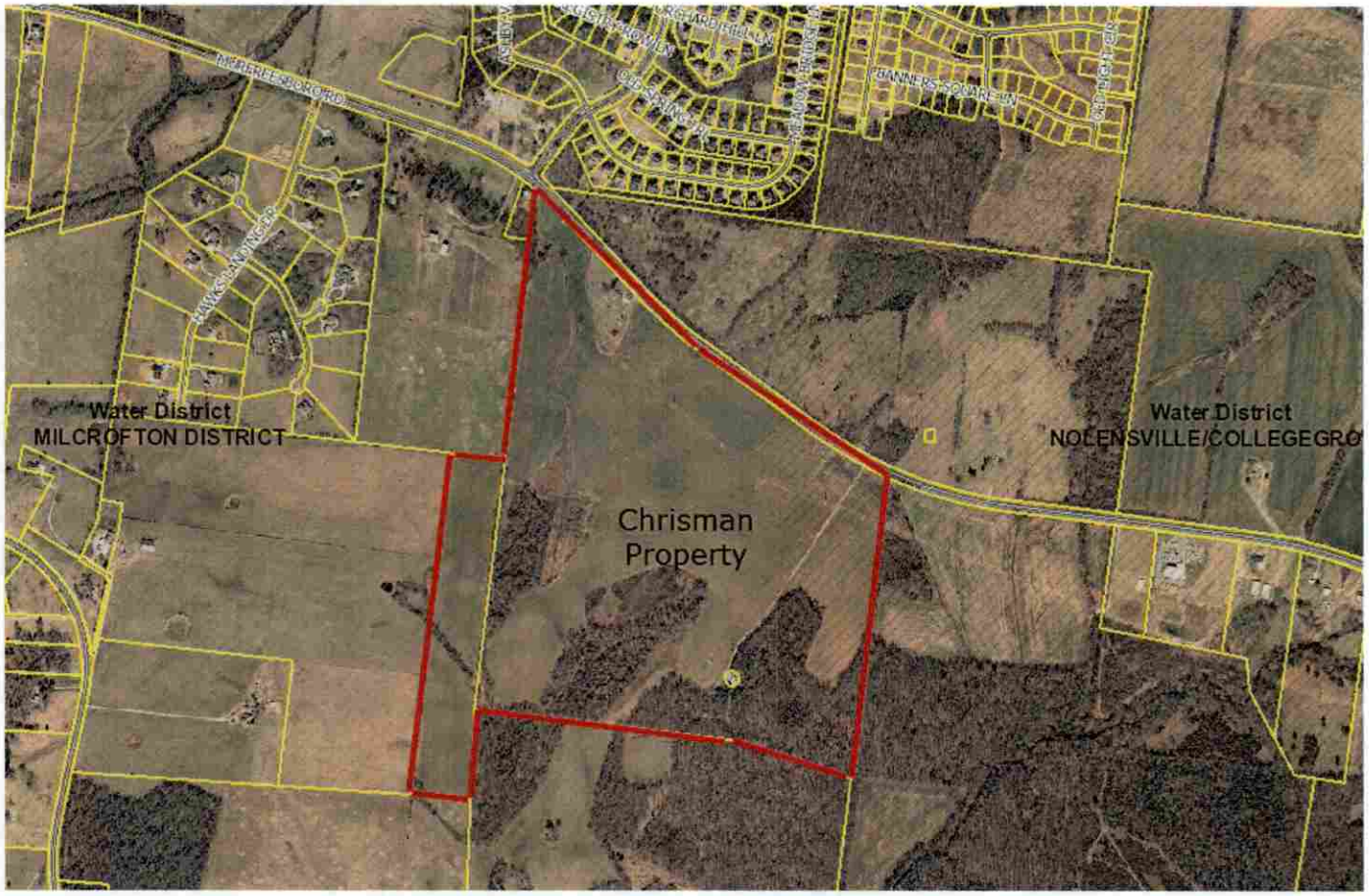
The majority of the Area of Review is agriculture land used primarily for pasture and row crops. See attached aerial map of property under Section 2 Area of Review.

5.0 Nature of Fluid

Fiddlers Glenn Subdivision (~175 lots) will have a peak design discharge of approximately 52,500 gpd of domestic wastewater. The effluent quality is typical domestic residential treated wastewater that meets State Operating Permit limits.

6.0 General Location of Publicly Supplied Water

The area will be served by Milcrofton Utility District. See attachment next page.



SEC Project No. 15064

7.0 Description of System

Treated wastewater approximately 52,500 gpd is pumped through arkal filter units and then distributed to HDPE drip lines with pressure compensating emitters. The drip lines are to be installed on 2-foot centers along the contours with the emitters spaced at 2-foot centers along the drip lines. Drip lines are plowed into the soils that have been approved by a certified soil scientist and placed at an approximate depth of 7-8 inches below the ground surface. Distribution of the treated wastewater is managed through solenoid valves and controlled by a programmable PLC.

8.0 Nature and Type of System

Treated wastewater from the subdivision will first be pumped from numerous water tight septic tanks at each lot. Grey water is pumped from the septic tank via a small diameter pressure collection line to a recirculating sand filters (RSF). The wastewater will then cycle through the RSF 5 times before discharging into the final dose tank. From the final dose tank, the treated wastewater is pumped through arkal filter units and then distributed through the drip dispersal lines within the approved soil site.

TN DEPT OF ENVIRONMENT
AND CONSERVATION
JUN 25 2015
DIV OF WATER RESOURCES
RECEIVED

SOIL PEDON DESCRIPTION

DESCRIBED BY: Lonnie Norrod and Terry Henry

DATE: 4/28/15

SITE LOCATION: Hwy 96-Williamson County-Christman Prop

GEOMORPHIC DESCRIPTION: footslope

PIT #: 1

PHYSIOGRAPHIC LOCATION: Nashville Basin

SOIL SERIES: Armour

DRAINAGE CLASS: well drained

CLASSIFICATION: fine-silty

GROUND WATER: none

PARENT MATERIAL: alluvium

LAND COVER: corn stubble

CLIMATE: thermic

SLOPE OF PIT:

SLOPE OF MAP UNIT: 0-5%

EROSION: none to slight

Horizon	Depth (inches)	Matrix Color	Depletions/Concentrations/Redox	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
Ap	0-9			silt loam	weak and moderate	medium	subangular blocky	
AB	9-14			silty clay loam	moderate	medium	subangular blocky	
Bt1	14-32			silty clay loam	moderate	medium	subangular blocky	
Bt2	32-44			silty clay loam	moderate	medium	subangular blocky	

SOIL PEDON DESCRIPTION

DESCRIBED BY: Lonnie Norrod and Terry Henry

DATE: April 28, 2015

SITE LOCATION: Hwy 96-Williamson County- Christman Property

GEOMORPHIC DESCRIPTION: upland sideslope

PIT #: 2

PHYSIOGRAPHIC LOCATION: Nashville Basin

SOIL SERIES: Sykes

DRAINAGE CLASS: well drained

CLASSIFICATION: fine-sitly

GROUND WATER: none

PARENT MATERIAL: alluvium over Residuum

LAND COVER: corn stubble

CLIMATE: thermic

SLOPE OF PIT: 5%

SLOPE OF MAP UNIT: 0-5%

EROSION: none to slight

Horizon	Depth (inches)	Matrix Color	Depletions/Concentrations/Redox	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
Ap	0-7			silt loam				
A	7-18			silt loam	moderate	medium	subangular blocky	
Bt1	18-27			silty clay loam	moderate	medium	subangular blocky	
Bt2	27-34			silty clay	moderate	medium	subangular blocky	
Bt3	34-44			clay	weak	medium	subangular blocky	

SOIL PEDON DESCRIPTION

DESCRIBED BY: Lonnie Norrod and Terry Henry

DATE: April 28, 2015

SITE LOCATION: Hwy 96-Williamson County- Christman Property

GEOMORPHIC DESCRIPTION: upland

PIT #: 3

PHYSIOGRAPHIC LOCATION: Nashville Basin

SOIL SERIES: Sykes

DRAINAGE CLASS: well drained

CLASSIFICATION: fine-sitly

GROUND WATER: none

PARENT MATERIAL: Residuum

LAND COVER: corn stubble

CLIMATE: thermic

SLOPE OF PIT:

SLOPE OF MAP UNIT: 5-15%

EROSION: moderate

Horizon	Depth (inches)	Matrix Color	Depletions/Concentrations/Redox	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
Ap	0-9			silt loam	weak & moderate	fine & medium	granular and subangular blocky	
Bt1	9-17			silty clay loam	moderate	medium	subangular blocky	
Bt2	17-23			silty clay loam	moderate	medium	subangular blocky	
Bt3	26-29			silty clay loam	moderate	medium	subangular blocky	
2BC	29-48			clay	weak	medium	subangular blocky	

SOIL PEDON DESCRIPTION

DESCRIBED BY: Lonnie Norrod and Terry Henry

DATE: April 28, 2015

SITE LOCATION: Hwy 96-Williamson County- Christman Property

GEOMORPHIC DESCRIPTION:

PIT #: 4

PHYSIOGRAPHIC LOCATION: Nashville Basin

SOIL SERIES: Armour

DRAINAGE CLASS: well drained

CLASSIFICATION: fine-sitly

GROUND WATER: none

PARENT MATERIAL: Alluvium over Residuum

LAND COVER: corn stubble

CLIMATE: thermic

SLOPE OF PIT:

SLOPE OF MAP UNIT: 0-5%

EROSION: none to slight

Horizon	Depth (inches)	Matrix Color	Depletions/Concentrations/Redox	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
Ap	0-9			silt loam	weak and moderate	fine and medium	granular and subangular blocky	
AB	9-16			silt loam	moderate	medium	subangular blocky	
Bt1	16-20			silty clay loam	moderate	medium	subangular blocky	
Bt2	20-25			silty clay loam	moderate	medium	subangular blocky	
Bt3	25-37			silty clay loam	moderate	medium	subangular blocky	
Btx	37-45			silty clay loam	weak	medium	suangular blocky	

SOIL PEDON DESCRIPTION

DESCRIBED BY: Lonnie Norrod and Terry Henry

DATE: April 28, 2015

SITE LOCATION: Hwy 96-Williamson County- Christman Property

GEOMORPHIC DESCRIPTION:

PIT #: 5

PHYSIOGRAPHIC LOCATION: Nashville Basin

SOIL SERIES: Armour-Harpeth

DRAINAGE CLASS: well drained

CLASSIFICATION: fine-sitly

GROUND WATER: none

PARENT MATERIAL: Alluvium over Residuum

LAND COVER: corn stubble

CLIMATE: thermic

SLOPE OF PIT:

SLOPE OF MAP UNIT: 0-5%

EROSION: none to slight

Horizon	Depth (inches)	Matrix Color	Depletions/Concentrations/Redox	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
Ap1	0-2			silt loam	weak	fine	granular	
Ap2	2-12			silt loam	moderate	medium	subangular blocky	
Bt1	12-20			silty clay loam	moderate	medium	subangular blocky	
Bt2	20-28			silty clay loam	moderate	medium	subangular blocky	
Bt3	28-36			silty clay loam	moderate	medium	subangular blocky	
Bt4	36-41			silty clay loam	moderate	medium	suangular blocky	
Bt5	41-48			silty clay loam	moderate	medium	subangular blocky	

SOIL PEDON DESCRIPTION

DESCRIBED BY: Lonnie Norrod and Terry Henry

DATE: April 28, 2015

SITE LOCATION: Hwy 96-Williamson County- Christman Property

GEOMORPHIC DESCRIPTION: footslope

PIT #: 6

PHYSIOGRAPHIC LOCATION: Nashville Basin

SOIL SERIES: Byler

DRAINAGE CLASS: moderately well drained

CLASSIFICATION: fine-sitly

GROUND WATER: none

PARENT MATERIAL: alluvium

LAND COVER: corn stubble

CLIMATE: thermic

SLOPE OF PIT:

SLOPE OF MAP UNIT: 0-5%

EROSION: none to slight

Horizon	Depth (inches)	Matrix Color	Depletions/Concentrations/Redox	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
Ap1	0-5	10YR 3/3		silt loam	weak	fine	granular	
Ap2	5-10	10YR 3/4		silt loam	moderate	medium	subangular blocky	
AB	10-14	10YR 5/4		silt loam	moderate	medium	subangular blocky	
Bt1	14-23	10YR 6/4		silty clay loam	moderate	medium	subangular blocky	
Bt2	23-28	10YR 5/4		silty clay loam	moderate	medium	subangular blocky	
Bt/Btx	28-33	10YR 6/4	common 10YR 4/6 common 5YR 4/6	silty clay loam	moderate	medium	suangular blocky	
Btx1	33-39	10YR 6/4	common 10YR 4/6 common 5YR 4/6	silty clay loam	weak	very coarse	prismatic	
Btx2	39-50	7.5YR5/6	many 7.5YR 7/2	silty clay loam	weak	very coarse	prismatic	

SOIL PEDON DESCRIPTION

DESCRIBED BY: Lonnie Norrod and Terry Henry

DATE: April 28, 2015

SITE LOCATION: Hwy 96-Williamson County- Christman Property

GEOMORPHIC DESCRIPTION: footslope

PIT #: 7

PHYSIOGRAPHIC LOCATION: Nashville Basin

SOIL SERIES: Byler

DRAINAGE CLASS: moderately well drained

CLASSIFICATION: fine-sitly

GROUND WATER: none

PARENT MATERIAL: alluvium

LAND COVER: corn stubble

CLIMATE: thermic

SLOPE OF PIT:

