Appendix R-5
SONIR Computer Model Results, GEE Equestrian Use Alternative

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

NAME OF PROJECT	The Hills at Southampton
	GEE - Equestrian Alternative; 88 units; STP; no fertilization

DATA INPUT FIELD

A	Site Recharge Parameters	Value	Units
1	Area of Site	591.00	acres
2	Precipitation Rate	49.90	inches
3	Acreage of Landscaping	0.00	acres
4	Fraction of Land in above	0.000	fraction
5	Evapotranspiration from above	23.00	inches
6	Runoff from above	0.50	inches
7	Acreage of Unfertilized Landscape	21.77	acres
8	Fraction of above	0.037	fraction
9	Evapotranspiration from above	23.90	inches
10	Runoff from above	0.50	inches
11	Acreage of Unvegetated/Dirt Roads	8.92	acres
12	Fraction of above	0.015	fraction
13	Evapotranspiration from above	6.36	inches
14	Runoff from above	1.05	inches
15	Acreage of Water/Ponds/Wetlands	2.14	acres
16	Fraction of Site in above	0.004	fraction
17	Evaporation from above	30.00	inches
18	Makeup Water (if applicable)	0.00	inches
19	Acreage of Natural/Natural Reveg	537.65	acres
20	Fraction of above	0.910	fraction
21	Evapotranspiration from above	23.00	inches
22	Runoff from above	0.35	inches
23	Acreage of Impervious/Paved/Bldgs	19.12	acres
24	Fraction of Land in above	0.032	fraction
25	Evapotrans. from above	4.99	inches
26	Runoff from Impervious	0.00	inches
23	Acreage of Wetlands	1.40	acres
24	Fraction of Land in above	0.002	fraction
25	Evapotrans. from above	30.00	inches
26	Runoff from above	0.00	inches
27	Acreage of Land Irrigated	0.00	acres
28	Fraction of Land Irrigated	0.000	fraction
29	Irrigation Rate	24.00	inches
30	Number of Dwellings	88	units
31	Water Use per Dwelling	300	gal/day
32	Wastewater Design Flow (units)	26,400	gal/day
33	Wastewater Design Flow (total)	5,370	gal/day
34	Adjusted WW Design Flow (total)	5,370	gal/day

B	Nitrogen Budget Parameters	Value	Units
1	Persons per Dwelling	2.90	persons
2	Nitrogen per Person per Year	10.0	lbs
3	a. Sanitary Nitrogen Leaching Rate	84%	percent
3	b. Treated Sanitary Nitrogen Leaching Rate	100%	percent
4	Fertilized Land (Landscaping)	0.00	acres
5	Fertilizer Application Rate (for above)	1.00	lbs/1000 sq ft
6	Fertilizer Nitrogen Leaching Rate (for above)	20%	percent
7	Fertilized Land (Other)	0.00	acres
8	Fertilizer Application Rate (for above)	2.50	lbs/1000 sq ft
9	Fertilizer Nitrogen Leaching Rate (for above)	20%	percent
10	Outdoor Cat Population	0.74	pets/dwelling
11	Cat Waste Nitrogen Load	3.22	lbs/pet/year
12	Outdoor Dog Population	1.40	pets/dwelling
13	Dog Waste Nitrogen Load	4.29	lbs/pet/year
14	Pet Waste Nitrogen Leaching Rate	25%	percent
15	Adjusted Pet Waste (days/year occupied)	100%	percent
16	Area of Land Irrigated	21.77	acres
17	Irrigation Rate	24.00	inches
18	Irrigation Nitrogen Leaching Rate	10%	percent
19	Atmospheric Nitrogen Application/Load	0.04	lbs/1000 sq ft
20	Atmos. N Leaching Rate (Natural/Wetlands)	25%	percent
21	Atmos. N Leaching Rate (Turf 30%; Golf 20%)	20%	percent
22	Atmos. N. Leaching Rate (Ag; Imperv; Other)	40%	percent
23	Nitrogen in Water Supply	2.00	mg/l
24	Nitrogen in Sanitary Flow -1	50.00	mg/l
25	Nitrogen in Sanitary Flow -2	10.00	mg/l
26	Number of Horses	132	horses
27	Tons Manure/Year/Horse	9.1	tons
28	Pounds Nitrogen/Ton	11.00	lbs/ton
29	Pounds Nitrogen/Year/Horse	100.10	lbs/year
30	Pounds Nitrogen/Year for Number of Horses	13,213	lbs N/year
31	Nitrogen/Manure Removed by Management	75%	percent
32	Horse Manure/Urine Leaching Rate	15%	percent

C	Comments
1)	Please refer to SONIR User Manual for data input instructions.
2)	Site quantities/coverages taken from GEE plan take-offs.
3)	See Final EIS Appendix T for information on equestrian use.

