

Appendix J-4
SONIR Model Results: Proposed Project

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

NAME OF PROJECT

Indian Hills - Proposed Conditions
Fort Salonga, NY

DATA INPUT FIELD

A	Site Recharge Parameters	Value	Units		B	Nitrogen Budget Parameters	Value	Units	
1	Area of Site	154.56	acres		1	Persons per Dwelling	1.50	persons	
2	Precipitation Rate	49.90	inches		2	Nitrogen per Person per Year	10.0	lbs	
3	Acreege of Fertilized Landscaping	32.77	acres		3	a. Sanitary Nitrogen Leaching Rate	84%	percent	
4	Fraction of Land in above	0.212	fraction		3	b. Treated Sanitary Nitrogen Leaching Rate	100%	percent	
5	Evapotranspiration from above	21.20	inches		4	Fertilized Landscaping	32.77	acres	
6	Runoff from above	0.50	inches		5	Fertilizer Application Rate (for above)	1.66	lbs/1000 sq ft	
7	Acreege of Unfertilized Landscaping	71.41	acres		6	Fertilizer Nitrogen Leaching Rate (for above)	10%	percent	
8	Fraction of above	0.462	fraction		7	Fertilized Land (other, if applicable)	0.00	acres	
9	Evapotranspiration from above	21.20	inches		8	Fertilizer Application Rate (for above)	0.00	lbs/1000 sq ft	
10	Runoff from above	0.50	inches		9	Fertilizer Nitrogen Leaching Rate (for above)	0%	percent	
11	Acreege of Unvegetated/Dirt Roads	1.09	acres		10	Outdoor Cat Population	0.19	pets/dwelling	
12	Fraction of above	0.007	fraction		11	Cat Waste Nitrogen Load	3.22	lbs/pet/year	
13	Evapotranspiration from above	21.20	inches		12	Outdoor Dog Population	0.35	pets/dwelling	
14	Runoff from above	0.00	inches		13	Dog Waste Nitrogen Load	4.29	lbs/pet/year	
15	Acreege of Water/Ponds	15.11	acres		14	Pet Waste Nitrogen Leaching Rate	25%	percent	
16	Fraction of Site in above	0.098	fraction		15	Area of Land Irrigated	32.77	acres	
17	Evaporation from above	30.00	inches		16	Irrigation Rate	27.74	inches	
18	Makeup Water (if applicable)	0.00	inches		17	Irrigation Nitrogen Leaching Rate	10%	percent	
19	Acreege of Natural	20.73	acres		18	Atmospheric Nitrogen Application/Load	0.04	lbs/1000 sq ft	
20	Fraction of above	0.134	fraction		19	Atmos. N Leaching Rate (Natural/Wetlands)	25%	percent	
21	Evapotranspiration from above	21.20	inches		20	Atmos. N Leaching Rate (Turf/Landscaped)	20%	percent	
22	Runoff from above	0.50	inches		21	Atmos. N. Leaching Rate (Ag; Imperv; Other)	40%	percent	
23	Acreege of Impervious/Paved/Bldgs	13.49	acres		22	Nitrogen in Water Supply	2.00	mg/l	
24	Fraction of Land in above	0.087	fraction		23	Nitrogen in Sanitary Flow	19.00	mg/l	
25	Evapotrans. from above	4.99	inches						
26	Runoff from Impervious	0.00	inches						
27	Acreege of Other	0.00	acres						
24	Fraction of Land in above	0.000	fraction						
25	Evapotrans. from above	21.20	inches						
26	Runoff from above	0.00	inches						
27	Acreege of Land Irrigated	32.77	acres						
28	Fraction of Land Irrigated	0.212	fraction						
29	Irrigation Rate	27.74	inches						
30	Number of Dwellings	98	units						
31	Water Use per Dwelling	300	gal/day						
32	Wastewater Design Flow (clubhouse)	33,350	gal/day						
					C	Comments			
					1) Please refer to user manual for data input instructions; updated per LINAP.				
					Total Acreege Check		154.6		100%

Indian Hills - Proposed Project

SITE RECHARGE COMPUTATIONS

A Fertilized Landscaping			B Unfertilized Landscaping				
	Value	Units		Value	Units		
1	A = Fraction of Land in Cover Type	0.212	fraction	1	A = Fraction of Land in Cover Type	0.462	fraction
2	P = Precipitation Rate	49.90	inches	2	P = Precipitation Rate	49.90	inches
3	E = Evapotranspiration Rate	21.20	inches	3	E = Evapotranspiration Rate	21.20	inches
4	Q = Runoff Rate	0.50	inches	4	Q = Runoff Rate	0.50	inches
5	R(a) = P - (E + Q)	28.20	inches	5	R(b) = P - (E + Q)	28.20	inches
6	R(A) = R(a) x A	5.98	inches	6	R(B) = R(b) x A	13.03	inches