SLOPE OF MAP UNIT: 0-5%

EROSION: none to slight

Horizon	Depth (inches)	Matrix Color	Depletions/Concentrations/Redox	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
Ap	0-5	10YR 4/3		silt loam	moderate	medium	subangular blocky	
AB	5-10	10YR 4/4		silt loam	moderate	medium	subangular blocky	
Bt1	10-14	10YR 4/4		silty clay loam	moderate	medium	subangular blocky	
Bt2	14-23	10YR 4/4	few 7.5 YR 5/8	silty clay loam	moderate	medium	subangular blocky	
Bt3	23-28	10YR 4/4	common 7.5YR 5/8	silty clay loam	moderate	medium	subangular blocky	
Bt/Btx	28-33	10YR 5/4	many 5YR 5/8 many 5YR 4/6	silty clay loam	moderate	medium	suangular blocky	
Btx	33-39	7.5YR 7/2 5YR 4/6		silty clay loam	weak	very coarse	prismatic	

SOIL PEDON DESCRIPTION

DESCRIBED BY: Lonnie Norrod and Terry Henry

DATE: April 28, 2015

SITE LOCATION: Hwy 96-Williamson County- Christman Property

GEOMORPHIC DESCRIPTION: upland

PIT #: 8

PHYSIOGRAPHIC LOCATION: Nashville Basin

SOIL SERIES: Stiversville

DRAINAGE CLASS: well drained

CLASSIFICATION: fine-loamy

GROUND WATER: none

PARENT MATERIAL: Alluvium/Residuum

LAND COVER: corn stubble

CLIMATE: thermic

SLOPE OF PIT:

SLOPE OF MAP UNIT: 5-15%

EROSION: moderate

Horizon	Depth (inches)	Matrix Color	Depletions/Concentrations/Redox	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
Ap	0-6			silt loam	moderate	medium	subangular blocky	
Bt1	6-14			silty clay loam	moderate	medium	subangular blocky	
Bt2	14-20			silty clay loam	moderate	medium	subangular blocky	
Bt3	20-31			clay loam	weak	medium	subangular blocky	
Bt4	31-46			clay loam	weak	medium	subangular blocky	

SOIL PEDON DESCRIPTION

DESCRIBED BY: Lonnie Norrod and Terry Henry

DATE: April 28, 2015

SITE LOCATION: Hwy 96-Williamson County- Christman Property

GEOMORPHIC DESCRIPTION: upland sideslope

PIT #: 9

PHYSIOGRAPHIC LOCATION: Nashville Basin

SOIL SERIES: Marsh

DRAINAGE CLASS: well drained

CLASSIFICATION: fine-loamy

GROUND WATER: none

PARENT MATERIAL: Residuum

LAND COVER: corn stubble

CLIMATE: thermic

SLOPE OF PIT:

SLOPE OF MAP UNIT: 5-15%

EROSION: none to slight

Horizon	Depth (inches)	Matrix Color	Depletions/Concentrations/Redox	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
Ap1	0-6			silt loam	weak and moderate	fine and medium	granular and subangular blocky	
Ap2	6-13			silty clay loam	moderate	medium	subangular blocky	
Bt1	13-17			clay loam	moderate	medium	subangular blocky	
Bt2	17-28			clay loam	weak	medium	subangular blocky	
C	28-37							
Cr	37-45							

SOIL PEDON DESCRIPTION

DESCRIBED BY: Lonnie Norrod and Terry Henry

DATE: April 28, 2015

SITE LOCATION: Hwy 96-Williamson County- Christman Property

GEOMORPHIC DESCRIPTION: upland shoulder slope

PIT #: 10

PHYSIOGRAPHIC LOCATION: Nashville Basin

SOIL SERIES: Stiversville

DRAINAGE CLASS: well drained

CLASSIFICATION: fine-loamy

GROUND WATER: none

PARENT MATERIAL: Residuum

LAND COVER: corn stubble

CLIMATE: thermic

SLOPE OF PIT:

SLOPE OF MAP UNIT: 0-15%

EROSION: none to slight

Horizon	Depth (inches)	Matrix Color	Depletions/Concentrations/Redox	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
Ap	0-9			silt loam	weak	medium	subangular blocky	
BA	9-16			silt loam	moderate	medium	subangular blocky	
Bt1	16-20			silty clay loam	moderate	medium	subangular blocky	
Bt2	20-25			clay loam	weak	medium	subangular blocky	
Bt3	25-37			clay	moderate	medium	subangular blocky	
2BC	37-45			clay	structureless		massive	

SOIL PEDON DESCRIPTION

DESCRIBED BY: Lonnie Norrod and Terry Henry

DATE: April 28, 2015

SITE LOCATION: Hwy 96-Williamson County- Christman Property

GEOMORPHIC DESCRIPTION: low terrace

PIT #: 11

PHYSIOGRAPHIC LOCATION: Nashville Basin

SOIL SERIES: Trace

DRAINAGE CLASS: well drained

CLASSIFICATION: fine-sitly

GROUND WATER: none

PARENT MATERIAL: Alluvium

LAND COVER: corn stubble

CLIMATE: thermic

SLOPE OF PIT:

SLOPE OF MAP UNIT: 0-5%

EROSION: none to slight

Horizon	Depth (inches)	Matrix Color	Depletions/Concentrations/Redox	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
Ap1	0-6			silt loam	weak	fine	granular	
Ap2	6-10			silt loam	weak	medium	subangular blocky	
Bt1	10-29			silty clay loam	moderate	medium	subangular blocky	
2BC	29-41			silty clay loam	structureless		massive	
2C	41-55			silty clay loam	structureless		massive	

SOIL PEDON DESCRIPTION

DESCRIBED BY: Lonnie Norrod and Terry Henry

DATE: April 28, 2015

SITE LOCATION: Hwy 96-Williamson County- Christman Property

GEOMORPHIC DESCRIPTION: low terrace

PIT #: 12

PHYSIOGRAPHIC LOCATION: Nashville Basin

SOIL SERIES: Trace

DRAINAGE CLASS: well drained

CLASSIFICATION: fine-sitly

GROUND WATER: none

PARENT MATERIAL: Alluvium

LAND COVER: corn stubble

CLIMATE: thermic

SLOPE OF PIT:

SLOPE OF MAP UNIT: 0-5%

EROSION: moderate

Horizon	Depth (inches)	Matrix Color	Depletions/Concentrations/Redox	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
Ap	0-8			silt loam	weak and moderate	fine and medium	granular and subangular blocky	
Bt1	8-20			silty clay loam	moderate	medium	subangular blocky	
Bt2	20-30			loam	moderate	medium	subangular blocky	
Bt3	30-38			clay loam	moderate	medium	subangular blocky	
2BC	38-50			clay loam	structureless		massive	

SOIL PEDON DESCRIPTION

DESCRIBED BY: Lonnie Norrod and Terry Henry

DATE: April 28, 2015

SITE LOCATION: Hwy 96-Williamson County- Christman Property

GEOMORPHIC DESCRIPTION: low terrace

PIT #: 13

PHYSIOGRAPHIC LOCATION: Nashville Basin

SOIL SERIES: Trace

DRAINAGE CLASS: well drained

CLASSIFICATION: fine-sitly

GROUND WATER: none

PARENT MATERIAL: Alluvium

LAND COVER: corn stubble

CLIMATE: thermic

SLOPE OF PIT:

SLOPE OF MAP UNIT: 0-5%

EROSION: moderate

Horizon	Depth (inches)	Matrix Color	Depletions/Concentrations/Redox	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
Ap	0-10			silt loam	weak and moderate	fine and medium	granular and subangular blocky	
Bt1	10-19			silty clay loam	moderate	medium	subangular blocky	
Bt2	19-26			silty clay loam	moderate	medium	subangular blocky	
Bt3	26-30			silty clay loam	moderate	medium	subangular blocky	
Bt4	30-40			clay loam	moderate	medium	subangular blocky	
2BC	40-46			clay loam	structureless		massive	

SOIL PEDON DESCRIPTION

DESCRIBED BY: Lonnie Norrod and Terry Henry

DATE: April 28, 2015

SITE LOCATION: Hwy 96-Williamson County- Christman Property

GEOMORPHIC DESCRIPTION: low terrace

PIT #: 14

PHYSIOGRAPHIC LOCATION: Nashville Basin

SOIL SERIES: Byler

DRAINAGE CLASS: moderately well drained

CLASSIFICATION: fine-sitly

GROUND WATER: none

PARENT MATERIAL: alluvium

LAND COVER: corn stubble

CLIMATE: thermic

SLOPE OF PIT:

SLOPE OF MAP UNIT: 5-15%

EROSION: moderate

Horizon	Depth (inches)	Matrix Color	Depletions/Concentrations/Redox	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
Ap	0-8	10YR 4/3		silt loam	weak	medium	subangular blocky	
Bt1	8-14	7.5YR 4/4		silty clay loam	moderate	medium	subangular blocky	
Bt2	14-19	7.5YR 5/4		silty clay loam	moderate	medium	subangular blocky	
Bt3	19-24	7.5YR 5/6		clay loam	moderate	medium	subangular blocky	
Bt4	24-29	7.5YR 5/6	many 10YR 7/4	clay loam	moderate	medium	subangular blocky	
Btx	29-50	7.5YR 5/6	many 5YR 5/8 many 7.5YR 7/2 many 7.5 YR 5/8	clay loam	weak	very coarse	prismatic	

SOIL PEDON DESCRIPTION

DESCRIBED BY: Lonnie Norrod and Terry Henry

DATE: April 28, 2015

SITE LOCATION: Hwy 96-Williamson County- Christman Property

GEOMORPHIC DESCRIPTION: low terrace

PIT #: 15

PHYSIOGRAPHIC LOCATION: Nashville Basin

SOIL SERIES: Byler

DRAINAGE CLASS: moderately well drained

CLASSIFICATION: fine-sitly

GROUND WATER: yes, seeping

PARENT MATERIAL: alluvium

LAND COVER: corn stubble

CLIMATE: thermic

SLOPE OF PIT:

SLOPE OF MAP UNIT: 0-5%

EROSION: moderate

Horizon	Depth (inches)	Matrix Color	Depletions/Concentrations/Redox	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
Ap	0-8			silt loam	weak	medium	subangular blocky	
Bt1	8-14			silty clay loam	weak	medium	subangular blocky	
Bt2	14-19			silty clay loam	moderate	medium	subangular blocky	
Bt3	19-25			silty clay loam	moderate	medium	subangular blocky	
Btx1	25-30		common depletions 10YR 7/2	silty clay loam	weak	very coarse	prismatic	
Btx2	30-50		many depletions 10YR 7/2	silty clay loam	weak	very coarse	prismatic	

SOIL PEDON DESCRIPTION

DESCRIBED BY: Lonnie Norrod and Terry Henry

DATE: April 28, 2015

SITE LOCATION: Hwy 96-Williamson County- Christman Property

GEOMORPHIC DESCRIPTION:

PIT #: 16

PHYSIOGRAPHIC LOCATION: Nashville Basin

SOIL SERIES: Stiversville (Severely Eroded)

DRAINAGE CLASS: well drained

CLASSIFICATION: fine-loamy

GROUND WATER: none

PARENT MATERIAL: Residuum

LAND COVER: corn stubble

CLIMATE: thermic

SLOPE OF PIT:

SLOPE OF MAP UNIT: 5-15%

EROSION: severe

Horizon	Depth (inches)	Matrix Color	Depletions/Concentrations/Redox	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
Ap	0-4			silt loam	weak and moderate	fine and medium	granular and subangular blocky	
Bt1	4-10			silty clay loam	moderate	medium	subangular blocky	
Bt2	10-25			clay loam	moderate	medium	subangular blocky	
Bt3	25-36			clay loam	weak	medium	subangular blocky	
Bt4	36-40			clay loam	weak	medium	subangular blocky	

SOIL PEDON DESCRIPTION

DESCRIBED BY: Lonnie Norrod and Terry Henry

DATE: April 28, 2015

SITE LOCATION: Hwy 96-Williamson County- Christman Property

GEOMORPHIC DESCRIPTION: footslope

PIT #: 17

PHYSIOGRAPHIC LOCATION: Nashville Basin

SOIL SERIES: Armour

DRAINAGE CLASS: well drained

CLASSIFICATION: fine-sitly

GROUND WATER: none

PARENT MATERIAL: Alluvium

LAND COVER: corn stubble

CLIMATE: thermic

SLOPE OF PIT:

SLOPE OF MAP UNIT: 0-5%

EROSION: moderate

Horizon	Depth (inches)	Matrix Color	Depletions/Concentrations/Redox	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
Ap	0-7			silt loam	weak and moderate	fine and medium	granular and subangular blocky	
A	7-14			silt loam	weak	medium	subangular blocky	
BA	14-21			silt loam	moderate	medium	subangular blocky	
Bt1	21-29			silty clay loam	moderate	medium	subangular blocky	
Bt2	29-34			silty clay loam	weak	medium	subangular blocky	
Bt3	34-50			silty clay loam	weak	medium	suangular blocky	

SOIL PEDON DESCRIPTION

DESCRIBED BY: Lonnie Norrod and Terry Henry

DATE: April 28, 2015

SITE LOCATION: Hwy 96-Williamson County- Christman Property

GEOMORPHIC DESCRIPTION: upland sideslope

PIT #: 18

PHYSIOGRAPHIC LOCATION: Nashville Basin

SOIL SERIES: Hampshire

DRAINAGE CLASS: well drained

CLASSIFICATION:

GROUND WATER: none

PARENT MATERIAL: Residuum

LAND COVER: corn stubble

CLIMATE: thermic

SLOPE OF PIT:

SLOPE OF MAP UNIT: 5-15%

EROSION: moderate

Horizon	Depth (inches)	Matrix Color	Depletions/Concentrations/Redox	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
Ap	0-9			silt loam	weak	fine	subangular blocky	
Bt1	9-16			silty clay loam	strong	medium	angular blocky	
Bt2	16-20			clay	moderate	medium	subangular blocky	
Bt3	20-25			clay	weak	medium	subangular blocky	

SOIL PEDON DESCRIPTION

DESCRIBED BY: Lonnie Norrod and Terry Henry

DATE: April 28, 2015

SITE LOCATION: Hwy 96-Williamson County- Christman Property

GEOMORPHIC DESCRIPTION: upland

PIT #: 19

PHYSIOGRAPHIC LOCATION: Nashville Basin

SOIL SERIES: Stiversville

DRAINAGE CLASS: well drained

CLASSIFICATION: fine-loamy

GROUND WATER: none

PARENT MATERIAL: Alluvium/Residuum

LAND COVER: corn stubble

CLIMATE: thermic

SLOPE OF PIT:

SLOPE OF MAP UNIT: 0-5%

EROSION: none to slight

Horizon	Depth (inches)	Matrix Color	Depletions/Concentrations/Redox	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
Ap1	0-3			silt loam	weak	fine	granular	
Ap2	3-10			silt loam	weak	medium	subangular blocky	
Bt1	10-16			silty clay loam	moderate	medium	subangular blocky	
Bt2	16-25			silty clay loam	moderate	medium	subangular blocky	
Bt3	25-45			clay loam	weak	medium	subangular blocky	

SOIL PEDON DESCRIPTION

DESCRIBED BY: Lonnie Norrod and Terry Henry

DATE: April 28, 2015

SITE LOCATION: Hwy 96-Williamson County- Christman Property

GEOMORPHIC DESCRIPTION: upland flat

PIT #: 20

PHYSIOGRAPHIC LOCATION: Nashville Basin

SOIL SERIES: Byler

DRAINAGE CLASS: moderately well drained

CLASSIFICATION: fine-sitly

GROUND WATER: none

PARENT MATERIAL: Alluvium

LAND COVER: corn stubble

CLIMATE: thermic

SLOPE OF PIT:

SLOPE OF MAP UNIT: 0-5%

EROSION: none to slight

Horizon	Depth (inches)	Matrix Color	Depletions/Concentrations/Redox	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
Ap	0-9			silt loam	weak and moderate	fine and medium	granular and subangular blocky	
Bt1	9-16			silty clay loam	moderate	medium	subangular blocky	
Bt2	16-20			silty clay loam	weak	medium	subangular blocky	
Btx	20-25	7.5YR 4/4	common 7.5 YR 7/2 common 7.5 YR 5/8	silty clay loam	weak	very coarse	prismatic	

Exhibit 2-C_SOP-15007_14-APR-15

JAMES A LEMMING
210 PARK LAUREATE DR
HOUSTON, TX 77024-5637

1516

37-65/1119 2559
6325194782

3-30-15
Date

Pay to the Order of TDEC $ 750.00

Seven Hundred & fifty ——— Dollars

Security Features Details on Back

WELLS FARGO
Wells Fargo Bank, N.A.
Texas
wellsfargo.com

For Cookaway farms SOP

MP

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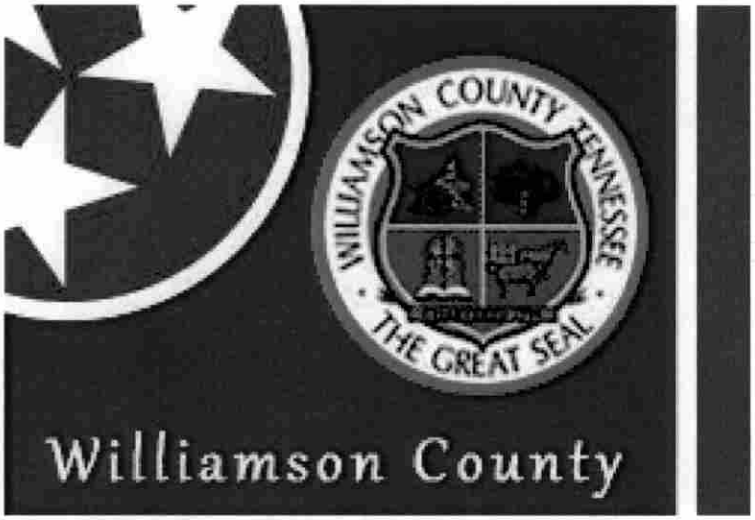


STATE OPERATING PERMIT APPLICATION
LOOKAWAY FARMS SD

WILLIAMSON COUNTY, TN

TN DEPT OF ENVIRONMENT
AND CONSERVATION
APR 14 2015
DIV OF WATER RESOURCES
RECEIVED

SEC, Inc.
SITE ENGINEERING CONSULTANTS
ENGINEERING • SURVEYING • LAND PLANNING
850 MIDDLE TENNESSEE BLVD • MURFREESBORO, TENNESSEE 37129
PHONE (615) 890-7901
WWW.SEC-CIVIL.COM

SEC Project No. 14412

Table of Contents

1.0 SOP Permit Application

SOP APPLICATION – page 1

Permit Number: SOP-_____

Type of application: ☒ New Permit ☐ Permit Reissuance ☐ Permit Modification

Permittee Identification: (Name of city, town, utility, industry, corporation, individual, etc., applying, according to the provisions of Tennessee Code Annotated Section 69-3-108 and Regulations of the Tennessee Water Quality Control Board.)	
Permittee Name (applicant):/Facility Name	Tennessee Wastewater Systems, Inc.
Permittee Address:	851 Aviation Parkway Smyrna, TN 37167

Official Contact: Charles Hyatt	Title or Position: President		
Mailing Address: 851 Aviation Pkwy	City: Smyrna	State: TN	Zip: 37167
Phone number(s): (615) 220-7200	E-mail:		

Optional Contact: Brian Carter	Title or Position: Operator		
Address: 849 Aviation Pkwy	City: Smyrna	State: TN	Zip: 37167
Phone number(s): office (615) 220-7200	E-mail:		

Application Certification (must be signed in accordance with the requirements of Rule 1200-4-5-.05)

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name and title, print or type	Signature	Date
Charles Hyatt - President	C R. Hyatt	4-10-15

OFFICIAL STATE USE ONLY

Received Date	Permit Number	Field Office	Reviewer
	SOP		

Permit Number: SOP-_____

Facility Identification:		**Existing Permit No.**	
Facility Name:	**Clovercroft Lookaway TF**	County:	**Williamson**
Facility Address or Location:	**Along Clovercroft Road just north of Tulloss Road**	Latitude:	**N 35° 55'51"**
		Longitude:	**W 86° 44'41"**

Name of Engineer for the project: **James F. Reed III P.E., R.L.S.**

Engineer address and phone number: **850 Middle Tennessee Blvd. 615-890-7901**

Name and distance to nearest receiving waters: **Mayes Creek splits the property**

If any other State or Federal Water/Wastewater Permits have been obtained for this site, list their permit numbers:
None

Name of company, utility, or governmental entity that will operate the permitted system: **Tennessee Wastewater**

Operator address: **849 Aviation Pkwy**
Smyrna TN 37167

Has the owner/operator filed for a Certificate of Convenience & Necessity (CCN), or an amended CCN, with the Tennessee Regulatory Authority (TRA) (may be required for collection systems and land application treatment systems)? ☒ Yes ☐ No ☐ N/A

If the applicant listed above does not yet own the facility/site or if the applicant will not be the operator, explain how and when the ownership will be transferred or describe the contractual arrangement and renewal terms of the contract for operations. **Tennessee Wastewater Systems Inc. will own the facility and site.**

Name of Public Water Provider: **Milcrofton Utility District**
Mike Jones 615-794-5947
mike@milcrofton.com

List Standard Industrial Codes (SIC)/ North American Industrial Code (s) (NAIC) for proposed activity (these are located at http://www.census.gov/epcd/www/naicstab.htm) **4941 - water system, 4959 – Sewage treatment, 4971 - Irrigation**

Complete the following information explaining the entity type, number of design units, and daily design wastewater flow:

Entity Type	Number of Design Units		Flow (gpd)
☐ City, town or county	No. of connections:		
☒ Subdivision	No. of homes: **108**	Avg. No. bedrooms per home: **3-4 @ 300gpd/home**	**32,400**
☐ School	No. of students:	Size of cafeteria(s): No. of showers: **0**	
☐ Apartment	No. of units:	No. units with Washer/Dryer hookups: No. units without W/D hookups:	
☐ Commercial Business	No. of employees:	Type of business:	
☐ Industry	No. of employees:	Product(s) manufactured:	
☐ Resort	No. of units:		
☐ Camp	No. of hookups:		
☐ RV Park	No. of hookups:	No. of dump stations:	
☐ Car Wash	No. of bays:		
☐ Other			

Describe the type and frequency of activities that result in wastewater generation.

The treatment and land application of typical domestic waste.

Permit Number: SOP-_____

Engineering Report (required for collection systems and/or land application treatment systems):	☐ N/A
☒ Prepared in accordance with Rule 1200-4-2-.03 and Section 1.2 of the Tennessee Design Criteria (see website for more information)	
☒ Attached, or	
☐ Previously submitted and entitled: Approved? ☐ Yes. Date: ☐ No	

Wastewater Collection System:	☐ N/A
System type (i.e., gravity, low pressure, vacuum, combination, etc.): **Watertight effluent pressure collection system**	
System Description: **2", 3", and 4" diameter SDR 21 PVC pressure pipe and required fittings**	
Describe methods to prevent and respond to any bypass of treatment or discharges (i.e., power failures, equipment failures, heavy rains, etc.): **Each home has a minimum of 24-36 hours storage in the STEP tank. Heavy rains have a minimal impact on a watertight collection system. Small generators can be connected to the pump stations and treatment system as necessary during an extended power outage.**	
In the event of a system failure describe means of operator notification: **All pumps have redundancy & alarms.**	
List the **emergency** contact(s) (name/phone): **Brian Carter /615-220-7200**	
For low-pressure systems, who is responsible for maintenance of STEP/STEG tanks and pumps or grinder pumps (list all contact information)? **STEP tanks – Tennessee Wastewater, 849 Aviation Parkway, Smyrna, TN 37167 (615) 220-7200**	
Approximate length of sewer (excluding private service lateral): **4,500 LF**	
Number/hp of lift stations: / Number/hp of lift pumps /	
Number/volume of low pressure and or grinder pump tanks **Proposed 1-1500 gal Recirc Tank, 1-1500 gal Final Dose Tank** Number/volume septic tanks **108~1,500 STEP tanks**	
Attach a schematic of the collection system. ☒ Attached	
If this is a satellite sewer and you are tying in to another sewer system complete the following section, listing tie-in points to the sewer system and their location (attach additional sheets as necessary):	

Tie-in Point	Latitude (xx.xxxx°)	Longitude (xx.xxxx°)
None		

Land Application Treatment System:	☐ N/A
Type of Land Application Treatment System: ☒ Drip ☐ Spray ☐ Other, explain:	
Type of treatment facility preceding land application (recirculating media filters, lagoons, other, etc.): **Recirculating media filter**	
Attach a treatment schematic. ☒ Attached	
Describe methods to prevent and respond to any bypass of treatment or discharges (i.e., power failures, equipment failures, heavy rains, etc.): **The existing septic tank and proposed STEP tanks are sized for peak daily flow storage for the purpose of power failures and equipment failures.**	
For New or Modified Projects: **Lookaway Farms SD** Name of Developer for the project: **Cregg McGaha**	
Developer address and phone number: **17361 Village Green Drive** **Houston, Tx 77040 (713)-937-1121 ext 1105**	
For land application, list: ☒ Proposed acreage involved: **approx. 7.4 acres total** ☒Inches/week gpd/sq.ft loading rate to be applied: **3.7 acre required with additional 3.7 acre of soils area, approximately 0.2 gpd/sf loading rate**	
Is wastewater disinfection proposed?	
☐ Yes Describe land application area access:	
☒ No Describe how access to the land application area will be restricted **fence with access gates**	

Permit Number: SOP-_____

Attach required additional Engineering Report Information (see website for more information)

☒ Topographic map (1:25,000 scale presented at a six inch by six inch minimum size) showing the location of the project including quadrangle(s) name(s) GPS coordinates, and latitude and longitude in decimal degrees should also be included.

☒ Scaled layout of facility showing the following: lots, buildings, etc. being served, the wastewater collection system routes, the pretreatment system location, the proposed land application area(s), roads, property boundaries, and sensitive areas such as streams, lakes, springs, wells, wellhead protection areas, sinkholes and wetlands.

☒ Soils information for the proposed land disposal area in the form of a Water Pollution Control (WPC) Soils Map per Chapter 16 and 17 State of Tennessee Design Criteria for Sewage Work. The soils information should include soil depth (borings to a minimum of 4 feet or refusal) and soil profile description for each soil mapped.

☒ Topographic map of the area where the wastewater is to be land applied with no greater than ten foot contours presented at a minimum size of 24 inches by 24 inches.

☒ Describe alternative application methods based on the following priority rating: (1) connection to a municipal/public sewer system, (2) connection to a conventional subsurface disposal system as regulated by the Division of Groundwater Protection, and/or (3) land application.

