**Appendix C-3
Proposed Project**

NP&W
NELSON POPE & VOORHIS, LLC
ENVIRONMENTAL • PLANNING • CONSULTING

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

NAME OF PROJECT — New Frontier

DATA INPUT FIELD — Proposed Conditions   **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	6.41	acres
4	Fraction of Land in Lawn	0.316	fraction
5	Evapotranspiration from Lawn	24.20	inches
6	Runoff from Lawn	0.30	inches
7	Acreage of Impervious	13.85	acres
8	Fraction of Land Impervious	0.683	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	6.41	acres
28	Fraction of Land Irrigated	0.316	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	0	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	6.41	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	6.41	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

A	Lawn Area Recharge	Value	Units		B	Impervious Area Recharge	Value	Units
1	A = Fraction of Land in Lawn	0.316	fraction		1	A = Fraction of Land in Impervious	0.683	fraction
2	P = Precipitation Rate	42.82	inches		2	P = Precipitation Rate	42.82	inches
3	E = Evapotranspiration Rate	24.20	inches		3	E = Evapotranspiration Rate	4.28	inches
4	Q = Runoff Rate	0.30	inches		4	Q = Runoff Rate	0.00	inches
5	R(l) = P - (E + Q)	18.32	inches		5	R(i) = P - (E + Q)	38.54	inches
6	R(L) = R(l) x A	5.79	inches		6	R(I) = R(i) x A	26.34	inches

C	Unvegetated Area Recharge	Value	Units		D	Water Area Loss	Value	Units
1	A = Fraction of Land Unveg.	0.000	fraction		1	A = Fraction of Site in Water	0.000	fraction
2	P = Precipitation Rate	42.82	inches		2	P = Precipitation Rate	42.82	inches
3	E = Evapotranspiration Rate	0.30	inches		3	E = Evaporation Rate	30.00	inches
4	Q = Runoff Rate	0.00	inches		4	Q = Runoff Rate	0.00	inches
5	R(u) = P - (E + Q)	42.52	inches		5	M = Makeup Water	0.00	inches
6	R(U) = R(u) x A	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	Value	Units		F	Other Area Recharge	Value	Units
1	A = Fraction of Land in Natural	0.000	fraction		1	A = Fraction of Land in Other	0.000	fraction
2	P = Precipitation Rate	42.82	inches		2	P = Precipitation Rate	42.82	inches
3	E = Evapotranspiration Rate	24.20	inches		3	E = Evapotranspiration Rate	0.00	inches
4	Q = Runoff Rate	0.30	inches		4	Q = Runoff Rate	0.30	inches
5	R(n) = P - (E + Q)	18.32	inches		5	R(o) = P - (E + Q)	42.52	inches
6	R(N) = R(n) x A	0.00	inches		6	R(O) = R(o) x A	0.00	inches

G	Irrigation Recharge	Value	Units		H	Wastewater Recharge	Value	Units
1	A = Fraction of Land Irrigated	0.316	fraction		1	WDF = Wastewater Design Flow	0	gal/day
2	I = Irrigation Rate	5.50	inches		2	WDF = Wastewater Design Flow	0	cu ft/yr
3	E = Evaptranspiration Rate	3.11	inches		3	A = Area of Site	882,787	sq ft
4	Q = Runoff Rate	0.30	inches		4	R(ww) = WDF/A	0.00	feet
5	R(irr) = I - (E + Q)	2.09	inches		5	R(WW) = Wastewater Recharge	0.00	inches
6	R(IRR) = R(irr) x A	0.66	inches					

Total Site Recharge		
R(T) =	R(L) + R(I) + R(U) + R(W) + R(N) + R(O) + R(IRR) + R(WW)	
R(T) =	**32.79**	**inches**

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

A	Sanitary Nitrogen-Residential	Value	Units	B	Pet Waste Nitrogen	Value	Units
1	Number of Dwellings	0	units	1	AR = Application Rate	3.19	lbs/pet
2	Persons per Dwelling	0.00	capita	2	Human Population	0	capita
3	P = Population	0.00	capita	3	Pets = 17 percent of capita	0	pets
4	N = Nitrogen per person	10	lbs	4	N(p) = AR x pets	0.00	lbs
5	LR = Leaching Rate	50%	percent	5	LR = Leaching Rate	50%	percent
6	N(S) = P x N x LR	0.00	lbs	6	N(P) = N(p) x LR	0.00	lbs
7	N(S) = Sanitary Nitrogen	0.00	lbs	7	N(P) = Pet Waste Nitrogen	0.00	lbs

