Appendix D-3
SONIR Analysis

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

NAME OF PROJECT

Riverside - Pine Barrens Area
Existing Use Analysis
Average Turfgrass Leaching Rate

DATA INPUT FIELD

A	*Site Recharge Parameters*	*Value*	*Units*
1	Area of Site	385.06	acres
2	Precipitation Rate	49.90	inches
3	Area of Fertilized Landscape	156.00	acres
4	Fraction of Land in Fertilized Landscape	0.405	fraction
5	Evapotranspiration from Fert/Land	23.00	inches
6	Runoff from Fert/Land	0.35	inches
7	Area of Non-Fertilized Landscape	0.00	acres
8	Fraction of Non-Fertilized Landscape	0.000	fraction
9	Evaporation from Non-Fertilized	23.90	inches
10	Runoff from Non-Fertilized Land	0.35	inches
11	Acreage of Unvegetated/Dirt Roads	18.26	acres
12	Fraction of Land Unvegetated	0.047	fraction
13	Evapotrans. from Unvegetated	21.20	inches
14	Runoff from Unvegetated	0.3493	inches
15	Acreage of Water/Wetlands	4.43	acres
16	Fraction of Site in Water	0.012	fraction
17	Evaporation from Water	30.00	inches
18	Makeup Water (if applicable)	0.00	inches
19	Acreage of Natural/Natural Reveg	107.26	acres
20	Fraction of Land Natural	0.279	fraction
21	Evapotrans. from Natural Area	23.00	inches
22	Runoff from Natural Area	0.35	inches
23	Acreage of Impervious/Paved/Bldgs	99.11	acres
24	Fraction of Land in Impervious	0.257	fraction
25	Evapotrans. from Impervious	4.99	inches
26	Runoff from Impervious	0.00	inches
23	Acreage of Other (Rain Gardens)	0.00	acres
24	Fraction of Land Other Area	0.000	fraction
25	Evapotrans. from Other Area	30.00	inches
26	Runoff from Other Area	0.50	inches
27	Acreage of Land Irrigated	156.00	acres
28	Fraction of Land Irrigated	0.405	fraction
29	Irrigation Rate	24.00	inches
30	Number of Dwellings	695	units
31	Water Use per Dwelling	0	gal/day
32	Wastewater Design Flow (units)	0	gal/day
33	Wastewater Design Flow (untreated)-1	192,286	gal/day
34	Wastewater Design Flow (treated)	0	gal/day

B	*Nitrogen Budget Parameters*	*Value*	*Units*
1	Persons per Dwelling	2.40	persons
2	Nitrogen per Person per Year	10.0	lbs
3	a. Sanitary Nitrogen Leaching Rate	50%	percent
3	b. Sanitary Nitrogen Leaching Rate	90%	percent
4	Fertilized Land-1	156.00	acres
5	Fertilizer Application Rate-1	2.30	lbs/1000 sq ft
6	Fertilizer Nitrogen Leaching Rate-1	10%	percent
7	Fertilized Land-2	0.00	acres
8	Fertilizer Application Rate-2	0.00	lbs/1000 sq ft
9	Fertilizer Nitrogen Leaching Rate-2	10%	percent
10	Pet Waste Application Rate	3.19	lbs/pet
11	Pet Waste Nitrogen Leaching Rate	50%	percent
12	Area of Land Irrigated	156.00	acres
13	Irrigation Rate	24.00	inches
14	Irrigation Nitrogen Leaching Rate	10%	percent
15	Nitrogen in Precipitation	1.00	mg/l
16	Precipitation Nitrogen Leaching Rate	10%	percent
17	Nitrogen in Water Supply	1.00	mg/l
18	Nitrogen in Sanitary Flow -1	50.00	mg/l
19	Nitrogen in Sanitary Flow -2	6.00	mg/l

C	*Comments*
1)	Please refer to user manual for data input instructions.

	Developed Area	273.37	71%
	Natural/Unvegetated/Revegetated Area	107.26	28%
	Total Acreage Check	385.06	100%

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

Existing Use Analysis
Average Turfgrass Leaching Rate

SITE RECHARGE COMPUTATIONS

A	*Fertilized Landscaped*	*Value*	*Units*
1	A = Fraction of Land in Cover Type	0.405	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	10.76	inches

B	*Non-fertilized Landsaped*	*Value*	*Units*
1	A = Fraction of Land in Cover Type	0.000	fraction
2	P = Precipitation Rate	49.90	inches
3	E = Evapotranspiration Rate	23.90	inches
4	Q = Runoff Rate	0.35	inches
5	R(b) = P - (E + Q)	25.65	inches
6	R(B) = R(b) x A	0.00	inches

C	*Unvegetated/Dirt Roads*	*Value*	*Units*
1	A = Fraction of Land in Cover Type	0.047	fraction
2	P = Precipitation Rate	49.90	inches
3	E = Evapotranspiration Rate	21.20	inches
4	Q = Runoff Rate	0.35	inches
5	R(c) = P - (E + Q)	28.35	inches
6	R(C) = R(c) x A	1.34	inches

D	*Water/Wetlands*		
1	A = Fraction of Site in Water	0.012	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	0.23	inches

E	*Natural/Natural Revegetation*		
1	A = Fraction of Land in Cover Type	0.279	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	7.40	inches

F	*Impervous/Paved/Roads*	*Value*	*Units*
1	A = Fraction of Land in Cover Type	0.257	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	11.56	inches

G	*Rain Gardens/Wetlands*		
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	0.50	inches
5	R(g) = P - (E + Q)	19.40	inches
6	R(G) = R(g) x A	0.00	inches

H	*Irrigation Recharge*		
1	A = Fraction of Land Irrigated	0.405	fraction
2	I = Irrigation Rate	24.00	inches
3	E = Evaptranspiration Rate	23.00	inches
4	Q = Runoff Rate	0.35	inches
5	R(h) = I - (E + Q)	0.65	inches
6	R(H) = R(H) x A	0.26	inches

