Updated Findings Hawthorne Project (Hawthorne Resort and Strickland Golf Course)
Summary Document that could be Sent to the PADEP

The proposed development will be a resort style development with a hotel (94 rooms), restaurants (3), rooming houses (150 cabins), mixed use building housing professional, medical, retail, 85 sf retail building, and recreation facilities, and banquet center with community pools, Figure 1. Based on information provided by Mr. Mike Gable, PE with LVL Engineering Group, the project will have a peak daily water demand of 60,500 gpd or an average daily demand of approximately 39,757 gpd (LVL Engineers – 2/2023). After completing the initial desktop and site assessment, a preliminary on-site evaluation was conducted in July 2022, updated in early October 2022, and additional testing was conducted after discussions with Mr. Tim Craven of the PADEP in October/ November 2022, and January 2023. The analysis is based on the on-site evaluation of 73 soils test pits, 31 vertical hydroconductivity tests, development of a site-specific water budget analysis by Mr. Brian Oram, Licensed Professional Geologist (PG000846), Certified Professional Soil Scientist (CPSS – 36209), and Licensed PA Sewage Enforcement Officier and owner of B.F. Environmental Consultants, Inc. and LVL Engineering Group evaluated the on-site land-based disposal capacity for the former Strickland Golf Course parcel (LVL Engineers – 2/2023).

Based on our analysis, the project as proposed would be best served by a **"Forested"** drip irrigation system that consisted of 4 distinct irrigation zones sized based on a water budget analysis, and assuming an average daily flow of 39,757 gpd. The system would require pretreatment of the water and flow equalization that would need to be sized at a peak flow rate of 60,500 gpd. The system would require a design and operational permit from the PADEP and it is likely that confirmation testing with the local agencies and the PADEP will be necessary. In this analysis, the potential wastewater disposal areas were divided into 4 zones or areas, Area I, Area II, Area III, and Area IV and this analysis shows that as proposed the drip irrigation system fields would have a daily reserve management capacity ranging from 5000 to 30,000 gpd, plus LVL Engineering Group has identified an area on the Strickland portion of the parcel that appears to have an on-site wastewater management capacity of an additional 24,974 gpd of capacity.

Area I: (see Map) Total Number of Test Pits within or surrounding this area (17)

Seasonal High Water Table : 20 to > 48 inches – Fifteen test pits had a the depth to a season high water table that was 20 inches or more.

Bedrock or Open Voids: – 1 test pit had a depth to bedrock of < 16 inches (Test Pit 2) (Unsuitable All Options), 16 test pits had a depth to rock of 20 inches or more (Conventional or Spray and Drip Irrigation **with PADEP Approval***) , and 11 test pits had a depth to open voids or bedrock of more than 26 inches (Drip Irrigation).

PADEP Approval: The **test pits with a depth to seasonal high water table of 20 inches and a bedrock or open void depth of less than 26 inches may be suitable for drip irrigation with PADEP approval*.** Based on a discussions with Mr. Tim Craven, the PADEP would consider this approach and application using the Lwp 15%), but it is likely the PADEP would require the wastewater to be pretreated to a standard beyond secondary treatment, i.e., possibly 10 mg/L BOD and 10 mg/L TSS with disinfection and the project would complete a preliminary and detailed hydrological evaluation including a nitrogen loading analysis and size the system based on average daily usage using a water budget analysis.

APPLICANT 13a

The project engineer, LVL Engineering Group, calculated that the area available within Area I that may be suitable for drip irrigation was 1.59 acres. A total of 8 (eight) saturated vertical hydroconductivity tests (Ksp) were completed within the area typical of Area I and the depth of the testing ranged from 12 to 29 inches. The testing was completed within the horizon that would likely have the lowest Ksp, i.e., cambic horizon (Bw). The field measured saturated vertical hydroconductivity ranged from 0.117 to 0.397 inches per hour. The geometric average permeability of all the data was 0.1932 inches per hour, but we decided to use the Ksp testing data that was not associated with depth to open voids or fractured bedrock approaching 20 inches, i.e., HC 1 – HC 4. The geometric mean Ksp for these 4 tests was 0.127 (0.1266) inches per hour or 0.53 ft^2/gpd (1.89 gpd/ft^2). A site specific water budget was than prepared using either 10% or 15 % of the field measured Ksp and limiting the monthly loading depth to a maximum of 9 ac-inches per month (2.25 acre-in/week).

Table 1. HC Testing Data for Area I.

TP #	Test Depth (in)	Ksp (inches/hr)	Horizon Type	HC ID #
TP1	29	0.117	Bw	AR1-HC1
TP3	22	0.132	Bw	AR1-HC2
TP4	26	0.122	Bw	AR1-HC3
TP5	29	0.135	Bw	AR1-HC4
TP7	15	0.292	Bw	AR1-HC5
TP26	12	0.218	Bw	AR1-HC6
TP27	12	0.298	Bw	AR1-HC7
TP28	12	0.397	Bw	AR1-HC8
Geo Avg. All		0.1932	(inches/hr)	
Geo Avg (HC1-HC4)		0.1266	(inches/hr)	

Table 2. Area I: Calculated Maximum Monthly Wastewater Loading Depths (Water Budget) (Ksp- 0.1266 in/hr) and 1.59 acres.

Month	Lwp ac-in/wk (10% Ksp)	Lwp ac-in/wk (15%Ksp)
January	1.09	2.15
February	1.20	2.26*
March	1.13	2.19
April	1.40	2.46*
May	1.54	2.61*
June	2.07	3.13*
July	2.29* (NOTE)	3.36*
August	2.12	3.19*
September	1.57	2.64*
October	1.43	2.50*
November	1.05	2.11
December	1.12	2.19

Note: The monthly loading depth should be reduced to a maximum of 2.25 ac-inches/month (30 days).

Table 3. Daily Capacity of a 1.59 acre Drip Irrigation Field in Area I.

	Avg Daily Capacity	Avg Daily Capacity
Month	gpd (10% Ksp)	gpd (15%Ksp)
January	6727	12536
February	7397	13879*
March	6975	12536
April	8608	12954*
May	9517	12536*
June	12774	12954*
July	12536*(NOTE)	12536*
August	12536	12536*
September	9696	12954*
October	8849	12536*
November	6455	12954
December	6931	12536

Note: This assumes a weekly maximum loading of 2.25 ac-inches per week (30 days).

PADEP Approval NEEDED– A number of the pits have limiting zones of between ≥ 20 inches to open voids/rock. Drip irrigation requires a depth to open voids and bedrock of 26 inches or more assuming that tubing is installed 6 inches below grade. We would need to propose an alternative installation depth and a way of protecting during winter months. (PADEP would need to approve and permit this approach.) **The preliminary discussion with Mr. Tim Craven suggested this was likely to be approved, but it was dependent on the confirmation testing, level of pretreatment, and proposed drip tubing installation approach.**

Area II: (see Map) Total Number of Test Pits within or surrounding this area (18)

Seasonal High Water Table:- 20 to 32 inches – all 18 pits had a depth to a water table of 20 inches or more, but 1 test pit had a depth to bedrock of 15 inches , 1 test pit had open voids at 22 inches, and 2 had bedrock at 21 to 23 inches.

Bedrock or Open Voids: exposed ledge or bedrock at a depth of 15 to 48 inches – 1 test pit had a depth to bedrock of < 16 inches (Test Pit 8) (Unsuitable All Options) , 17 test pits had a depth to bedrock/open voids of 20 inches or more (Conventional or Spray and **Drip Irrigation with PADEP Approval**) , and 15 test pits had a depth to bedrock of greater than 26 inches (Drip Irrigation).

This area is more uniformly suitable for drip irrigation than Area I, but a portion of the test pits have a depth to open voids or bedrock of less than 26 inches. The project engineer, LVL Engineering Group, calculated that the area available within Area II was 2.31 acres.

A total of 8 (eight) saturated vertical hydroconductivity tests (Ksp) were completed with the area typical of Area II and the depth of the testing ranged from 20 to 24 inches. The testing was completed within the horizon that would likely have the lowest Ksp. The field measured saturated vertical hydroconductivity ranged from 0.114 to 0.502 inches per hour. The geometric average permeability of all the data was 0.18436 inches per hour, but for this assessment we only used the testing results for AR II-HC 1 – HC 4. The geometric average Ksp for these 4 tests was 0.118 (0.1177) inches per hour or 0.57 ft^2/gpd (1.76 gpd/ft^2). A site-specific water budget was than prepared using either 10% or 15 % of the field measured Ksp and limiting the monthly loading depth to a maximum of 9 acre-inches per month (2.25 ac-in/week) .

Table 4. HC Testing Data for Area II.

TP #	Test Depth (in)	Ksp (inches/hr)	Horizon Type	HC ID #
TP25	22	0.114	Bw	AR2-HC1
TP9	24	0.119	Bw	AR2-HC2
TP10	22	0.120	Bw	AR2-HC3
TP11	20	0.117	Bw	AR2-HC4
TP12	20	0.502	Bw	AR2-HC5
TP13	20	0.240	Bw	AR2-HC6
TP14	20	0.259	Bw	AR2-HC7
TP15	20	0.221	Bw	AR2-HC8
Geo Avg. All		0.1844	(inches/hr)	
Geo Avg (HC1-HC4)		0.1177	(inches/hr)	

Table 5. Area II: Calculated Maximum Monthly Wastewater Loading Depths (Water Budget) (Ksp- 0.1177 in/hr).

Month	Lwp ac-in/wk (10% Ksp)	Lwp ac-in/wk (15%Ksp)
January	0.94	1.93
February	1.05	2.04
March	0.98	1.97
April	1.25	2.23
May	1.39	2.38*
June	1.92	2.91*
July	2.14	3.13*
August	1.97	2.96*
September	1.42	2.41*
October	1.28	2.27*
November	0.90	1.89
December	0.97	1.96

Note: The monthly loading depth should be reduced to a maximum of 2.25 ac-inches/month (30 days).

Table 6. Daily Capacity of a 2.31 acre Drip Irrigation Field in Area II.

	Avg Daily Capacity	Avg Daily Capacity
Month	gpd (10% Ksp)	gpd (15%Ksp)
January	8429	17289
February	9402	18262
March	8789	17649
April	11161	18820*
May	12483	18813*
June	17215	18820*
July	18213*(NOTE)	18213*
August	17695	18213*
September	12742	18820*
October	11511	18213*
November	8034	16894
December	8725	17586

Note: The monthly loading depth should be reduced to a maximum of 2.25 ac-inches/month (30 days).

PADEP Approval NEEDED– A number of the pits have limiting zones of between ≥ 20 inches to open voids/rock. Drip irrigation requires a depth to open voids and bedrock of 26 inches or more assuming that tubing is installed 6 inches below grade. We would need to propose an alternative installation depth and a way of protecting during winter months. (PADEP would need to approve and permit this approach.) **The preliminary discussion with Mr. Tim Craven suggested this was likely to be approved, but it was dependent on the confirmation testing, level of pretreatment, and proposed drip tubing installation approach.**

Area III (see Map) Total Number of Test Pits within or surrounding this area (20)

For Area III, we evaluated 20 test pits and only Test Pit 17, Test Pit 21, Test Pit D2 were unsuitable for conventional disposal or drip irrigation, but TP 17 and TP 21 were suitable for spray irrigation. The area did not have a shallow depth to bedrock as was identified in Area I and Area II, but all the test pits suitable for onsite wastewater management showed evidence of the presence of a perched water table condition that ranged in depth from 20 to 31 inches. This condition was associated with the presence of a dense horizon (Bd) or fragipan horizon (Bx). A fragipan horizon is a soil horizon that has a tendency to restrict the vertical movement of water through the soil profile, which tends to create both a seasonal perched water table and promote the horizontal migration of the applied water. The hydroconductivity testing was conducted within the fragipan horizon and the depth of the testing ranged from 30 to 46 inches.