For Drip Dispersal Systems Only: Unless otherwise determined by the Department, sewage treatment effluent wells, i.e, large capacity treatment/drip dispersal systems after approval of the SOP Application, will be issued an UIC tracking number and will be authorized as Permit by Rule per UIC Rule 1200-4-6-.14(2) and upon issue of a State Operating Permit and Sewage System Construction Approval by the Department. Describe the following:

The area of review (AOR) for each Drip Dispersal System shall, unless otherwise specified by the Department, consist of the area lying within a one mile radius or an area defined by using calculations under 1200-4-6-.09 of the Drip Dispersal System site or facility, and shall include, but not be limited to general surface geographic features, general subsurface geology, and general demographic and cultural features within the area. Attach to this part of the application a general characterization of the AOR, including the following: (This can be in narrative form) see 2.0

☒ A general description of all past and present groundwater uses as well as the general groundwater flow direction and general water quality. see 3.0

☒ A general description of the population and cultural development within the AOR, i.e. ☒ agricultural, ☐ commercial, ☐ residential or ☐ mixed. see 4.0

☒ Nature of injected fluid to include physical, chemical, biological or radiological characteristics. see 5.0

☒ If groundwater is used for drinking water within the area of review, then identify and locate on a topographic map all groundwater withdrawal points within the AOR, which supply public or private drinking water systems. Or supply map showing general location of publicly supplied water for the area(this can be obtained from the water provider) see 6.0

☐ If the proposed system is located within a wellhead protection area or source water protection area designated by Rule 1200-5-1-.34, show the boundary of the protection area on the facility site plan.

☒ Description of system, Volume of injected fluid in gallons per day based upon design flow, including any monitoring wells see 7.0

☒ Nature and type of system, including installed dimensions of wells and construction materials see 8.0

Pump and Haul:	☒ N/A
Reason system cannot be served by public sewer:	
Distance to the nearest manhole where public sewer service is available:	
When sewer service will be available:	
Volume of holding tank: gal.	
Tennessee licensed septage hauler (attach copy of agreement):	
Facility accepting the septage (attach copy of acceptance letter):	
Latitude and Longitude (in decimal degrees) of approved manhole for discharge of septage:	
Describe methods to prevent and respond to any bypass of treatment or discharges (i.e., power failures, equipment failures, heavy rains, etc.):	

Holding Ponds (for non-domestic wastewater only):	☒ N/A
Pond use: ☐ Recirculation ☐ Sedimentation ☐ Cooling ☐ Other (describe):	

Permit Number: SOP-_____

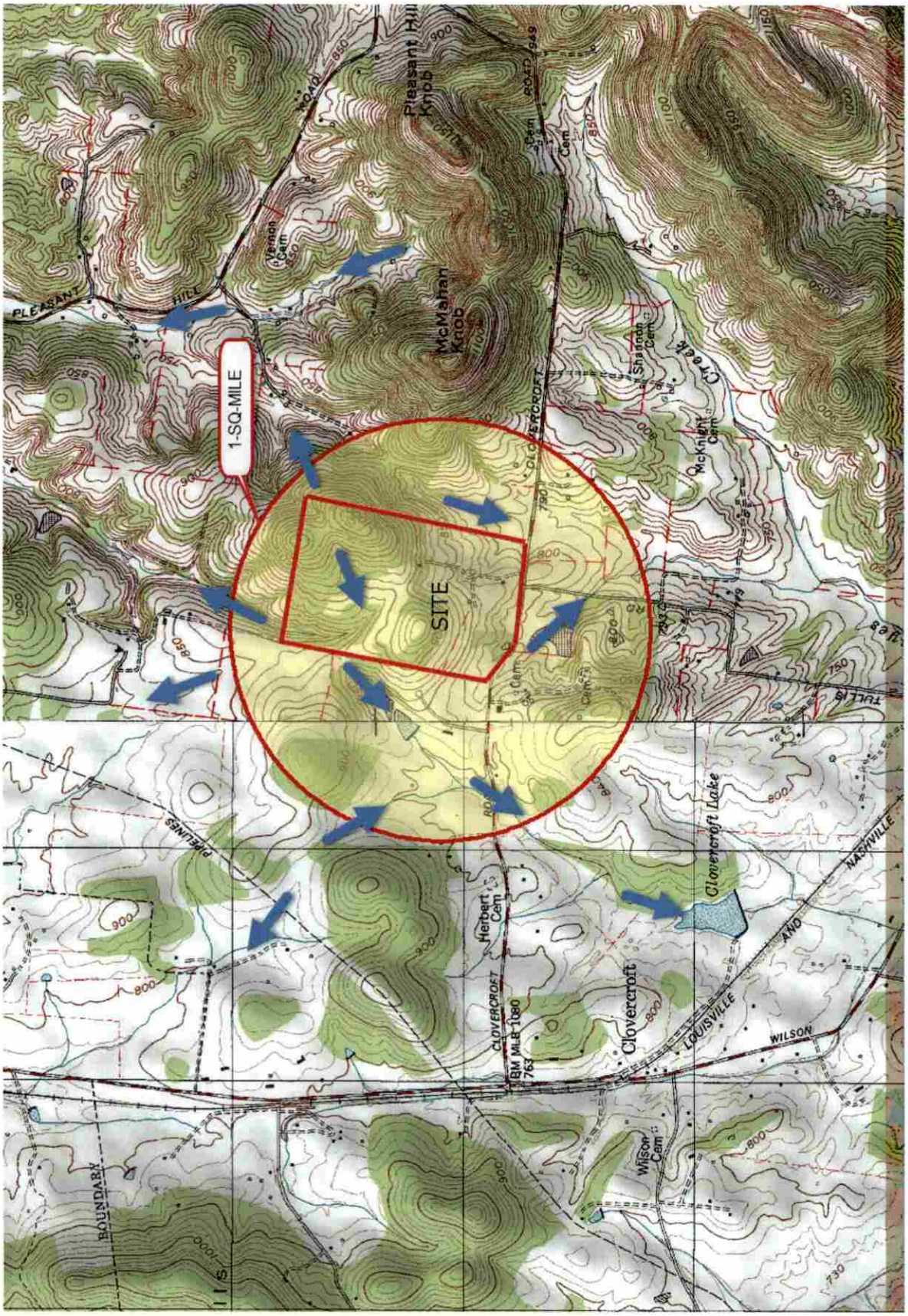
Describe pond use and operation:
If the pond(s) are existing pond(s), what was the previous use?
Have you prepared a plan to dispose of rainfall in excess of evaporation? ☐ Yes ☐ No
If so, describe disposal plan:
Is the pond ever dewatered? ☐ Yes ☐ No
If so, describe the purpose for dewatering and procedures for disposal of wastewater and/or sludge:
Is(are) the pond(s) aerated? ☐ Yes ☐ No
Volume of pond(s): gal. Dimensions:
Is the pond lined (Note if this is a new pond system it must be lined for SOP coverage. Otherwise, you must apply for an Underground Injection Control permit.)? ☐ Yes ☐ No
Describe the liner material (if soil liner is used give the compaction specifications):
Is there an emergency overflow structure? ☐ Yes ☐ No
If so, provide a design drawing of structure.
Are monitoring wells or lysimeters installed near or around the pond(s)? ☐ Yes ☐ No
If so, provide location information and describe monitoring protocols (attach additional sheets as necessary):
Attach required additional Information
☐ Topographic map (1:24,000 scale presented at a six inch by six inch minimum size) showing the location of the project including GPS coordinates, latitude and longitude in decimal degrees quadrangle name should also be included.
☐ Scaled layout of facility showing the following: lots, buildings, etc. being served, the wastewater collection system routes, the pretreatment system location, roads, property boundaries, and sensitive areas such as streams, lakes, springs, wells, wellhead protection areas, sinkholes and wetlands.
The area of review (AOR) for each holding pond shall, unless otherwise specified by the Department, consist of the area lying within and below a one mile radius of the holding pond site or facility, and shall include, but not be limited to surface geographic features, subsurface geology, and demographic and cultural features within the area. Attach to this part of the application a complete characterization of the AOR, including the following: (This can be in narrative form)
☐ Description of all past and present uses of groundwater within the AOR, as documented by public record.
☐ Description of the groundwater hydrology within the AOR, including characteristics of all subsurface aquifers, presence or absence of solution development features, general direction of groundwater movement, and chemical characteristics of the ground waters in the AOR..
☐ Description of the population and cultural development within the AOR, including the number of persons living within one mile of the well or facility, land uses within the AOR, and the existence of any community, state, regional or national parks, wildlife refuges, natural or wilderness areas, recreational or other public-use areas, or any other environmentally sensitive features within the area of review.
☐ If groundwater is used for drinking water within the area of review, then identify and locate on a topographic map all groundwater withdrawal points within the AOR, which supply public or private drinking water systems..
☐ Identify any surface water intake, which supplies a public water distribution system and is located within the AOR or within three miles topographically down gradient from the well or facility. If any such intake(s) wells or springs exist, then locate on map

Permit Number: SOP-_____

Mobile Wash Operations:	☒ N/A
☐ Individual Operator	☐ Fleet Operation Operator
Indicate the type of equipment, vehicle, or structure to be washed during normal operations (check all that apply):	
☐ Cars	☐ Parking Lot(s): sq. ft.
☐ Trucks	☐ Windows: sq. ft.
☐ Trailers (Interior washing of dump-trailers, or tanks, is prohibited.)	☐ Structures (describe):
☐ Other (describe):	
Wash operations take place at (check all that apply):	
☐ Car sales lot(s)	☐ Public parking lot(s)
☐ Private industry lot(s)	☐ Private property(ies)
☐ County(ies), list:	☐ Statewide
Wash equipment description:	
☐ Truck mounted	☐ Trailer mounted
☐ Rinse tank size(s) (gal.):	☐ Mixed tanks size(s) (gal.):
☐ Collection tank size(s) (gal.):	Number of tanks per vehicle:
Pressure washer: psi (rated) gpm (rated)	Pressure washer: ☐ gas powered ☐ electric
Vacuum system manufacturer/model:	Vacuum system capacity: inches Hg
Describe any other method or system used to contain and collect wastewater:	
List the public sewer system where you are permitted or have written permission to discharge waste wash water (include a copy of the permit or permission letter):	
Are chemicals pre-mixed, prior to arriving at wash location? ☐ Yes ☐ No	
Describe all soaps, detergents, or other chemicals used in the wash operation (attach additional sheets as necessary):	

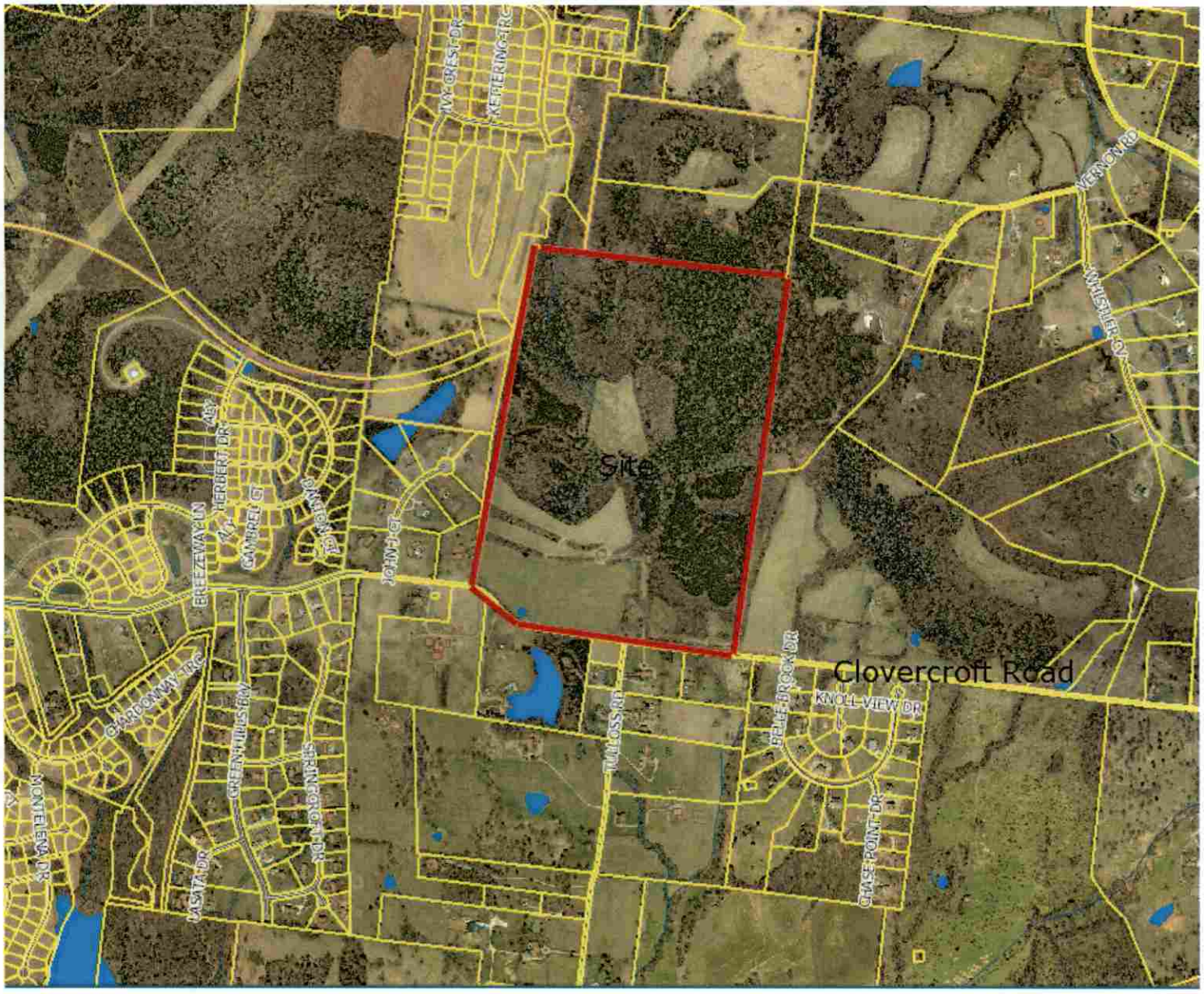
Chemical name:	Manufacturer:	Primary CAS No. or Product No.