Developed Area	105.86	18%
Natural/Unvegetated/Revegetated Area	485.14	82%
Total Acreage Check	591.00	100%

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

GEE - Equestrian Alternative; 88 units; STP; no fertilization

SITE RECHARGE COMPUTATIONS

A	Landscaping	Value	Units
1	A = Fraction of Land in Cover Type	0.000	fraction
2	P = Precipitation Rate	49.90	inches
3	E = Evapotranspiration Rate	23.00	inches
4	Q = Runoff Rate	0.50	inches
5	R(a) = P - (E + Q)	26.40	inches
6	R(A) = R(a) x A	0.00	inches

B	Unfertilized Landscape	Value	Units
1	A = Fraction of Land in Cover Type	0.037	fraction
2	P = Precipitation Rate	49.90	inches
3	E = Evapotranspiration Rate	23.90	inches
4	Q = Runoff Rate	0.50	inches
5	R(b) = P - (E + Q)	25.50	inches
6	R(B) = R(b) x A	0.94	inches

C	Unvegetated/Dirt Roads	Value	Units
1	A = Fraction of Land in Cover Type	0.015	fraction
2	P = Precipitation Rate	49.90	inches
3	E = Evapotranspiration Rate	6.36	inches
4	Q = Runoff Rate	1.05	inches
5	R(c) = P - (E + Q)	42.49	inches
6	R(C) = R(c) x A	0.64	inches

D	Water/Ponds	Value	Units
1	A = Fraction of Site in Water	0.004	fraction
2	P = Precipitation Rate	49.90	inches
3	E = Evaporation Rate	30.00	inches
4	Q = Runoff Rate	0.00	inches
5	M = Makeup Water	0.00	inches
6	R(d) = {P - (E+Q)} - M	19.90	inches
7	R(D) = R(d) x A	0.07	inches

E	Natural/Natural Revegetation	Value	Units
1	A = Fraction of Land in Cover Type	0.910	fraction
2	P = Precipitation Rate	49.90	inches
3	E = Evapotranspiration Rate	23.00	inches
4	Q = Runoff Rate	0.35	inches
5	R(e) = P - (E + Q)	26.55	inches
6	R(E) = R(e) x A	24.15	inches

F	Impervous/Paved/Roads	Value	Units
1	A = Fraction of Land in Cover Type	0.032	fraction
2	P = Precipitation Rate	49.90	inches
3	E = Evapotranspiration Rate	4.99	inches
4	Q = Runoff Rate	0.00	inches
5	R(f) = P - (E + Q)	44.91	inches
6	R(F) = R(f) x A	1.45	inches

F	Rain Gardens/Wetlands	Value	Units
1	A = Fraction of Land in Cover Type	0.002	fraction
2	P = Precipitation Rate	49.90	inches
3	E = Evapotranspiration Rate	30.00	inches
4	Q = Runoff Rate	0.00	inches
5	R(g) = P - (E + Q)	19.90	inches
6	R(G) = R(g) x A	0.05	inches

H	Irrigation Recharge	Value	Units
1	A = Fraction of Land Irrigated	0.000	fraction
2	I = Irrigation Rate	24.00	inches
3	E = Evaptranspiration Rate	20.54	inches
4	Q = Runoff Rate	0.50	inches
5	R(h) = I - (E + Q)	2.96	inches
6	R(H) = R(H) x A	0.00	inches

I	Wastewater Recharge	Value	Units
1	WDF = Wastewater Design Flow	31,770	gal/day
2	WDF = Wastewater Design Flow	1,550,392	cu ft/yr
3	A = Area of Site	25,743,960	sq ft
4	R(j) = WDF/A	0.06	feet
5	R(I) = Wastewater Recharge	0.72	inches