A total of ten Ksp tests were completed and the results ranged from 0.0675 to 0.115 inches per hour. The geometric average Ksp excluding the highest value of 0.115 inches per hour (TP19 – A3-HC4) was 0.069 (0.0693) inches per hour or 0.96 ft^2/gpd (1.04 gpd/ft^2). We conducted some preliminary percolation testing at a depth of 20 inches throughout Area III and the mean percolation rate was 45 minutes per inch. This rate would be equivalent to a recommended design factor of 1.89 gpd/ft^2 for conventional wastewater disposal systems with the systems being sized using peak daily flow.

After excluding the unsuitable area, the project engineer, LVL Engineering Group, calculated that the area available within Area III for drip irrigation was 3.70 acres. Based on the geometric average Ksp of 0.069 inches per hour, a water budget analysis was prepared assuming that PADEP would permit using 10% to 15 % of the field measured Ksp.

Table 7. HC Testing Data for Area III.

TP #	Test Depth (in)	Ksp (inches/hr)	Horizon Type	HC ID #
TP24	30	0.068	BX	AR3-HC1
TP16	38	0.073	BX	AR3-HC2
TP18	41	0.063	BX	AR3-HC3
TP19	41.5	0.115	BX	AR3-HC4
TP22	40	0.068	BX	AR3-HC5
TP20	46	0.063	BX	AR3-HC6
TP23	38	0.073	BX	AR3-HC7
TP-D3	36	0.067	BX	AR3-HC8
TP-D7	40	0.077	BX	AR3-HC9
TP-D9	36	0.071	BX	AR3-HC10
Geo Avg. All		0.0730	(inches/hr)	
Geo Avg (All, but HC4)		0.0693	(inches/hr)	

Table 8. Area III: Calculated Maximum Monthly Wastewater Loading Depths (Water Budget) (Ksp- 0.0693 in/hr).

	Lwp ac-in/wk	Lwp ac-in/month
Month	(10% Ksp)	(15%Ksp)
January	0.13	0.71
February	0.24	0.82
March	0.17	0.75
April	0.43	1.02
May	0.58	1.16
June	1.11	1.69
July	1.33	1.91
August	1.16	1.74
September	0.61	1.19
October	0.47	1.05
November	0.08	0.67
December	0.16	0.74

Table 9. Area III: Daily Capacity of a 3.70 acre Drip Irrigation Field (Water Budget Method).

	Avg Daily Capacity	Avg Daily Capacity
Month	gpd (10% Ksp)	gpd (15%Ksp)
January	1839	10193
February	3395	11749
March	2415	10769
April	6210	14565
May	8326	16680
June	15899	24253
July	19080	27434
August	16668	25022
September	8741	17095
October	6772	15126
November	1206	9560
December	2313	10667

Area IV (see Map) Total Number of Test Pits within or surrounding this area (18)

For Area IV, we evaluated 18 test pits and Test Pit D26A, Test Pit D27, Test Pit D28, Test Pit D30A, D31, Test Pit D32, and Test Pit D35 were unsuitable for conventional disposal and spray or drip irrigation. For the area suitable for land-based disposal the depth bedrock ranged from 27 to 38+ inches. Some of the areas were considered unsuitable because these were "fill areas" that contained urban debris or paving material. The test pits suitable for onsite wastewater management showed evidence of the presence of a perched water table condition that ranged in depth from 22 to 35 inches and one test pit had a water line buried at a depth of 38 inches (Test Pit 42). The hydroconductivity testing was conducted within the most restrictive soil horizon and the depth of the testing ranged from 25 to 35 inches.

A total of five Ksp tests were completed and the resulted ranged from 0.0635 to 0.08 inches per hour. The geometric average Ksp was 0.0709 inches per hour for Area IV was. This Ksp value is equivalent to a maximum loading rate of 0.94 ft^2/gpd (1.06 gpd/ft^2). After excluding the unsuitable area, the project engineer calculated that the area available within Area III was 2.19 acres. Based on the geometric average Ksp of 0.0709 inches per hour, a water budget analysis was prepared assuming that PADEP would permit using 10% to 15 % of the field measured Ksp.

Table 10. HC Testing Data for Area IV.

TP #	Test Depth (in)	Ksp (inches/hr)	Horizon Type	HC ID #
TP29	35	0.063	Bw	AR4-HC1
TP34	30	0.073	Bw	AR4-HC2
TP36	30	0.065	Bw	AR4-HC3
TP39	25	0.074	Bw	AR4-HC4
TP41	30	0.080	C	AR4-HC5
Geo Avg. All		0.0709	(inches/hr)	

Table II. Area IV: Calculated Maximum Monthly Wastewater Loading Depths (Water Budget) (Ksp- 0.0709 in/hr).

	Lwp ac-in/wk	Lwp ac-in/month
Month	(10% Ksp)	(15%Ksp)
January	0.15	0.75
February	0.26	0.86
March	0.19	0.79
April	0.46	1.06
May	0.61	1.20
June	1.13	1.73
July	1.36	1.95
August	1.19	1.78
September	0.64	1.23
October	0.50	1.09
November	0.11	0.71
December	0.19	0.78

Table 12. Area IV: Daily Capacity of a 2.19 acre Drip Irrigation Field (Water Budget Method).

	Avg Daily Capacity	Avg Daily Capacity
Month	gpd (10% Ksp)	gpd (15%Ksp)
January	1316	6385
February	2239	7308
March	1658	6726
April	3910	8978
May	5165	10233
June	9657	14726
July	11545	16613
August	10114	15182
September	5411	10479
October	4242	9311
November	941	6009
December	1597	6666

If we calculated the combined capacity of the four areas, we get the following:

Table 13. Combined Capacity – Drip Irrigation Based on a Water Budget Model.

	Avg Daily Capacity	Avg Daily Capacity
Month	gpd (10% Ksp)	gpd (15%Ksp)
January	**18,311**	46,403
February	**22,433**	51,198
March	**19,837**	47,681
April	**29,889**	55,316
May	**35,491**	57,662
June	55,545	70,452
July	61,374	74,797
August	57,013	70,953
September	**36,589**	59,347
October	**31,374**	55,185
November	**16,636**	45,418
December	**19,567**	47,455

10%Ksp Approach – A number of months do not have a daily average capacity of at least 39,757 gpd.
15%Ksp Approach – Using a higher quality effluent, the total drip irrigation capacity for the system would range from 45,418 gpd to 74,797 gpd, which provides a reserve capacity ranging from 5,661 gpd (winter/spring/fall) to 35,040 gpd (summer) depending on the time of year.

Preliminary Conclusions

1. If **PADEP will approve** the application of drip irrigation and permit a loading of **15% Ksp**, the project area using all or portions of Area I, II, III, and IV is sufficient to manage average daily flow of at least 39,757 gpd, see Table 13. This level of application will likely require a highly treated effluent with disinfection and some level of denitrification.

2. If the **PADEP will not approve** the use of the 15%Ksp and we are limited to **10% Ksp** it will likely be necessary to test additional acreage, because a number of months do not have a daily average capacity of at least 39,757 gpd and it may be necessary to utilize the potential disposal area located on the former Strickland Golf Course parcel as identified by LVL Engineering Group (LVL Engineers – 2/2023).

Recommendations and Professional Opinions

1. Since my last conversation with the PADEP, Mr. Tim Craven, suggested that all preliminary testing should be completed to characterize the site and determine capacity, a summary of available findings should be submitted to the PADEP and the local agency.

2**.** With respect to nitrogen loading, it appears we may need to get the total nitrogen level of the treated wastewater down to **below 30 mg N/L**. The specific effluent number is not known at this time, but first step would be to agree on a base level of pretreatment treatment based on the proposed 15% Lwp loading depths.

3. Because we are seeking approvals that will be subject to PADEP determination and approval, a portion of the drip field is located in areas upgradient from potential on-site production wells, and because of the loading rate, it may be wise to assume that prior to on-site disposal the system may need to provide a **BOD and TSS of 10 mg/L** with **UV disinfection and consider an effluent total nitrogen of < 30 mg N/L. At present, the design engineer is proposing to use system, Ecoflo Coco Filter, the system is reportedly NSF/ANSI 40 and 245 approved and reportedly the effluent TSS will approach 8 mg/L and $CBOD_5$ will approach 6 mg/L.**

4. It may be wise for the project to collect water samples from the following: on-site wells, surface waters, springs, and wetlands. These samples should be tested for total coliform, *E. coli.*, nitrate, nitrite, ammonia, TKN, pH, conductivity, and total dissolved solids for groundwater sources and springs. For wetlands, streams, and other surface waters, I would recommend fecal coliform, *E. coli.*, nitrate, nitrite, ammonia, TKN, pH, conductivity, and total dissolved solids.

5. The system will require confirmation testing with the local agency and PADEP and it is likely that the PADEP will require both a preliminary and detailed hydrogeological assessment, formal monitoring and maintenance program, and following the permitting process it is likely that the PADEP will require the system be operated by a certified operator.

6. Regarding Paradise Township Chapter 110, the proposed land-based disposal system will be designed and permitted by the PADEP using standards and an approach that is consistent with Chapter 73. Paradise Township, other local agencies, and PADEP will be part of the confirmation testing for the project and this testing will be part of the planning modules that will be submitted at some future date. Regarding the maintenance of this system, the planning process and PADEP will require the system will require a maintenance agreement between the owners and the local agencies. It is likely a draft of that agreement will be part of future land development planning modules.

Regarding industrial, toxic, or hazardous substances or chemicals, these chemicals are not permitted to be disposed using a land-based sewage management system and the project is not seeking a permit to dispose of wasted classified as industrial, toxic, or hazardous, the system is being designed and permitted to manage domestic sewage. It is not permitted to disposal of French drains or runoff into the proposed land-based disposal system, this water will be managed by the stormwater management system.

Regarding the status of the system as an individual sewage system or a community sewage system should be addressed by the legal experts for the project since this determination is based on an interpretation of local agency ordinances, state law, and appropriate case law.

Signature Page

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Hawthorne Project – Summary with Comments
Soils Morphological Analysis

Test Pit # 1

-2 – 0 inches Organic, fibric
0 – 3 inches 7.5YR3/3, channery silt loam, wk fine granular, v. friable
3 – 8 inches 5YR5/2, channery sandy loam, wk f sbk, v. friable
8 – 12 inches 7.5YR4/6, v. channery silt loam, wk f sbk, friable
12 – 21 inches 7.5YR5/4, v. channery silt loam, wk m sbk, friable / sl. sticky when wet
21 – 33 inches 7.5YR5/3, v. channery sandy loam, wk m sbk, friable/ sl. sticky when wet, redox (c2d)
33 – 72 inches Rippable Bedrock

Limiting Zone – 21 inches SHWT; Bedrock 33 inches

System – Drip and spray irrigation approach generally suitable.