I	*Wastewater Recharge*		
1	WDF = Wastewater Design Flow	192,286	gal/day
2	WDF = Wastewater Design Flow	9,383,653	cu ft/yr
3	A = Area of Site	16,773,214	sq ft
4	R(j) = WDF/A	0.56	feet
5	R(I) = Wastewater Recharge	6.71	inches

J	*Runoff Recharge*		
1	Q(A) = Runoff from Landscaped	0.142	inches
2	Q(B) = Runoff from Non-fertilized Landscape	0.002	inches
3	Q(C) = Runoff from Unvegetated	0.017	inches
4	Q(E) = Runoff from Natural	0.097	inches
5	Q(H) = Runoff from Rain Gardens	0.000	inches
6	Q(I) = Runoff from Irrigation	0.14	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) =	**38.66**	**inches**
R(T)(adj) =	**38.66**	**inches**

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

Existing Use Analysis

Average Turfgrass Leaching Rate

SITE NITROGEN BUDGET

A	*Sanitary Nitrogen (Wastewater Flow)(untreated)*		
1	CF = Wastewater Flow	192,286	gal/day
2	CF = Wastewater Flow	265,647,916	liters/yr
3	N = Nitrogen (untreated)	50.00	mg/l
4	N = Nitrogen (untreated)	29287.68	lbs
7	LR = Leaching Rate	50%	percent
8	N(S) = CF x N x LR	6,641,197,904	milligrams
9	N(S) = Sanitary Nitrogen	14643.84	lbs
10	N = loss/removed	14643.84	lbs

B	*Pet Waste Nitrogen*	*Value*	*Units*
1	AR = Application Rate	3.19	lbs/pet
2	Human Population	1668	capita
3	Pets = 17 percent of capita	284	pets
4	N(p) = AR x pets	904.56	lbs
5	LR = Leaching Rate	50%	percent
6	N(P) = N(p) x LR	452.28	lbs
7	N = (loss/removed)	452.28	lbs

C	*Sanitary Nitrogen (Wastewater Flow)(treated)*		
1	CF = Wastewater Flow	0	gal/day
2	CF = Wastewater Flow	0	liters/yr
3	N = Nitrogen (untreated)	50.00	mg/l
4	N = Nitrogen (untreated)	0.00	lbs
5	N =Nitrogen (treated)	6.00	mg/l
7	LR = Leaching Rate	90%	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	1.00	mg/l
4	N(WW) = WDF x N	0	milligrams
5	N(WW) = Wastewater Nitrogen	0.00	lbs

E	*Fertilized Land*		
1	A = Area of Land Fertilized	6,795,360	sq ft
2	AR = Application Rate	2.30	lbs/1000 sf
3	N(T) = Nitrogen (total applied)	15629.33	lbs
4	LR = Leaching Rate	10%	percent
5	N(F1) = A x AR x LR	1562.93	lbs
6	N = loss/removed	14066.40	lbs

F	*Non-Fertilized Land*		
1	A = Area of Land Non-Fertilized	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	10%	percent
5	N(F2) = A x AR x LR	0.00	lbs
6	N = loss/removed	0.00	lbs

G	*Precipitation Nitrogen (existing condition)*		
1	R(n) = Natural Recharge (feet)	1.96	feet
2	A = Area of Site (sq ft)	16,773,214	sq ft
3	R(N) = R(n) x A	32,887,921	cu ft
4	R(N) = Natural Recharge (liters)	931,385,936	liters
5	N = Nitrogen in Precipitation	1.00	mg/l
6	N(T) = Nitrogen (total)	2,054	lbs
7	LR = Leaching Rate	10%	percent
8	N(ppt) = R(N) x N x LR	93,138,593.64	milligrams
10	N(irr) = Irrigation Nitrogen	205.37	lbs
9	N = loss/removed	1848.34	lbs

H	*Irrigation Nitrogen*		
1	R = Irrigation Recharge (inches)	0.26	inches
2	R = Irrigation Rate (feet)	0.02	feet
3	A = Area of Land Irrigated	6,795,360	sq ft
4	R(I) = R(irr) x A	149,282	cu ft
5	R(I) = Site Precipitation (liters)	4,227,674	liters
6	N = Nitrogen in Water Supply	2.00	mg/l
7	N(T) = Nitrogen (total applied)	18.64	lbs
8	LR = Leaching Rate	10%	percent
9	N(irr) = R(I) x N x LR	845,535	milligrams
10	N(irr) = Irrigation Nitrogen	1.86	lbs
11	N = loss/removed	16.78	lbs

Total Site Nitrogen		
N=	N(S) + N(P) + N(WW) + N(F1) + N(F2) + N(ppt) + N(irr)	
N=	**16,866.29**	lbs

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

NAME OF PROJECT

Riverside - Pine Barrens Area
Existing Use Analysis
Average Turfgrass Leaching Rate

FINAL COMPUTATIONS

A	*Nitrogen in Recharge*	*Value*	*Units*
1	N = Total Nitrogen (lbs)	16,866.29	lbs
2	N = Total Nitrogen (milligrams)	7,657,294,471	milligrams
3	R(T) = Total Recharge (inches)	38.66	inches
4	R(T) = Total Recharge (feet)	3.22	feet
5	A = Area of Site	16,773,214	sq ft
6	R = R(T) x A	54,039,250	cu ft
7	R = Site Recharge Volume	1,530,391,559	liters
9	NR = N/R	5.00	mg/l

CONCENTRATION OF
NITROGEN IN RECHARGE

5.00

B	*Site Recharge Summary*	*Value*	*Units*
1	R(T) = Total Site Recharge	38.66	inches/yr
2	R = Site Recharge Volume	54,039,250	cu ft/yr
3	R = Site Recharge Volume	404,241,690	gal/yr
4	R = Site Recharge Volume	404.24	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

