Appendix G-2
SONIR Model Results, Existing Conditions/Alternative 1

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

NAME OF PROJECT

The Hills at Southampton

Existing Conditions

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 Parlato Farm	15.78	acres
4	Fraction of Land in above	0.027	fraction
5	Evapotranspiration from above	23.00	inches
6	Runoff from above	0.35	inches
7	Acreage of Kracke Nursery	2.64	acres
8	Fraction of above	0.004	fraction
9	Evapotranspiration from above	23.90	inches
10	Runoff from above	0.35	inches
11	Acreage of Unvegetated/Dirt Roads	21.98	acres
12	Fraction of above	0.037	fraction
13	Evapotranspiration from above	21.20	inches
14	Runoff from above	1.05	inches
15	Acreage of Water/Ponds/Wetlands	1.40	acres
16	Fraction of Site in above	0.002	fraction
17	Evaporation from above	30.00	inches
18	Makeup Water (if applicable)	0.00	inches
19	Acreage of Natural/Natural Reveg	549.20	acres
20	Fraction of above	0.929	fraction
21	Evapotranspiration from above	23.00	inches
22	Runoff from above	0.35	inches
23	Acreage of Impervious/Paved/Bldgs	0.00	acres
24	Fraction of Land in above	0.000	fraction
25	Evapotrans. from above	4.99	inches
26	Runoff from Impervious	0.00	inches
23	Acreage of Other (Rain Gardens)	0.00	acres
24	Fraction of Land in above	0.000	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	20.89	inches
30	Number of Dwellings	0	units
31	Water Use per Dwelling	0	gal/day
32	Wastewater Design Flow (units)	0	gal/day
33	Wastewater Design Flow (total)	0	gal/day
34	Adjusted WW Design Flow (total)	0	gal/day

B	Nitrogen Budget Parameters	Value	Units
1	Persons per Dwelling	2.50	persons
2	Nitrogen per Person per Year	10.0	lbs
3	a. Sanitary Nitrogen Leaching Rate	50%	percent
3	b. Treated Sanitary Nitrogen Leaching Rate	90%	percent
4	Fertilized Land (Parlato Farm)	15.78	acres
5	Fertilizer Application Rate (for above)	3.00	lbs/1000 sq ft
6	Fertilizer Nitrogen Leaching Rate (for above)	15%	percent
7	Fertilized Land (Kracke Nursery)	1.00	acres
8	Fertilizer Application Rate (for above)	1.00	lbs/1000 sq ft
9	Fertilizer Nitrogen Leaching Rate (for above)	15%	percent
10	Pet Waste Application Rate	3.19	lbs/pet
11	Pet Waste Nitrogen Leaching Rate	50%	percent
12	Area of Land Irrigated	0.00	acres
13	Irrigation Rate	20.89	inches
14	Irrigation Nitrogen Leaching Rate	15%	percent
15	Nitrogen in Precipitation	0.75	mg/l
16	Precipitation Nitrogen Leaching Rate	15%	percent
17	Nitrogen in Water Supply	2.00	mg/l
18	Nitrogen in Sanitary Flow -1	50.00	mg/l
19	Nitrogen in Sanitary Flow -2	19.00	mg/l

C	Comments
1)	Please refer to SONIR User Manual for data input instructions.

Developed Area	18.42	3%
Natural/Unvegetated/Revegetated Area	572.58	97%
Total Acreage Check	591.00	100%

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

Existing Conditions

SITE RECHARGE COMPUTATIONS

A	Parlato Farm	Value	Units
1	A = Fraction of Land in Cover Type	0.027	fraction
2	P = Precipitation Rate	49.90	inches
3	E = Evapotranspiration Rate	23.00	inches
4	Q = Runoff Rate	0.35	inches
5	R(a) = P - (E + Q)	26.55	inches
6	R(A) = R(a) x A	0.71	inches

B	Kracke Nursery	Value	Units
1	A = Fraction of Land in Cover Type	0.004	fraction
2	P = Precipitation Rate	49.90	inches
3	E = Evapotranspiration Rate	23.90	inches
4	Q = Runoff Rate	0.35	inches
5	R(b) = P - (E + Q)	25.65	inches
6	R(B) = R(b) x A	0.11	inches

C	Unvegetated/Dirt Roads	Value	Units
1	A = Fraction of Land in Cover Type	0.037	fraction
2	P = Precipitation Rate	49.90	inches
3	E = Evapotranspiration Rate	21.20	inches
4	Q = Runoff Rate	1.05	inches
5	R(c) = P - (E + Q)	27.65	inches
6	R(C) = R(c) x A	1.03	inches

D	Water/Ponds/Wetlands	Value	Units
1	A = Fraction of Site in Water	0.002	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	0.05	inches

E	Natural/Natural Revegetation	Value	Units
1	A = Fraction of Land in Cover Type	0.929	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	24.67	inches

F	Impervous/Paved/Roads	Value	Units
1	A = Fraction of Land in Cover Type	0.000	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	0.00	inches

F	Rain Gardens/Wetlands	Value	Units
1	A = Fraction of Land in Cover Type	0.000	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	0.00	inches

H	Irrigation Recharge	Value	Units
1	A = Fraction of Land Irrigated	0.000	fraction
2	I = Irrigation Rate	20.89	inches
3	E = Evaptranspiration Rate	20.54	inches
4	Q = Runoff Rate	0.35	inches
5	R(h) = I - (E + Q)	0.00	inches
6	R(H) = R(H) x A	0.00	inches