J	Runoff Recharge	Value	Units
1	Q(A) = Runoff from Rough/Landscaped	0.000	inches
2	Q(B) = Runoff from Unfertilized Landscaped	0.018	inches
3	Q(C) = Runoff from Unvegetated	0.016	inches
4	Q(E) = Runoff from Natural	0.318	inches
5	Q(H) = Runoff from Rain Gardens	0.000	inches
6	Q(I) = Runoff from Irrigation	0.00	inches
7	Q(tot) = Q(A)+Q(B)+Q(C)+Q(E)+Q(H)+Q(I)	0.35	inches

Total Site Recharge	
R(T) =	R(A)+R(B)+R(C)+R(D)+R(E)+R(F)+R(G)+R(H)+R(I)+R(J)+Q(tot)
R(T) =	**28.38** inches

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

GEE - Equestrian Alternative; 88 units; STP; no fertilization

SITE NITROGEN BUDGET

A	*Sanitary Nitrogen-Residential*	*Value*	*Units*
1	Number of Dwellings	0	units
2	Persons per Dwelling	2.90	capita
3	P = Population	0.00	capita
4	N = Nitrogen per person	10	lbs
6	N = (total; pre loss/removal)	0	lbs
7	LR = Leaching Rate	84%	percent
8	N(S) = P x N x LR	0.00	lbs
9	N = loss/removed	0.00	lbs

C	*Sanitary Nitrogen (Wastewater Design Flow)*		
1	CF = Commercial/STP Flow	31,770	gal/day
2	CF = Commercial/STP Flow	43,891,049	liters/yr
3	N = Nitrogen (1)	10.00	mg/l
4	N = Nitrogen (1)	967.80	lbs
7	LR = Leaching Rate	100%	percent
8	N(S) = CF x N x LR	438,910,493	milligrams
9	N(S) = Sanitary Nitrogen	967.80	lbs
10	N = loss/removed	0.00	lbs

E	*Fertilized Land (Landscaped)*		
1	A = Area of Land Fertilized 1	0	sq ft
2	AR = Application Rate	1.00	lbs/1000 sf
3	N(T) = Nitrogen (total applied)	0.00	lbs
4	LR = Leaching Rate	20%	percent
5	N(F1) = A x AR x LR	0.00	lbs
6	N = loss/removed	0.00	lbs

G	*Atmospheric Nitrogen (existing condition)*		
1	Application Load	0.041	lbs/1000 sf
2	Area of Natural/Wetlands/1000 sf	23,574	1000 sf
3	Leaching Rate	25%	percent
4	Atmos. N Load-1 (natural/wetlands)	241.64	lbs/year
5	Area of turf/golf/1000 sf	948	1000 sf
6	Leaching Rate	20%	percent
7	Atmos. N Load-2 (golf/turf)	7.78	lbs/year
8	Area of Impervious/Agricult/1000 sf	1,221	1000 sf
9	Leaching Rate	40%	percent
10	Atmos. N Load-3 (ag; imperv; other)	20.03	lbs/year
11	N(at) = N Load 1 + 2 +3	269.44	lbs
12	N = loss/removed	786.06	lbs

I	*Horse Nitrogen*	*Value*	*Units*
1	Pounds Nitrogen/Year/No. of Horses	13,213	lbs
4	N/Manure After Management	9,910	Removed
5	Horse Waste Nitrogen Leached	15%	percent
6	N(h) = Horse Nitrogen	1,486	lbs
7	N = loss/removed	8,423	lbs

B	*Cat Waste Nitrogen*	*Value*	*Units*
1	Number of Cats per Dwelling	0.74	cats/dwelling
2	Number of Cats (Cats/dwelling x dwellings)	65	cats
3	Cat Waste Nitrogen Load	3.22	lbs/cat/year
4	N(p) = AR x cats x Adjustment (if applicable)	209.69	lbs/year
5	LR = Leaching Rate	25%	percent
6	N(P) = N(p) x LR	52.42	lbs
7	N = (loss/removed)	157.26	lbs