C	Sanitary Nitrogen (Commercial/STP)			D	Water Supply Nitrogen (other than wastewater, if applicable)		
1	CF = Commercial/STP Flow	0	gal/day	1	WDF = Wastewater Design Flow	0	gal/day
2	CF = Commercial/STP Flow	0	liters/yr	2	WDF = Wastewater Design Flow	0	liters/yr
3	N = Nitrogen in Commercial	40.00	mg/l	3	N = Nitrogen in Water Supply	1.00	mg/l
4	LR = Leaching Rate	50%	percent	4	N(WW) = WDF x N	0	milligrams
5	N(S) = CF x N x LR	0	milligrams	5	N(WW) = Wastewater Nitrogen	0.00	lbs
6	N(S) = Sanitary Nitrogen	0.00	lbs				

E	Fertilizer Nitrogen 1			F	Fertilizer Nitrogen 2		
				1	A = Area of Land Fertilized 2	0	sq ft
1	A = Area of Land Fertilized 1	279,220	sq ft	2	AR = Application Rate	0.00	lbs/1000 sf
2	AR = Application Rate	2.30	lbs/1000 sf	3	LR = Leaching Rate	0%	percent
3	LR = Leaching Rate	14%	percent	4	N(F2) = A x AR x LR	0.00	lbs
4	N(F1) = A x AR x LR	89.91	lbs	5	N(F2) = Fertilizer Nitrogen	0.00	lbs
5	N(F1) = Fertilizer Nitrogen	89.91	lbs				

G	Precipitation Nitrogen			H	Irrigation Nitrogen		
				1	R = Irrigation Recharge (inches)	2.09	inches
1	R(n) = Natural Recharge (feet)	2.68	feet	2	R = Irrigation Rate (feet)	0.17	feet
2	A = Area of Site (sq ft)	882,787	sq ft	3	A = Area of Land Irrigated	279,220	sq ft
3	R(N) = R(n) x A	2,363,899	cu ft	4	R(I) = R(irr) x A	48,675	cu ft
4	R(N) = Natural Recharge (liters)	66,945,622	liters	5	R(I) = Site Precipitation (liters)	1,378,474	liters
5	N = Nitrogen in Precipitation	1.00	mg/l	6	N = Nitrogen in Water Supply	1.00	mg/l
6	LR = Leaching Rate	15%	percent	7	LR = Leaching Rate	15%	percent
7	N(ppt) = R(N) x N x LR	669,456	milligrams	8	N(irr) = R(I) x N x LR	206,771	milligrams
8	N(ppt) = Precipitation Nitrogen	1.48	lbs	9	N(irr) = Irrigation Nitrogen	0.46	lbs

Total Site Nitrogen		
N=	N(S) + N(P) + N(WW) + N(F1) + N(F2) + N(ppt) + N(irr)	
N=	91.84	lbs

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

NAME OF PROJECT

New Frontier
Proposed Conditions

FINAL COMPUTATIONS   SHEET 4

A	Nitrogen in Recharge	Value	Units
1	N = Total Nitrogen (lbs)	91.84	lbs
2	N = Total Nitrogen (milligrams)	41,695,720	milligrams
3	R(T) = Total Recharge (inches)	32.79	inches
4	R(T) = Total Recharge (feet)	2.73	feet
5	A = Area of Site	882,787	sq ft
6	R = R(T) x A	2,412,574	cu ft
7	R = Site Recharge Volume	68,324,096	liters
9	NR = N/R	0.61	mg/l

FINAL CONCENTRATION OF
NITROGEN IN RECHARGE

0.61

B	Site Recharge Summary	Value	Units
1	R(T) = Total Site Recharge	32.79	inches/yr
2	R = Site Recharge Volume	2,412,574	cu ft/yr
3	R = Site Recharge Volume	18,047,308	gal/yr
4	R = Site Recharge Volume	18.05	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