I	Wastewater Recharge		
1	WDF = Wastewater Design Flow	0	gal/day
2	WDF = Wastewater Design Flow	0	cu ft/yr
3	A = Area of Site	25,743,960	sq ft
4	R(j) = WDF/A	0.00	feet
5	R(I) = Wastewater Recharge	0.00	inches

J	Runoff Recharge		
1	Q(A) = Runoff from Rough/Landscaped	0.009	inches
2	Q(B) = Runoff from Tees/Fairways	0.002	inches
3	Q(C) = Runoff from Unvegetated	0.039	inches
4	Q(E) = Runoff from Natural	0.325	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)	0.37	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) =	26.95	inches
R(T)(adj) =	26.95	inches

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

Existing Conditions

SITE NITROGEN BUDGET

A	Sanitary Nitrogen-Residential	Value	Units
1	Number of Dwellings	0	units
2	Persons per Dwelling	2.50	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	50%	percent
8	N(S) = P x N x LR	0.00	lbs
9	N = loss/removed	0.00	lbs

B	Pet Waste Nitrogen	Value	Units
1	AR = Application Rate	3.19	lbs/pet
2	Human Population	0	capita
3	Pets = 17 percent of capita	0	pets
4	N(p) = AR x pets	0.00	lbs
5	LR = Leaching Rate	50%	percent
6	N(P) = N(p) x LR	0.00	lbs
7	N = (loss/removed)	0.00	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)	50.00	mg/l
4	N = Nitrogen (1)	0.00	lbs
5	N =Nitrogen (2)	50.00	mg/l
6	N = Nitrogen (2)	0.00	lbs
7	LR = Leaching Rate	50%	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

D	Water Supply Nitrogen (other than wastewater, if applicable)		
1	WDF = Wastewater Design Flow	0	gal/day
2	WDF = Wastewater Design Flow	0	liters/yr
3	N = Nitrogen in Water Supply	2.00	mg/l
4	N(WW) = WDF x N	0	milligrams
5	N(WW) = Wastewater Nitrogen	0.00	lbs

E	Fertilized Land (Parlato)		
1	A = Area of Land Fertilized 1	687,377	sq ft
2	AR = Application Rate	3.00	lbs/1000 sf
3	N(T) = Nitrogen (total applied)	2062.13	lbs
4	LR = Leaching Rate	15%	percent
5	N(F1) = A x AR x LR	309.32	lbs
6	N = loss/removed	1752.81	lbs

F	Fertilized Land (Kracke)		
1	A = Area of Land Fertilized 2	43,560	sq ft
2	AR = Application Rate	1.00	lbs/1000 sf
3	N(T) = Nitrogen (total applied)	43.56	lbs
4	LR = Leaching Rate	15%	percent
5	N(F2) = A x AR x LR	6.53	lbs
6	N = loss/removed	37.03	lbs

G	Precipitation Nitrogen (existing condition)		
1	R(n) = Natural Recharge (feet)	3.08	feet
2	A = Area of Site (sq ft)	25,743,960	sq ft
3	R(N) = R(n) x A	79,406,839	cu ft
4	R(N) = Natural Recharge (liters)	2,248,801,688	liters
5	N = Nitrogen in Precipitation	0.75	mg/l
6	N(T) = Nitrogen (total)	3,719	lbs
7	LR = Leaching Rate	15%	percent
8	N(ppt) = R(N) x N x LR	252,990,189.95	milligrams
10	N(irr) = Irrigation Nitrogen	557.84	lbs
9	N = loss/removed	3161.11	lbs

H	Irrigation Nitrogen		
1	R = Irrigation Recharge (inches)	0.00	inches
2	R = Irrigation Rate (feet)	0.00	feet
3	A = Area of Land Irrigated	0	sq ft
4	R(I) = R(irr) x A	0	cu ft
5	R(I) = Site Precipitation (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	15%	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=	873.70	lbs

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

NAME OF PROJECT

The Hills at Southampton

Existing Conditions

FINAL COMPUTATIONS

A	Nitrogen in Recharge	Value	Units
1	N = Total Nitrogen (lbs)	873.70	lbs
2	N = Total Nitrogen (milligrams)	396,658,406	milligrams
3	R(T) = Total Recharge (inches)	26.95	inches
4	R(T) = Total Recharge (feet)	2.25	feet
5	A = Area of Site	25,743,960	sq ft
6	R = R(T) x A	57,808,795	cu ft
7	R = Site Recharge Volume	1,637,145,087	liters
9	NR = N/R	0.24	mg/l

CONCENTRATION OF

NITROGEN IN RECHARGE   **0.24**

A	Nitrogen in Recharge	Value	Units
1	N = Total Nitrogen (lbs)	873.70	lbs
2	N = Total Nitrogen (milligrams)	396,658,406	milligrams
3	R(T) = Total Recharge (inches)	26.95	inches
4	R(T) = Total Recharge (feet)	2.25	feet
5	A = Area of Site	25,743,960	sq ft
6	R = R(T) x A	57,808,795	cu ft
7	R = Site Recharge Volume	1,637,145,087	liters
9	NR = N/R	0.24	mg/l

B	Site Recharge Summary	Value	Units
1	R(T) = Total Site Recharge	26.95	inches/yr
2	R = Site Recharge Volume	57,808,795	cu ft/yr
3	R = Site Recharge Volume	432,439,850	gal/yr
4	R = Site Recharge Volume	432.44	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