C Unvegetated/Dirt Roads			D Water/Ponds				
	Value	Units		Value	Units		
1	A = Fraction of Land in Cover Type	0.007	fraction	1	A = Fraction of Site in Water	0.098	fraction
2	P = Precipitation Rate	49.90	inches	2	P = Precipitation Rate	49.90	inches
3	E = Evapotranspiration Rate	21.20	inches	3	E = Evaporation Rate	30.00	inches
4	Q = Runoff Rate	0.00	inches	4	Q = Runoff Rate	0.00	inches
5	R(c) = P - (E + Q)	28.70	inches	5	M = Makeup Water	0.00	inches
6	R(C) = R(c) x A	0.20	inches	6	R(d) = {P - (E+Q)} - M	19.90	inches
				7	R(D) = R(d) x A	1.95	inches

E Natural			F Impervious/Paved/Roads				
	Value	Units		Value	Units		
1	A = Fraction of Land in Cover Type	0.134	fraction	1	A = Fraction of Land in Cover Type	0.087	fraction
2	P = Precipitation Rate	49.90	inches	2	P = Precipitation Rate	49.90	inches
3	E = Evapotranspiration Rate	21.20	inches	3	E = Evapotranspiration Rate	4.99	inches
4	Q = Runoff Rate	0.50	inches	4	Q = Runoff Rate	0.00	inches
5	R(e) = P - (E + Q)	28.20	inches	5	R(f) = P - (E + Q)	44.91	inches
6	R(E) = R(e) x A	3.78	inches	6	R(F) = R(f) x A	3.92	inches

G Other			H Irrigation Recharge				
	Value	Units		Value	Units		
1	A = Fraction of Land in Cover Type	0.000	fraction	1	A = Fraction of Land Irrigated	0.212	fraction
2	P = Precipitation Rate	49.90	inches	2	I = Irrigation Rate	27.74	inches
3	E = Evapotranspiration Rate	21.20	inches	3	E = Evaptranspiration Rate	21.40	inches
4	Q = Runoff Rate	0.00	inches	4	Q = Runoff Rate	0.00	inches
5	R(g) = P - (E + Q)	28.70	inches	5	R(h) = I - (E + Q)	6.34	inches
6	R(G) = R(g) x A	0.00	inches	6	R(H) = R(h) x A	1.34	inches

I Wastewater Recharge			J Runoff Recharge				
	Value	Units		Value	Units		
1	WDF = Wastewater Design Flow	33,350	gal/day	1	Q(A) = Runoff from Landscaped	0.106	inches
2	WDF = Wastewater Design Flow	1,627,497	cu ft/yr	2	Q(B) = Runoff from Unfertilized Landscaping	0.231	inches
3	A = Area of Site	6,732,634	sq ft	3	Q(C) = Runoff from Unvegetated	0.000	inches
4	R(j) = WDF/A	0.24	feet	4	Q(E) = Runoff from Natural	0.067	inches
5	R(I) = Wastewater Recharge	2.90	inches	5	Q(H) = Runoff from Other	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)	0.40	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) =	33.51	inches



SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

Indian Hills - Proposed Project

SITE NITROGEN BUDGET

A	Sanitary Nitrogen-Residential	Value	Units
1	Number of Dwellings	0	units
2	Persons per Dwelling	1.50	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	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	33,350	gal/day
2	CF = Commercial/STP Flow	46,073,859	liters/yr
5	N =Nitrogen	19.00	mg/l
6	N = Nitrogen	1930.26	lbs
7	LR = Leaching Rate	100%	percent
8	N(S) = CF x N x LR	875,403,316	milligrams
9	N(S) = Sanitary Nitrogen	1930.26	lbs
10	N = loss/removed	0.00	lbs

E	Fertilized Land (Fertilized Landscaping)		
1	A = Area of Land Fertilized	1,427,461	sq ft
2	AR = Application Rate	1.66	lbs/1000 sf
3	N(T) = Nitrogen (total applied)	2374.28	lbs
4	LR = Leaching Rate	10%	percent
5	N(F1) = A x AR x LR	237.43	lbs
6	N = loss/removed	2136.85	lbs

G	Atmospheric Nitrogen (existing condition)		
1	Application Load	0.041	lbs/1000 sf
2	Area of Natural/Wetlands/1000 sf	4,672	1000 sf
3	Leaching Rate	25%	percent
4	Atmos. N Load-1 (natural/wetlands)	47.89	lbs/year
5	Area of turf/landscaped/1000 sf	1,427	1000 sf
6	Leaching Rate	20%	percent
7	Atmos. N Load-2 (golf/turf)	11.71	lbs/year
8	Area of Impervious/Agricult/1000 sf	588	1000 sf
9	Leaching Rate	40%	percent
10	Atmos. N Load-3 (ag; imperv; other)	9.64	lbs/year
11	N(at) = N Load 1 + 2 +3	69.23	lbs
12	N = loss/removed	204.93	lbs