Riverside - Pine Barrens Area
Theoretical Development Scenario
Average Turfgrass Leaching Rate

DATA INPUT FIELD

A	*Site Recharge Parameters*	*Value*	*Units*
1	Area of Site	385.06	acres
2	Precipitation Rate	49.90	inches
3	Area of Fertilized Landscape	153.32	acres
4	Fraction of Land in Fertilized Landscape	0.398	fraction
5	Evapotranspiration from Fert/Land	23.00	inches
6	Runoff from Fert/Land	0.35	inches
7	Area of Non-Fertilized Landscape	0.00	acres
8	Fraction of Non-Fertilized Landscape	0.000	fraction
9	Evaporation from Non-Fertilized	23.90	inches
10	Runoff from Non-Fertilized Land	0.35	inches
11	Acreage of Unvegetated/Dirt Roads	5.95	acres
12	Fraction of Land Unvegetated	0.015	fraction
13	Evapotrans. from Unvegetated	21.20	inches
14	Runoff from Unvegetated	0.3493	inches
15	Acreage of Water/Wetlands	4.43	acres
16	Fraction of Site in Water	0.012	fraction
17	Evaporation from Water	30.00	inches
18	Makeup Water (if applicable)	0.00	inches
19	Acreage of Natural/Natural Reveg	79.62	acres
20	Fraction of Land Natural	0.207	fraction
21	Evapotrans. from Natural Area	23.00	inches
22	Runoff from Natural Area	0.35	inches
23	Acreage of Impervious/Paved/Bldgs	141.75	acres
24	Fraction of Land in Impervious	0.368	fraction
25	Evapotrans. from Impervious	4.99	inches
26	Runoff from Impervious	0.00	inches
23	Acreage of Other (Rain Gardens)	0.00	acres
24	Fraction of Land Other Area	0.000	fraction
25	Evapotrans. from Other Area	30.00	inches
26	Runoff from Other Area	0.50	inches
27	Acreage of Land Irrigated	153.32	acres
28	Fraction of Land Irrigated	0.398	fraction
29	Irrigation Rate	24.00	inches
30	Number of Dwellings	2714	units
31	Water Use per Dwelling	0	gal/day
32	Wastewater Design Flow (units)	0	gal/day
33	Wastewater Design Flow (untreated)-1	152,049	gal/day
34	Wastewater Design Flow (treated)	475,378	gal/day

B	*Nitrogen Budget Parameters*	*Value*	*Units*
1	Persons per Dwelling	2.40	persons
2	Nitrogen per Person per Year	10.0	lbs
3	a. Sanitary Nitrogen Leaching Rate	50%	percent
3	b. Sanitary Nitrogen Leaching Rate	90%	percent
4	Fertilized Land-1	153.32	acres
5	Fertilizer Application Rate-1	2.10	lbs/1000 sq ft
6	Fertilizer Nitrogen Leaching Rate-1	10%	percent
7	Fertilized Land-2	0.00	acres
8	Fertilizer Application Rate-2	0.00	lbs/1000 sq ft
9	Fertilizer Nitrogen Leaching Rate-2	10%	percent
10	Pet Waste Application Rate	3.19	lbs/pet
11	Pet Waste Nitrogen Leaching Rate	50%	percent
12	Area of Land Irrigated	153.32	acres
13	Irrigation Rate	24.00	inches
14	Irrigation Nitrogen Leaching Rate	10%	percent
15	Nitrogen in Precipitation	1.00	mg/l
16	Precipitation Nitrogen Leaching Rate	10%	percent
17	Nitrogen in Water Supply	2.00	mg/l
18	Nitrogen in Sanitary Flow-1 (treated)	50.00	mg/l
19	Nitrogen in Sanitary Flow-2 (untreated)	6.00	mg/l

C	*Comments*
1)	Please refer to user manual for data input instructions.

	Developed Area	301.02	78%
	Natural/Unvegetated/Revegetated Area	79.62	21%
	Total Acreage Check	385.07	100%

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

Theoretical Development Scenario
Average Turfgrass Leaching Rate

SITE RECHARGE COMPUTATIONS

A	*Fertilized Landscaped*	*Value*	*Units*
1	A = Fraction of Land in Cover Type	0.398	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	10.57	inches

B	*Non-fertilized Landsaped*	*Value*	*Units*
1	A = Fraction of Land in Cover Type	0.000	fraction
2	P = Precipitation Rate	49.90	inches
3	E = Evapotranspiration Rate	23.90	inches
4	Q = Runoff Rate	0.35	inches
5	R(b) = P - (E + Q)	25.65	inches
6	R(B) = R(b) x A	0.00	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	21.20	inches
4	Q = Runoff Rate	0.35	inches
5	R(c) = P - (E + Q)	28.35	inches
6	R(C) = R(c) x A	0.44	inches

D	*Water/Wetlands*		
1	A = Fraction of Site in Water	0.012	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	0.23	inches

E	*Natural/Natural Revegetation*		
1	A = Fraction of Land in Cover Type	0.207	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	5.49	inches

F	*Impervous/Paved/Roads*	*Value*	*Units*
1	A = Fraction of Land in Cover Type	0.368	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	16.53	inches

G	*Rain Gardens/Wetlands*		
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	0.50	inches
5	R(g) = P - (E + Q)	19.40	inches
6	R(G) = R(g) x A	0.00	inches

H	*Irrigation Recharge*		
1	A = Fraction of Land Irrigated	0.398	fraction
2	I = Irrigation Rate	24.00	inches
3	E = Evaptranspiration Rate	23.00	inches
4	Q = Runoff Rate	0.35	inches
5	R(h) = I - (E + Q)	0.65	inches
6	R(H) = R(H) x A	0.26	inches

I	*Wastewater Recharge*		
1	WDF = Wastewater Design Flow	475,378	gal/day
2	WDF = Wastewater Design Flow	23,198,684	cu ft/yr
3	A = Area of Site	16,773,214	sq ft
4	R(j) = WDF/A	1.38	feet
5	R(I) = Wastewater Recharge	16.60	inches

