

**APPENDIX G**

**SONIR COMPUTER MODEL RESULTS, REVISED  
PLAN**

## SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

**NAME OF PROJECT**

**The Meadows at Yaphank PDD**

**DATA INPUT FIELD**

**Revised Project, using Dorade STP**

**SHEET 1**

<i>A</i>	<i>Site Recharge Parameters</i>	<i>Value</i>	<i>Units</i>
1	Area of Site	333.46	acres
2	Precipitation Rate	45.20	inches
3	Acreage of Lawn	32.00	acres
4	Fraction of Land in Lawn	0.096	fraction
5	Evapotranspiration from Lawn	22.40	inches
6	Runoff from Lawn	0.90	inches
7	Acreage of Impervious	96.94	acres
8	Fraction of Land Impervious	0.291	fraction
9	Evaporation from Impervious	4.52	inches
10	Runoff from Impervious	0.00	inches
11	Acreage of Unvegetated	2.58	acres
12	Fraction of Land Unvegetated	0.008	fraction
13	Evapotrans. from Unvegetated	21.20	inches
14	Runoff from Unvegetated	2.1	inches
15	Acreage of Water	1.20	acres
16	Fraction of Site in Water	0.004	fraction
17	Evaporation from Water	30.00	inches
18	Makeup Water (if applicable)	0.00	inches
19	Acreage of Natural Area	134.61	acres
20	Fraction of Land Natural	0.404	fraction
21	Evapotrans. from Natural Area	23.00	inches
22	Runoff from Natural Area	0.30	inches
23	Acreage of Other Area	66.13	acres
24	Fraction of Land Other Area	0.198	fraction
25	Evapotrans. from Other Area	23.00	inches
26	Runoff from Other Area	0.00	inches
27	Acreage of Land Irrigated	32.00	acres
28	Fraction of Land Irrigated	0.096	fraction
29	Irrigation Rate	5.50	inches
30	Number of Dwellings	850	units
31	Water Use per Dwelling	0	gal/day
32	Wastewater Design Flow	0	gal/day
33	Commercial /STP Design Flow	275,275	gal/day

<i>B</i>	<i>Nitrogen Budget Parameters</i>	<i>Value</i>	<i>Units</i>
1	Persons per Dwelling	2.06	persons
2	Nitrogen per Person per Year	0.0	lbs
3	a. Sanitary Nitrogen Leaching Rate (septic)	50%	percent
3	b. Sanitary Nitrogen Leaching Rate (STP)	90%	percent
4	Area of Land Fertilized 1	32.00	acres
5	Fertilizer Application Rate 1	1.00	lbs/1000 sq ft
6	Fertilizer Nitrogen Leaching Rate 1	16%	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	16%	percent
12	Area of Land Irrigated	32.00	acres
13	Irrigation Rate	5.50	inches
14	Irrigation Nitrogen Leaching Rate	16%	percent
15	Nitrogen in Precipitation	0.50	mg/l
16	Precipitation Nitrogen Leaching Rate	16%	percent
17	Nitrogen in Water Supply	1.16	mg/l
18	Nitrogen in Commercial/STP Flow	8.00	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 at 50% removal; and, 3.b.) is for commercial or STP which would be expected to remove 10% additional nitrogen as a result of leaching of STP effluent discharge (see User Guide for references).
3)	Acreage of Lawn is 15% of the Meadows site.
4)	Acreage of Other Area is natural landscaping, non-fertilized.
5)	Fertilizer management will be used to achieve 1 lb/1000 SF per Non-Point Source Management Handbook.
6)	Half of the pet owners are expected to observe "Pick up after your Pet" practices.
7)	Nitrogen in STP Flow will be treated to 8 mg/l.

## SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

### SITE RECHARGE COMPUTATIONS

Revised Project, using Dorade STP

SHEET 2

<b>A Lawn Area Recharge</b>			<b>B Impervious Area Recharge</b>				
	<i>Value</i>	<i>Units</i>		<i>Value</i>	<i>Units</i>		
1	A = Fraction of Land in Lawn	0.096	fraction	1	A = Fraction of Land in Impervious	0.291	fraction
2	P = Precipitation Rate	45.20	inches	2	P = Precipitation Rate	45.20	inches
3	E = Evapotranspiration Rate	22.40	inches	3	E = Evapotranspiration Rate	4.52	inches
4	Q = Runoff Rate	0.90	inches	4	Q = Runoff Rate	0.00	inches
5	$R(l) = P - (E + Q)$	21.90	inches	5	$R(i) = P - (E + Q)$	40.68	inches
6	$R(L) = R(l) \times A$	2.10	inches	6	$R(I) = R(i) \times A$	11.83	inches

<b>C Unvegetated Area Recharge</b>			<b>D Water Area Loss</b>				
	<i>Value</i>	<i>Units</i>		<i>Value</i>	<i>Units</i>		
1	A = Fraction of Land Unveg.	0.008	fraction	1	A = Fraction of Site in Water	0.004	fraction
2	P = Precipitation Rate	45.20	inches	2	P = Precipitation Rate	45.20	inches
3	E = Evapotranspiration Rate	21.20	inches	3	E = Evaporation Rate	30.00	inches
4	Q = Runoff Rate	2.10	inches	4	Q = Runoff Rate	0.00	inches
5	$R(u) = P - (E + Q)$	21.90	inches	5	M = Makeup Water	0.00	inches
6	$R(U) = R(u) \times A$	0.17	inches	6	$R(w) = \{P - (E+Q)\} - M$	15.20	inches
				7	$R(W) = R(w) \times A$	0.05	inches

<b>E Natural Area Recharge</b>			<b>F Other Area Recharge</b>				
	<i>Value</i>	<i>Units</i>		<i>Value</i>	<i>Units</i>		
1	A = Fraction of Land in Natural	0.404	fraction	1	A = Fraction of Land in Other	0.198	fraction
2	P = Precipitation Rate	45.20	inches	2	P = Precipitation Rate	45.20	inches
3	E = Evapotranspiration Rate	23.00	inches	3	E = Evapotranspiration Rate	23.00	inches
4	Q = Runoff Rate	0.30	inches	4	Q = Runoff Rate	0.00	inches
5	$R(n) = P - (E + Q)$	21.90	inches	5	$R(o) = P - (E + Q)$	22.20	inches
6	$R(N) = R(n) \times A$	8.84	inches	6	$R(O) = R(o) \times A$	4.40	inches

<b>G Irrigation Recharge</b>			<b>H Wastewater Recharge</b>				
	<i>Value</i>	<i>Units</i>		<i>Value</i>	<i>Units</i>		
1	A = Fraction of Land Irrigated	0.096	fraction	1	WDF = Wastewater Design Flow	275,275	gal/day
2	I = Irrigation Rate	5.50	inches	2	WDF = Wastewater Design Flow	13,433,558	cu ft/yr
3	E = Evaptranspiration Rate	2.73	inches	3	A = Area of Site	14,525,518	sq ft
4	Q = Runoff Rate	0.90	inches	4	$R(ww) = WDF/A$	0.92	feet
5	$R(irr) = I - (E + Q)$	1.87	inches	5	$R(WW) = \text{Wastewater Recharge}$	11.10	inches
6	$R(IRR) = R(irr) \times A$	0.18	inches				

<b>Total Site Recharge</b>		
$R(T) =$	$R(L) + R(I) + R(U) + R(W) + R(N) + R(O) + R(IRR) + R(WW)$	
$R(T) =$	<b>38.67</b>	<b>inches</b>

## SIMULATION OF NITROGEN IN RECHARGE (SONIR)

NELSON, POPE & VOORHIS, LLC MICROCOMPUTER MODEL

### SITE NITROGEN BUDGET

Revised Project, using Dorado STP

SHEET 3

<b>A Sanitary Nitrogen-Residential</b>			<b>Value</b>	<b>Units</b>	<b>B Pet Waste Nitrogen</b>			<b>Value</b>	<b>Units</b>
1	Number of Dwellings		850	units	1	AR = Application Rate	3.19	lbs/pet	
2	Persons per Dwelling		2.06	capita	2	Human Population	1751	capita	
3	P = Population		1751.00	capita	3	Pets = 10 percent of capita x 50% (half)	88	pets	
4	N = Nitrogen per person		0	lbs	4	N(p) = AR x pets	279.28	lbs	
5	LR = Leaching Rate		50%	percent	5	LR = Leaching Rate	16%	percent	
6	N(S) = P x N x LR		0.00	lbs	6	N(P) = N(p) x LR	44.69	lbs	
7	N(S) = Sanitary Nitrogen		0.00	lbs	7	N(P) = Pet Waste Nitrogen	22.34	lbs	

