Appendix C-4
Alternative 2

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

NAME OF PROJECT **New Frontier**

DATA INPUT FIELD **Alternative 2** **SHEET 1**

A	*Site Recharge Parameters*	*Value*	*Units*
1	Area of Site	20.27	acres
2	Precipitation Rate	42.82	inches
3	Acreage of Lawn	3.28	acres
4	Fraction of Land in Lawn	0.162	fraction
5	Evapotranspiration from Lawn	24.20	inches
6	Runoff from Lawn	0.30	inches
7	Acreage of Impervious	16.98	acres
8	Fraction of Land Impervious	0.838	fraction
9	Evaporation from Impervious	4.28	inches
10	Runoff from Impervious	0.00	inches
11	Acreage of Unvegetated	0.00	acres
12	Fraction of Land Unvegetated	0.000	fraction
13	Evapotrans. from Unvegetated	24.20	inches
14	Runoff from Unvegetated	0.30	inches
15	Acreage of Water	0.00	acres
16	Fraction of Site in Water	0.000	fraction
17	Evaporation from Water	30.00	inches
18	Makeup Water (if applicable)	0.00	inches
19	Acreage of Natural Area	0.00	acres
20	Fraction of Land Natural	0.000	fraction
21	Evapotrans. from Natural Area	24.20	inches
22	Runoff from Natural Area	0.30	inches
23	Acreage of Other Area	0.00	acres
24	Fraction of Land Other Area	0.000	fraction
25	Evapotrans. from Other Area	0.00	inches
26	Runoff from Other Area	0.30	inches
27	Acreage of Land Irrigated	3.28	acres
28	Fraction of Land Irrigated	0.162	fraction
29	Irrigation Rate	5.50	inches
30	Number of Dwellings	0	units
31	Water Use per Dwelling	0	gal/day
32	Wastewater Design Flow	0	gal/day
33	Commercial /STP Design Flow	7,755	gal/day

B	*Nitrogen Budget Parameters*	*Value*	*Units*
1	Persons per Dwelling	0.00	persons
2	Nitrogen per Person per Year	10.0	lbs
3	a. Sanitary Nitrogen Leaching Rate	50%	percent
3	b. Sanitary Nitrogen Leaching Rate	0%	percent
4	Area of Land Fertilized 1	3.28	acres
5	Fertilizer Application Rate 1	2.30	lbs/1000 sq ft
6	Fertilizer Nitrogen Leaching Rate 1	14%	percent
7	Area of Land Fertilized 2	0.00	acres
8	Fertilizer Application Rate 2	0.00	lbs/1000 sq ft
9	Fertilizer Nitrogen Leaching Rate 2	0%	percent
10	Pet Waste Application Rate	3.19	lbs/pet
11	Pet Waste Nitrogen Leaching Rate	50%	percent
12	Area of Land Irrigated	3.28	acres
13	Irrigation Rate	5.50	inches
14	Irrigation Nitrogen Leaching Rate	15%	percent
15	Nitrogen in Precipitation	1.00	mg/l
16	Precipitation Nitrogen Leaching Rate	15%	percent
17	Nitrogen in Water Supply	1.00	mg/l
18	Nitrogen in Commercial/STP Flow	40.00	mg/l

C	*Comments*
1)	Please refer to user manual for data input instructions.
2)	Sanitary Nitrogen Leaching Rate 3.a.) is for residential wastewater and 3.b.) is for commercial or STP which varies from 50 percent for conventional systems to 10 percent for STP effluent discharge.
3)	All sanitary waste will be conveyed to SCSD 21, Bergen Point

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

SITE RECHARGE COMPUTATIONS | **Alternative 2** | **SHEET 2**

A	*Lawn Area Recharge*	*Value*	*Units*
1	A = Fraction of Land in Lawn	0.162	fraction
2	P = Precipitation Rate	42.82	inches
3	E = Evapotranspiration Rate	24.20	inches
4	Q = Runoff Rate	0.30	inches
5	R(l) = P - (E + Q)	18.32	inches
6	R(L) = R(l) x A	2.97	inches

B	*Impervious Area Recharge*	*Value*	*Units*
1	A = Fraction of Land in Impervious	0.838	fraction
2	P = Precipitation Rate	42.82	inches
3	E = Evapotranspiration Rate	4.28	inches
4	Q = Runoff Rate	0.00	inches
5	R(i) = P - (E + Q)	38.54	inches
6	R(I) = R(i) x A	32.29	inches

C	*Unvegetated Area Recharge*		
1	A = Fraction of Land Unveg.	0.000	fraction
2	P = Precipitation Rate	42.82	inches
3	E = Evapotranspiration Rate	0.30	inches
4	Q = Runoff Rate	0.00	inches
5	R(u) = P - (E + Q)	42.52	inches
6	R(U) = R(u) x A	0.00	inches

D	*Water Area Loss*		
1	A = Fraction of Site in Water	0.000	fraction
2	P = Precipitation Rate	42.82	inches
3	E = Evaporation Rate	30.00	inches
4	Q = Runoff Rate	0.00	inches
5	M = Makeup Water	0.00	inches
6	R(w) = {P - (E+Q)} - M	12.82	inches
7	R(W) = R(w) x A	0.00	inches

E	*Natural Area Recharge*		
1	A = Fraction of Land in Natural	0.000	fraction
2	P = Precipitation Rate	42.82	inches
3	E = Evapotranspiration Rate	24.20	inches
4	Q = Runoff Rate	0.30	inches
5	R(n) = P - (E + Q)	18.32	inches
6	R(N) = R(n) x A	0.00	inches