J	*Runoff Recharge*		
1	Q(A) = Runoff from Landscaped	0.139	inches
2	Q(B) = Runoff from Non-fertilized Landscape	0.002	inches
3	Q(C) = Runoff from Unvegetated	0.005	inches
4	Q(E) = Runoff from Natural	0.072	inches
5	Q(H) = Runoff from Rain Gardens	0.000	inches
6	Q(I) = Runoff from Irrigation	0.14	inches
7	Q(tot) = Q(A)+Q(B)+Q(C)+Q(E)+Q(H)+Q(I)	0.36	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) =	**50.48**	**inches**
R(T)(adj) =	**50.48**	**inches**

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

Theoretical Development Scenario

Average Turfgrass Leaching Rate

SITE NITROGEN BUDGET

A	*Sanitary Nitrogen (Wastewater Flow)(untreated)*		
1	CF = Wastewater Flow	152,049	gal/day
2	CF = Wastewater Flow	210,059,495	liters/yr
3	N = Nitrogen (untreated)	50.00	mg/l
4	N = Nitrogen (untreated)	23159.06	lbs
7	LR = Leaching Rate	50%	percent
8	N(S) = CF x N x LR	5,251,487,368	milligrams
9	N(S) = Sanitary Nitrogen	11579.53	lbs
10	N = loss/removed	11579.53	lbs

B	*Pet Waste Nitrogen*	*Value*	*Units*
1	AR = Application Rate	3.19	lbs/pet
2	Human Population	6514	capita
3	Pets = 17 percent of capita	1107	pets
4	N(p) = AR x pets	3532.33	lbs
5	LR = Leaching Rate	50%	percent
6	N(P) = N(p) x LR	1766.16	lbs
7	N = (loss/removed)	1766.16	lbs

C	*Sanitary Nitrogen (Wastewater Flow)(treated)*		
1	CF = Wastewater Flow	475,378	gal/day
2	CF = Wastewater Flow	656,746,591	liters/yr
3	N = Nitrogen (untreated)	50.00	mg/l
4	N = Nitrogen (untreated)	72406.31	lbs
5	N =Nitrogen (treated)	6.00	mg/l
7	LR = Leaching Rate	90%	percent
8	N(S) = CF x N x LR	3,546,431,594	milligrams
9	N(S) = Sanitary Nitrogen	7819.88	lbs
10	N = loss/removed	64586.43	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*		
1	A = Area of Land Fertilized	6,678,619	sq ft
2	AR = Application Rate	2.10	lbs/1000 sf
3	N(T) = Nitrogen (total applied)	14025.10	lbs
4	LR = Leaching Rate	10%	percent
5	N(F1) = A x AR x LR	1402.51	lbs
6	N = loss/removed	12622.59	lbs

F	*Non-Fertilized Land*		
1	A = Area of Land Non-Fertilized	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	10%	percent
5	N(F2) = A x AR x LR	0.00	lbs
6	N = loss/removed	0.00	lbs

G	*Precipitation Nitrogen (existing condition)*		
1	R(n) = Natural Recharge (feet)	0.90	feet
2	A = Area of Site (sq ft)	16,773,214	sq ft
3	R(N) = R(n) x A	15,021,690	cu ft
4	R(N) = Natural Recharge (liters)	425,414,271	liters
5	N = Nitrogen in Precipitation	1.00	mg/l
6	N(T) = Nitrogen (total)	938	lbs
7	LR = Leaching Rate	10%	percent
8	N(ppt) = R(N) x N x LR	42,541,427.13	milligrams
10	N(irr) = Irrigation Nitrogen	93.80	lbs
9	N = loss/removed	844.23	lbs

H	*Irrigation Nitrogen*		
1	R = Irrigation Recharge (inches)	0.26	inches
2	R = Irrigation Rate (feet)	0.02	feet
3	A = Area of Land Irrigated	6,678,619	sq ft
4	R(I) = R(irr) x A	144,197	cu ft
5	R(I) = Site Precipitation (liters)	4,083,663	liters
6	N = Nitrogen in Water Supply	2.00	mg/l
7	N(T) = Nitrogen (total applied)	18.01	lbs
8	LR = Leaching Rate	10%	percent
9	N(irr) = R(I) x N x LR	816,733	milligrams
10	N(irr) = Irrigation Nitrogen	1.80	lbs
11	N = loss/removed	16.21	lbs

Total Site Nitrogen		
N=	N(S) + N(P) + N(WW) + N(F1) + N(F2) + N(ppt) + N(irr)	
N=	**22,663.69**	lbs

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

NAME OF PROJECT

Riverside - Pine Barrens Area
Theoretical Development Scenario
Average Turfgrass Leaching Rate

FINAL COMPUTATIONS

A	*Nitrogen in Recharge*	*Value*	*Units*
1	N = Total Nitrogen (lbs)	22,663.69	lbs
2	N = Total Nitrogen (milligrams)	10,289,314,681	milligrams
3	R(T) = Total Recharge (inches)	50.48	inches
4	R(T) = Total Recharge (feet)	4.21	feet
5	A = Area of Site	16,773,214	sq ft
6	R = R(T) x A	70,552,741	cu ft
7	R = Site Recharge Volume	1,998,053,627	liters
9	NR = N/R	5.15	mg/l

CONCENTRATION OF
NITROGEN IN RECHARGE

5.15

B	*Site Recharge Summary*	*Value*	*Units*
1	R(T) = Total Site Recharge	50.48	inches/yr
2	R = Site Recharge Volume	70,552,741	cu ft/yr
3	R = Site Recharge Volume	527,771,191	gal/yr
4	R = Site Recharge Volume	527.77	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

Riverside - Total Study Area
Existing Use Analysis
Average Turfgrass Leaching Rate