B'	*Dog Waste Nitrogen*	*Value*	*Units*
1	Number of Dogs per Dwelling	1.40	dogs/dwelling
2	Number of Cats (Cats/dwelling x dwellings)	123	dogs
3	Dog Waste Nitrogen Load	4.29	lbs/dog/year
4	N(p) = AR x dogs x Adjustment (if applicable)	528.53	lbs/year
5	LR = Leaching Rate	25%	percent
6	N(P) = N(p) x LR	132.13	lbs
7	N = (loss/removed)	396.40	lbs

D	*Water Supply Nitrogen* (other than wastewater, if applicable)	*Value*	*Units*
1	WDF = Wastewater Design Flow	0	gal/day
2	WDF = Wastewater Design Flow	0	liters/yr
3	N = Nitrogen in Water Supply	50.00	mg/l
4	N(WW) = WDF x N	0	milligrams
5	N(WW) = Wastewater Nitrogen	0.00	lbs

F	*Fertilized Land (Other)*		
1	A = Area of Land Fertilized 2	0	sq ft
2	AR = Application Rate	2.50	lbs/1000 sf
3	N(T) = Nitrogen (total applied)	0.00	lbs
4	LR = Leaching Rate	20%	percent
5	N(F2) = A x AR x LR	0.00	lbs
6	N = loss/removed	0.00	lbs

H	*Irrigation Nitrogen*		
1	R = Irrigation Recharge (inches)	0.00	inches
2	R = Irrigation Rate (feet)	0.0000	feet
3	A = Area of Land Irrigated	1,045,440	sq ft
4	R(I) = R(irr) x A	0	cu ft
5	R(I) = Site Irrigation (liters)	0	liters
6	N = Nitrogen in Water Supply	2.00	mg/l
7	N(T) = Nitrogen (total applied)	0.00	lbs
8	LR = Leaching Rate	10%	percent
9	N(irr) = R(I) x N x LR	0	milligrams
10	N(irr) = Irrigation Nitrogen	0.00	lbs
11	N = loss/removed	0.00	lbs

Total Site Nitrogen		
N=	N(S) + N(P) + N(WW) + N(F1) + N(F2) + N(ppt) + N(irr)	
N=	**2,908.28**	lbs

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

NAME OF PROJECT

> **The Hills at Southampton**
> **GEE - Equestrian Alternative; 88 units; STP; no fertilization**

FINAL COMPUTATIONS

A	Nitrogen in Recharge	Value	Units
1	N = Total Nitrogen (lbs)	2,908.28	lbs
2	N = Total Nitrogen (milligrams)	1,320,358,919	milligrams
3	R(T) = Total Recharge (inches)	28.38	inches
4	R(T) = Total Recharge (feet)	2.37	feet
5	A = Area of Site	25,743,960	sq ft
6	R = R(T) x A	60,887,486	cu ft
7	R = Site Recharge Volume	1,724,333,612	liters
9	NR = N/R	0.77	mg/l

CONCENTRATION OF

NITROGEN IN RECHARGE

Pre-Mitigation   **0.77**

A	Nitrogen in Recharge	Value	Units
1	N = Total Nitrogen (lbs)	2,908.28	lbs
2	N = Total Nitrogen (milligrams)	1,320,358,919	milligrams
3	R(T) = Total Recharge (inches)	28.38	inches
4	R(T) = Total Recharge (feet)	2.37	feet
5	A = Area of Site	25,743,960	sq ft
6	R = R(T) x A	60,887,486	cu ft
7	R = Site Recharge Volume	1,724,333,612	liters
9	NR = N/R	0.77	mg/l

B	Site Recharge Summary	Value	Units
1	R(T) = Total Site Recharge	0.00	inches/yr
2	R = Site Recharge Volume	60,887,486	cu ft/yr
3	R = Site Recharge Volume	455,470,059	gal/yr
4	R = Site Recharge Volume	455.47	MG/yr

Conversions used in SONIR
Acres x 43,560 = Square Feet
Cubic Feet x 7.48052 = Gallons
Cubic Feet x 28.32 = Liters
Days x 365 = Years
Feet x 12 = Inches
Gallons x 0.1337 = Cubic Feet
Gallons x 3.785 = Liters
Grams / 1,000 = Milligrams
Grams x 0.002205 = Pounds
Milligrams / 1,000 = Grams