2.0 Area of Review



Area of Review

SEC Project No. 14412



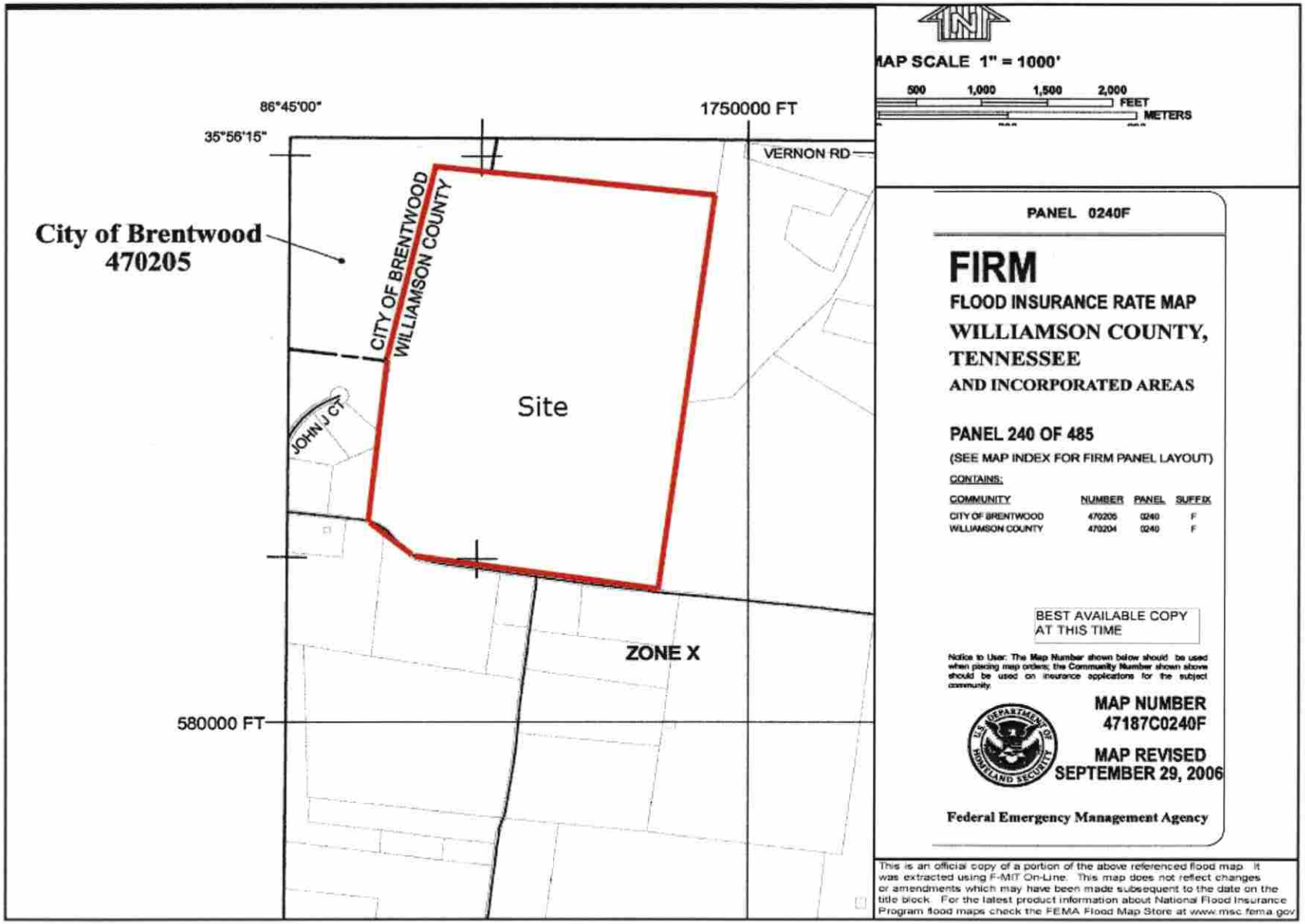
Aerial Map

SEC Project No. 14412

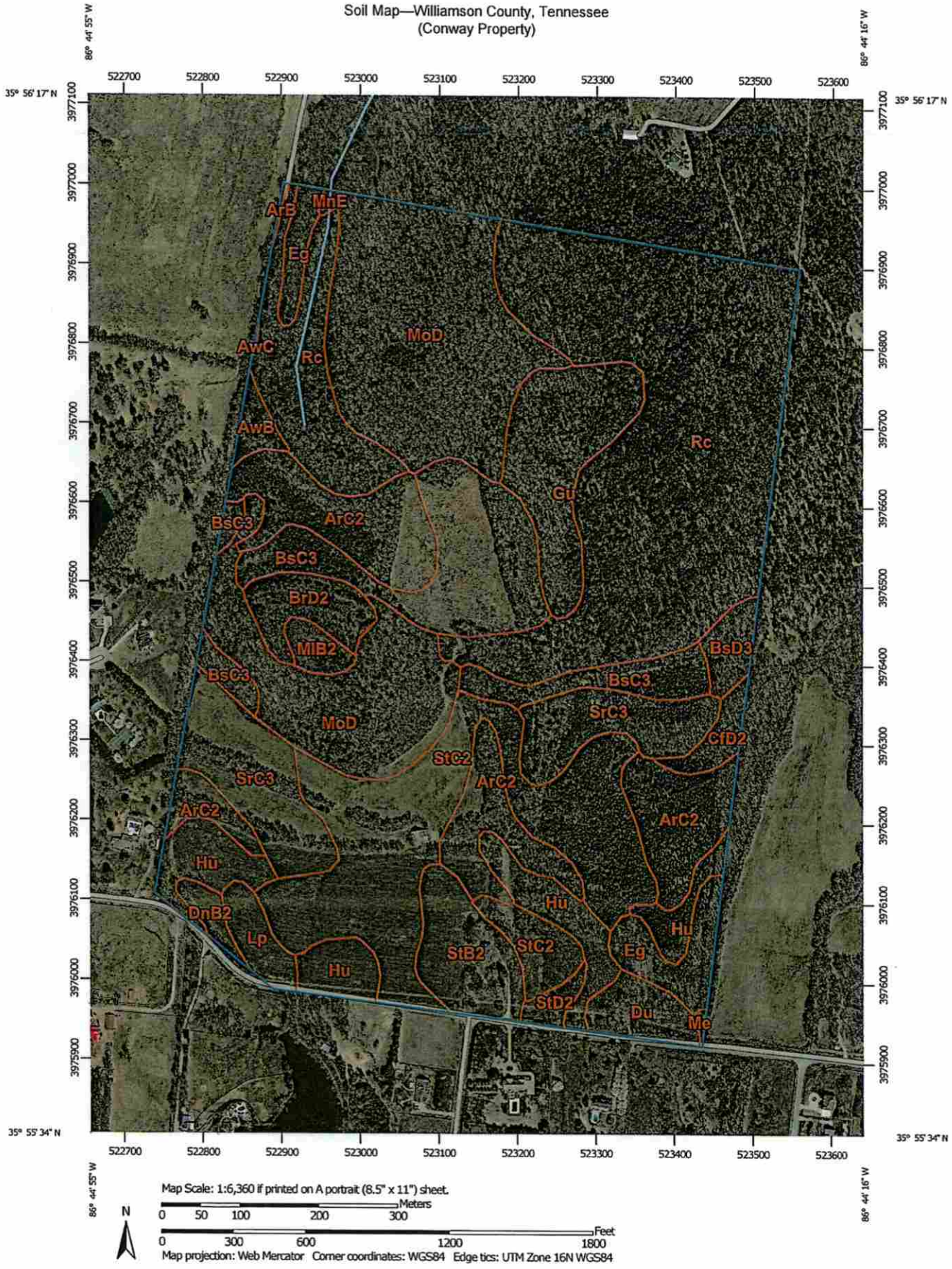
FEMA MAP

100-Year Floodplain and Elevations

SEC Project No. 14412



Soil Map—Williamson County, Tennessee
(Conway Property)



USDA MAP

National Cooperative Soil Survey

SEC Project No. 14412

Map Unit Legend

Williamson County, Tennessee (TN187)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
ArB	Armour silt loam, 2 to 5 percent slopes	0.1	0.0%
ArC2	Armour silt loam, 5 to 12 percent slopes, eroded	15.6	9.2%
AwB	Ashwood silty clay loam, 2 to 5 percent slopes	0.9	0.5%
AwC	Ashwood silty clay loam, 5 to 12 percent slopes	0.0	0.0%
BrD2	Braxton cherty silt loam, 12 to 20 percent slopes, eroded	2.8	1.7%
BsC3	Braxton cherty silty clay loam, 5 to 12 percent slopes, severely eroded	13.4	8.0%
BsD3	Braxton cherty silty clay loam, 12 to 20 percent slopes, severely eroded	1.4	0.9%
CfD2	Culleoka flaggy loam, 12 to 20 percent slopes, eroded	1.2	0.7%
DnB2	Donerail silt loam, 2 to 5 percent slopes, eroded	0.8	0.5%
Du	Dunning silt loam, phosphatic	2.2	1.3%
Eg	Egam silt loam, phosphatic	3.9	2.3%
Gu	Gullied land	7.4	4.4%
Hu	Huntington silt loam, phosphatic	8.3	4.9%
Lp	Lindell silt loam, 0 to 2 percent slopes, occasionally flooded	1.7	1.0%
Me	Melvin silt loam, phosphatic	0.1	0.1%
MlB2	Mimosa silt loam, 2 to 5 percent slopes, eroded	1.0	0.6%
MnE	Mimosa-Rock outcrop complex, 20 to 40 percent slopes	0.2	0.1%
MoD	Mimosa and Ashwood very rocky soils, 5 to 20 percent slopes	28.8	17.1%
Rc	Rockland	42.4	25.1%
SrC3	Stiversville clay loam, 5 to 12 percent slopes, severely eroded	10.6	6.3%
StB2	Stiversville silt loam, 2 to 5 percent slopes, eroded	4.4	2.6%
StC2	Stiversville silt loam, 5 to 12 percent slopes, eroded	20.8	12.3%

Williamson County, Tennessee (TN187)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
StD2	Stiversville silt loam, 12 to 20 percent slopes, eroded	0.7	0.4%
Totals for Area of Interest		168.8	100.0%

3.0 Groundwater General Description

The attached USGS maps indicate the Lookaway Farms Subdivision wastewater treatment area drainage flow path is to the southwest discharging into Mayes Creek watershed and to the north. The site is comprised of approximately 162 acres. The topography is mainly gently rolling to rolling slopes of 5 - 15 % with moderately steep slopes at the north of the property equating approximately 30% of the property. The property is bordered by Clovercroft Road to the south, to the west by an existing subdivision, and east by large tract of land. Roughly 65% of the site is wooded and the 7-10 acres for drip dispersal is mostly cleared with some minor underbrush.

The above mentioned property has typically been used for pasture land. Groundwater was used historically to provide water. At this time the area is served by Milcrofton Utility District for water.

It is assumed tat the groundwater movement and surface flows are to the southwest toward Mayes Creek

See attached maps and USDA soils info under Section 2 Area of Review.

4.0 Population General Description

The majority of the Area of Review is agriculture land used primarily for pasture and row crops. See attached aerial map of property under Section 2 Area of Review.

5.0 Nature of Fluid

Lookaway Farms Subdivision (~108 lots) will have a peak design discharge of approximately 32,400 gpd of domestic wastewater. The effluent quality is typical domestic residential treated wastewater that meets State Operating Permit limits.

6.0 General Location of Publicly Supplied Water

The area will be served by Milcrofton Utility District. See attachment next page.

Milcrofton
UTILITY DISTRICT

December 18, 2014

Mr. Jamie Reed, P.E.
SEC, Inc.
850 Middle Tennessee Blvd.
Murfreesboro, TN. 37129

RE: Conway Property, 108 Single Family Subdivision
Map 60, Parcel 35, Clovercroft Road
GAM Project No. 14-000

Dear Mr. Reed,

The above referenced property is located within the Milcrofton Utility District and Nolensville College Grove Utility District boundaries. Nolensville College Grove Utility District has agreed to allow Milcrofton Utility District to be the single water service provider for the project. Milcrofton Utility District will provide domestic water service and fire service for this project. Milcrofton Utility District is only chartered to provide water service within there District boundaries, therefore all sanitary sewer services will need to be provided by others.

If you have any questions please feel free to contact Mr. Mike Jones, General Manager or myself.

Sincerely,
Milcrofton Utility District

Gregg M. Clingerman, P.E.