DATA INPUT FIELD

A	*Site Recharge Parameters*	*Value*	*Units*
1	Area of Site	467.56	acres
2	Precipitation Rate	49.90	inches
3	Area of Fertilized Landscape	167.31	acres
4	Fraction of Land in Fertilized Landscape	0.358	fraction
5	Evapotranspiration from Fert/Land	23.00	inches
6	Runoff from Fert/Land	0.35	inches
7	Area of Non-Fertilized Landscape	0.00	acres
8	Fraction of Non-Fertilized Landscape	0.000	fraction
9	Evaporation from Non-Fertilized	23.90	inches
10	Runoff from Non-Fertilized Land	0.35	inches
11	Acreage of Unvegetated/Dirt Roads	22.67	acres
12	Fraction of Land Unvegetated	0.048	fraction
13	Evapotrans. from Unvegetated	21.20	inches
14	Runoff from Unvegetated	0.3493	inches
15	Acreage of Water/Wetlands	19.60	acres
16	Fraction of Site in Water	0.042	fraction
17	Evaporation from Water	30.00	inches
18	Makeup Water (if applicable)	0.00	inches
19	Acreage of Natural/Natural Reveg	141.85	acres
20	Fraction of Land Natural	0.303	fraction
21	Evapotrans. from Natural Area	23.00	inches
22	Runoff from Natural Area	0.35	inches
23	Acreage of Impervious/Paved/Bldgs	116.13	acres
24	Fraction of Land in Impervious	0.248	fraction
25	Evapotrans. from Impervious	4.99	inches
26	Runoff from Impervious	0.00	inches
23	Acreage of Other (Rain Gardens)	0.00	acres
24	Fraction of Land Other Area	0.000	fraction
25	Evapotrans. from Other Area	30.00	inches
26	Runoff from Other Area	0.50	inches
27	Acreage of Land Irrigated	167.31	acres
28	Fraction of Land Irrigated	0.358	fraction
29	Irrigation Rate	24.00	inches
30	Number of Dwellings	844	units
31	Water Use per Dwelling	0	gal/day
32	Wastewater Design Flow (units)	0	gal/day
33	Wastewater Design Flow (untreated)-1	216,146	gal/day
34	Wastewater Design Flow (treated)	0	gal/day

B	*Nitrogen Budget Parameters*	*Value*	*Units*
1	Persons per Dwelling	2.40	persons
2	Nitrogen per Person per Year	10.0	lbs
3	a. Sanitary Nitrogen Leaching Rate	50%	percent
3	b. Sanitary Nitrogen Leaching Rate	90%	percent
4	Fertilized Land-1	167.31	acres
5	Fertilizer Application Rate-1	2.30	lbs/1000 sq ft
6	Fertilizer Nitrogen Leaching Rate-1	10%	percent
7	Fertilized Land-2	0.00	acres
8	Fertilizer Application Rate-2	0.00	lbs/1000 sq ft
9	Fertilizer Nitrogen Leaching Rate-2	10%	percent
10	Pet Waste Application Rate	3.19	lbs/pet
11	Pet Waste Nitrogen Leaching Rate	50%	percent
12	Area of Land Irrigated	167.31	acres
13	Irrigation Rate	24.00	inches
14	Irrigation Nitrogen Leaching Rate	10%	percent
15	Nitrogen in Precipitation	1.00	mg/l
16	Precipitation Nitrogen Leaching Rate	10%	percent
17	Nitrogen in Water Supply	1.00	mg/l
18	Nitrogen in Sanitary Flow -1	50.00	mg/l
19	Nitrogen in Sanitary Flow -2	10.00	mg/l

C	*Comments*
1)	Please refer to user manual for data input instructions.

	Developed Area	306.11	65%
	Natural/Unvegetated/Revegetated Area	141.85	30%
	Total Acreage Check	467.56	100%

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

Existing Use Analysis
Average Turfgrass Leaching Rate

SITE RECHARGE COMPUTATIONS

A	*Fertilized Landscaped*	*Value*	*Units*
1	A = Fraction of Land in Cover Type	0.358	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	9.50	inches

B	*Non-fertilized Landsaped*	*Value*	*Units*
1	A = Fraction of Land in Cover Type	0.000	fraction
2	P = Precipitation Rate	49.90	inches
3	E = Evapotranspiration Rate	23.90	inches
4	Q = Runoff Rate	0.35	inches
5	R(b) = P - (E + Q)	25.65	inches
6	R(B) = R(b) x A	0.00	inches

C	*Unvegetated/Dirt Roads*	*Value*	*Units*
1	A = Fraction of Land in Cover Type	0.048	fraction
2	P = Precipitation Rate	49.90	inches
3	E = Evapotranspiration Rate	21.20	inches
4	Q = Runoff Rate	0.35	inches
5	R(c) = P - (E + Q)	28.35	inches
6	R(C) = R(c) x A	1.37	inches

D	*Water/Wetlands*		
1	A = Fraction of Site in Water	0.042	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	0.83	inches

E	*Natural/Natural Revegetation*		
1	A = Fraction of Land in Cover Type	0.303	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	8.06	inches

F	*Impervous/Paved/Roads*	*Value*	*Units*
1	A = Fraction of Land in Cover Type	0.248	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	11.15	inches

G	*Rain Gardens/Wetlands*		
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	0.50	inches
5	R(g) = P - (E + Q)	19.40	inches
6	R(G) = R(g) x A	0.00	inches

H	*Irrigation Recharge*		
1	A = Fraction of Land Irrigated	0.358	fraction
2	I = Irrigation Rate	24.00	inches
3	E = Evaptranspiration Rate	23.00	inches
4	Q = Runoff Rate	0.35	inches
5	R(h) = I - (E + Q)	0.65	inches
6	R(H) = R(H) x A	0.23	inches