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

NAME OF PROJECT

The Hills at Southampton

GEE - Equestrian Alternative; 88 units; STP; no fertilization

DATA INPUT FIELD

A	Site Recharge Parameters	Value	Units
1	Area of Site	591.00	acres
2	Precipitation Rate	49.90	inches
3	Acreage of Landscaping	59.20	acres
4	Fraction of Land in above	0.100	fraction
5	Evapotranspiration from above	23.00	inches
6	Runoff from above	0.50	inches
7	Acreage of Unfertilized Landscape	21.77	acres
8	Fraction of above	0.037	fraction
9	Evapotranspiration from above	23.90	inches
10	Runoff from above	0.50	inches
11	Acreage of Unvegetated/Dirt Roads	8.92	acres
12	Fraction of above	0.015	fraction
13	Evapotranspiration from above	6.36	inches
14	Runoff from above	1.05	inches
15	Acreage of Water/Ponds/Wetlands	2.14	acres
16	Fraction of Site in above	0.004	fraction
17	Evaporation from above	30.00	inches
18	Makeup Water (if applicable)	0.00	inches
19	Acreage of Natural/Natural Reveg	478.45	acres
20	Fraction of above	0.810	fraction
21	Evapotranspiration from above	23.00	inches
22	Runoff from above	0.35	inches
23	Acreage of Impervious/Paved/Bldgs	19.12	acres
24	Fraction of Land in above	0.032	fraction
25	Evapotrans. from above	4.99	inches
26	Runoff from Impervious	0.00	inches
23	Acreage of Wetlands	1.40	acres
24	Fraction of Land in above	0.002	fraction
25	Evapotrans. from above	30.00	inches
26	Runoff from above	0.00	inches
27	Acreage of Land Irrigated	59.20	acres
28	Fraction of Land Irrigated	0.100	fraction
29	Irrigation Rate	24.00	inches
30	Number of Dwellings	88	units
31	Water Use per Dwelling	300	gal/day
32	Wastewater Design Flow (units)	26,400	gal/day
33	Wastewater Design Flow (total)	5,370	gal/day
34	Adjusted WW Design Flow (total)	5,370	gal/day

B	Nitrogen Budget Parameters	Value	Units
1	Persons per Dwelling	2.90	persons
2	Nitrogen per Person per Year	10.0	lbs
3	a. Sanitary Nitrogen Leaching Rate	84%	percent
3	b. Treated Sanitary Nitrogen Leaching Rate	100%	percent
4	Fertilized Land (Landscaping)	59.20	acres
5	Fertilizer Application Rate (for above)	2.04	lbs/1000 sq ft
6	Fertilizer Nitrogen Leaching Rate (for above)	30%	percent
7	Fertilized Land (Other)	59.20	acres
8	Fertilizer Application Rate (for above)	2.50	lbs/1000 sq ft
9	Fertilizer Nitrogen Leaching Rate (for above)	20%	percent
10	Outdoor Cat Population	0.74	pets/dwelling
11	Cat Waste Nitrogen Load	3.22	lbs/pet/year
12	Outdoor Dog Population	1.40	pets/dwelling
13	Dog Waste Nitrogen Load	4.29	lbs/pet/year
14	Pet Waste Nitrogen Leaching Rate	25%	percent
15	Adjusted Pet Waste (days/year occupied)	100%	percent
16	Area of Land Irrigated	80.97	acres
17	Irrigation Rate	24.00	inches
18	Irrigation Nitrogen Leaching Rate	10%	percent
19	Atmospheric Nitrogen Application/Load	0.04	lbs/1000 sq ft
20	Atmos. N Leaching Rate (Natural/Wetlands)	25%	percent
21	Atmos. N Leaching Rate (Turf 30%; Golf 20%)	20%	percent
22	Atmos. N. Leaching Rate (Ag; Imperv; Other)	40%	percent
23	Nitrogen in Water Supply	2.00	mg/l
24	Nitrogen in Sanitary Flow -1	50.00	mg/l
25	Nitrogen in Sanitary Flow -2	10.00	mg/l
26	Number of Horses	132	horses
27	Tons Manure/Year/Horse	9.1	tons
28	Pounds Nitrogen/Ton	11.00	lbs/ton
29	Pounds Nitrogen/Year/Horse	100.10	lbs/year
30	Pounds Nitrogen/Year for Number of Horses	13,213	lbs N/year
31	Nitrogen/Manure Removed by Management	75%	percent
32	Horse Manure/Urine Leaching Rate	15%	percent

