

---

## APPENDIX F-3

### SONIR RESULTS, PROPOSED CONDITIONS

---

# SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

Proposed Conditions

**NAME OF PROJECT**

South Country Road Quiogue MFPRD

Quiogue, NY

8/9/2021

**DATA INPUT FIELD**

A	Site Recharge Parameters	Value	Units	B	Nitrogen Budget Parameters	Value	Units
1	Area of Site	17.33	acres	1	Persons per Dwelling	0.00	persons
2	Precipitation Rate	50.10	inches	2	Nitrogen per Person per Year	10.0	lbs
3	Acreage of Fertilized Landscaping	3.35	acres	3	a. Sanitary Nitrogen Leaching Rate	84%	percent
4	Fraction of Land in above	0.193	fraction	3	b. Treated Sanitary Nitrogen Leaching Rate	100%	percent
5	Evapotranspiration from above	21.20	inches	4	Fertilized Landscaping	3.35	acres
6	Runoff from above	0.50	inches	5	Fertilizer Application Rate (for above)	1.50	lbs/1000 sq ft
7	Acreage of Natural Landscaping/Reveg	4.15	acres	6	Fertilizer Nitrogen Leaching Rate (for above)	20%	percent
8	Fraction of above	0.239	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/Much	0.09	acres	10	Outdoor Cat Population	0.19	pets/dwelling
12	Fraction of above	0.005	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	Acreage of Water/Ponds	0.00	acres	14	Pet Waste Nitrogen Leaching Rate	25%	percent
16	Fraction of Site in above	0.000	fraction	15	Area of Land Irrigated	3.35	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	5.17	acres	18	Atmospheric Nitrogen Application/Load	0.04	lbs/1000 sq ft
20	Fraction of above	0.298	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	4.57	acres	22	Nitrogen in Water Supply	2.00	mg/l
24	Fraction of Land in above	0.264	fraction	23	Nitrogen in Sanitary Flow	10.00	mg/l
25	Evapotrans. from above	5.01	inches				
26	Runoff from Impervious	0.00	inches				
23	Acreage of Other	0.00	acres				
24	Fraction of Land in above	0.000	fraction	C	Comments		
25	Evapotrans. from above	21.20	inches	1)	Please refer to user manual for data input instructions; updated per LINAP.		
26	Runoff from above	0.00	inches				
27	Acreage of Land Irrigated	3.35	acres				
28	Fraction of Land Irrigated	0.193	fraction				
29	Irrigation Rate	24.00	inches				
30	Number of Dwellings	104	units				
31	Water Use per Dwelling	225 & 300 gpd	gal/day				
32	Wastewater Design Flow (existing uses)	24,677	gal/day				
					Total Acreage Check	17.33	100%

# SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

## South Country Road Quiogue MFPRD

### SITE RECHARGE COMPUTATIONS

<b>A Fertilized Landscaping</b>			<b>Value</b>	<b>Units</b>	<b>B Unfertilized Landscaping</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	0.239	fraction	
2	P = Precipitation Rate		50.10	inches	2	P = Precipitation Rate	50.10	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	$R(a) = P - (E + Q)$		28.40	inches	5	$R(b) = P - (E + Q)$	28.40	inches	
6	$R(A) = R(a) \times A$		5.49	inches	6	$R(B) = R(b) \times A$	6.80	inches	

<b>C Unvegetated/Dirt Roads</b>			<b>Value</b>	<b>Units</b>	<b>D Water/Ponds</b>			<b>Value</b>	<b>Units</b>
1	A = Fraction of Land in Cover Type		0.005	fraction	1	A = Fraction of Site in Water	0.000	fraction	
2	P = Precipitation Rate		50.10	inches	2	P = Precipitation Rate	50.10	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	$R(c) = P - (E + Q)$		28.90	inches	5	M = Makeup Water	0.00	inches	
6	$R(C) = R(c) \times A$		0.15	inches	6	$R(d) = \{P - (E+Q)\} - M$	20.10	inches	
					7	$R(D) = R(d) \times A$	0.00	inches	