Test Pit # 2

-2 – 0 inches Organic, fibric
0 – 3 inches 7.5YR3/3, channery silt loam, wk fine granular, v. friable
3 –10 inches 7.5YR5/4, channery sandy loam, wk f sbk, v. friable
10 – 15 inches Rippable Bedrock

Limiting Zone – Bedrock 10 inches

System – Drip and Spray irrigation approach unsuitable.

Test Pit # 3

-2 – 0 inches Organic, fibric
0 – 6 inches 7.5YR3/3, channery silt loam, wk fine granular, v. friable
6 – 14 inches 7.5YR4/4, v. channery silt loam, wk f sbk, friable
14 – 21 inches 7.5YR5/4, v. channery loam, wk m sbk, friable / sl. sticky when wet
21 – 39 inches 7.5YR5/3, v. channery sandy loam, wk c sbk, friable/ sl. sticky when wet, redox (c2d)
39 – 50 inches Rippable Bedrock

Limiting Zone – 21 inches SHWT; Bedrock 39 inches

System – Drip and spray irrigation approach generally suitable.

Test Pit # 4

-2 – 0 inches Organic, fibric
0 – 4 inches 7.5YR3/3, channery silt loam, wk fine granular, v. friable
4 – 10 inches 7.5YR4/4, v. channery silt loam, wk f sbk, friable
10 – 20 inches 7.5YR5/4, v. channery loam, wk m sbk, friable / sl. sticky when wet
20 – 35 inches 7.5YR5/3, v. stony loam, wk m sbk, friable/ sl. sticky when wet, redox (c2d)
35 – 45 inches Rippable Bedrock

Limiting Zone – 20 inches SHWT; Bedrock 35 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit # 5

-2 – 0 inches Organic, fibric
0 – 4 inches 7.5YR3/3, channery silt loam, wk fine granular, v. friable
4 – 11 inches 7.5YR4/4, v. channery silt loam, wk f sbk, friable
11 – 21 inches 7.5YR5/4, v. channery loam, wk m sbk, friable / sl. sticky when wet
21 – 48 inches 7.5YR5/3, v. stony loam, wk m sbk, friable/ sl. sticky when wet, redox (c2d)
48 inches Rippable Bedrock

Limiting Zone – 21 inches SHWT; Bedrock 48 inches

System – Drip and spray irrigation approach generally suitable.

Test Pit # 6
-2 – 0 inches Organic, fibric
0 – 6 inches 7.5YR3/3, channery silt loam, wk fine granular, v. friable
6 – 10 inches 7.5YR4/6, channery silt loam, wk f sbk, friable
10 –16 inches 7.5YR5/4, v. channery loam, wk m sbk, friable
16 inches Rippable Bedrock

Limiting Zone –Bedrock 16 inches

System – Drip irrigation would be unsuitable, but spray irrigation would be suitable.

Test Pit # 7

-2 – 0 inches Organic, fibric
0 – 2 inches 5YR3/3, channery silt loam, wk fine granular, v. friable
2 – 5 inches 5YR4/2, v. channery silt loam, wk f sbk, friable
5 – 8 inches 7.5YR4/6, v. channery loam, wk f sbk, friable
8 – 22 inches 7.5YR5/4, v. channery loam, wk m sbk, friable
22 inches Rippable Bedrock

Limiting Zone –Bedrock 22 inches

System – Spray irrigation approach generally suitable and drip irrigation may be suitable, but would require PADEP approval and likely slightly more advanced treatment.

Test Pit# 8

-2 – 0 inches	Organic, fibric
0 – 4 inches	5YR3/3, channery silt loam, wk fine granular, v. friable
4 – 8 inches	5YR4/2, v. channery silt loam, wk f sbk, friable
8 –11 inches	7.5YR4/6, v. channery loam, wk f sbk, friable
11 – 15 inches	7.5YR5/4, v. channery loam, wk m sbk, friable
15 inches	Rippable Bedrock

Limiting Zone –Bedrock 15 inches

System – Drip and spray irrigation would be unsuitable.

Test Pit# 9

-2 – 0 inches	Organic, fibric
0 – 5 inches	7.5YR3/3, 5YR4/2, channery silt loam/loam, wk fine granular, v. friable
5 – 9 inches	7.5YR4/6, channery silt loam, wk f sbk, v. friable
9 – 14 inches	7.5YR4/4, channery silt loam, wk f sbk, friable
14 – 24 inches	7.5YR5/4, channery loam, wk m sbk, friable
24 – 36 inches	5YR5/3, very channery sandy loam, wk c sbk, friable, sl. stick when wet, redox (c2d)
36 - 72 inches	Rippable Bedrock

Limiting Zone –Seasonal High Water Table 24 inches; Bedrock 36 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit# 10

-2 – 0 inches	Organic, fibric
0 – 4 inches	7.5YR3/3, 5YR4/2, channery silt loam/loam, wk fine granular, v. friable
4 – 10 inches	7.5YR4/6, channery silt loam, wk f sbk, v. friable
10 – 22 inches	7.5YR5/4, channery silt loam, wk m sbk, friable
22 – 48 inches	10YR4/4, cobbly sandy loam, wk c sbk, friable – sl firm, redox (c2d), Manganese staining
48 inches	Rippable Bedrock

Limiting Zone –Seasonal High Water Table 22 inches; Bedrock 48 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit # 11

-2 – 0 inches	Organic, fibric
0 – 3 inches	5YR3/3, v. channery silt loam, wk fine granular, v. friable
4 – 10 inches	5YR4/2, v. channery silt loam, wk f sbk, v. friable
10 – 17 inches	5YR4/6, v. channery silt loam, wk f sbk, friable
17 – 24 inches	5YR5/4, v. channery loam, wk m sbk, friable
24 - 60 inches	7.5YR5/3, ext. channery sandy loam, wk c sbk, friable with pockets of frost turned coarse fragments
60 inches	Rippable Bedrock

Limiting Zone –Open Voids 22 inches; Bedrock 60 inches
System – Spray irrigation approach generally suitable and drip irrigation may be suitable, but would require PADEP approval and likely slightly more advanced treatment.

Test Pit # 12

-3 – 0 inches	Organic, fibric
0 – 4 inches	5YR3/3, channery silt loam, wk fine granular, v. friable
4 – 8 inches	5YR4/4, channery silt loam, wk f sbk, v. friable
8 – 16 inches	5YR5/4, channery silt loam, wk f sbk, friable
16 – 22 inches	5YR5/3, channery loam, wk m sbk, friable
22 - 36 inches	variegated, stony loam, massive, tight in place, lithochromic, redox (c2p), mn staining
36 - 45 inches	Rippable Bedrock

Limiting Zone –Seasonal High Water Table 22 inches; Bedrock 36 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit # 13

-2 – 0 inches	Organic, fibric
0 – 4 inches	2.5YR4/2, channery sandy loam, mod fine granular, v. friable
4 – 8 inches	5YR4/6, channery silt loam, wk f sbk, v. friable
8 – 15 inches	5YR5/4, channery silt loam, wk f sbk, friable
15 – 21 inches	5YR5/3, v. channery silt loam, wk m sbk, friable, sl. sticky
21 - 33 inches	5YR5/2, v. channery sandy loam, wk m sbk, sl. sticky, redox (c2d)
33 - 46 inches	Rippable Bedrock

Limiting Zone –Seasonal High Water Table 21 inches; Bedrock 33 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit # 14

-2 – 0 inches Organic, fibric
0 – 4 inches 5YR3/3, channery silt loam, wk fine granular, v. friable
4 – 10 inches 5YR4/4, channery silt loam, wk f sbk, v. friable
10 – 23 inches 5YR5/3, v. channery silt loam, wk f sbk, friable, sl. sticky when wet
23 - 30 inches Rippable Bedrock

Limiting Zone –Bedrock 23 inches
System – Spray irrigation approach generally suitable and drip irrigation may be suitable, but would require PADEP approval and likely slightly more advanced treatment.

Test Pit # 15
-2 – 0 inches Organic, fibric
0 – 5 inches 7.5YR3/3, channery silt loam, wk f granular, v. friable
5 – 11 inches 7.5YR4/4, channery silt loam, wk f sbk, friable
11 – 21 inches 7.5YR5/4, v. channery silt loam, wk m sbk, friable, sl. sticky when wet
21 – 46 inches Rippable Bedrock with seepage at 24 inches, standing water at base of pit.

Limiting Zone – Bedrock 21 inches, Seepage 24 inches, Standing Water at 45 inches
System – Spray irrigation approach generally suitable and drip irrigation may be suitable, but would require PADEP approval and likely slightly more advanced treatment.

Test Pit # 16 – near cartway

-2 – 0 inches Organic, fibric
0 – 6 inches 7.5YR3/3, channery silt loam, wk fine granular, v. friable
6 – 10 inches 7.5YR4/4, channery silt loam, wk f sbk, friable
10 – 20 inches 7.5YR5/4, v. channery silt loam, wk m sbk, friable, sl. sticky
20 – 30 inches 5YR5/3, v. channery sandy loam, wk coarse platy, sl. firm, redox (c2d)
30 – 60 inches 5YR5/3, v. channery sandy loam, wk coarse prismatic, firm, redox (m2d) – seepage at 30 inches, seepage at 60 inches with standing water at 55 inches (initially), but by end of day at 36 inches.

Limiting Zone –Seasonal High Water Table 20 inches, Seepage 30 inches, Standing Water at 45 inches, but rose to 36 inches.
System – Drip and spray irrigation approach generally suitable.

Test Pit # 17 (Along Road)

-2 – 0 inches Organic, fibric
0 – 4 inches 7.5YR3/3, channery silt loam, wk fine granular, v. friable
4 – 10 inches 7.5YR4/4, channery silt loam, wk f sbk, friable
10 – 15 inches 7.5YR5/4, v. channery silt loam, wk m sbk, friable, sl. sticky
15 – 33 inches 5YR5/3, v. channery loam, wk m sbk, friable, redox (c2d)
33 – 48 inches 5YR5/4, v. channery loam, wk coarse prismatic, firm/brittle, redox (c3p)
48 – 60 inches Rippable Bedrock

Limiting Zone –Seasonal High Water Table 15 inches, Bedrock at 48 inches
System – Generally suitable for spray irrigation, but unsuitable for drip irrigation.