C	Comments
1)	Please refer to SONIR User Manual for data input instructions.
2)	Site quantities/coverages taken from GEE plan take-offs.
3)	See Final EIS Appendix T for information on equestrian use.

Developed Area	46.66	8%
Natural/Unvegetated/Revegetated Area	544.34	92%
Total Acreage Check	591.00	100%

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

GEE - Equestrian Alternative; 88 units; STP; no fertilization

SITE RECHARGE COMPUTATIONS

A	Landscaping	Value	Units
1	A = Fraction of Land in Cover Type	0.100	fraction
2	P = Precipitation Rate	49.90	inches
3	E = Evapotranspiration Rate	23.00	inches
4	Q = Runoff Rate	0.50	inches
5	R(a) = P - (E + Q)	26.40	inches
6	R(A) = R(a) x A	2.64	inches

B	Unfertilized Landscape	Value	Units
1	A = Fraction of Land in Cover Type	0.037	fraction
2	P = Precipitation Rate	49.90	inches
3	E = Evapotranspiration Rate	23.90	inches
4	Q = Runoff Rate	0.50	inches
5	R(b) = P - (E + Q)	25.50	inches
6	R(B) = R(b) x A	0.94	inches

C	Unvegetated/Dirt Roads	Value	Units
1	A = Fraction of Land in Cover Type	0.015	fraction
2	P = Precipitation Rate	49.90	inches
3	E = Evapotranspiration Rate	6.36	inches
4	Q = Runoff Rate	1.05	inches
5	R(c) = P - (E + Q)	42.49	inches
6	R(C) = R(c) x A	0.64	inches

D	Water/Ponds	Value	Units
1	A = Fraction of Site in Water	0.004	fraction
2	P = Precipitation Rate	49.90	inches
3	E = Evaporation Rate	30.00	inches
4	Q = Runoff Rate	0.00	inches
5	M = Makeup Water	0.00	inches
6	R(d) = {P - (E+Q)} - M	19.90	inches
7	R(D) = R(d) x A	0.07	inches

E	Natural/Natural Revegetation		
1	A = Fraction of Land in Cover Type	0.810	fraction
2	P = Precipitation Rate	49.90	inches
3	E = Evapotranspiration Rate	23.00	inches
4	Q = Runoff Rate	0.35	inches
5	R(e) = P - (E + Q)	26.55	inches
6	R(E) = R(e) x A	21.49	inches

F	Impervous/Paved/Roads	Value	Units
1	A = Fraction of Land in Cover Type	0.032	fraction
2	P = Precipitation Rate	49.90	inches
3	E = Evapotranspiration Rate	4.99	inches
4	Q = Runoff Rate	0.00	inches
5	R(f) = P - (E + Q)	44.91	inches
6	R(F) = R(f) x A	1.45	inches

F	Rain Gardens/Wetlands		
1	A = Fraction of Land in Cover Type	0.002	fraction
2	P = Precipitation Rate	49.90	inches
3	E = Evapotranspiration Rate	30.00	inches
4	Q = Runoff Rate	0.00	inches
5	R(g) = P - (E + Q)	19.90	inches
6	R(G) = R(g) x A	0.05	inches

H	Irrigation Recharge		
1	A = Fraction of Land Irrigated	0.100	fraction
2	I = Irrigation Rate	24.00	inches
3	E = Evaptranspiration Rate	20.54	inches
4	Q = Runoff Rate	0.50	inches
5	R(h) = I - (E + Q)	2.96	inches
6	R(H) = R(H) x A	0.30	inches

I	Wastewater Recharge		
1	WDF = Wastewater Design Flow	31,770	gal/day
2	WDF = Wastewater Design Flow	1,550,392	cu ft/yr
3	A = Area of Site	25,743,960	sq ft
4	R(j) = WDF/A	0.06	feet
5	R(I) = Wastewater Recharge	0.72	inches

