

**Appendix J-5**  
**SONIR Model Results: Alternative 2**

**SIMULATION OF NITROGEN IN RECHARGE (SONIR)**

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

**NAME OF PROJECT**

**Indian Hills - Alternative 2  
Fort Salonga, NY**

**DATA INPUT FIELD**

A	<i>Site Recharge Parameters</i>	<i>Value</i>	<i>Units</i>	B	<i>Nitrogen Budget Parameters</i>	<i>Value</i>	<i>Units</i>
1	Area of Site	152.20	acres	1	Persons per Dwelling	2.93	persons
2	Precipitation Rate	49.90	inches	2	Nitrogen per Person per Year	10.0	lbs
3	Acreage of Fertilized Landscaping	95.98	acres	3	a. Sanitary Nitrogen Leaching Rate	84%	percent
4	Fraction of Land in above	0.631	fraction	3	b. Treated Sanitary Nitrogen Leaching Rate	100%	percent
5	Evapotranspiration from above	21.20	inches	4	Fertilized Landscaping	95.98	acres
6	Runoff from above	0.50	inches	5	Fertilizer Application Rate (for above)	2.04	lbs/1000 sq ft
7	Acreage of Unfertilized Landscaping	0.00	acres	6	Fertilizer Nitrogen Leaching Rate (for above)	30%	percent
8	Fraction of above	0.000	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	Acreage of Unvegetated/Dirt Roads	0.00	acres	10	Outdoor Cat Population	0.74	pets/dwelling
12	Fraction of above	0.000	fraction	11	Cat Waste Nitrogen Load	3.22	lbs/pet/year
13	Evapotranspiration from above	21.20	inches	12	Outdoor Dog Population	1.40	pets/dwelling
14	Runoff from above	0.00	inches	13	Dog Waste Nitrogen Load	4.29	lbs/pet/year
15	Acreage of Water/Ponds	5.05	acres	14	Pet Waste Nitrogen Leaching Rate	25%	percent
16	Fraction of Site in above	0.033	fraction	15	Area of Land Irrigated	95.98	acres
17	Evaporation from above	30.00	inches	16	Irrigation Rate	24.00	inches
18	Makeup Water (if applicable)	0.00	inches	17	Irrigation Nitrogen Leaching Rate	10%	percent
19	Acreage of Natural	29.44	acres	18	Atmospheric Nitrogen Application/Load	0.04	lbs/1000 sq ft
20	Fraction of above	0.193	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	Acreage of Impervious/Paved/Bldgs	21.74	acres	22	Nitrogen in Water Supply	2.00	mg/l
24	Fraction of Land in above	0.143	fraction	23	Nitrogen in Sanitary Flow	50.00	mg/l
25	Evapotrans. from above	4.99	inches				
26	Runoff from Impervious	0.00	inches	<b>C Comments</b>			
27	Acreage of Other	0.00	acres	1) Please refer to user manual for data input instructions; updated per LINAP.			
24	Fraction of Land in above	0.000	fraction				
25	Evapotrans. from above	21.20	inches				
26	Runoff from above	0.00	inches				
27	Acreage of Land Irrigated	95.98	acres				
28	Fraction of Land Irrigated	0.631	fraction				
29	Irrigation Rate	24.00	inches				
30	Number of Dwellings	98	units				
31	Water Use per Dwelling	300	gal/day				
32	Wastewater Design Flow (clubhouse)	600	gal/day	Total Acreage Check		152.2	100%



**Indian Hills - Alternative 2**

**SITE RECHARGE COMPUTATIONS**

<b>A Fertilized Landscaping</b>			<b>B Unfertilized Landscaping</b>				
	<b>Value</b>	<b>Units</b>		<b>Value</b>	<b>Units</b>		
1	A = Fraction of Land in Cover Type	0.631	fraction	1	A = Fraction of Land in Cover Type	0.000	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	17.78	inches	6	R(B) = R(b) x A	0.00	inches

<b>C Unvegetated/Dirt Roads</b>			<b>D Water/Ponds</b>				
	<b>Value</b>	<b>Units</b>		<b>Value</b>	<b>Units</b>		
1	A = Fraction of Land in Cover Type	0.000	fraction	1	A = Fraction of Site in Water	0.033	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	0.00	inches	6	R(d) = {P - (E+Q)} - M	19.90	inches
				7	R(D) = R(d) x A	0.66	inches