Test Pit # 18 (Along Road)

-2 – 0 inches Organic, fibric
0 – 3 inches 7.5YR3/3, channery silt loam, wk fine granular, v. friable
3 – 9 inches 7.5YR4/4, channery silt loam, wk f sbk, friable
9 – 15 inches 7.5YR5/4, v. channery silt loam, wk m sbk, friable
15 – 20 inches 7.5YR5/3, v. channery silt loam, wk m sbk, friable, sl. sticky, most roots end)
20 – 32 inches 5YR5/3, v. stony sandy loam, wk platy, firm/brittle, redox (c2d)
32 – 69 inches 5YR5/3, v. stony sandy loam, wk coarse prismatic, brittle, Mn staining, redox (c3d)

Limiting Zone –Seasonal High Water Table 20 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit # 19

-2 – 0 inches Organic, fibric
0 – 4 inches 7.5YR3/3, channery silt loam, wk fine granular, v. friable
4 – 10 inches 7.5YR4/4, channery silt loam, wk f sbk, friable
10 – 16 inches 7.5YR5/4, v. channery silt loam, wk m sbk, friable
16 – 24 inches 7.5YR5/3, v. channery silt loam, wk m sbk, friable, sl. sticky, most roots end)
24 – 33 inches 5YR5/3, v. stony sandy loam, wk platy, firm/brittle, redox (c2d)
33 – 70 inches 5YR5/3, v. stony sandy loam, wk coarse prismatic, brittle, Mn staining, redox (c3d)

Limiting Zone –Seasonal High Water Table 24 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit # 20

-2 – 0 inches Organic, fibric
0 – 4 inches 7.5YR3/4, channery silt loam, wk fine granular, v. friable
4 – 8 inches 7.5YR4/6, channery silt loam, wk f sbk, friable
8 – 12 inches 7.5YR5/4, channery silt loam, wk m sbk, friable
12 – 24 inches 5YR4/4, channery loam, wk m sbk, friable, sl. sticky
24 – 36 inches 5YR5/3, v. stony sandy loam, wk platy, firm/brittle, redox (c2d)
36 – 72 inches 5YR5/3, v. stony sandy loam, wk coarse prismatic, brittle, Mn staining, redox (c3p)

Limiting Zone –Seasonal High Water Table 24 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit # 21

-2 – 0 inches Organic, fibric (very high surface rock)
0 – 4 inches 7.5YR3/4, channery silt loam, wk fine granular, v. friable
4 – 10 inches 7.5YR4/6, channery silt loam, wk f sbk, friable
10 – 15 inches 7.5YR5/3, channery silt loam, wk m sbk, friable
15 – 36 inches 5YR5/3, v. stony sandy loam, wk platy, firm/brittle, redox (c2d), seepage at 15 inches
36 – 60 inches 5YR5/3, v. stony sandy loam, wk coarse prismatic, brittle, Mn staining, redox (c3p) seepage at 36 inches

Limiting Zone –Seasonal High Water Table 15 inches- Seepage at 15 inches and 36 inches with standing water.

Note: Seepage appears to be associated with areas with high surface rock content.
System – Generally suitable for spray irrigation, but unsuitable for drip irrigation.

Test Pit # 22

-2 – 0 inches Organic, fibric (very high surface rock)
0 – 6 inches 7.5YR3/3, v. channery silt loam, wk fine granular, v. friable
6 – 9 inches 7.5YR4/6, v. channery silt loam, wk f sbk, friable
9 – 12 inches 7.5YR5/4, v. channery silt loam, wk f sbk, friable
22– 31 inches 7.5YR5/3, v. gravelly sandy loam, wk coarse platy, sl. firm, lithochromic
31 – 60 inches 5YR4/3, v. stony sandy loam, wk coarse prismatic, firm, Mn staining, redox (c2d)

Limiting Zone –Seasonal High Water Table 31 inches

System – Drip and spray irrigation approach generally suitable.

Test Pit # 23

-2 – 0 inches Organic, fibric (very high surface rock)
0 – 3 inches 7.5YR3/3, v. channery silt loam, wk fine granular, v. friable
3 – 7 inches 7.5YR4/6, v. channery silt loam, wk f sbk, friable
7 – 11 inches 7.5YR4/4, v. channery silt loam, wk m sbk, friable
11– 25 inches 7.5YR5/4, v. channery sandy loam, wk m sbk, friable
25 – 60 inches 5YR4/3, v. stony sandy loam, wk coarse prismatic, firm, Mn staining, redox (c2d) seepage at 40 inches

Limiting Zone –Seasonal High Water Table 25 inches

System – Drip and spray irrigation approach generally suitable.

Test Pit # 24

-3 – 0 inches Organic, fibric (very high surface rock)
0 – 2 inches 7.5YR3/3, channery silt loam, wk fine granular, v. friable
2 – 8 inches 7.5YR4/6, channery silt loam, wk f sbk, friable
8 – 14 inches 7.5YR4/4, channery silt loam, wk m sbk, friable
14– 22 inches 7.5YR5/4, channery sandy loam, wk m sbk, friable
22 – 48 inches 5YR4/3, stony sandy loam, wk coarse prismatic, firm, Mn staining, redox (c2d) seepage at 36 inches

Limiting Zone –Seasonal High Water Table 25 inches

System – Drip and spray irrigation approach generally suitable.

Test Pit # 25

-2 – 0 inches Organic, fibric (very high surface rock)
0 – 7 inches 5YR5/2, v. channery loam/sandy loam, w fine granular, v. friable
7 – 12 inches 7.5YR4/6, v. channery silt loam, mod f sbk, friable
12 – 21 inches 7.5YR5/4, v. channery silt loam, wk f sbk, friable
21 – 32 inches 5YR5/4, v. channery loam, wk m sbk, friable, sl. sticky
32 – 60 inches variegated, v. channery sandy loam, massive, tight in place, clay films, lithochromic colors, redox (f2d)

Limiting Zone –Seasonal High Water Table 32 inches

System – Drip and spray irrigation approach generally suitable.

Test Pit # 26

-2 – 0 inches Organic, fibric (very high surface rock)
0 – 3 inches 7.5YR3/3, v. shaly silt loam, w fine granular, v. friable
3 – 8 inches 7.5YR4/6, v. shaly loam, wk f sbk, friable
8 – 20 inches 5YR4/4, v. shaly loam, wk f sbk, friable
20 – 30 inches 5YR4/4, ext. shaly loam, wk m sbk, tight in place with pockets of frost turned soil with open voids and uncoated fragments, lithochromic colors
30 inches Rock – greenish gray sandstone (Competent)

Limiting Zone –Open Voids 20 inches and Bedrock at 30 inches

System – Spray irrigation approach generally suitable and drip irrigation may be suitable, but would require PADEP approval and likely slightly more advanced treatment.

Test Pit # 27

-2 – 0 inches Organic, fibric (very high surface rock)
0 – 3 inches 5YR3/3, v. shaly silt loam, w fine granular, v. friable
3 – 8 inches 5YR4/4, v. shaly loam, wk f sbk, friable
8 – 20 inches 5YR5/4, v. channery loam, wk f sbk, friable with many roots
20 – 30 inches 5YR4/4, ext. channery loam, wk m sbk, tight in place with pockets of frost turned soil with open voids and uncoated fragments, lithochromic colors
30 – 50 inches Rippable Bedrock Rock, roots extend to 40 inches

Limiting Zone –Open Voids 20 inches and Bedrock at 30 inches

System – Spray irrigation approach generally suitable and drip irrigation may be suitable, but would require PADEP approval and likely slightly more advanced treatment.

Test Pit # 28

-2 – 0 inches Organic, fibric (very high surface rock)
0 – 3 inches 7.5YR3/3, v. shaly silt loam, w fine granular, v. friable
3 – 6 inches 7.5YR4/6, v. shaly loam, wk f sbk, friable
6 – 12 inches 5YR4/4, v. shaly loam, wk f sbk, friable
12 – 20 inches 5YR5/4, ext. shaly loam, wk f sbk, friable (lithochromic colors)
20 - 30 inches Rock Rippable Bedrock
30 inches Bedrock (Competent)

Limiting Zone –Open Voids 20 inches and Bedrock at 30 inches

System – Spray irrigation approach generally suitable and drip irrigation may be suitable, but would require PADEP approval and likely slightly more advanced treatment.

Test Pit – D1 (Area III)

-5 – 0 inches Organic, fibric with surface rock
0 – 4 inches 5YR3/3, v. channery silt loam, wk fine granular, v. friable
4 – 11 inches 5YR4/4, v. channery silt loam, wk f sbk, friable
11 – 22 inches 5YR5/4, v. ch silt loam, wk m sbk, friable
22 – 35 inches 5YR5/4, v. channery sandy loam, wk c sbk, friable, sl. sticky, most roots end, redox (c2d)
35 – 40 inches 5YR5/3, v. stony sandy loam, wk coarse prismatic, brittle, Mn staining, redox (c3d)

Limiting Zone –Seasonal High Water Table 22 inches, seepage at 35 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit – D1A (Area III) – on downslope side of the road

-1 – 0 inches Organic, fibric
0 – 4 inches 5YR3/3, v. channery silt loam, wk fine granular, v. friable
4 – 11 inches 5YR4/4, v. channery silt loam, wk f sbk, friable
11 – 23 inches 5YR5/4, v. ch silt loam, wk m sbk, friable
23 – 27 inches 5YR5/4, v. channery sandy loam, wk c sbk, friable, sl. sticky, most roots end , redox (c2d)
27 – 45 inches 5YR5/3, v. stony sandy loam, wk coarse prismatic, brittle, Mn staining, redox (c3d)

Limiting Zone –Seasonal High Water Table 23 inches, seepage at 27 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit – D2 (Area III)

Unsuitable – appears to be a gully formation with flowing water.

Test Pit – D3 (Area III)

-4 – 0 inches Organic, fibric
0 – 3 inches 7.5YR3/3, v. channery silt loam, wk fine granular, v. friable
3 – 11 inches 7.5YR4/6, v. channery silt loam, wk f sbk, friable
11 – 22 inches 7.5YR4/4, v. channery silt loam, wk m sbk, friable
22 – 30 inches 7.5YR5/4, v. channery loam, wk m sbk, friable, sl. sticky
30 – 40 inches 5YR5/4, v. stony sandy loam, wk c sbk, firm, redox (c2d), most roots end

Limiting Zone –Seasonal High Water Table 30 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit – D4 (Area III)

-6 – 0 inches Organic, fibric (very high surface rock)
0 – 5 inches 7.5YR3/3, v. channery silt loam, wk fine granular, v. friable
5 – 12 inches 7.5YR4/4, v. channery silt loam, wk f sbk, friable
12– 20 inches 7.5YR5/4, v. channery sandy loam, wk m sbk, friable
20 – 30 inches 5YR5/4, v. stony sandy loam, wk c sbk, friable, sl. sticky, redox (f2d)
30 – 40 inches 5YR5/4, v. stony sandy loam, wk c sbk, firm, redox (c2d), most roots end

Limiting Zone –Seasonal High Water Table 20 inches, seepage at 30 inches and standing water at 39 inches

System – Drip and spray irrigation approach generally suitable.

Test Pit – D5 (Area III)

-4 – 0 inches Organic, fibric (very high surface rock)
0 – 6 inches 5YR5/2, v. channery loam, mod fine granular, v. friable (E horizon)
6 – 11 inches 5YR4/6, v. channery silt loam, wk f sbk, friable
11– 21 inches 5YR4/4, v. channery silt loam, wk m sbk, friable
21 – 32 inches 5YR5/4, v. channery loam, wk m sbk, friable, sl. sticky, redox (f2d)
32 – 45 inches 5YR5/3, v. channery sandy loam, wk c sbk, firm, redox (c2d), most roots end

Limiting Zone –Seasonal High Water Table 21 inches

System – Drip and spray irrigation approach generally suitable.