J	Runoff Recharge		
1	Q(A) = Runoff from Rough/Landscaped	0.050	inches
2	Q(B) = Runoff from Unfertilized Landscaped	0.018	inches
3	Q(C) = Runoff from Unvegetated	0.016	inches
4	Q(E) = Runoff from Natural	0.283	inches
5	Q(H) = Runoff from Rain Gardens	0.000	inches
6	Q(I) = Runoff from Irrigation	0.05	inches
7	Q(tot) = Q(A)+Q(B)+Q(C)+Q(E)+Q(H)+Q(I)	0.42	inches

Total Site Recharge		
R(T) =	R(A)+R(B)+R(C)+R(D)+R(E)+R(F)+R(G)+R(H)+R(I)+R(J)+Q(tot)	
R(T) =	**28.73**	**inches**

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

GEE - Equestrian Alternative; 88 units; STP; no fertilization

SITE NITROGEN BUDGET

A	Sanitary Nitrogen-Residential	Value	Units
1	Number of Dwellings	88	units
2	Persons per Dwelling	2.90	capita
3	P = Population	255.20	capita
4	N = Nitrogen per person	10	lbs
6	N = (total; pre loss/removal)	2552	lbs
7	LR = Leaching Rate	84%	percent
8	N(S) = P x N x LR	2143.68	lbs
9	N = loss/removed	408.32	lbs

C	Sanitary Nitrogen (Wastewater Design Flow)		
1	CF = Commercial/STP Flow	0	gal/day
2	CF = Commercial/STP Flow	0	liters/yr
3	N = Nitrogen (1)	10.00	mg/l
4	N = Nitrogen (1)	0.00	lbs
7	LR = Leaching Rate	100%	percent
8	N(S) = CF x N x LR	0	milligrams
9	N(S) = Sanitary Nitrogen	0.00	lbs
10	N = loss/removed	0.00	lbs

E	Fertilized Land (Landscaped)		
1	A = Area of Land Fertilized 1	2,578,752	sq ft
2	AR = Application Rate	2.04	lbs/1000 sf
3	N(T) = Nitrogen (total applied)	5260.65	lbs
4	LR = Leaching Rate	30%	percent
5	N(F1) = A x AR x LR	1578.20	lbs
6	N = loss/removed	3682.46	lbs

G	Atmospheric Nitrogen (existing condition)		
1	Application Load	0.041	lbs/1000 sf
2	Area of Natural/Wetlands/1000 sf	20,995	1000 sf
3	Leaching Rate	25%	percent
4	Atmos. N Load-1 (natural/wetlands)	215.20	lbs/year
5	Area of turf/golf/1000 sf	3,527	1000 sf
6	Leaching Rate	20%	percent
7	Atmos. N Load-2 (golf/turf)	28.92	lbs/year
8	Area of Impervious/Agricult/1000 sf	1,221	1000 sf
9	Leaching Rate	40%	percent
10	Atmos. N Load-3 (ag; imperv; other)	20.03	lbs/year
11	N(at) = N Load 1 + 2 +3	264.16	lbs
12	N = loss/removed	791.35	lbs

I	Horse Nitrogen	Value	Units
1	Pounds Nitrogen/Year/No. of Horses	13,213	lbs
4	N/Manure After Management	9,910	Removed
5	Horse Waste Nitrogen Leached	15%	percent
6	N(h) = Horse Nitrogen	1,486	lbs
7	N = loss/removed	8,423	lbs

B	Cat Waste Nitrogen	Value	Units
1	Number of Cats per Dwelling	0.74	cats/dwelling
2	Number of Cats (Cats/dwelling x dwellings)	65	cats
3	Cat Waste Nitrogen Load	3.22	lbs/cat/year
4	N(p) = AR x cats x Adjustment (if applicable)	209.69	lbs/year
5	LR = Leaching Rate	25%	percent
6	N(P) = N(p) x LR	52.42	lbs
7	N = (loss/removed)	157.26	lbs