<b>E Natural</b>			<b>Value</b>	<b>Units</b>	<b>F Impervious/Paved/Roads</b>			<b>Value</b>	<b>Units</b>
1	A = Fraction of Land in Cover Type		0.298	fraction	1	A = Fraction of Land in Cover Type	0.264	fraction	
2	P = Precipitation Rate		50.10	inches	2	P = Precipitation Rate	50.10	inches	
3	E = Evapotranspiration Rate		21.20	inches	3	E = Evapotranspiration Rate	5.01	inches	
4	Q = Runoff Rate		0.50	inches	4	Q = Runoff Rate	0.00	inches	
5	$R(e) = P - (E + Q)$		28.40	inches	5	$R(f) = P - (E + Q)$	45.09	inches	
6	$R(E) = R(e) \times A$		8.47	inches	6	$R(F) = R(f) \times A$	11.89	inches	

<b>G Other</b>			<b>Value</b>	<b>Units</b>	<b>H Irrigation Recharge</b>			<b>Value</b>	<b>Units</b>
1	A = Fraction of Land in Cover Type		0.000	fraction	1	A = Fraction of Land Irrigated	0.193	fraction	
2	P = Precipitation Rate		50.10	inches	2	I = Irrigation Rate	24.00	inches	
3	E = Evapotranspiration Rate		21.20	inches	3	E = Evapotranspiration Rate	21.40	inches	
4	Q = Runoff Rate		0.00	inches	4	Q = Runoff Rate	0.00	inches	
5	$R(g) = P - (E + Q)$		28.90	inches	5	$R(h) = I - (E + Q)$	2.60	inches	
6	$R(G) = R(g) \times A$		0.00	inches	6	$R(H) = R(h) \times A$	0.50	inches	

<b>I Wastewater Recharge</b>			<b>Value</b>	<b>Units</b>	<b>J Runoff Recharge</b>			<b>Value</b>	<b>Units</b>
1	WDF = Wastewater Design Flow		24,677	gal/day	1	Q(A) = Runoff from Landscaped	0.097	inches	
2	WDF = Wastewater Design Flow		1,204,250	cu ft/yr	2	Q(B) = Runoff from Unfertilized Landscaping	0.120	inches	
3	A = Area of Site		754,895	sq ft	3	Q(C) = Runoff from Unvegetated	0.000	inches	
4	$R(j) = WDF/A$		1.60	feet	4	Q(E) = Runoff from Natural	0.149	inches	
5	R(I) = Wastewater Recharge		19.14	inches	5	Q(H) = Runoff from Other	0.000	inches	
					6	Q(I) = Runoff from Irrigation	0.00	inches	
					7	$Q(tot) = Q(A)+Q(B)+Q(C)+Q(E)+Q(H)+Q(I)$	0.37	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>52.82</b>	<b>inches</b>

# SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

## South Country Road Quiogue MFPRD

### SITE NITROGEN BUDGET

A	Sanitary Nitrogen-Residential	Value	Units
1	Number of Dwellings	0	units
2	Persons per Dwelling	0.00	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)	Value	Units
1	CF = Commercial/STP Flow	24,677	gal/day
2	CF = Commercial/STP Flow	34,091,892	liters/yr
5	N = Nitrogen	10.00	mg/l
6	N = Nitrogen	751.73	lbs
7	LR = Leaching Rate	84%	percent
8	N(S) = CF x N x LR	286,371,896	milligrams
9	N(S) = Sanitary Nitrogen	631.45	lbs
10	N = loss/removed	120.28	lbs

E	Fertilized Land (Fertilized Landscaping)	Value	Units
1	A = Area of Land Fertilized	145,926	sq ft
2	AR = Application Rate	1.50	lbs/1000 sf
3	N(T) = Nitrogen (total applied)	218.89	lbs
4	LR = Leaching Rate	20%	percent
5	N(F1) = A x AR x LR	43.78	lbs
6	N = loss/removed	175.11	lbs