Test Pit – D6 (Area III)

-4 – 0 inches Organic, fibric
0 – 4 inches 7.5YR3/4, channery silt loam, wk fine granular, v. friable
4 – 10 inches 7.5YR4/6, channery silt loam, wk f sbk, friable
10 – 26 inches 7.5YR5/4, channery loam, wk m sbk, friable
26 – 32 inches 5YR5/4, v. stony sandy loam, wk c sbk, firm, redox (f2d)
32 – 45 inches 5YR5/3, v. stony sandy loam, wk coarse prismatic, brittle, Mn staining, redox (c3p)

Limiting Zone –Seasonal High Water Table 26 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit – D7 (Area III)

-4 – 0 inches Organic, fibric
0 – 6 inches 7.5YR3/3, channery silt loam, wk fine granular, v. friable
6 – 11 inches 7.5YR4/4, channery silt loam, wk f sbk, friable
11 – 26 inches 7.5YR5/4, v. channery loam, wk m sbk, friable
26 – 34 inches 5YR5/4, v. stony sandy loam, wk c abk, firm, redox (f2d)
34 – 45 inches 5YR5/3, v. stony sandy loam, wk coarse prismatic, brittle, Mn staining, redox (c3d)

Limiting Zone –Seasonal High Water Table 26 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit – D8 (Area III)

-2 – 0 inches Organic, fibric
0 – 5 inches 7.5YR3/3, channery silt loam, wk fine granular, v. friable
5 – 10 inches 7.5YR4/4, channery silt loam, wk f sbk, friable
10 – 24 inches 7.5YR5/4, v. channery loam, wk m sbk, friable
24 – 31 inches 5YR5/4, v. stony sandy loam, wk c abk, firm, redox (f2d)
31 – 46 inches 5YR5/3, v. stony sandy loam, wk coarse prismatic, brittle, Mn staining, redox (c3d)

Limiting Zone –Seasonal High Water Table 24 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit – D9 (Area III)

-3 – 0 inches Organic, fibric (very high surface rock)
0 – 5 inches 7.5YR3/3, v. channery silt loam, wk fine granular, v. friable
5 – 12 inches 7.5YR4/6, v. channery silt loam, wk f sbk, friable
12 – 24 inches 7.5YR5/4, v. channery silt loam, wk f sbk, friable
24– 31 inches 7.5YR5/3, v. channery sandy loam, wk coarse sbk, sl. firm, lithochromic colors
31 – 42 inches 5YR4/3, v. stony sandy loam, wk coarse prismatic, firm, Mn staining, redox (c2d)

Limiting Zone –Seasonal High Water Table 31 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit – D10 (Area III)

-3 – 0 inches Organic, fibric (very high surface rock)
0 – 2 inches 5YR3/3, channery loam, mod fine granular, v. friable
2 – 9 inches 5YR4/4, channery silt loam, wk f sbk, friable
9– 23 inches 5YR5/4, channery loam, wk m sbk, friable
23 – 41 inches 5YR5/3, channery sandy loam, wk c sbk, firm, redox (c2d), most roots end

Limiting Zone –Seasonal High Water Table 23 inches

System – Drip and spray irrigation approach generally suitable.

Test Pit – D11 (Area I)

-2 – 0 inches Organic, fibric (very high surface rock)
0 – 5 inches 7.5YR3/3, v. channery silt loam, w fine granular, v. friable
5 – 10 inches 7.5YR4/6, v. channery loam, wk f sbk, friable
10 – 24 inches 7.5YR5/4, v. channery loam, wk f sbk, friable with many roots
24 – 38 inches 7.5YR4/4, v. channery loam pockets clay loam, massive, sl. sticky
38 inches Ripple Rock

Limiting Zone –Bedrock at 38 inches

System – Drip and spray irrigation approach generally suitable.

Test Pit – D12 (Area I)

-2 – 0 inches Organic, fibric (very high surface rock)
0 – 6 inches 7.5YR3/3, v. channery silt loam, w fine granular, v. friable
6 – 14 inches 7.5YR4/6, v. channery loam, wk f sbk, friable
14 – 24 inches 7.5YR5/4, v. channery loam, wk m sbk, friable
24 – 40 inches 5YR5/4, v. channery loam, wk m sbk, friable (lithochromic colors), redox (f2d)
40 – 45 inches 5YR5/4, ext. channery loam/sandy loam, massive, sl. sticky, redox (c2d)

Limiting Zone –24 inches SHWT

System – Drip and spray irrigation approach generally suitable.

Test Pit – D13 (Area I)

-2 – 0 inches Organic, fibric (very high surface rock)
0 – 4 inches 7.5YR3/3, v. ch silt loam, w fine granular, v. friable
4 – 8 inches 7.5YR4/6/7.5YR4/4, v. ch loam/ silt loam, wk f sbk, friable
8 – 23 inches 7.5YR5/4, v. ch loam, wk m sbk, friable
23 – 26 inches 5YR5/4, ext. ch loam/silt loam, wk m sbk, sl. sticky
26 inches Rock – greenish gray sandstone (Competent)

Limiting Zone –Bedrock at 26 to 30 inches

System – Drip and spray irrigation approach generally suitable.

Test Pit – D14 (Area I)

-3 – 0 inches Organic, fibric
0 – 5 inches 7.5YR3/3, channery silt loam, wk fine granular, v. friable
5 – 13 inches 7.5YR4/4, v. channery silt loam, wk f sbk, friable
13 – 24 inches 7.5YR5/4, v. channery loam, wk m sbk, friable / sl. sticky when wet
24 – 38 inches 5YR5/3, v. ch loam, wk m sbk, friable/ sl. sticky when wet, redox (f2d)

Limiting Zone – 24 inches SHWT

System – Drip and spray irrigation approach generally suitable.

Test Pit – D15 (Area I)

-4 – 0 inches Organic, fibric
0 – 5 inches 7.5YR3/3, channery silt loam, wk fine granular, v. friable
5 – 12 inches 7.5YR4/4, v. channery silt loam, wk f sbk, friable
12 – 27 inches 7.5YR5/4, v. channery loam, wk m sbk, friable / sl. sticky when wet
27 – 35 inches variegated, ext ch silt loam, massive, friable/ sl. sticky when wet, redox (f2d)

Limiting Zone – 27 inches SHWT

System – Drip and spray irrigation approach generally suitable.

Test Pit – D16 (Area I)

-2 – 0 inches Organic, fibric
0 – 6 inches 7.5YR3/3, channery silt loam, wk fine granular, v. friable
6 – 13 inches 7.5YR4/4, v. channery silt loam, wk f sbk, friable
13 – 22 inches 7.5YR5/4, v. channery loam, wk m sbk, friable / sl. sticky when wet
22 – 38 inches 7.5YR5/3, v. channery sandy loam, wk msbk, friable/ sl. sticky when wet, redox (c2d)
38 – 45 inches Rippable Bedrock

Limiting Zone – 22 inches SHWT; Bedrock 38 inches

System – Drip and spray irrigation approach generally suitable.

Test Pit – D17 (Area I)

-2 – 0 inches Organic, fibric
0 – 5 inches 7.5YR3/3, channery silt loam, wk fine granular, v. friable
4 – 13 inches 7.5YR4/4, v. channery silt loam, wk f sbk, friable
10 – 24 inches 7.5YR5/4, v. channery loam, wk m sbk, friable
20 – 36 inches 7.5YR5/3, v. ch loam, wk m sbk, friable/ sl. sticky when wet, redox (f2d)
33 – 40 inches variegated, ext ch loam, massive, friable/ sl. sticky when wet, lithochromic colors, discontinuous pockets of open voids redox (f2d)
40 Rippable Bedrock

Limiting Zone – 20 inches SHWT; Bedrock 40 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit – D18 (Area II)

-3 – 0 inches Organic, fibric
0 – 5 inches 7.5YR3/3, v. channery silt loam, wk fine granular, v. friable
5 – 12 inches 7.5YR4/4 / 7.5YR4/6, v. channery silt loam/loam, wk f sbk, v. friable
12 – 22 inches 7.5YR5/4, v. channery loam, wk m sbk, friable
22 – 38 inches 7.5YR5/3, v. channery loam, wk c sbk, friable, sl sticky, lithochromic, redox (f2d)

Limiting Zone: 22 inches SHWT
System – Drip and spray irrigation approach generally suitable.

Test Pit – D19 (Area II)

-3 – 0 inches	Organic, fibric
0 – 5 inches	7.5YR3/3, v. channery silt loam, wk fine granular, v. friable
5 – 12 inches	7.5YR4/4 / 7.5YR4/6, v. channery silt loam/loam, wk f sbk, v. friable
12 – 22 inches	7.5YR5/4, v. channery loam, wk m sbk, friable
22 – 31 inches	5YR5/4, v. channery silt loam, wk c sbk, friable, sl sticky, lithochromic
31 – 42 inches	5YR5/3, ext. channery loam, wk c sbk, friable, sticky, lithochromic, redox (f2d)
42	Rippable Bedrock

Limiting Zone: 31 inches SHWT; Bedrock 42 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit – D20 (Area II)

-3 – 0 inches	Organic, fibric
0 – 5 inches	5YR3/4, v. channery silt loam, wk fine granular, v. friable
5 – 15 inches	5YR4/6, v. channery silt loam/loam, wk f sbk, v. friable
15 – 22 inches	5YR5/4, v. channery silt loam, wk m sbk, friable
22 – 30 inches	5YR5/4, v. channery loam, wk c sbk, friable, sl. sticky
30 – 35 inches	variegated , extremely shaly silt loam, massive, loose
35	Rippable Bedrock

Limiting Zone: Bedrock 35 inches: Open voids at 30 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit – D21 (Area II)

-3 – 0 inches	Organic, fibric
0 – 5 inches	5YR3/4, v. channery silt loam, wk fine granular, v. friable
5 – 14 inches	5YR4/4, v. channery silt loam/loam, wk f sbk, v. friable
14 – 21 inches	5YR5/4, v. channery silt loam, wk m sbk, friable
21 – 30 inches	5YR5/4, v. channery loam, wk c sbk, friable, sl. sticky
30 – 37 inches	5YR5/3, v. channery clay loam, wk c sbk, sticky when wet, redox (f2d)
37	Rippable Bedrock

Limiting Zone: 30 inches SHWT; Bedrock 37 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit – D22 (Area II)

-3 – 0 inches	Organic, fibric
0 – 5 inches	7.5YR3/3, v. channery silt loam, wk fine granular, v. friable
5 – 13 inches	7.5YR4/4 / 7.5YR4/6, v. channery silt loam/loam, wk f sbk, v. friable
13 – 27 inches	7.5YR5/4, v. channery loam, wk m sbk, friable
27 – 31 inches	5YR5/4, v. channery loam, wk c sbk, friable, sl. sticky
31 – 40 inches	5YR5/3, ext. channery silt loam, wk c sbk, friable , sl. sticky when wet, redox (f2d)
40	Rippable Bedrock

Limiting Zone –31 inches SHWT; Bedrock 40 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit – D23 (Area II)

-4 – 0 inches	Organic, fibric
0 – 6 inches	7.5YR3/3, v. channery silt loam, wk fine granular, v. friable
6 – 15 inches	7.5YR4/4 / 7.5YR4/6, v. channery silt loam/loam, wk f sbk, v. friable
15 – 27 inches	7.5YR5/4, v. channery loam, wk m sbk, friable
27 – 35 inches	5YR5/3, ext. channery silt loam, wk c sbk, friable , sl. sticky when wet, redox (f2d)
35	Rippable Bedrock

Limiting Zone –27 inches SHWT; Bedrock 35 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit – D24 (Area II)

-2 – 0 inches	Organic, fibric
0 – 5 inches	7.5YR3/3, v. channery silt loam, wk fine granular, v. friable
5 – 17 inches	7.5YR4/4 / 7.5YR4/6, v. channery silt loam/loam, wk f sbk, v. friable
17 – 22 inches	7.5YR5/4, v. channery loam, wk m sbk, friable
22 – 30 inches	5YR5/4, v. channery silt loam, wk m sbk, friable
30 - 37 inches	5YR5/3, ext. channery silt loam, wk c sbk, friable , sl. sticky when wet
37	Rippable Bedrock