I	*Wastewater Recharge*		
1	WDF = Wastewater Design Flow	216,146	gal/day
2	WDF = Wastewater Design Flow	10,548,033	cu ft/yr
3	A = Area of Site	20,366,914	sq ft
4	R(j) = WDF/A	0.52	feet
5	R(I) = Wastewater Recharge	6.21	inches

J	*Runoff Recharge*		
1	Q(A) = Runoff from Landscaped	0.125	inches
2	Q(B) = Runoff from Non-fertilized Landscape	0.002	inches
3	Q(C) = Runoff from Unvegetated	0.017	inches
4	Q(E) = Runoff from Natural	0.106	inches
5	Q(H) = Runoff from Rain Gardens	0.000	inches
6	Q(I) = Runoff from Irrigation	0.12	inches
7	Q(tot) = Q(A)+Q(B)+Q(C)+Q(E)+Q(H)+Q(I)	0.38	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) =	**37.74**	**inches**
R(T)(adj) =	**37.74**	**inches**

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

Existing Use Analysis

Average Turfgrass Leaching Rate

SITE NITROGEN BUDGET

A	*Sanitary Nitrogen (Wastewater Flow)(untreated)*		
1	CF = Wastewater Flow	216,146	gal/day
2	CF = Wastewater Flow	298,611,103	liters/yr
3	N = Nitrogen (untreated)	50.00	mg/l
4	N = Nitrogen (untreated)	32921.87	lbs
7	LR = Leaching Rate	50%	percent
8	N(S) = CF x N x LR	7,465,277,566	milligrams
9	N(S) = Sanitary Nitrogen	16460.94	lbs
10	N = loss/removed	16460.94	lbs

B	*Pet Waste Nitrogen*	*Value*	*Units*
1	AR = Application Rate	3.19	lbs/pet
2	Human Population	2026	capita
3	Pets = 17 percent of capita	344	pets
4	N(p) = AR x pets	1098.48	lbs
5	LR = Leaching Rate	50%	percent
6	N(P) = N(p) x LR	549.24	lbs
7	N = (loss/removed)	549.24	lbs

C	*Sanitary Nitrogen (Wastewater Flow)(treated)*		
1	CF = Wastewater Flow	0	gal/day
2	CF = Wastewater Flow	0	liters/yr
3	N = Nitrogen (untreated)	50.00	mg/l
4	N = Nitrogen (untreated)	0.00	lbs
5	N =Nitrogen (treated)	10.00	mg/l
7	LR = Leaching Rate	90%	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	1.00	mg/l
4	N(WW) = WDF x N	0	milligrams
5	N(WW) = Wastewater Nitrogen	0.00	lbs

E	*Fertilized Land*		
1	A = Area of Land Fertilized	7,288,024	sq ft
2	AR = Application Rate	2.30	lbs/1000 sf
3	N(T) = Nitrogen (total applied)	16762.45	lbs
4	LR = Leaching Rate	10%	percent
5	N(F1) = A x AR x LR	1676.25	lbs
6	N = loss/removed	15086.21	lbs

F	*Non-Fertilized Land*		
1	A = Area of Land Non-Fertilized	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	10%	percent
5	N(F2) = A x AR x LR	0.00	lbs
6	N = loss/removed	0.00	lbs

G	*Precipitation Nitrogen (existing condition)*		
1	R(n) = Natural Recharge (feet)	2.05	feet
2	A = Area of Site (sq ft)	20,366,914	sq ft
3	R(N) = R(n) x A	41,667,831	cu ft
4	R(N) = Natural Recharge (liters)	1,180,032,964	liters
5	N = Nitrogen in Precipitation	1.00	mg/l
6	N(T) = Nitrogen (total)	2,602	lbs
7	LR = Leaching Rate	10%	percent
8	N(ppt) = R(N) x N x LR	118,003,296.37	milligrams
10	N(irr) = Irrigation Nitrogen	260.20	lbs
9	N = loss/removed	2341.78	lbs

H	*Irrigation Nitrogen*		
1	R = Irrigation Recharge (inches)	0.23	inches
2	R = Irrigation Rate (feet)	0.02	feet
3	A = Area of Land Irrigated	7,288,024	sq ft
4	R(I) = R(irr) x A	141,414	cu ft
5	R(I) = Site Precipitation (liters)	4,004,858	liters
6	N = Nitrogen in Water Supply	2.00	mg/l
7	N(T) = Nitrogen (total applied)	17.66	lbs
8	LR = Leaching Rate	10%	percent
9	N(irr) = R(I) x N x LR	800,972	milligrams
10	N(irr) = Irrigation Nitrogen	1.77	lbs
11	N = loss/removed	15.90	lbs

Total Site Nitrogen		
N=	N(S) + N(P) + N(WW) + N(F1) + N(F2) + N(ppt) + N(irr)	
N=	**18,948.39**	lbs

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

NAME OF PROJECT

Riverside - Total Study Area
Existing Use Analysis
Average Turfgrass Leaching Rate

FINAL COMPUTATIONS

A	*Nitrogen in Recharge*	*Value*	*Units*
1	N = Total Nitrogen (lbs)	18,948.39	lbs
2	N = Total Nitrogen (milligrams)	8,602,567,840	milligrams
3	R(T) = Total Recharge (inches)	37.74	inches
4	R(T) = Total Recharge (feet)	3.15	feet
5	A = Area of Site	20,366,914	sq ft
6	R = R(T) x A	64,057,292	cu ft
7	R = Site Recharge Volume	1,814,102,524	liters
9	NR = N/R	4.74	mg/l

CONCENTRATION OF
NITROGEN IN RECHARGE

4.74

B	*Site Recharge Summary*	*Value*	*Units*
1	R(T) = Total Site Recharge	37.74	inches/yr
2	R = Site Recharge Volume	64,057,292	cu ft/yr
3	R = Site Recharge Volume	479,181,858	gal/yr
4	R = Site Recharge Volume	479.18	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

Riverside - Overall Study Area
Theoretical Development Scenario
Average Turfgrass Leaching Rate