<b>E Natural</b>			<b>F Impervious/Paved/Roads</b>				
	<b>Value</b>	<b>Units</b>		<b>Value</b>	<b>Units</b>		
1	A = Fraction of Land in Cover Type	0.193	fraction	1	A = Fraction of Land in Cover Type	0.143	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	5.45	inches	6	R(F) = R(f) x A	6.41	inches

<b>G Other</b>			<b>H Irrigation Recharge</b>				
	<b>Value</b>	<b>Units</b>		<b>Value</b>	<b>Units</b>		
1	A = Fraction of Land in Cover Type	0.000	fraction	1	A = Fraction of Land Irrigated	0.631	fraction
2	P = Precipitation Rate	49.90	inches	2	I = Irrigation Rate	24.00	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)	2.60	inches
6	R(G) = R(g) x A	0.00	inches	6	R(H) = R(h) x A	1.64	inches

<b>I Wastewater Recharge</b>			<b>J Runoff Recharge</b>				
	<b>Value</b>	<b>Units</b>		<b>Value</b>	<b>Units</b>		
1	WDF = Wastewater Design Flow	600	gal/day	1	Q(A) = Runoff from Landscaped	0.315	inches
2	WDF = Wastewater Design Flow	29,280	cu ft/yr	2	Q(B) = Runoff from Unfertilized Landscaping	0.000	inches
3	A = Area of Site	6,629,832	sq ft	3	Q(C) = Runoff from Unvegetated	0.000	inches
4	R(j) = WDF/A	0.00	feet	4	Q(E) = Runoff from Natural	0.097	inches
5	R(I) = Wastewater Recharge	0.05	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)	0.41	inches

<b>Total Site Recharge</b>		
R(T) =	R(A)+R(B)+R(C)+R(D)+R(E)+R(F)+R(G)+R(H)+R(I)+R(J)+Q(tot)	
<b>R(T) =</b>	<b>32.42</b>	<b>inches</b>



**SIMULATION OF NITROGEN IN RECHARGE (SONIR)**

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

**Indian Hills - Alternative 2**

**SITE NITROGEN BUDGET**

A	Sanitary Nitrogen-Residential	Value	Units
1	Number of Dwellings	98	units
2	Persons per Dwelling	2.93	capita
3	P = Population	287.14	capita
4	N = Nitrogen per person	10	lbs
6	N = (total; pre loss/removal)	2871.4	lbs
7	LR = Leaching Rate	84%	percent
8	N(S) = P x N x LR	2411.98	lbs
9	N = loss/removed	459.42	lbs

C	Sanitary Nitrogen (Wastewater Design Flow)	Value	Units
1	CF = Commercial/STP Flow	600	gal/day
2	CF = Commercial/STP Flow	828,915	liters/yr
5	N = Nitrogen	50.00	mg/l
6	N = Nitrogen	91.39	lbs
7	LR = Leaching Rate	84%	percent
8	N(S) = CF x N x LR	34,814,430	milligrams
9	N(S) = Sanitary Nitrogen	76.77	lbs
10	N = loss/removed	14.62	lbs

E	Fertilized Land (Fertilized Landscaping)	Value	Units
1	A = Area of Land Fertilized	4,180,889	sq ft
2	AR = Application Rate	2.04	lbs/1000 sf
3	N(T) = Nitrogen (total applied)	8529.01	lbs
4	LR = Leaching Rate	30%	percent
5	N(F1) = A x AR x LR	2558.70	lbs
6	N = loss/removed	5970.31	lbs

G	Atmospheric Nitrogen (existing condition)	Value	Units
1	Application Load	0.041	lbs/1000 sf
2	Area of Natural/Wetlands/1000 sf	1,502	1000 sf
3	Leaching Rate	25%	percent
4	Atmos. N Load-1 (natural/wetlands)	15.40	lbs/year
5	Area of turf/landscaped/1000 sf	4,181	1000 sf
6	Leaching Rate	20%	percent
7	Atmos. N Load-2 (golf/turf)	34.28	lbs/year
8	Area of Impervious/Agricult/1000 sf	947	1000 sf
9	Leaching Rate	40%	percent
10	Atmos. N Load-3 (ag; imperv; other)	15.53	lbs/year
11	N(at) = N Load 1 + 2 + 3	65.21	lbs
12	N = loss/removed	206.63	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)	73	cats
3	Cat Waste Nitrogen Load	3.22	lbs/cat/year
4	N(p) = AR x cats x Adjustment (if applicable)	233.51	lbs/year
5	LR = Leaching Rate	25%	percent
6	N(P) = N(p) x LR	58.38	lbs
7	N = (loss/removed)	175.14	lbs