Cc: Mike Jones, Don Scholes

6333 Arno Road • Franklin, Tennessee 37064
(615) 794-5947 • Fax (615) 791-9872
Milcrofton Utility District is an Equal Opportunity Provider and Employer

7.0 Description of System

Treated wastewater approximately 32,400 gpd is pumped through arkal filter units and then distributed to HDPE drip lines with pressure compensating emitters. The drip lines are to be installed on 2-foot centers along the contours with the emitters spaced at 2-foot centers along the drip lines. Drip lines are plowed into the soils that have been approved by a certified soil scientist and placed at an approximate depth of 7-8 inches below the ground surface. Distribution of the treated wastewater is managed through solenoid valves and controlled by a programmable PLC.

8.0 Nature and Type of System

Treated wastewater from the subdivision will first be pumped from numerous water tight septic tanks at each lot. Grey water is pumped from the septic tank via a small diameter pressure collection line to a recirculating sand filters (RSF). The wastewater will then cycle through the RSF 5 times before discharging into the final dose tank. From the final dose tank, the treated wastewater is pumped through arkal filter units and then distributed through the drip dispersal lines within the approved soil site.

Lookaway Farms Subdivision
Wastewater Design Flow

4/2/2015

Daily Flow

Number of 3-BR Buildable Residential Lots	108 lots
Daily Flow for 3-BR	300 gpd/lot
Daily Flow	32400 gpd

Land Application Area

Land Application Area	0.2 gal/sf/day*
Total Area Required	162000 s.f.
or	3.72 acres

* assummed soil absorption rate

Number of Required Zones

Length per zone (@ 2' o.c.)	4500 L.F.
Number of Zones	18.0 Zones

Land Reserve Area

Area per lot	100% S.F./lot
Total Area Required	162000 S.F.
or	3.72 acres

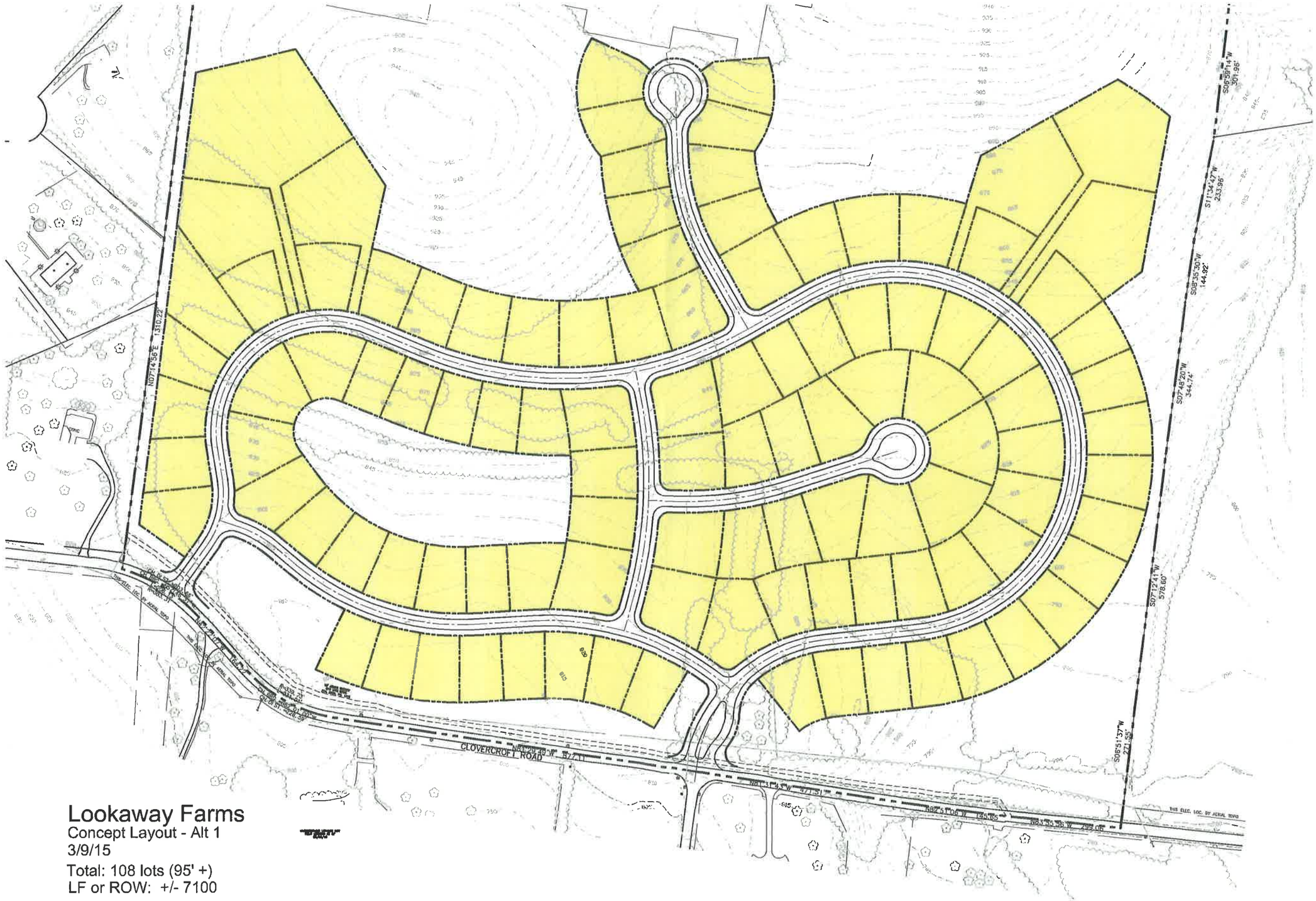
Total Soils Area Required (Land Application + Reserve)

324000 s.f.	7.44 acres

Sand Filter Size

5 gal/S.F./day	
32400 gpd	
Area Req'd	6480 S.F.
Use Filter No.	P555303131.75

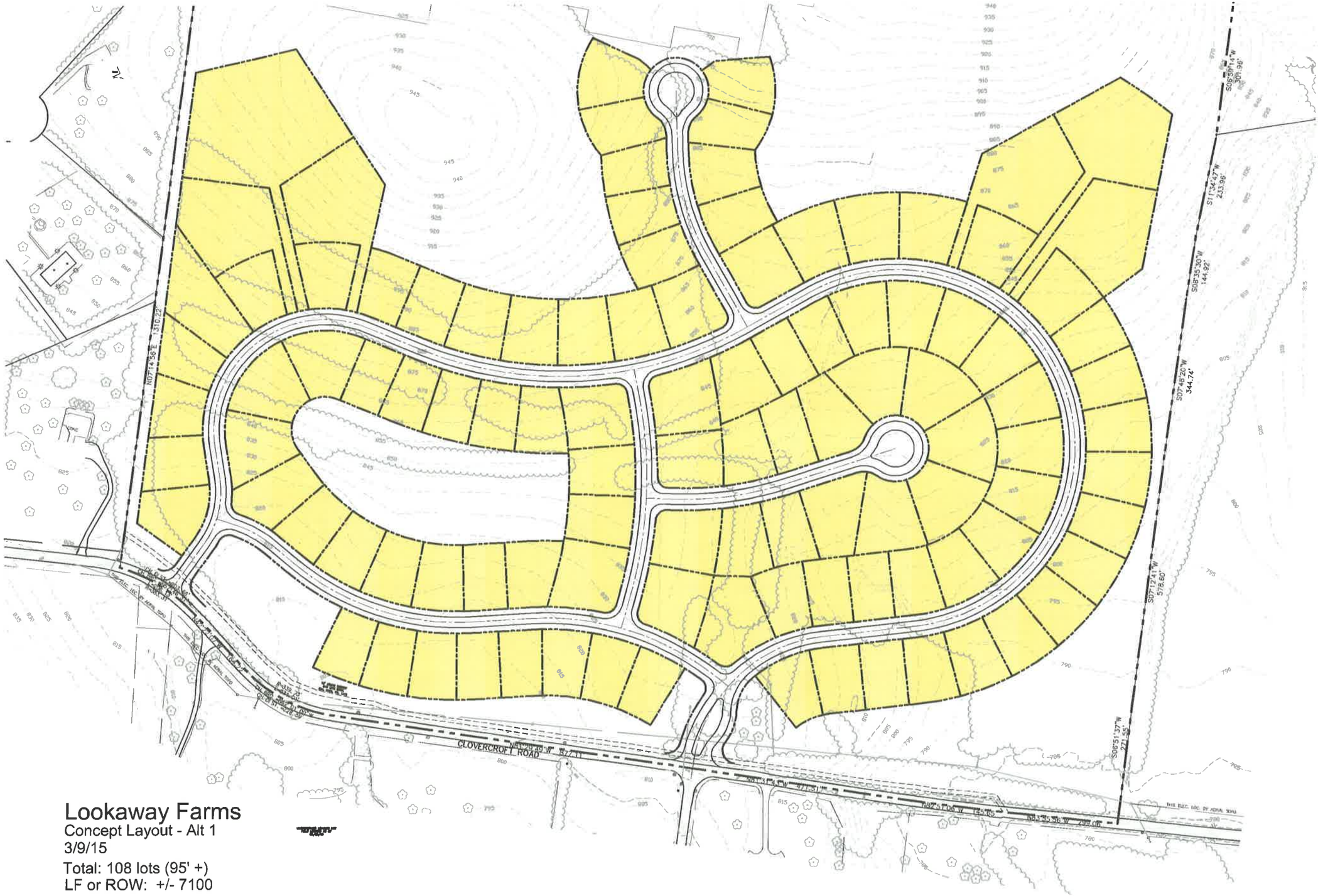
55' x 131.75'



Lookaway Farms

Concept Layout - Alt 1
3/9/15

Total: 108 lots (95' +)
LF or ROW: +/- 7100



Lookaway Farms

Concept Layout - Alt 1

3/9/15

Total: 108 lots (95' +)

LF or ROW: +/- 7100

DWR Soil Pedon Description (Field) Form

Described By: Lonnie Norrod and Terry Henry

Date: 3/17/2015

Site Location: Conway Property

Stop or Pit #: A

SOP # (office use only):

Soil Series: Sykes

Drainage Class: well drained

Soil Classification (control section): Fine-silty

Ground Water: none

Parent Material: Residuum

Erosion: none to slight

Climate: Thermic

Land Cover: fescue and broomsage

Slope of Map Unit: 5-15%

Slope of Pit: 9%

Geomorphic Description: Upland side slope

Latitude/Longitude (center of soils area) N35.93113

W86.74716

Physiographic Location: Nashville Basin

Additional Notes:

Soil Pedon Description

Horizon	Depths (in)	Matrix Color	Depletions/Concentrations Redox/Mottles, etc.	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
A	0-8			silt loam	weak	fine	granular	
AB	8-15			silt loam	moderate	medium	subangular blocky	
Bt1	15-24			silty clay loam	moderate	medium	subangular blocky	
Bt2	24-34			silty clay loam	moderate	medium	subangular blocky	
2Bt3	34-42			clay	moderate	medium	subangular blocky	

DWR Soil Pedon Description (Field) Form

Described By: Lonnie Norrod and Terry Henry **Date:** 3/17/15

Site Location: Conway Property

Stop or Pit #: B **SOP # (office use only):**

Soil Series: Talbott? (Mixed Mineralogy) **Drainage Class:** well drained

Soil Classification (control section): **Ground Water:** none

Parent Material: Residuum **Erosion:** none to slight

Climate: Thermic **Land Cover:** upland hardwoods

Slope of Map Unit: 0-15% **Slope of Pit:**

Geomorphic Description: Upland side slope **Latitude/Longitude (center of soils area)**

Physiographic Location: Nashville Basin

Additional Notes:

Soil Pedon Description

Horizon	Depths	Matrix Color	Depletions/Concentrations Redox/Mottles, etc.	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
A1	0-3			silt loam	weak	fine	granular	
A2	3-8			gravelly silt loam	weak	fine	granular	
Bt1	8-13			silty clay loam	moderate	medium	subangular blocky	
Bt2	13-21			silty clay loam	moderate	medium	subangular blocky	
Bt3	21-27			clay	weak	medium	subangular blocky	
Bt4	27-32			clay	structureless		massive	
R	32							

DWR Soil Pedon Description (Field) Form

Described By: Lonnie Norrod and Terry Henry

Date: 3/17/15

Site Location: Conway Property

Stop or Pit #: C

SOP # (office use only):

Soil Series: Marsh

Drainage Class: well drained

Soil Classification (control section): fine-loamy

Ground Water: none

Parent Material: Residuum

Erosion: none to slight

Climate: Thermic

Land Cover: upland hardwoods

Slope of Map Unit: 0-15%

Slope of Pit: 8%

Geomorphic Description: Upland side slope

Latitude/Longitude (center of soils area)

Physiographic Location: Nashville Basin

Additional Notes:

Soil Pedon Description

Horizon	Depths	Matrix Color	Depletions/Concentrations Redox/Mottles, etc.	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
A1	0-5			silt loam	weak	fine	granular	
A2	5-9			silt loam	moderate	medium	subangular blocky	
Bt1	9-17			loam	moderate	medium	subangular blocky	
Bt2	17-27			clay loam	moderate	medium	subangular blocky	
BC	27-40			very flaggy clay loam	moderate	medium	subangular blocky	

DWR Soil Pedon Description (Field) Form

Described By: Lonnie Norrod and Terry Henry

Date: 3/17/15

Site Location: Conway Property

Stop or Pit #: D

SOP # (office use only):