DATA INPUT FIELD

A	*Site Recharge Parameters*	*Value*	*Units*
1	Area of Site	467.56	acres
2	Precipitation Rate	49.90	inches
3	Area of Fertilized Landscape	164.01	acres
4	Fraction of Land in Fertilized Landscape	0.351	fraction
5	Evapotranspiration from Fert/Land	23.00	inches
6	Runoff from Fert/Land	0.35	inches
7	Area of Non-Fertilized Landscape	0.00	acres
8	Fraction of Non-Fertilized Landscape	0.000	fraction
9	Evaporation from Non-Fertilized	23.90	inches
10	Runoff from Non-Fertilized Land	0.35	inches
11	Acreage of Unvegetated/Dirt Roads	9.97	acres
12	Fraction of Land Unvegetated	0.021	fraction
13	Evapotrans. from Unvegetated	21.20	inches
14	Runoff from Unvegetated	0.3493	inches
15	Acreage of Water/Wetlands	19.60	acres
16	Fraction of Site in Water	0.042	fraction
17	Evaporation from Water	30.00	inches
18	Makeup Water (if applicable)	0.00	inches
19	Acreage of Natural/Natural Reveg	109.45	acres
20	Fraction of Land Natural	0.234	fraction
21	Evapotrans. from Natural Area	23.00	inches
22	Runoff from Natural Area	0.35	inches
23	Acreage of Impervious/Paved/Bldgs	164.53	acres
24	Fraction of Land in Impervious	0.352	fraction
25	Evapotrans. from Impervious	4.99	inches
26	Runoff from Impervious	0.00	inches
23	Acreage of Other (Rain Gardens)	0.00	acres
24	Fraction of Land Other Area	0.000	fraction
25	Evapotrans. from Other Area	30.00	inches
26	Runoff from Other Area	0.50	inches
27	Acreage of Land Irrigated	164.01	acres
28	Fraction of Land Irrigated	0.351	fraction
29	Irrigation Rate	24.00	inches
30	Number of Dwellings	3043	units
31	Water Use per Dwelling	0	gal/day
32	Wastewater Design Flow (units)	0	gal/day
33	Wastewater Design Flow (untreated)-1	171,072	gal/day
34	Wastewater Design Flow (treated)	538,065	gal/day

B	*Nitrogen Budget Parameters*	*Value*	*Units*
1	Persons per Dwelling	2.40	persons
2	Nitrogen per Person per Year	10.0	lbs
3	a. Sanitary Nitrogen Leaching Rate	50%	percent
3	b. Sanitary Nitrogen Leaching Rate	90%	percent
4	Fertilized Land-1	164.01	acres
5	Fertilizer Application Rate-1	2.10	lbs/1000 sq ft
6	Fertilizer Nitrogen Leaching Rate-1	10%	percent
7	Fertilized Land-2	0.00	acres
8	Fertilizer Application Rate-2	0.00	lbs/1000 sq ft
9	Fertilizer Nitrogen Leaching Rate-2	10%	percent
10	Pet Waste Application Rate	3.19	lbs/pet
11	Pet Waste Nitrogen Leaching Rate	50%	percent
12	Area of Land Irrigated	164.01	acres
13	Irrigation Rate	24.00	inches
14	Irrigation Nitrogen Leaching Rate	10%	percent
15	Nitrogen in Precipitation	1.00	mg/l
16	Precipitation Nitrogen Leaching Rate	10%	percent
17	Nitrogen in Water Supply	2.00	mg/l
18	Nitrogen in Sanitary Flow-1 (treated)	50.00	mg/l
19	Nitrogen in Sanitary Flow-2 (untreated)	5.00	mg/l

C	*Comments*
1)	Please refer to user manual for data input instructions.

	Developed Area	338.51	72%
	Natural/Unvegetated/Revegetated Area	109.45	23%
	Total Acreage Check	467.56	100%

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

Theoretical Development Scenario
Average Turfgrass Leaching Rate

SITE RECHARGE COMPUTATIONS

A	*Fertilized Landscaped*	*Value*	*Units*
1	A = Fraction of Land in Cover Type	0.351	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	9.31	inches

B	*Non-fertilized Landsaped*	*Value*	*Units*
1	A = Fraction of Land in Cover Type	0.000	fraction
2	P = Precipitation Rate	49.90	inches
3	E = Evapotranspiration Rate	23.90	inches
4	Q = Runoff Rate	0.35	inches
5	R(b) = P - (E + Q)	25.65	inches
6	R(B) = R(b) x A	0.00	inches

C	*Unvegetated/Dirt Roads*	*Value*	*Units*
1	A = Fraction of Land in Cover Type	0.021	fraction
2	P = Precipitation Rate	49.90	inches
3	E = Evapotranspiration Rate	21.20	inches
4	Q = Runoff Rate	0.35	inches
5	R(c) = P - (E + Q)	28.35	inches
6	R(C) = R(c) x A	0.60	inches

D	*Water/Wetlands*		
1	A = Fraction of Site in Water	0.042	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	0.83	inches

E	*Natural/Natural Revegetation*		
1	A = Fraction of Land in Cover Type	0.234	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	6.22	inches

F	*Impervous/Paved/Roads*	*Value*	*Units*
1	A = Fraction of Land in Cover Type	0.352	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	15.80	inches

G	*Rain Gardens/Wetlands*		
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	0.50	inches
5	R(g) = P - (E + Q)	19.40	inches
6	R(G) = R(g) x A	0.00	inches

H	*Irrigation Recharge*		
1	A = Fraction of Land Irrigated	0.351	fraction
2	I = Irrigation Rate	24.00	inches
3	E = Evaptranspiration Rate	23.00	inches
4	Q = Runoff Rate	0.35	inches
5	R(h) = I - (E + Q)	0.65	inches
6	R(H) = R(H) x A	0.23	inches