B'	Dog Waste Nitrogen	Value	Units
1	Number of Dogs per Dwelling	1.40	dogs/dwelling
2	Number of Cats (Cats/dwelling x dwellings)	123	dogs
3	Dog Waste Nitrogen Load	4.29	lbs/dog/year
4	N(p) = AR x dogs x Adjustment (if applicable)	528.53	lbs/year
5	LR = Leaching Rate	25%	percent
6	N(P) = N(p) x LR	132.13	lbs
7	N = (loss/removed)	396.40	lbs

D	Water Supply Nitrogen (other than wastewater, if applicable)	Value	Units
1	WDF = Wastewater Design Flow	0	gal/day
2	WDF = Wastewater Design Flow	0	liters/yr
3	N = Nitrogen in Water Supply	50.00	mg/l
4	N(WW) = WDF x N	0	milligrams
5	N(WW) = Wastewater Nitrogen	0.00	lbs

F	Fertilized Land (Other)		
1	A = Area of Land Fertilized 2	2,578,752	sq ft
2	AR = Application Rate	2.50	lbs/1000 sf
3	N(T) = Nitrogen (total applied)	6446.88	lbs
4	LR = Leaching Rate	20%	percent
5	N(F2) = A x AR x LR	1289.38	lbs
6	N = loss/removed	5157.50	lbs

H	Irrigation Nitrogen		
1	R = Irrigation Recharge (inches)	0.30	inches
2	R = Irrigation Rate (feet)	0.0247	feet
3	A = Area of Land Irrigated	1,045,440	sq ft
4	R(I) = R(irr) x A	25,831	cu ft
5	R(I) = Site Irrigation (liters)	731,538	liters
6	N = Nitrogen in Water Supply	2.00	mg/l
7	N(T) = Nitrogen (total applied)	3.23	lbs
8	LR = Leaching Rate	10%	percent
9	N(irr) = R(I) x N x LR	146,308	milligrams
10	N(irr) = Irrigation Nitrogen	0.32	lbs
11	N = loss/removed	2.90	lbs

Total Site Nitrogen		
N=	N(S) + N(P) + N(WW) + N(F1) + N(F2) + N(ppt) + N(irr)	
N=	5,368.57	lbs

NP&V

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

NAME OF PROJECT

The Hills at Southampton
GEE - Equestrian Alternative; 88 units; STP; no fertilization

FINAL COMPUTATIONS

A	Nitrogen in Recharge	Value	Units
1	N = Total Nitrogen (lbs)	5,368.57	lbs
2	N = Total Nitrogen (milligrams)	2,437,332,636	milligrams
3	R(T) = Total Recharge (inches)	28.73	inches
4	R(T) = Total Recharge (feet)	2.39	feet
5	A = Area of Site	25,743,960	sq ft
6	R = R(T) x A	61,631,026	cu ft
7	R = Site Recharge Volume	1,745,390,669	liters
9	NR = N/R	1.40	mg/l

CONCENTRATION OF

NITROGEN IN RECHARGE

Pre-Mitigation   **1.40**

A	Nitrogen in Recharge	Value	Units
1	N = Total Nitrogen (lbs)	5,368.57	lbs
2	N = Total Nitrogen (milligrams)	2,437,332,636	milligrams
3	R(T) = Total Recharge (inches)	28.73	inches
4	R(T) = Total Recharge (feet)	2.39	feet
5	A = Area of Site	25,743,960	sq ft
6	R = R(T) x A	61,631,026	cu ft
7	R = Site Recharge Volume	1,745,390,669	liters
9	NR = N/R	1.40	mg/l

B	Site Recharge Summary	Value	Units
1	R(T) = Total Site Recharge	0.00	inches/yr
2	R = Site Recharge Volume	61,631,026	cu ft/yr
3	R = Site Recharge Volume	461,032,126	gal/yr
4	R = Site Recharge Volume	461.03	MG/yr

Conversions used in SONIR
Acres x 43,560 = Square Feet
Cubic Feet x 7.48052 = Gallons
Cubic Feet x 28.32 = Liters
Days x 365 = Years
Feet x 12 = Inches
Gallons x 0.1337 = Cubic Feet
Gallons x 3.785 = Liters
Grams / 1,000 = Milligrams
Grams x 0.002205 = Pounds
Milligrams / 1,000 = Grams