F	*Other Area Recharge*		
1	A = Fraction of Land in Other	0.000	fraction
2	P = Precipitation Rate	42.82	inches
3	E = Evapotranspiration Rate	0.00	inches
4	Q = Runoff Rate	0.30	inches
5	R(o) = P - (E + Q)	42.52	inches
6	R(O) = R(o) x A	0.00	inches

G	*Irrigation Recharge*		
1	A = Fraction of Land Irrigated	0.162	fraction
2	I = Irrigation Rate	5.50	inches
3	E = Evaptranspiration Rate	3.11	inches
4	Q = Runoff Rate	0.30	inches
5	R(irr) = I - (E + Q)	2.09	inches
6	R(IRR) = R(irr) x A	0.34	inches

H	*Wastewater Recharge*		
1	WDF = Wastewater Design Flow	7,755	gal/day
2	WDF = Wastewater Design Flow	378,448	cu ft/yr
3	A = Area of Site	882,787	sq ft
4	R(ww) = WDF/A	0.43	feet
5	R(WW) = Wastewater Recharge	5.14	inches

Total Site Recharge		
R(T) =	R(L) + R(I) + R(U) + R(W) + R(N) + R(O) + R(IRR) + R(WW)	
R(T) =	**40.74** **inches**	

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

SITE NITROGEN BUDGET — **Alternative 2** — **SHEET 3**

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
5	LR = Leaching Rate	50%	percent
6	N(S) = P x N x LR	0.00	lbs
7	N(S) = Sanitary Nitrogen	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(P) = Pet Waste Nitrogen	0.00	lbs

C	*Sanitary Nitrogen (Commercial/STP)*		
1	CF = Commercial/STP Flow	7,755	gal/day
2	CF = Commercial/STP Flow	10,713,726	liters/yr
3	N = Nitrogen in Commercial	40.00	mg/l
4	LR = Leaching Rate	50%	percent
5	N(S) = CF x N x LR	214,274,528	milligrams
6	N(S) = Sanitary Nitrogen	472.48	lbs

D	*Water Supply Nitrogen (other than wastewater, if applicable)*		
1	WDF = Wastewater Design Flow	7,755	gal/day
2	WDF = Wastewater Design Flow	10,713,726	liters/yr
3	N = Nitrogen in Water Supply	1.00	mg/l
4	N(WW) = WDF x N	10,713,726	milligrams
5	N(WW) = Wastewater Nitrogen	23.62	lbs

E	*Fertilizer Nitrogen 1*		
1	A = Area of Land Fertilized 1	142,877	sq ft
2	AR = Application Rate	2.30	lbs/1000 sf
3	LR = Leaching Rate	14%	percent
4	N(F1) = A x AR x LR	46.01	lbs
5	N(F1) = Fertilizer Nitrogen	46.01	lbs

F	*Fertilizer Nitrogen 2*		
1	A = Area of Land Fertilized 2	0	sq ft
2	AR = Application Rate	0.00	lbs/1000 sf
3	LR = Leaching Rate	0%	percent
4	N(F2) = A x AR x LR	0.00	lbs
5	N(F2) = Fertilizer Nitrogen	0.00	lbs

G	*Precipitation Nitrogen*		
1	R(n) = Natural Recharge (feet)	2.94	feet
2	A = Area of Site (sq ft)	882,787	sq ft
3	R(N) = R(n) x A	2,593,634	cu ft
4	R(N) = Natural Recharge (liters)	73,451,708	liters
5	N = Nitrogen in Precipitation	1.00	mg/l
6	LR = Leaching Rate	15%	percent
7	N(ppt) = R(N) x N x LR	734,517	milligrams
8	N(ppt) = Precipitation Nitrogen	1.62	lbs

H	*Irrigation Nitrogen*		
1	R = Irrigation Recharge (inches)	2.09	inches
2	R = Irrigation Rate (feet)	0.17	feet
3	A = Area of Land Irrigated	142,877	sq ft
4	R(I) = R(irr) x A	24,907	cu ft
5	R(I) = Site Precipitation (liters)	705,366	liters
6	N = Nitrogen in Water Supply	1.00	mg/l
7	LR = Leaching Rate	15%	percent
8	N(irr) = R(I) x N x LR	105,805	milligrams
9	N(irr) = Irrigation Nitrogen	0.23	lbs

Total Site Nitrogen		
N=	N(S) + N(P) + N(WW) + N(F1) + N(F2) + N(ppt) + N(irr)	
N=	**543.96**	lbs

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

NAME OF PROJECT

New Frontier
Alternative 2

FINAL COMPUTATIONS **SHEET 4**

A	*Nitrogen in Recharge*	*Value*	*Units*
1	N = Total Nitrogen (lbs)	543.96	lbs
2	N = Total Nitrogen (milligrams)	246,957,086	milligrams
3	R(T) = Total Recharge (inches)	40.74	inches
4	R(T) = Total Recharge (feet)	3.39	feet
5	A = Area of Site	882,787	sq ft
6	R = R(T) x A	2,996,989	cu ft
7	R = Site Recharge Volume	84,874,717	liters
9	NR = N/R	2.91	mg/l

FINAL CONCENTRATION OF NITROGEN IN RECHARGE

2.91

B	*Site Recharge Summary*	*Value*	*Units*
1	R(T) = Total Site Recharge	40.74	inches/yr
2	R = Site Recharge Volume	2,996,989	cu ft/yr
3	R = Site Recharge Volume	22,419,033	gal/yr
4	R = Site Recharge Volume	22.42	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