Limiting Zone –Bedrock 37 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit – D25 (Area II)

-3 – 0 inches Organic, fibric
0 – 6 inches 7.5YR3/3, channery silt loam, wk fine granular, v. friable
6– 18 inches 7.5YR4/4, channery silt loam, wk f sbk, v. friable
18 – 24 inches 7.5YR5/4, channery loam, wk f sbk, friable
24 – 38 inches 7.5YR5/3, channery silt loam, wk m sbk, friable, sl. sticky
38 - 42 inches 5YR5/3, ext. stony silt loam, wk c sbk, friable , sl. sticky when wet, redox (f2d)
45 inches Rippable Bedrock

Limiting Zone –Seasonal High Water Table 38 inches; Bedrock 42 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit – D26 (Area II)

-3 – 0 inches Organic, fibric
0 – 5 inches 7.5YR3/3, channery silt loam, wk fine granular, v. friable
5– 12 inches 7.5YR4/4, channery silt loam, wk f sbk, v. friable
12 – 26 inches 7.5YR5/4, channery loam, wk f sbk, friable
26 – 39 inches 7.5YR5/3, channery silt loam, wk m sbk, friable, sl. sticky
39 - 45 inches 5YR5/3, ext. channery silt loam, wk c sbk, friable , sl. sticky when wet, redox (f2d)
45 inches Rippable Bedrock

Limiting Zone –Seasonal High Water Table 39 inches; Bedrock 45 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit – D26A (Area IV)

Unsuitable: Fractured Rock at 9 to 12 inches; competent rock at 18 to 24 inches

Test Pit – D27 (Area IV)

Unsuitable: Urban Fill (Trash)/ Pavement

Test Pit – D28 (Area IV)

Unsuitable: Fractured Rock at 9 to 12 inches; competent rock at 18 to 24 inches

Test Pit – D29 (Area IV)

-3 – 0 inches Organic, fibric
0 – 6 inches 7.5YR3/3, v. channery silt loam, wk fine granular, v. friable
6 – 15 inches 7.5YR4/4, v channery silt loam, wk f sbk, v. friable
15 – 23 inches 7.5YR5/4, v channery loam, wk f sbk, friable
23 – 32 inches 7.5YR5/4, v ch sandy loam, wk c sbk, friable,
32 - 40 inches 7.5YR5/3, v ch sandy loam, wk c sbk, friable, redox (c2d)

Limiting Zone –32 inches SHWT
System – Drip and spray irrigation approach generally suitable.

Test Pit – D30A(Area IV)

Unsuitable: Fractured Rock at 9 to 12 inches; competent rock at 18 to 24 inches

Test Pit – D30B(Area IV) – Southside of Road

-2 – 0 inches	Organic, fibric
0 – 5 inches	7.5YR3/3, channery silt loam, wk fine granular, v. friable
5– 12 inches	7.5YR4/4, channery silt loam, wk f sbk, v. friable
12 – 22 inches	7.5YR5/4, channery loam, wk f sbk, friable
22 – 33 inches	7.5YR5/4, channery silt loam, wk m sbk, friable, sl. sticky
33 - 45 inches	7.5YR5/3, v ch silt loam, wk c sbk, friable , sl. sticky when wet, redox (c2d)

Limiting Zone –Seasonal High Water Table 33 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit – D31 (Area IV)

Unsuitable: Urban Fill (Trash)

Test Pit – D32 (Area IV)

Unsuitable: Compacted/ Disturbed Area

Test Pit – D33 (Area IV) – closer to paved road

-2 – 0 inches	Organic, fibric
0 – 4 inches	7.5YR3/3, channery silt loam, wk fine granular, v. friable
4 – 9 inches	7.5YR4/6, channery silt loam, wk f sbk, v. friable
9 – 12 inches	7.5YR4/4, channery silt loam, wk f sbk, friable
12 – 22 inches	7.5YR5/4, channery silt loam, wk m sbk, friable, sl. sticky
22 - 27 inches	5YR5/3, v ch sandy loam, wk c sbk, firm , sl. sticky when wet, redox (f2d)
27 - 30 inches	Rock

Limiting Zone –Seasonal High Water Table 22 inches; Bedrock at 27 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit – D34 (Area IV) – off paved road

-2 – 0 inches	Organic, fibric
0 – 5 inches	7.5YR3/3, channery silt loam, wk fine granular, v. friable
5 – 8 inches	7.5YR4/6, channery silt loam, wk f sbk, v. friable
8 – 14 inches	7.5YR4/4, channery silt loam, wk f sbk, friable
14 – 23 inches	7.5YR5/4, channery silt loam, wk m sbk, friable, sl. sticky
23 - 36 inches	7.5YR5/3, v ch sandy loam, wk c sbk, firm , sl. sticky when wet, redox (c1d)
36	Rock

Limiting Zone –Seasonal High Water Table 23 inches; Bedrock at 36 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit – D35 (Area IV)

Unsuitable: Compacted/ Disturbed Area

Test Pit – D36 (Area IV)

-2 – 0 inches Organic, fibric
0 – 5 inches 7.5YR3/3, channery silt loam, wk fine granular, v. friable
5 – 11 inches 7.5YR4/6, channery silt loam, wk f sbk, v. friable
11 – 22 inches 7.5YR4/4, channery silt loam, wk f sbk, friable
22– 36 inches 7.5YR5/4, v. ch loam, wk m sbk, friable, sl. sticky (f2d)
36 - 45 inches 5YR5/3, v ch sandy loam, wk c sbk, firm , sl. sticky when wet, redox (c2d)

Limiting Zone –Seasonal High Water Table 22 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit – D37 (Area IV) – edge of cleared area

-2 – 0 inches Organic, fibric
0 – 5 inches 7.5YR3/3/ 5YR5/2, channery silt loam / loam, mod fine granular, v. friable
5 – 9 inches 7.5YR4/6, channery silt loam, wk f sbk, v. friable
9 – 22 inches 7.5YR5/4, channery silt loam, wk f – m sbk, friable
22– 37 inches 7.5YR5/3, v. ch loam, wk c sbk, friable, sl. sticky, redox (f2d)

Limiting Zone –Seasonal High Water Table 22 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit – D38 (Area IV) – edge of cleared area

-2 – 0 inches Organic, fibric
0 – 5 inches 7.5YR3/3, channery silt loam, mod fine granular, v. friable
5 – 10 inches 7.5YR4/4, channery silt loam, wk f sbk, v. friable
10 – 22 inches 7.5YR5/4, channery silt loam, wk m sbk, friable
22– 35 inches 5YR5/3, v. ch sandy loam, wk c sbk, friable
35 – 40 inches 5YR5/3, v. ch sandy loam, wk c sbk, friable, redox (f2d)

Limiting Zone –Seasonal High Water Table 35 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit – D39 (Area IV) – edge of cleared area

-2 – 0 inches Organic, fibric
0 – 5 inches 7.5YR3/3, channery silt loam, mod fine granular, v. friable
5 – 9 inches 7.5YR4/6, channery silt loam, wk f sbk, v. friable
9 – 15 inches 7.5YR4/4, channery silt loam, wk m sbk, friable
15– 23 inches 7.5YR5/4, v. ch loam, wk m sbk, friable
23 – 36 inches 7.5YR5/3, v. ch sandy loam/loam, wk c sbk, sticky, redox (c2d)

Limiting Zone –Seasonal High Water Table 23 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit – D40 (Area IV)

-2 – 0 inches	Organic, fibric
0 – 5 inches	7.5YR3/3, channery silt loam, mod fine granular, v. friable
5 – 10 inches	7.5YR4/6, channery silt loam, wk f sbk, v. friable
10 – 22 inches	7.5YR4/4, channery silt loam, wk m sbk, friable
22 – 32 inches	7.5YR5/4, v. ch loam, wk m sbk, friable
32 – 40 inches	7.5YR5/3, v. ch silt loam, wk c sbk, sticky, redox (f2d)

Limiting Zone –Seasonal High Water Table 32 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit – D41 (Area IV)

-3 – 0 inches	Organic, fibric
0 – 4 inches	7.5YR3/3, channery silt loam, mod fine granular, v. friable
4 – 9 inches	7.5YR4/6, channery silt loam, wk f sbk, v. friable
9 – 17 inches	7.5YR4/4, channery silt loam, wk m sbk, friable
17 – 22 inches	7.5YR5/4, v. ch loam, wk m sbk, friable
22 – 30 inches	7.5YR5/4, v. ch loam, wk m sbk, friable- sl sticky when wet
30 – 35 inches	5YR5/3, v. ch silt loam, wk c sbk, sticky, redox (f2d)
35	Rock

Limiting Zone –Seasonal High Water Table 30 inches; Bedrock at 35 inches
System – Drip and spray irrigation approach generally suitable.

Test Pit – D42 (Area IV)

-3 – 0 inches	Organic, fibric
0 – 5 inches	7.5YR3/3, channery silt loam, mod fine granular, v. friable
5 – 12 inches	7.5YR4/6, channery silt loam, wk f sbk, v. friable
12 – 22 inches	7.5YR4/4, channery silt loam, wk m sbk, friable
22 – 30 inches	7.5YR5/4, v. ch loam, wk m sbk, friable
30 – 38 inches	variegated, v. ch sandy loam, massive, non-sticky
38	Rock

Limiting Zone –Seasonal High Water Table 30 inches; Bedrock at 35 inches
System – Drip and spray irrigation approach generally suitable.

Buried water line along the north side of test pit.

END
Reviewed by Mr. Brian Oram – 10/4/2022 (Ok to release for the purpose of confirmation testing)
Reviewed by Mr. Brian Oram – 10/27/2022 (Additional Confirmation Testing Needed)
Reveiwed by Mr. Brian Oram - 1/23/2023 (Ok to release for the purpose of confirmation testing)
Reviewed by Mr. Brian Oram – 2/17/2023 (OK RELEASE TO PADEP or Local Agency)

Field Data Area I

Test Pit	TP1	TP3	TP4	TP5	TP7	TP26	TP27	TP28
HC #	AR1-HC1	AR1-HC2	AR1-HC3	AR1-HC4	AR1-HC5	AR1-HC6	AR1-HC7	AR1-HC8
Install Depth (in)	29	22	26	29	15	12	12	12
Pipe Length (in)	30	20	24	24	6	12	6	6
Presoak (1 hour)	4.5	4.75	3.875	3.75	4.125	3.125	2.125	4.875
Presoak (1 hour)	3.125	4.25	4	3.125	2.75	3	1.875	4.5
1	2.25	2.75	3.25	2.5	1.25	0.75	1.125	1.75
2	2.125	2.625	2.25	1.875	0.75	0.625	1	1.25
3	1.75	2.5	1.875	1.75	0.625	0.5	0.75	0.875
4	1.875	1.625	1.5	1.625	0.5	0.5	0.875	0.625
5	1.625	1.25	1.25	1.375	0.375	0.375	0.625	0.5
6	1.5	1.25	1.25	1.375	0.25	0.375	0.5	0.625
7	1.625	1.125	1.375	1.5	0.375	0.5	0.625	0.5
8	1.5	1.125	1.25	1.375	0.25	0.375	0.5	0.5
Final Drop (in)	1.5	1.125	1.25	1.375	0.25	0.375	0.5	0.5
Interval (min)	30	30	30	30	10	10	20	15