Soil Series: Stiversville

Drainage Class: well drained

Soil Classification (control section): fine-loamy

Ground Water: none

Parent Material: residuum

Erosion: none to slight

Climate: thermic

Land Cover: recently cleared cedar forest

Slope of Map Unit: 0-15%

Slope of Pit:

Geomorphic Description: upland sideslope

Latitude/Longitude (center of soils area)

Physiographic Location: Nashville Basin

Additional Notes:

Soil Pedon Description

Horizon	Depths	Matrix Color	Depletions/Concentrations Redox/Mottles, etc.	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
A1	0-5			silt loam	weak	fine	granular	
A2	5-11			silt loam	moderate	medium	subangular blocky	
Bt1	11-16			silt loam	moderate	medium	subangular blocky	
Bt2	16-31			silty clay loam	moderate	medium	subangular blocky	
Bt3	31-36			clay loam	moderate	medium	subangular blocky	
Bt4	36-41			clay loam	moderate	medium	subangular blocky	

DWR Soil Pedon Description (Field) Form

Described By: Lonnie Norrod and Terry Henry

Date: 3/17/15

Site Location: Conway Property

Stop or Pit #: E

SOP # (office use only):

Soil Series: Marsh

Drainage Class: well drained

Soil Classification (control section): fine-loamy

Ground Water: none

Parent Material: residuum

Erosion: none to slight

Climate: thermic

Land Cover: upland hardwoods

Slope of Map Unit: 5-15%

Slope of Pit: 7%

Geomorphic Description: upland sideslope

Latitude/Longitude (center of soils area)

Physiographic Location: Nashville Basin

Additional Notes:

Soil Pedon Description

Horizon	Depths	Matrix Color	Depletions/Concentrations Redox/Mottles, etc.	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
A1	0-5			silt loam	weak	fine	granular	
A2	5-11			silt loam	moderade	medium	subangular blocky	
Bt1	11-17			silty clay loam	moderate	medium	subangular blocky	
Bt2	17-23			silty clay loam	moderate	medium	subangular blocky	
BC	23-40			extremely flaggy silty clay loam	moderate	medium	subangular blocky	

DWR Soil Pedon Description (Field) Form

Described By: Lonnie Norrod and Terry Henry

Date: 3/17/15

Site Location: Conway Property

Stop or Pit #: F

SOP # (office use only):

Soil Series: Stiversville

Drainage Class: well drained

Soil Classification (control section): fine-loamy

Ground Water: none

Parent Material: residuum

Erosion: none to slight

Climate: thermic

Land Cover: upland hardwoods

Slope of Map Unit: 5-15%

Slope of Pit: 7%

Geomorphic Description: upland sideslope

Latitude/Longitude (center of soils area)

Physiographic Location: Nashville Basin

Additional Notes:

Soil Pedon Description

Horizon	Depths	Matrix Color	Depletions/Concentrations Redox/Mottles, etc.	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
A1	0-4			silt loam	weak	fine	granular	
A2	4-11			silt loam	moderate	medium	subangular blocky	
BA	11-20			silty clay loam	moderate	medium	subangular blocky	
Bt	20-39			clay loam	moderate	medium	subangular blocky	

DWR Soil Pedon Description (Field) Form

Described By: Lonnie Norrod and Terry Henry

Date: 3/17/15

Site Location: Conway Property

Stop or Pit #: G

SOP # (office use only):

Soil Series: Boonesboro

Drainage Class: well drained

Soil Classification (control section): fine-silty

Ground Water: none

Parent Material: alluvium

Erosion: none

Climate: thermic

Land Cover: mixed grasses

Slope of Map Unit: 5-15%

Slope of Pit:

Geomorphic Description: floodplain

Latitude/Longitude (center of soils area)

Physiographic Location: Nashville Basin

Additional Notes:

Soil Pedon Description

Horizon	Depths	Matrix Color	Depletions/Concentrations Redox/Mottles, etc.	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
Ap1	0-5			silt loam	weak	fine	granular	
Ap2	5-8			silt loam	moderate	medium	subangular blocky	
Bw1	8-11			silt loam	weak	medium	subangular blocky	
Bw2	11-15			silt loam	weak	medium	subangular blocky	
Bw3	15-19			silt loam	weak	medium	subangular blocky	
Bw4	19-25			silt loam	weak	medium	subangular blocky	
Bw5	25-28			silt loam	weak	medium	subangular blocky	
Bw6	28-33			sitly loam	weak	medium	subangular blocky	

DWR Soil Pedon Description (Field) Form

Described By: Lonnie Norrod and Terry Henry **Date:** 3/17/15

Site Location: Conway Property

Stop or Pit #: H **SOP # (office use only):**

Soil Series: Nesbitt **Drainage Class:** well drained

Soil Classification (control section): fine-silty **Ground Water:** none

Parent Material: residuum **Erosion:** none to slight

Climate: thermic **Land Cover:** hardwoods

Slope of Map Unit: 5-15% **Slope of Pit:**

Geomorphic Description: upland drainageway/sideslope **Latitude/Longitude (center of soils area)**

Physiographic Location: Nashville Basin

Additional Notes: No low chroma mottles throughout entire profile

Soil Pedon Description

Horizon	Depths	Matrix Color	Depletions/Concentrations Redox/Mottles, etc.	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
A	0-6			silt loam	weak	fine	granular	
BA	6-9			silty clay loam	moderate	medium	subangular blocky	
Bt	9-19			silty clay loam	moderate	medium	subangular blocky	
Btx1	19-27			silty clay loam	moderate	medium	subangular and angular blocky	
Btx2	27-32			gravelly silty clay loam	moderate	medium	subangular and angular blocky	
2Bt3	32-39			clay	moderate	medium	subangular blocky	

DWR Soil Pedon Description (Field) Form

Described By: Lonnie Norrod and Terry Henry

Date: 3/17/15

Site Location: Conway Property

Stop or Pit #: I

SOP # (office use only):

Soil Series: Mimosa Overwash

Drainage Class: well drained

Soil Classification (control section): fine silty

Ground Water: none

Parent Material: residuum

Erosion: none to slight

Climate: thermic

Land Cover: hardwoods

Slope of Map Unit: 5-15%

Slope of Pit: 8%

Geomorphic Description: upland sideslope

Latitude/Longitude (center of soils area)

Physiographic Location: Nashville Basin

Additional Notes:

Soil Pedon Description

Horizon	Depths	Matrix Color	Depletions/Concentrations Redox/Mottles, etc.	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
A	0-5			silt loam	weak	fine	granular	
B	5-14			silty clay loam	weak	medium	subangular blocky	
Ab	14-17			silty clay loam	weak	medium	subangular blocky	
Btb1	17-20			silt loam	weak	medium	subangular blocky	
Btb2	20-30			silty clay loam	moderate	medium	subangular blocky	
Btb3	30-40			clay	structureless		massive	

DWR Soil Pedon Description (Field) Form

Described By: Lonnie Norrod and Terry Henry **Date:** 3/17/15

Site Location: Conway Property

Stop or Pit #: J **SOP # (office use only):**

Soil Series: Stiversville **Drainage Class:** well drained

Soil Classification (control section): fine-loamy **Ground Water:** none

Parent Material: residuum **Erosion:** none to slight

Climate: thermic **Land Cover:** cleared cedar forrest

Slope of Map Unit: 5-15% **Slope of Pit:**

Geomorphic Description: upland sideslope **Latitude/Longitude (center of soils area)**

Physiographic Location: Nashville Basin

Additional Notes: no low chroma mottles throughout entire profile

Soil Pedon Description

Horizon	Depths	Matrix Color	Depletions/Concentrations Redox/Mottles, etc.	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
A1	0-3			silt loam	weak	fine	granular	
A2	3-9			silt loam	weak	medium	subangular blocky	
Bt	9-15			silty clay loam	moderate	medium	subangular blocky	
Btx	15-34			silty clay loam	moderate	medium	subangular blocky	and angular
Bt'	34-37			clay loam	moderate	medium	subanular blocky	

DWR Soil Pedon Description (Field) Form

Described By: Lonnie Norrod and Terry Henry **Date:** 3-17-15

Site Location: Conway Propety

Stop or Pit #: K **SOP # (office use only):**

Soil Series: Stiversville **Drainage Class:** well drained

Soil Classification (control section): fine-loamy **Ground Water:** none

Parent Material: residuum **Erosion:** none to slight

Climate: thermic **Land Cover:** mixed grasses

Slope of Map Unit: 5-15% **Slope of Pit:**

Geomorphic Description: upland hillside **Latitude/Longitude (center of soils area)**

Physiographic Location: Nashville Basin

Additional Notes: no low chroma mottles throughout entire profile

Soil Pedon Description

Horizon	Depths	Matrix Color	Depletions/Concentrations Redox/Mottles, etc.	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
A1	0-3			silty loam	weak	fine	granular	
A2	3-16			silt loam	weak	medium	subanular blocky	
AB	16-19			silt loam	moderate	medium	subangular blocky	
Bt1	19-24			silty clay loam	moderate	medium	subangular blocky	
Btx	24-39			silty clay loam	weak	medium	angular blocky	and subangular
Bt'	39-44			silty clay loam	moderate	medium	subangular blocky	

DWR Soil Pedon Description (Field) Form

Described By: Lonnie Norrod and Terry Henry

Date: 3/17/15

Site Location: Conway Property

Stop or Pit #: L

SOP # (office use only):

Soil Series: Nesbitt

Drainage Class: moderately well drained

Soil Classification (control section): fine silty

Ground Water: none

Parent Material: residuum

Erosion: none to slight

Climate: thermic

Land Cover: mixed grasses

Slope of Map Unit: 5-15%

Slope of Pit:

Geomorphic Description: upland sideslope

Latitude/Longitude (center of soils area)

Physiographic Location: Nashville Basin

Additional Notes:

Soil Pedon Description

Horizon	Depths	Matrix Color	Depletions/Concentrations Redox/Mottles, etc.	Soil Texture	Soil Structure			Soil Horizon Notes
					Grade	Size	Type	
A1	0-3	7.5YR 4/4		silt loam	weak	medium	granular	
A2	3-7	7.5YR 4/4		silt loam	weak	medium	subanular blocky and granular	
AB	7-10	7.5YR 4/4		silt loam	moderate	medium	subangular blocky	
Bt1	10-14	7.5YR 5/4		silty clay loam	moderate	medium	subangular blocky	
Bt2	14-20	7.5YR 4/4		silty clay loam	moderate	medium	subangular blocky	
Btx	20-26	7.5 YR 4/4	common 10YR 7/2	silty clay loam	moderate	medium	subangular blocky	Depth to low chroma mottles 24"
Btx2	26-31		common 10YR 7/2	gravelly silty clay loam	weak	medium	subangular blocky	
2Bt	31-44	mixed 10YR 6/2 10YR 7/2 10YR 5/8 10YR 5/6		clay	structureless		massive	

– ALL SLOPES ARE 5-15% –

LEGEND :

CAP-TA-MIM – Capshaw-Talbott-Mimosa soil complex with a restrictive layer within <20" 20" of the soil surface

TA-BA-CAP-HAM – Talbott-Barfield-Capshaw-Hampshire soil complex with a <20" restrictive layer within 20" of the surface

- Drain; recommend installation 15' or more away upslope
- Drain; recommend installation 25' or more away upslope
- Fence row
- Old or current fence row that is built up due to farming practices
- Short/steep slope or escarpment; install the recommended distance away as noted on the soil map
- End of evaluation
- Soil Pedon Description Pit location

SHORT/STEEP SLOPE CAUSED BY OLD FENCEROW; RECOMMEND INSTALLATION 10' OR MORE AWAY UPSLOPE

FENCE POST

364.00'

S06°00'31"W

OLD ROCK WALL INSTALL 15' AWAY UPSLOPE

MA-ST 20+

FILL

IPF/ "RAGAN-SMITH" CAP

N88°28'34"E 133.32'

N13°51'38"E 942.57'

S07°14'56"W 1273.86' TO R/W OF CLOVERCROFT RD.

S12°44'57"W 379.06'

FENCE

FENCE

S79°08'59"E 250.00'

S79°08'59"E 400.00'

N10°51'01"E 200.00'

SOILS GRID AREA 1
509,998 SQ.FT.
11.708 ACRES

SHALLOW ROCK

MIM-TA <20

ST-SK 20+

CAP-TA-MIM <20

HAM-TA <20

NOL 20+

NOL-BO 20+

FO ST 20+

MIM-TA <20

ST-SK 20+

S46°30'10"E 150.00'

S43°29'50"W 100.00'

N83°35'00"E 89.81'

IRF "RAGAN-SMITH" CAP

SOILS GRID AREA 2
17,500 SQ.FT.
0.402 ACRES

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE SOILS GRID SHOWN WAS STAKED UNDER MY SUPERVISION WITH AN ACCURACY EXCEEDING 1: 1,000.

DATE: 03-19-15

SURVEYOR: Wm. Shane Ball

WM. SHANE BALL, TN #2477

WM. SHANE BALL REGISTERED LAND SURVEYOR AGRICULTURE COMMERCE TENNESSEE NO. 2477 03-19-15

Water Pollution Control Soils Map Completed by:

Lonnie Norrod
Soil Scientist

3/24/15

I, Lonnie Norrod, affirm that this **Water Pollution Control Soils Map** has been prepared in accordance with accepted standards of soil science practice and the standards and methodologies established in the NRCS Soil Survey Manual and USDA Soil Taxonomy. No other warranties are made or implied.