B	Cat Waste Nitrogen	Value	Units
1	Number of Cats per Dwelling	0.19	cats/dwelling
2	Number of Cats (Cats/dwelling x dwellings)	18	cats
3	Cat Waste Nitrogen Load	3.22	lbs/cat/year
4	N(p) = AR x cats x Adjustment (if applicable)	58.38	lbs/year
5	LR = Leaching Rate	25%	percent
6	N(P) = N(p) x LR	14.59	lbs
7	N = (loss/removed)	43.78	lbs

B'	Dog Waste Nitrogen	Value	Units
1	Number of Dogs per Dwelling	0.35	dogs/dwelling
2	Number of Dogs (Dogs/dwelling x dwellings)	34	dogs
3	Dog Waste Nitrogen Load	4.29	lbs/dog/year
4	N(p) = AR x dogs x Adjustment (if applicable)	147.15	lbs/year
5	LR = Leaching Rate	25%	percent
6	N(P) = N(p) x LR	36.79	lbs
7	N = (loss/removed)	110.36	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	19.00	mg/l
4	N(WW) = WDF x N	0	milligrams
5	N(WW) = Wastewater Nitrogen	0.00	lbs

F	Fertilized Land (Unfertilized Landscaping)		
1	A = Area of Land Fertilized 2	0	sq ft
2	AR = Application Rate	0.00	lbs/1000 sf
3	N(T) = Nitrogen (total applied)	0.00	lbs
4	LR = Leaching Rate	0%	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)	1.34	inches
2	R = Irrigation Rate (feet)	0.1120	feet
3	A = Area of Land Irrigated	1,208,354	sq ft
4	R(I) = R(irr) x A	135,357	cu ft
5	R(I) = Site Irrigation (liters)	3,833,319	liters
6	N = Nitrogen in Water Supply	2.00	mg/l
7	N(T) = Nitrogen (total applied)	16.90	lbs
8	LR = Leaching Rate	10%	percent
9	N(irr) = R(I) x N x LR	766,664	milligrams
10	N(irr) = Irrigation Nitrogen	1.69	lbs
11	N = loss/removed	15.21	lbs

Total Site Nitrogen		
N=	N(S) + N(P) + N(WW) + N(F1) + N(F2) + N(ppt) + N(irr)	
N=	2,289.99	lbs



SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

NAME OF PROJECT

**Indian Hills - Proposed Project
Fort Salonga, NY**

FINAL COMPUTATIONS

<i>A</i>	<i>Nitrogen in Recharge (concentr.)</i>	<i>Value</i>	<i>Units</i>
1	N = Total Nitrogen (lbs)	2,289.99	lbs
2	N = Total Nitrogen (milligrams)	1,039,656,485	milligrams
3	R(T) = Total Recharge (inches)	33.51	inches
4	R(T) = Total Recharge (feet)	2.79	feet
5	A = Area of Site	6,732,634	sq ft
6	R = R(T) x A	18,799,163	cu ft
7	R = Site Recharge Volume	532,392,307	liters
9	NR = N/R	1.95	mg/l

CONCENTRATION OF NITROGEN IN RECHARGE <div style="text-align: right; background-color: #e0e0e0; padding: 5px;">1.95</div>
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<i>A</i>	<i>Nitrogen in Recharge</i>	<i>Value</i>	<i>Units</i>
1	N = Total Nitrogen (lbs)	2,289.99	lbs
2	N = Total Nitrogen (milligrams)	1,039,656,485	milligrams
3	R(T) = Total Recharge (inches)	33.51	inches
4	R(T) = Total Recharge (feet)	2.79	feet
5	A = Area of Site	6,732,634	sq ft
6	R = R(T) x A	18,799,163	cu ft
7	R = Site Recharge Volume	532,392,307	liters
9	NR = N/R	1.95	mg/l

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

<i>B</i>	<i>Site Recharge Summary</i>	<i>Value</i>	<i>Units</i>
1	R(T) = Total Site Recharge	33.51	inches/yr
2	R = Site Recharge Volume	18,799,163	cu ft/yr
3	R = Site Recharge Volume	140,627,518	gal/yr
4	R = Site Recharge Volume	140.63	MG/yr

<u>Nitrogen Load Summary - On-Site</u>	<u>Load</u>	<u>Percent</u>
Sanitary Nitrogen (On-Site Wastewater)	1,930.26	84.29%
Fertilized Landscaping	237.43	10.37%
Dog Waste Nitrogen	36.79	1.61%
Cat Waste Nitrogen	14.59	0.64%
Atmospheric Nitrogen	69.23	3.02%
Irrigation Nitrogen	1.69	0.07%
Total Pounds Nitrogen	2,289.99	100.00%