G	Atmospheric Nitrogen (existing condition)	Value	Units
1	Application Load	0.041	lbs/1000 sf
2	Area of Natural/Wetlands/1000 sf	406	1000 sf
3	Leaching Rate	25%	percent
4	Atmos. N Load-1 (natural/wetlands)	4.16	lbs/year
5	Area of turf/landscaped/1000 sf	146	1000 sf
6	Leaching Rate	20%	percent
7	Atmos. N Load-2 (golf/turf)	1.20	lbs/year
8	Area of Impervious/Agricult/1000 sf	199	1000 sf
9	Leaching Rate	40%	percent
10	Atmos. N Load-3 (ag; imperv; other)	3.26	lbs/year
11	N(at) = N Load 1 + 2 + 3	8.62	lbs
12	N = loss/removed	22.17	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)	19	cats
3	Cat Waste Nitrogen Load	3.22	lbs/cat/year
4	N(p) = AR x cats x Adjustment (if applicable)	61.95	lbs/year
5	LR = Leaching Rate	25%	percent
6	N(P) = N(p) x LR	15.49	lbs
7	N = (loss/removed)	46.46	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)	36	dogs
3	Dog Waste Nitrogen Load	4.29	lbs/dog/year
4	N(p) = AR x dogs x Adjustment (if applicable)	156.16	lbs/year
5	LR = Leaching Rate	25%	percent
6	N(P) = N(p) x LR	39.04	lbs
7	N = (loss/removed)	117.12	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	10.00	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)	0.50	inches
2	R = Irrigation Rate (feet)	0.0419	feet
3	A = Area of Land Irrigated	1,045,440	sq ft
4	R(I) = R(irr) x A	43,786	cu ft
5	R(I) = Site Irrigation (liters)	1,240,026	liters
6	N = Nitrogen in Water Supply	2.00	mg/l
7	N(T) = Nitrogen (total applied)	5.47	lbs
8	LR = Leaching Rate	10%	percent
9	N(irr) = R(I) x N x LR	248,005	milligrams
10	N(irr) = Irrigation Nitrogen	0.55	lbs
11	N = loss/removed	4.92	lbs

Total Site Nitrogen	
N=	N(S) + N(P) + N(WW) + N(F1) + N(F2) + N(ppt) + N(irr)
N=	738.92 lbs



# SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

NAME OF PROJECT

South Country Road Quiogue MFPRD  
Quiogue, NY

**FINAL COMPUTATIONS**

A	Nitrogen in Recharge (concentr.)	Value	Units
1	N = Total Nitrogen (lbs)	738.92	lbs
2	N = Total Nitrogen (milligrams)	335,471,722	milligrams
3	R(T) = Total Recharge (inches)	52.82	inches
4	R(T) = Total Recharge (feet)	4.40	feet
5	A = Area of Site	754,895	sq ft
6	R = R(T) x A	3,322,483	cu ft
7	R = Site Recharge Volume	94,092,721	liters
9	NR = N/R	3.57	mg/l

CONCENTRATION OF NITROGEN IN RECHARGE  <b>3.57</b>
---

A	Nitrogen in Recharge	Value	Units
1	N = Total Nitrogen (lbs)	738.92	lbs
2	N = Total Nitrogen (milligrams)	335,471,722	milligrams
3	R(T) = Total Recharge (inches)	52.82	inches
4	R(T) = Total Recharge (feet)	4.40	feet
5	A = Area of Site	754,895	sq ft
6	R = R(T) x A	3,322,483	cu ft
7	R = Site Recharge Volume	94,092,721	liters
9	NR = N/R	3.57	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	52.82	inches/yr
2	R = Site Recharge Volume	3,322,483	cu ft/yr
3	R = Site Recharge Volume	24,853,901	gal/yr
4	R = Site Recharge Volume	24.85	MG/yr

Nitrogen Load Summary - On-Site	Load	Percent
Sanitary Nitrogen (On-Site Wastewater)	631.45	85.46%
Fertilized Landscaping	43.78	5.92%
Dog Waste Nitrogen	39.04	5.28%
Cat Waste Nitrogen	15.49	2.10%
Atmospheric Nitrogen	8.62	1.17%
Irrigation Nitrogen	0.55	0.07%
Total Pounds Nitrogen	738.92	100.00%