

Appendix C-2
Existing Conditions/Alternative 1



SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

NAME OF PROJECT

New Frontier

DATA INPUT FIELD

Existing Conditions

SHEET 1

<i>A</i>	<i>Site Recharge Parameters</i>	<i>Value</i>	<i>Units</i>
1	Area of Site	20.27	acres
2	Precipitation Rate	42.82	inches
3	Acreage of Lawn	1.82	acres
4	Fraction of Land in Lawn	0.090	fraction
5	Evapotranspiration from Lawn	24.20	inches
6	Runoff from Lawn	0.30	inches
7	Acreage of Impervious	18.24	acres
8	Fraction of Land Impervious	0.900	fraction
9	Evaporation from Impervious	4.28	inches
10	Runoff from Impervious	0.00	inches
11	Acreage of Unvegetated	0.20	acres
12	Fraction of Land Unvegetated	0.010	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	1.82	acres
28	Fraction of Land Irrigated	0.090	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	54,010	gal/day

<i>B</i>	<i>Nitrogen Budget Parameters</i>	<i>Value</i>	<i>Units</i>
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	1.82	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	1.82	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

<i>C</i>	<i>Comments</i>
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.

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

SITE RECHARGE COMPUTATIONS

Existing Conditions

SHEET 2

<i>A Lawn Area Recharge</i>			<i>B Impervious Area Recharge</i>				
	<i>Value</i>	<i>Units</i>		<i>Value</i>	<i>Units</i>		
1	A = Fraction of Land in Lawn	0.090	fraction	1	A = Fraction of Land in Impervious	0.900	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(I) = P - (E + Q)	18.32	inches	5	R(i) = P - (E + Q)	38.54	inches
6	R(L) = R(I) x A	1.65	inches	6	R(I) = R(i) x A	34.69	inches

<i>C Unvegetated Area Recharge</i>			<i>D Water Area Loss</i>				
	<i>Value</i>	<i>Units</i>		<i>Value</i>	<i>Units</i>		
1	A = Fraction of Land Unveg.	0.010	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	0.42	inches	6	R(w) = {P - (E+Q)} - M	12.82	inches
				7	R(W) = R(w) x A	0.00	inches

<i>E Natural Area Recharge</i>			<i>F Other Area Recharge</i>				
	<i>Value</i>	<i>Units</i>		<i>Value</i>	<i>Units</i>		
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

<i>G Irrigation Recharge</i>			<i>H Wastewater Recharge</i>				
	<i>Value</i>	<i>Units</i>		<i>Value</i>	<i>Units</i>		
1	A = Fraction of Land Irrigated	0.090	fraction	1	WDF = Wastewater Design Flow	54,010	gal/day
2	I = Irrigation Rate	5.50	inches	2	WDF = Wastewater Design Flow	2,635,715	cu ft/yr
3	E = Evapotranspiration 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	2.99	feet
5	R(irr) = I - (E + Q)	2.09	inches	5	R(WW) = Wastewater Recharge	35.83	inches
6	R(IRR) = R(irr) x A	0.19	inches				

Total Site Recharge		
R(T) =	R(L) + R(I) + R(U) + R(W) + R(N) + R(O) + R(IRR) + R(WW)	
R(T) =	72.78	inches

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

SITE NITROGEN BUDGET

Existing Conditions

SHEET 3

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)	Value	Units
1	CF = Commercial/STP Flow	54,010	gal/day
2	CF = Commercial/STP Flow	74,616,165	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	1,492,323,305	milligrams
6	N(S) = Sanitary Nitrogen	3290.57	lbs

D	Water Supply Nitrogen (other than wastewater, if applicable)	Value	Units
1	WDF = Wastewater Design Flow	54,010	gal/day
2	WDF = Wastewater Design Flow	74,616,165	liters/yr
3	N = Nitrogen in Water Supply	1.00	mg/l
4	N(WW) = WDF x N	74,616,165	milligrams
5	N(WW) = Wastewater Nitrogen	164.53	lbs

E	Fertilizer Nitrogen 1	Value	Units
1	A = Area of Land Fertilized 1	79,279	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	25.53	lbs
5	N(F1) = Fertilizer Nitrogen	25.53	lbs

F	Fertilizer Nitrogen 2	Value	Units
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	Value	Units
1	R(n) = Natural Recharge (feet)	3.06	feet
2	A = Area of Site (sq ft)	882,787	sq ft
3	R(N) = R(n) x A	2,704,230	cu ft
4	R(N) = Natural Recharge (liters)	76,583,788	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	765,838	milligrams
8	N(ppt) = Precipitation Nitrogen	1.69	lbs

H	Irrigation Nitrogen	Value	Units
1	R = Irrigation Recharge (inches)	2.09	inches
2	R = Irrigation Rate (feet)	0.17	feet
3	A = Area of Land Irrigated	79,279	sq ft
4	R(I) = R(irr) x A	13,820	cu ft
5	R(I) = Site Precipitation (liters)	391,392	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	58,709	milligrams
9	N(irr) = Irrigation Nitrogen	0.13	lbs

Total Site Nitrogen	
N=	N(S) + N(P) + N(WW) + N(F1) + N(F2) + N(ppt) + N(irr)
N=	3482.45 lbs

SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

NAME OF PROJECT

New Frontier

Existing Conditions

FINAL COMPUTATIONS

SHEET 4

<i>A</i>	<i>Nitrogen in Recharge</i>	<i>Value</i>	<i>Units</i>
1	N = Total Nitrogen (lbs)	3482.45	lbs
2	N = Total Nitrogen (milligrams)	1,581,031,192	milligrams
3	R(T) = Total Recharge (inches)	72.78	inches
4	R(T) = Total Recharge (feet)	6.06	feet
5	A = Area of Site	882,787	sq ft
6	R = R(T) x A	5,353,773	cu ft
7	R = Site Recharge Volume	151,618,844	liters
9	NR = N/R	10.43	mg/l

<p>FINAL CONCENTRATION OF NITROGEN IN RECHARGE</p> <div style="background-color: #cccccc; padding: 5px; display: inline-block; margin: 10px auto;"> <p>10.43</p> </div>
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<i>B</i>	<i>Site Recharge Summary</i>	<i>Value</i>	<i>Units</i>
1	R(T) = Total Site Recharge	72.78	inches/yr
2	R = Site Recharge Volume	5,353,773	cu ft/yr
3	R = Site Recharge Volume	40,049,004	gal/yr
4	R = Site Recharge Volume	40.05	MG/yr

<i>Conversions used in SONIR</i>
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