B'	Dog Waste Nitrogen	Value	Units
1	Number of Dogs per Dwelling	1.40	dogs/dwelling
2	Number of Dogs (Dogs/dwelling x dwellings)	137	dogs
3	Dog Waste Nitrogen Load	4.29	lbs/dog/year
4	N(p) = AR x dogs x Adjustment (if applicable)	588.59	lbs/year
5	LR = Leaching Rate	25%	percent
6	N(P) = N(p) x LR	147.15	lbs
7	N = (loss/removed)	441.44	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 (Unfertilized Landscaping)	Value	Units
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	Value	Units
1	R = Irrigation Recharge (inches)	1.64	inches
2	R = Irrigation Rate (feet)	0.1366	feet
3	A = Area of Land Irrigated	1,045,440	sq ft
4	R(I) = R(irr) x A	142,842	cu ft
5	R(I) = Site Irrigation (liters)	4,045,298	liters
6	N = Nitrogen in Water Supply	2.00	mg/l
7	N(T) = Nitrogen (total applied)	17.84	lbs
8	LR = Leaching Rate	10%	percent
9	N(irr) = R(I) x N x LR	809,060	milligrams
10	N(irr) = Irrigation Nitrogen	1.78	lbs
11	N = loss/removed	16.06	lbs

Total Site Nitrogen	
N=	N(S) + N(P) + N(WW) + N(F1) + N(F2) + N(ppt) + N(irr)
N=	5,319.97 lbs



**SIMULATION OF NITROGEN IN RECHARGE (SONIR)**

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

**NAME OF PROJECT**

**Indian Hills - Alternative 2  
Fort Salonga, NY**

**FINAL COMPUTATIONS**

A	Nitrogen in Recharge (concentr.)	Value	Units
1	N = Total Nitrogen (lbs)	5,319.97	lbs
2	N = Total Nitrogen (milligrams)	2,415,265,825	milligrams
3	R(T) = Total Recharge (inches)	32.42	inches
4	R(T) = Total Recharge (feet)	2.70	feet
5	A = Area of Site	6,629,832	sq ft
6	R = R(T) x A	17,910,444	cu ft
7	R = Site Recharge Volume	507,223,773	liters
9	NR = N/R	4.76	mg/l

<p>CONCENTRATION OF NITROGEN IN RECHARGE</p> <p style="margin-left: 200px;"><b>4.76</b></p>
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A	Nitrogen in Recharge	Value	Units
1	N = Total Nitrogen (lbs)	5,319.97	lbs
2	N = Total Nitrogen (milligrams)	2,415,265,825	milligrams
3	R(T) = Total Recharge (inches)	32.42	inches
4	R(T) = Total Recharge (feet)	2.70	feet
5	A = Area of Site	6,629,832	sq ft
6	R = R(T) x A	17,910,444	cu ft
7	R = Site Recharge Volume	507,223,773	liters
9	NR = N/R	4.76	mg/l

Conversions used in SONIR	
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

B	Site Recharge Summary	Value	Units
1	R(T) = Total Site Recharge	32.42	inches/yr
2	R = Site Recharge Volume	17,910,444	cu ft/yr
3	R = Site Recharge Volume	133,979,434	gal/yr
4	R = Site Recharge Volume	133.98	MG/yr

Nitrogen Load Summary - On-Site	Load	Percent
Sanitary Nitrogen (On-Site Wastewater)	2,488.74	46.78%
Fertilized Landscaping	2558.70	48.10%
Dog Waste Nitrogen	147.15	2.77%
Cat Waste Nitrogen	58.38	1.10%
Atmospheric Nitrogen	65.21	1.23%
Irrigation Nitrogen	1.78	0.03%
Total Pounds Nitrogen	5,319.97	100.00%