I	*Wastewater Recharge*		
1	WDF = Wastewater Design Flow	538,065	gal/day
2	WDF = Wastewater Design Flow	26,257,841	cu ft/yr
3	A = Area of Site	20,366,914	sq ft
4	R(j) = WDF/A	1.29	feet
5	R(I) = Wastewater Recharge	15.47	inches

J	*Runoff Recharge*		
1	Q(A) = Runoff from Landscaped	0.123	inches
2	Q(B) = Runoff from Non-fertilized Landscape	0.002	inches
3	Q(C) = Runoff from Unvegetated	0.007	inches
4	Q(E) = Runoff from Natural	0.082	inches
5	Q(H) = Runoff from Rain Gardens	0.000	inches
6	Q(I) = Runoff from Irrigation	0.12	inches
7	Q(tot) = Q(A)+Q(B)+Q(C)+Q(E)+Q(H)+Q(I)	0.34	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) =	**48.81**	**inches**
R(T)(adj) =	**48.81**	**inches**

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

Theoretical Development Scenario

Average Turfgrass Leaching Rate

SITE NITROGEN BUDGET

A	*Sanitary Nitrogen (Wastewater Flow)(untreated)*		
1	CF = Wastewater Flow	171,072	gal/day
2	CF = Wastewater Flow	236,340,245	liters/yr
3	N = Nitrogen (untreated)	50.00	mg/l
4	N = Nitrogen (untreated)	26056.51	lbs
7	LR = Leaching Rate	50%	percent
8	N(S) = CF x N x LR	5,908,506,120	milligrams
9	N(S) = Sanitary Nitrogen	13028.26	lbs
10	N = loss/removed	13028.26	lbs

B	*Pet Waste Nitrogen*	*Value*	*Units*
1	AR = Application Rate	3.19	lbs/pet
2	Human Population	7303	capita
3	Pets = 17 percent of capita	1242	pets
4	N(p) = AR x pets	3960.53	lbs
5	LR = Leaching Rate	50%	percent
6	N(P) = N(p) x LR	1980.26	lbs
7	N = (loss/removed)	1980.26	lbs

C	*Sanitary Nitrogen (Wastewater Flow)(treated)*		
1	CF = Wastewater Flow	538,065	gal/day
2	CF = Wastewater Flow	743,350,249	liters/yr
3	N = Nitrogen (untreated)	50.00	mg/l
4	N = Nitrogen (untreated)	81954.36	lbs
5	N =Nitrogen (treated)	5.00	mg/l
7	LR = Leaching Rate	90%	percent
8	N(S) = CF x N x LR	3,345,076,121	milligrams
9	N(S) = Sanitary Nitrogen	7375.89	lbs
10	N = loss/removed	74578.47	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*		
1	A = Area of Land Fertilized	7,144,276	sq ft
2	AR = Application Rate	2.10	lbs/1000 sf
3	N(T) = Nitrogen (total applied)	15002.98	lbs
4	LR = Leaching Rate	10%	percent
5	N(F1) = A x AR x LR	1500.30	lbs
6	N = loss/removed	13502.68	lbs

F	*Non-Fertilized Land*		
1	A = Area of Land Non-Fertilized	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	10%	percent
5	N(F2) = A x AR x LR	0.00	lbs
6	N = loss/removed	0.00	lbs

G	*Precipitation Nitrogen (existing condition)*		
1	R(n) = Natural Recharge (feet)	1.12	feet
2	A = Area of Site (sq ft)	20,366,914	sq ft
3	R(N) = R(n) x A	22,861,202	cu ft
4	R(N) = Natural Recharge (liters)	647,429,248	liters
5	N = Nitrogen in Precipitation	1.00	mg/l
6	N(T) = Nitrogen (total)	1,428	lbs
7	LR = Leaching Rate	10%	percent
8	N(ppt) = R(N) x N x LR	64,742,924.81	milligrams
10	N(irr) = Irrigation Nitrogen	142.76	lbs
9	N = loss/removed	1284.82	lbs

H	*Irrigation Nitrogen*		
1	R = Irrigation Recharge (inches)	0.23	inches
2	R = Irrigation Rate (feet)	0.02	feet
3	A = Area of Land Irrigated	7,144,276	sq ft
4	R(I) = R(irr) x A	135,891	cu ft
5	R(I) = Site Precipitation (liters)	3,848,434	liters
6	N = Nitrogen in Water Supply	2.00	mg/l
7	N(T) = Nitrogen (total applied)	16.97	lbs
8	LR = Leaching Rate	10%	percent
9	N(irr) = R(I) x N x LR	769,687	milligrams
10	N(irr) = Irrigation Nitrogen	1.70	lbs
11	N = loss/removed	15.27	lbs

Total Site Nitrogen		
N=	N(S) + N(P) + N(WW) + N(F1) + N(F2) + N(ppt) + N(irr)	
N=	**24,029.16**	lbs

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

NAME OF PROJECT

Riverside - Overall Study Area
Theoretical Development Scenario
Average Turfgrass Leaching Rate

FINAL COMPUTATIONS

A	*Nitrogen in Recharge*	*Value*	*Units*
1	N = Total Nitrogen (lbs)	24,029.16	lbs
2	N = Total Nitrogen (milligrams)	10,909,240,776	milligrams
3	R(T) = Total Recharge (inches)	48.81	inches
4	R(T) = Total Recharge (feet)	4.07	feet
5	A = Area of Site	20,366,914	sq ft
6	R = R(T) x A	82,836,353	cu ft
7	R = Site Recharge Volume	2,345,925,511	liters
9	NR = N/R	4.65	mg/l

CONCENTRATION OF
NITROGEN IN RECHARGE

4.65

B	*Site Recharge Summary*	*Value*	*Units*
1	R(T) = Total Site Recharge	48.81	inches/yr
2	R = Site Recharge Volume	82,836,353	cu ft/yr
3	R = Site Recharge Volume	619,658,994	gal/yr
4	R = Site Recharge Volume	619.66	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