Legend:

ST - Stiversville soil with no restrictive layer observed < 20" deep
20+

ST-SK – Stiversville-Sykes soil complex with no restrictive layer observed < 20" deep
20+

MA-ST – Marsh-Stiversville soil complex with no restrictive layer observed < 20" deep
20+

NOL – Nolin soil with no restrictive layer observed less than 20" deep
20+

NOL-BO – Nolin-Boonesboro soil complex with no restrictive layer observed < 20" deep
20+

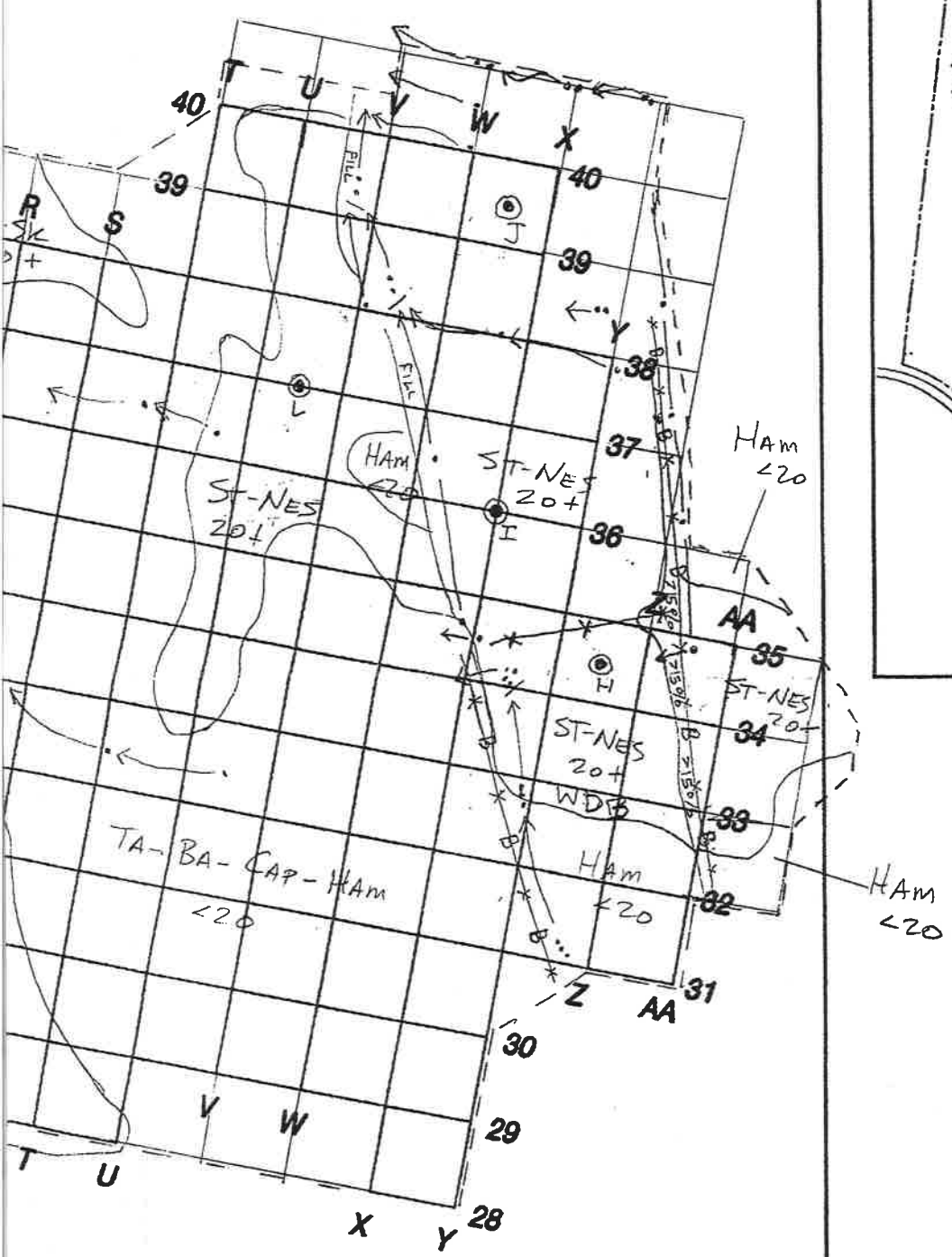
ST-NES – Stiversville-Nesbitt soil complex with no restrictive layer observed <20" deep
20+

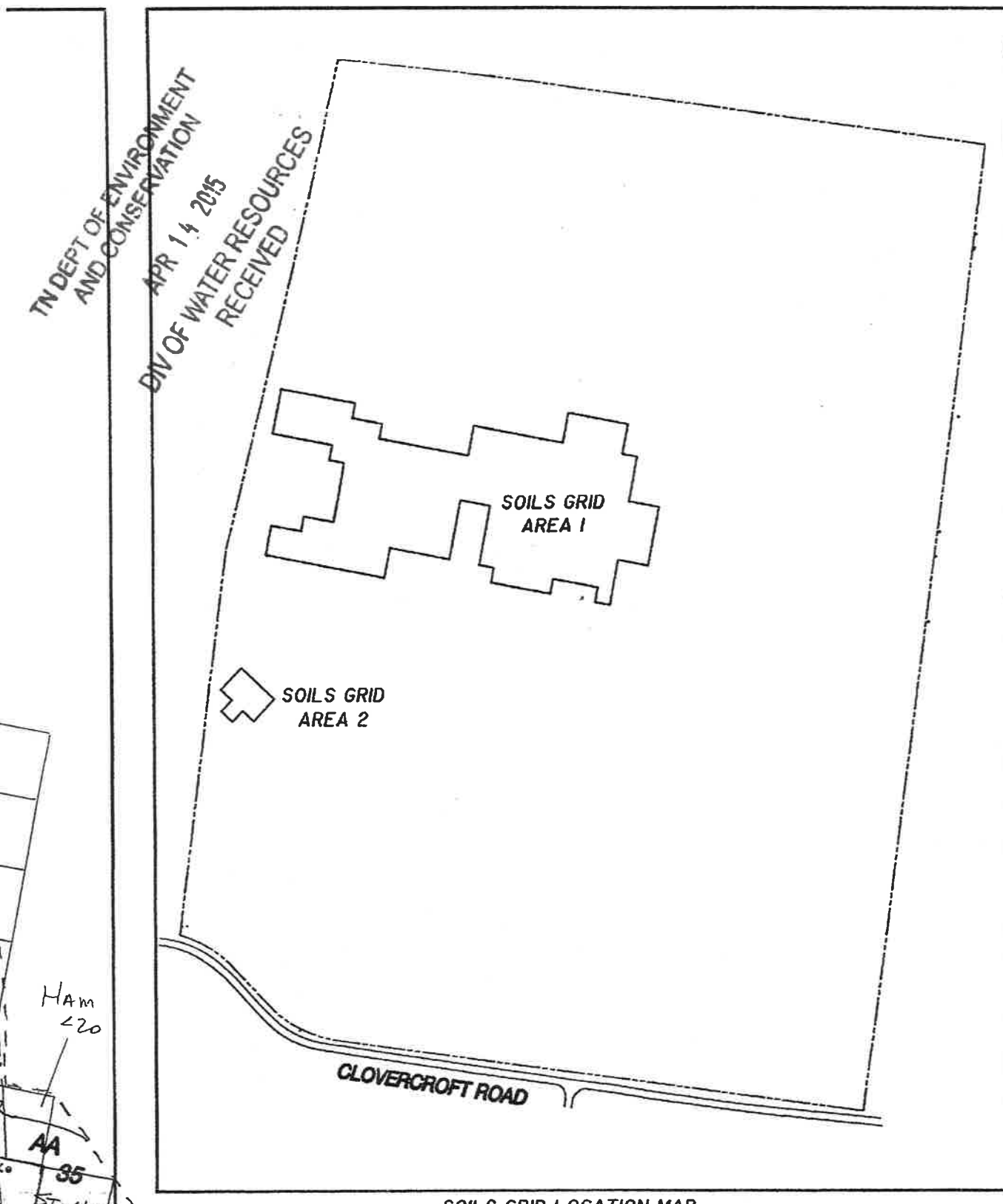
ST-NES – Stiversville-Nesbitt soil complex with no restrictive layer observed <20" deep;
20+ With Diversion Berm to protect the area from surface runoff entering from
WDB directly upslope of the area

HAM – Hampshire soil with a restrictive layer within 20" of the surface
<20"

MIM-TA – Mimosa-Talbott soil complex with a restrictive layer within 20" of the
<20" surface

HAM-TA – Hampshire-Talbott soil complex with a restrictive layer within
<20" 20" of the surface





SOILS GRID LOCATION MAP
(N.T.S.)

north

0 100 200 300
feet

50' SOILS GRID MAP

THIS SURVEY IS NOT TO BE CONSIDERED A GENERAL PROPERTY SURVEY AS DEFINED UNDER RULE 0820-03-07 OF THE STANDARDS OF PRACTICE, TENNESSEE BOARD OF EXAMINERS FOR LAND SURVEYORS. THIS SURVEY WAS DONE UNDER THE AUTHORITY OF TCA 62-18-126. NO PROPERTY CORNERS WERE SET OR RESET BY THIS SURVEY. BOUNDARY INFORMATION SHOWN HEREON WAS DERIVED FROM PUBLIC RECORDS, PLANS PROVIDED BY OTHERS, AND/OR PHYSICAL EVIDENCE LOCATED DURING THE SURVEY.

REVISIONS:

DATE	DESCRIPTION
02/13/15	ADDITIONAL GRID STAKES AT LINES 27-40
03/19/15	ADDITIONAL SOILS AREA ADDED

NANCY P. CONWAY PROPERTY

PROPERTY MAP 60, PARCEL 35.00
WILLIAMSON COUNTY, TENNESSEE

SEC, Inc.
SITE ENGINEERING CONSULTANTS
ENGINEERING SURVEYING LAND PLANNING
850 MIDDLE TENNESSEE BLVD MURFREESBORO, TENNESSEE 3712
PHONE (615) 890-7901 FAX (615) 895-2567

PROJ. #	DATE:	FILE:	DRAWN BY:	SCALE:	SHEET

Exhibit 2-D- Cabin Assessment Example

State of Tennessee Comptroller of the Treasury

Real Estate Assessment Data

County Number: 078 **County Name:** SEVIER **Tax Year:** 2017

Property Owner and Mailing Address

Jan 1 Owner:

[redacted]

Property Location

Address: UPPER MIDDLE CREEK RD 2251

Map: 085 **Grp:** **Ctrl Map:** 085 **Parcel:** 056.00 **PI:** **S/I:** 004

Value Information

Reappraisal Year: 2016

Land Mkt Value:	$50,000
Improvement Value:	$145,300
Total Market Appraisal:	$195,300
Assessment %:	25
Assessment:	$48,825

General Information

Class:	00 - RESIDENTIAL		
City #:	000	**City:**	
SSD1:	000	**SSD2:**	000
District:	13	**Mkt Area:**	H01
# Bldgs:	1	**# Mobile Homes:**	0
Utilities - Water / Sewer:	03 - PUBLIC / INDIVIDUAL	**Utilities - Electricity:**	01 - PUBLIC
Utilities - Gas / Gas Type:	00 - NONE	**Zoning:**	A-1

Subdivision Data

Subdivision: SUMMIT VIEW

Plat Bk: 36 **Plat Pg:** 376 **Block:** **Lot:** D

Additional Description

UNIT-D

Building Information

Building # 1

Improvement Type:	03 - SPECIAL_RES	**Stories:**	2
Living/Business Sq. Ft.:	1,154		
Foundation:	04 - SPECIAL FOOTING	**Floor System:**	04 - WOOD W/ SUB FLOOR
Exterior Wall:	05 - SIDING ABOVE AVG	**Structural Frame:**	00 - NONE
Roof Framing:	02 - GABLE/HIP	**Roof Cover/Deck:**	13 - PREFIN METAL CRIMPED
Cabinet/Millwork:	03 - AVERAGE	**Floor Finish:**	11 - CARPET COMBINATION

Interior Finish:	10 - PANEL-PLAST-DRYWALL	**Paint/Decor:**	03 - AVERAGE
Heat and A/C:	07 - HEAT & COOLING SPLIT	**Plumbing Fixtures:**	11
Bath Tile:	00 - NONE	**Electrical:**	03 - AVERAGE
Shape:	01 - RECTANGULAR DESIGN	**Quality:**	01 - AVERAGE
Act Yr Built:	2007	**Condition:**	A - AVERAGE

Building Areas:

Area: USL **Sq Ft:** 888
Area: BAS **Sq Ft:** 888
Area: BMF **Sq Ft:** 888
Area: OPF **Sq Ft:** 144

Extra Features

Bldg/Card#	Type	Description	Units
1	HOT TUB		1
1	WOOD DECK	2X8X37	592

Sale Information

Sale Date	Price	Book	Page	Vac/Imp	Type Instrument	Qualification
02/08/2011	$0	3684	642			
10/13/2010	$0	3621	799			
06/08/2010	$0	3554	164			
02/01/2010	$170,800	3684	645	IMPROVED	WD	I
03/22/2007	$334,242	2785	67	IMPROVED	AA	A
01/10/2006	$0	2438	816			

Land Information

Deed Acres: 0.00 **Calc Acres:** 0.00 **Total Land Units:** 1.00
Land Type: 06 - RES RESORT **Soil Class:** **Units:** 1.00

New Search Return to List View GIS Map for this Parcel

Glossary of Terms How to Search Fact Sheet

Division of Property Assessments Home Page
Comptroller of the Treasury Home Page
State of Tennessee Home Page