Field Data Area II

Test Pit	TP25	TP9	TP10	TP11	TP12	TP13	TP14	TP15
HC #	AR2-HC1	AR2-HC2	AR2-HC3	AR2-HC4	AR2-HC5	AR2-HC6	AR2-HC7	AR2-HC8
Install Depth (in)	22	24	22	20	20	20	20	20
Pipe Length (in)	36	32	22	30	24	24	24	24
Presoak (1 hour)	7.25	5.5	4.75	6.25	Dry	8.75	7.125	6.875
Presoak (1 hour)	6.875	6.25	4.125	6.125	12.5	8.125	6.5	6.125
1	3.125	2.75	1.75	1.875	3.125	2.5	2.25	2.625
2	2.25	2.875	1.625	2.25	3.25	2.25	2.125	2.25
3	2.5	2.25	1.125	1.875	2.875	2.125	2.25	2.125
4	1.875	2	1.25	1.75	2.5	1.875	1.875	1.875
5	1.75	1.875	1.375	1.625	2.75	1.625	2.125	1.75
6	1.875	1.75	1.25	1.5	2.625	1.75	1.75	1.625
7	1.75	1.625	1.25	1.625	2.75	1.75	1.875	1.75
8	1.75	1.625	1.125	1.5	2.5	1.625	1.75	1.5
Final Drop (in)	1.75	1.625	1.125	1.5	2.5	1.625	1.75	1.5
Interval (min)	30	30	30	30	15	20	20	20

Field Data Area III

Test Pit	TP24	TP16	TP18	TP19	TP22	TP20	TP23	TP-D3	TP-D7	TP-D9
HC #	A3-HC1	A3-HC2	A3-HC3	A3-HC4	A3-HC5	A3-HC6	A3-HC7	A3-HC8	A3-HC9	A3-HC10
Install Depth (in)	30	38	41	41.5	40	46	38	36	40	36
Pipe Length (in)	30	36	36.5	35.5	38.25	41.25	40	38.75	41.25	36.5
Presoak (1 hour)	7.5	5.75	4.75	6.5	3.75	3.5	3.75	3.5	4.75	3.625
Presoak (1 hour)	6.25	4	3.5	6.25	3.875	3.25	3.125	3	4	3.5
1	1.875	1.75	1.875	3.125	1.75	1.25	1.75	1.5	1.75	1.875
2	1.75	1.625	1.625	2.75	1.5	1.375	1.625	1.25	1.625	1.75
3	1.25	1.5	1.625	2.125	1.625	1.125	1.625	1.25	1.5	1.625
4	1.375	1.5	1.75	2.125	1.375	1.25	1.5	1.25	1.375	1.5
5	1.25	1.25	1.125	1.875	1.25	1.375	1.625	1.375	1.375	1.125
6	0.875	1.125	1	1.75	1.125	1.125	1.25	1.125	1.625	1.125
7	1	1.125	1	1.875	1.25	1.25	1.25	1.25	1.5	1.25
8	0.875	1.25	1.125	1.75	1.125	1.375	1.25	1.125	1.5	1.125
Final Drop (in)	0.875	1.125	1	1.75	1.125	1.125	1.25	1.125	1.375	1.125
Interval (min)	30	30	30	30	30	30	30	30	30	30

Field Data Area IV

Test Pit	TP29	TP34	TP36	TP39	TP41
HC #	A4-HC1	A4-HC2	A4-HC3	A4-HC4	A4-HC5
Install Depth (in)	35	30	30	25	30
Pipe Length (in)	36.5	35.75	35.5	35.5	36.5
Presoak (1 hour)	5.125	6.75	5.625	4.25	4.5
Presoak (1 hour)	3.75	5.5	4.25	4.75	3.125
1	1.5	1.625	1.5	1.375	1.5
2	1.25	1.5	1.25	1.25	1.25
3	1.375	1.25	1.125	1.375	1.375
4	1.25	1.375	1.25	1.25	1.375
5	1	1.5	1.25	1.375	1.375
6	1.25	1.25	1.25	1.5	1.25
7	1	1.5	1.375	1.125	1.25
8	1.125	1.125	1	1.125	1.5
Final Drop (in)	1	1.125	1	1.125	1.25
Interval (min)	30	30	30	30	30

Hawthorne Project Site 4101N 7511 W

Site: Stroudsburg, PA 368596 Site 170

	Precip (0.5)	Precip (0.9)
January	3.45	4.591
February	2.79	3.713
March	3.61	4.804
April	3.57	4.751
May	4.56	6.069
June	4.15	5.523
July	3.95	5.257
August	3.99	5.310
September	4.38	5.829
October	3.49	4.645
November	3.88	5.164
December	3.34	4.445
Annual	49.58	60.1
Sum	45.16	60.1

Source: Climatography of the United States, Pennsylvania Monthly Statioin Climate Summaries, NO 20, 1971 - 2000.

	Temperature (F)	Temperature (C)
January	25.8	-3.44
February	27.8	-2.33
March	37.5	3.06
April	48.4	9.11
May	58.8	14.89
June	67.3	19.61
July	71.9	22.17
August	70.2	21.22
September	62.1	16.72
October	50.7	10.39
November	40.3	4.61
December	30.9	-0.61

	P (%)	Sunshine (hours)	Day	Sunshine/day	Corr Factor
January	6.68	292.58	31	9.44	0.7865
February	6.69	292.8	28	10.46	0.8714
March	8.31	363.98	31	11.74	0.9784
April	8.96	392.45	30	13.08	1.0901
May	10.07	441.07	31	14.23	1.1857
June	10.17	445.23	30	14.84	1.2368
July	10.29	450.48	31	14.53	1.2110
August	9.59	419.82	31	13.54	1.1285
September	8.4	367.92	30	12.26	1.0220
October	7.73	338.36	31	10.91	0.9096
November	6.68	292.37	30	9.75	0.8121
December	6.47	283.17	31	9.13	0.7612
	100.04	4380.23			

Hawthorne
ET Calculation

Month	T (Celsuis)	I	a	PET (MM)	F	Grass Adj PET (mm)	Grass Adj PET (in)	Crop CCF	Forest PET (in)
January	-3.44	0	1.199286	0	0.7865	0.00	0	1	0
February	-2.33	0		0	0.8714	0.00	0	1	0
March	3.06	0.474445		10.15	0.9784	9.93	0.39	1	0.39
April	9.11	2.480564		37.61	1.0901	41.00	1.61	1	1.61
May	14.89	5.217626		67.78	1.1857	80.36	3.16	1.1	3.48
June	19.61	7.917859		94.31	1.2368	116.64	4.59	1.15	5.28
July	22.17	9.531249		109.24	1.2110	132.28	5.21	1.15	5.99
August	21.22	8.923203		103.68	1.1285	117.01	4.61	1.15	5.30
September	16.72	6.220517		77.91	1.0220	79.62	3.13	1.1	3.45
October	10.39	3.025834		44.02	0.9096	40.04	1.58	1	1.58
November	4.61	0.884629		16.62	0.8121	13.50	0.53	1	0.53
December	-0.61	0		0	0.7612	0.00	0	1	0
Annual		44.67592					24.82		27.61

Month	Grass Adj PET (in)	Forest PET (in)
January	0	0
February	0	0
March	0.39	0.39
April	1.61	1.61
May	3.16	3.48
June	4.59	5.28
July	5.21	5.99
August	4.61	5.30
September	3.13	3.45
October	1.58	1.58
November	0.53	0.53
December	0	0
Annual	24.82	27.61

Area I - Loading Analysis

Hawthorne

Ksp 0.126627741

Drip

Ksp	0.126627741	inch/hr	10% Ksp		Month		
Drip	Rainfall(0.9)	Forested	Lwp (10)		WW (10)	WW (10)	WW (10)
Month	(inches)	ET (inches)	(inches)	Days	Inches	inches/day	inches/wk
January	4.59	0	9.42	31	4.83	0.16	1.09
February	3.71	0	8.51	28	4.80	0.17	1.20
March	4.80	0.39	9.42	31	5.01	0.16	1.13
April	4.75	1.61	9.12	30	5.98	0.20	1.40
May	6.07	3.48	9.42	31	6.83	0.22	1.54
June	5.52	5.28	9.12	30	8.88	0.30	2.07
July	5.26	5.99	9.42	31	10.15	0.33	2.29
August	5.31	5.30	9.42	31	9.41	0.30	2.12
September	5.83	3.45	9.12	30	6.74	0.22	1.57
October	4.64	1.58	9.42	31	6.35	0.20	1.43
November	5.16	0.53	9.12	30	4.48	0.15	1.05
Decemeber	4.44	0.00	9.42	31	4.98	0.16	1.12
Total	60.10	27.61			78.43		

Hawthorne

Ksp 0.126627741

Drip

Ksp	0.126627741	inch/hr	15% Ksp		Month		
Drip	Rainfall(0.9)	Forested	Lwp (10)		WW (15)	WW (15)	WW (15)
Month	(inches)	ET (inches)	(inches)	Days	Inches	inches/day	inches/wk
January	4.59	0	14.13	31	9.54	0.31	2.15
February	3.71	0	12.76	28	9.05	0.32	2.26
March	4.80	0.39	14.13	31	9.72	0.31	2.19
April	4.75	1.61	13.68	30	10.54	0.35	2.46
May	6.07	3.48	14.13	31	11.54	0.37	2.61
June	5.52	5.28	13.68	30	13.43	0.45	3.13
July	5.26	5.99	14.13	31	14.86	0.48	3.36
August	5.31	5.30	14.13	31	14.12	0.46	3.19
September	5.83	3.45	13.68	30	11.29	0.38	2.64
October	4.64	1.58	14.13	31	11.06	0.36	2.50
November	5.16	0.53	13.68	30	9.04	0.30	2.11
Decemeber	4.44	0	14.13	31	9.69	0.31	2.19
Total	60.10	27.61			133.90		

Area II Loading Analysis

Hawthorne

Ksp 0.11769798

Drip

Ksp	0.11769798	inch/hr	10% Ksp		Month		
Drip	Rainfall(0.9)	Forested	Lwp (10)		WW (10)	WW (10)	WW (10)
Month	(inches)	ET (inches)	(inches)	Days	Inches	inches/day	inches/wk
January	4.59	0	8.76	31	4.17	0.13	0.94
February	3.71	0	7.91	28	4.20	0.15	1.05
March	4.80	0.39080368	8.76	31	4.34	0.14	0.98
April	4.75	1.614151847	8.47	30	5.34	0.18	1.25
May	6.07	3.480299434	8.76	31	6.17	0.20	1.39
June	5.52	5.2810654	8.47	30	8.23	0.27	1.92
July	5.26	5.989244359	8.76	31	9.49	0.31	2.14
August	5.31	5.297631056	8.76	31	8.74	0.28	1.97
September	5.83	3.448140454	8.47	30	6.09	0.20	1.42
October	4.64	1.576359362	8.76	31	5.69	0.18	1.28
November	5.16	0.531355532	8.47	30	3.84	0.13	0.90
Decemeber	4.44	0	8.76	31	4.31	0.14	0.97
Total	60.10	27.61			70.61		

Hawthorne

Ksp 0.11769798

Drip

Ksp	0.11769798	inch/hr	15% Ksp		Month		
Drip	Rainfall(0.9)	Forested	Lwp (10)		WW (15)	WW (15)	WW (15)
Month	(inches)	ET (inches)	(inches)	Days	Inches	inches/day	inches/wk
January	4.59	0	13.14	31	8.54	0.28	1.93
February	3.71	0	11.86	28	8.15	0.29	2.04
March	4.80	0.39	13.14	31	8.72	0.28	1.97
April	4.75	1.61	12.71	30	9.57	0.32	2.23
May	6.07	3.48	13.14	31	10.55	0.34	2.38
June	5.52	5.28	12.71	30	12.47	0.42	2.91
July	5.26	5.99	13.14	31	13.87	0.45	3.13
August	5.31	5.30	13.14	31	13.12	0.42	2.96
September	5.83	3.45	12.71	30	10.33	0.34	2.41
October	4.64	1.58	13.14	31	10.07	0.32	2.27
November	5.16	0.53	12.71	30	8.08	0.27	1.89
Decemeber	4.44	0	13.14	31	8.69	0.28	1.96
Total	60.10	27.61			122.16		

Area III Loading Analysis

Hawthorne
Ksp 0.069343
Drip

Ksp	0.069343	inch/hr	10% Ksp		Month		
Drip	Rainfall(0.9)	Forested	Lwp (10)		WW (10)	WW (10)	WW (10)
Month	(inches)	ET (inches)	(inches)	Days	Inches	inches/day	inches/wk
January	4.59	0	5.16	31	0.57	0.02	0.13
February	3.71	0	4.66	28	0.95	0.03	0.24
March	4.80	0.39	5.16	31	0.75	0.02	0.17
April	4.75	1.61	4.99	30	1.86	0.06	0.43
May	6.07	3.48	5.16	31	2.57	0.08	0.58
June	5.52	5.28	4.99	30	4.75	0.16	1.11
July	5.26	5.99	5.16	31	5.89	0.19	1.33
August	5.31	5.30	5.16	31	5.15	0.17	1.16
September	5.83	3.45	4.99	30	2.61	0.09	0.61
October	4.64	1.58	5.16	31	2.09	0.07	0.47
November	5.16	0.53	4.99	30	0.36	0.01	0.08
Decemeber	4.44	0.00	5.16	31	0.71	0.02	0.16
Total	60.10	27.61			28.25		

Hawthorne
Ksp 0.069343
Drip

Ksp	0.069343	inch/hr	15% Ksp		Month		
Drip	Rainfall(0.9)	Forested	Lwp (10)		WW (15)	WW (15)	WW (15)
Month	(inches)	ET (inches)	(inches)	Days	Inches	inches/day	inches/wk
January	4.59	0	7.74	31	3.15	0.10	0.71
February	3.71	0	6.99	28	3.28	0.12	0.82
March	4.80	0.39	7.74	31	3.33	0.11	0.75
April	4.75	1.61	7.49	30	4.35	0.15	1.02
May	6.07	3.48	7.74	31	5.15	0.17	1.16
June	5.52	5.28	7.49	30	7.25	0.24	1.69
July	5.26	5.99	7.74	31	8.47	0.27	1.91
August	5.31	5.30	7.74	31	7.73	0.25	1.74
September	5.83	3.45	7.49	30	5.11	0.17	1.19
October	4.64	1.58	7.74	31	4.67	0.15	1.05
November	5.16	0.53	7.49	30	2.86	0.10	0.67
Decemeber	4.44	0	7.74	31	3.29	0.11	0.74
Total	60.10	27.61			58.63		

Area IV Loading Analysis

Hawthorne
Ksp 0.070918075
Drip

Ksp	0.070918075	inch/hr	10% Ksp		Month		
Drip	Rainfall(0.9)	Forested	Lwp (10)		WW (10)	WW (10)	WW (10)
Month	(inches)	ET (inches)	(inches)	Days	Inches	inches/day	inches/wk
January	4.59	0	5.28	31	0.68	0.02	0.15
February	3.71	0	4.77	28	1.05	0.04	0.26
March	4.80	0.39	5.28	31	0.86	0.03	0.19
April	4.75	1.61	5.11	30	1.97	0.07	0.46
May	6.07	3.48	5.28	31	2.69	0.09	0.61
June	5.52	5.28	5.11	30	4.86	0.16	1.13
July	5.26	5.99	5.28	31	6.01	0.19	1.36
August	5.31	5.30	5.28	31	5.26	0.17	1.19
September	5.83	3.45	5.11	30	2.73	0.09	0.64
October	4.64	1.58	5.28	31	2.21	0.07	0.50
November	5.16	0.53	5.11	30	0.47	0.02	0.11
Decemeber	4.44	0.00	5.28	31	0.83	0.03	0.19
Total	60.10	27.61					

Hawthorne
Ksp 0.070918075
Drip

Ksp	0.070918075	inch/hr	15% Ksp		Month		
Drip	Rainfall(0.9)	Forested	Lwp (15)		WW (15)	WW (15)	WW (15)
Month	(inches)	ET (inches)	(inches)	Days	Inches	inches/day	inches/wk
January	4.59	0	7.91	31	3.32	0.11	0.75
February	3.71	0	7.15	28	3.44	0.12	0.86
March	4.80	0.39	7.91	31	3.50	0.11	0.79
April	4.75	1.61	7.66	30	4.52	0.15	1.06
May	6.07	3.48	7.91	31	5.33	0.17	1.20
June	5.52	5.28	7.66	30	7.42	0.25	1.73
July	5.26	5.99	7.91	31	8.65	0.28	1.95
August	5.31	5.30	7.91	31	7.90	0.25	1.78
September	5.83	3.45	7.66	30	5.28	0.18	1.23
October	4.64	1.58	7.91	31	4.85	0.16	1.09
November	5.16	0.53	7.66	30	3.03	0.10	0.71
Decemeber	4.44	0	7.91	31	3.47	0.11	0.78
Total	60.10	27.61					

Field Data Area I

Test Pit	TP1	TP3	TP4	TP5	TP7	TP26	TP27	TP28
HC #	AR1-HC1	AR1-HC2	AR1-HC3	AR1-HC4	AR1-HC5	AR1-HC6	AR1-HC7	AR1-HC8
Install Depth (in)	29	22	26	29	15	12	12	12
Pipe Length (in)	30	20	24	24	6	12	6	6
Presoak (1 hour)	4.5	4.75	3.875	3.75	4.125	3.125	2.125	4.875
Presoak (1 hour)	3.125	4.25	4	3.125	2.75	3	1.875	4.5
1	2.25	2.75	3.25	2.5	1.25	0.75	1.125	1.75
2	2.125	2.625	2.25	1.875	0.75	0.625	1	1.25
3	1.75	2.5	1.875	1.75	0.625	0.5	0.75	0.875
4	1.875	1.625	1.5	1.625	0.5	0.5	0.875	0.625
5	1.625	1.25	1.25	1.375	0.375	0.375	0.625	0.5
6	1.5	1.25	1.25	1.375	0.25	0.375	0.5	0.625
7	1.625	1.125	1.375	1.5	0.375	0.5	0.625	0.5
8	1.5	1.125	1.25	1.375	0.25	0.375	0.5	0.5
Final Drop (in)	1.5	1.125	1.25	1.375	0.25	0.375	0.5	0.5
Interval (min)	30	30	30	30	10	10	20	15

Field Data Area II

Test Pit	TP25	TP9	TP10	TP11	TP12	TP13	TP14	TP15
HC #	AR2-HC1	AR2-HC2	AR2-HC3	AR2-HC4	AR2-HC5	AR2-HC6	AR2-HC7	AR2-HC8
Install Depth (in)	22	24	22	20	20	20	20	20
Pipe Length (in)	36	32	22	30	24	24	24	24
Presoak (1 hour)	7.25	5.5	4.75	6.25	Dry	8.75	7.125	6.875
Presoak (1 hour)	6.875	6.25	4.125	6.125	12.5	8.125	6.5	6.125
1	3.125	2.75	1.75	1.875	3.125	2.5	2.25	2.625
2	2.25	2.875	1.625	2.25	3.25	2.25	2.125	2.25
3	2.5	2.25	1.125	1.875	2.875	2.125	2.25	2.125
4	1.875	2	1.25	1.75	2.5	1.875	1.875	1.875
5	1.75	1.875	1.375	1.625	2.75	1.625	2.125	1.75
6	1.875	1.75	1.25	1.5	2.625	1.75	1.75	1.625
7	1.75	1.625	1.25	1.625	2.75	1.75	1.875	1.75
8	1.75	1.625	1.125	1.5	2.5	1.625	1.75	1.5
Final Drop (in)	1.75	1.625	1.125	1.5	2.5	1.625	1.75	1.5
Interval (min)	30	30	30	30	15	20	20	20

Field Data Area III

Test Pit	TP24	TP16	TP18	TP19	TP22	TP20	TP23	TP-D3	TP-D7	TP-D9
HC #	A3-HC1	A3-HC2	A3-HC3	A3-HC4	A3-HC5	A3-HC6	A3-HC7	A3-HC8	A3-HC9	A3-HC10
Install Depth (in)	30	38	41	41.5	40	46	38	36	40	36
Pipe Length (in)	30	36	36.5	35.5	38.25	41.25	40	38.75	41.25	36.5
Presoak (1 hour)	7.5	5.75	4.75	6.5	3.75	3.5	3.75	3.5	4.75	3.625
Presoak (1 hour)	6.25	4	3.5	6.25	3.875	3.25	3.125	3	4	3.5
1	1.875	1.75	1.875	3.125	1.75	1.25	1.75	1.5	1.75	1.875
2	1.75	1.625	1.625	2.75	1.5	1.375	1.625	1.25	1.625	1.75
3	1.25	1.5	1.625	2.125	1.625	1.125	1.625	1.25	1.5	1.625
4	1.375	1.5	1.75	2.125	1.375	1.25	1.5	1.25	1.375	1.5
5	1.25	1.25	1.125	1.875	1.25	1.375	1.625	1.375	1.375	1.125
6	0.875	1.125	1	1.75	1.125	1.125	1.25	1.125	1.625	1.125
7	1	1.125	1	1.875	1.25	1.25	1.25	1.25	1.5	1.25
8	0.875	1.25	1.125	1.75	1.125	1.375	1.25	1.125	1.5	1.125
Final Drop (in)	0.875	1.125	1	1.75	1.125	1.125	1.25	1.125	1.375	1.125
Interval (min)	30	30	30	30	30	30	30	30	30	30

Field Data Area IV

Test Pit	TP29	TP34	TP36	TP39	TP41
HC #	A4-HC1	A4-HC2	A4-HC3	A4-HC4	A4-HC5
Install Depth (in)	35	30	30	25	30
Pipe Length (in)	36.5	35.75	35.5	35.5	36.5
Presoak (1 hour)	5.125	6.75	5.625	4.25	4.5
Presoak (1 hour)	3.75	5.5	4.25	4.75	3.125
1	1.5	1.625	1.5	1.375	1.5
2	1.25	1.5	1.25	1.25	1.25
3	1.375	1.25	1.125	1.375	1.375
4	1.25	1.375	1.25	1.25	1.375
5	1	1.5	1.25	1.375	1.375
6	1.25	1.25	1.25	1.5	1.25
7	1	1.5	1.375	1.125	1.25
8	1.125	1.125	1	1.125	1.5
Final Drop (in)	1	1.125	1	1.125	1.25
Interval (min)	30	30	30	30	30