<b>C Sanitary Nitrogen (Commercial/STP)</b>			<b>D Water Supply Nitrogen (other than wastewater, if applicable)</b>					
1	CF = Commercial/STP Flow		275,275	gal/day	1	WDF = Water Design Flow	0	gal/day
2	CF = Commercial/STP Flow		380,299,294	liters/yr	2	WDF = Water Design Flow	0	liters/yr
3	N = Nitrogen in Commercial		8.00	mg/l	3	N = Nitrogen in Water Supply	1.16	mg/l
4	LR = Leaching Rate		90%	percent	4	N(WW) = WDF x N	0	milligrams
5	N(S) = CF x N x LR		2,738,154,920	milligrams	5	N(WW) = Water Nitrogen	0.00	lbs
6	N(S) = Sanitary Nitrogen		6037.63	lbs				

<b>E Fertilizer Nitrogen 1</b>			<b>F Fertilizer Nitrogen 2</b>					
1	A = Area of Land Fertilized 1		1,393,920	sq ft	1	A = Area of Land Fertilized 2	0	sq ft
2	AR = Application Rate		1.00	lbs/1000 sf	2	AR = Application Rate	0.00	lbs/1000 sf
3	LR = Leaching Rate		16%	percent	3	LR = Leaching Rate	0%	percent
4	N(F1) = A x AR x LR		223.03	lbs	4	N(F2) = A x AR x LR	0.00	lbs
5	N(F1) = Fertilizer Nitrogen		223.03	lbs	5	N(F2) = Fertilizer Nitrogen	0.00	lbs

<b>G Precipitation Nitrogen</b>			<b>H Irrigation Nitrogen</b>					
1	R(n) = Natural Recharge (feet)		2.28	feet	1	R = Irrigation Recharge (inches)	1.87	inches
2	A = Area of Site (sq ft)		14,525,518	sq ft	2	R = Irrigation Rate (feet)	0.16	feet
3	R(N) = R(n) x A		33,160,436	cu ft	3	A = Area of Land Irrigated	1,393,920	sq ft
4	R(N) = Natural Recharge (liters)		939,103,534	liters	4	R(I) = R(irr) x A	217,723	cu ft
5	N = Nitrogen in Precipitation		0.50	mg/l	5	R(I) = Site Precipitation (liters)	6,165,913	liters
6	LR = Leaching Rate		16%	percent	6	N = Nitrogen in Water Supply	1.16	mg/l
7	N(ppt) = R(N) x N x LR		75,128,283	milligrams	7	LR = Leaching Rate	16%	percent
8	N(ppt) = Precipitation Nitrogen		165.66	lbs	8	N(irr) = R(I) x N x LR	1,144,393	milligrams
					9	N(irr) = Irrigation Nitrogen	2.52	lbs

<b>Total Site Nitrogen</b>		
N=	$N(S) + N(P) + N(WW) + N(F1) + N(F2) + N(ppt) + N(irr)$	
N=	<b>6451.18</b>	lbs

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NAME OF PROJECT

The Meadows at Yaphank PDD

Revised Project using Dorade STP

### FINAL COMPUTATIONS

SHEET 4

<i>A</i>	<i>Nitrogen in Recharge</i>	<i>Value</i>	<i>Units</i>
1	N = Total Nitrogen (lbs)	6451.18	lbs
2	N = Total Nitrogen (milligrams)	2,928,836,995	milligrams
3	R(T) = Total Recharge (inches)	38.67	inches
4	R(T) = Total Recharge (feet)	3.22	feet
5	A = Area of Site	14,525,518	sq ft
6	R = R(T) × A	46,811,716	cu ft
7	R = Site Recharge Volume	1,325,707,798	liters
9	NR = N/R	2.21	mg/l

FINAL CONCENTRATION OF  
NITROGEN IN RECHARGE

2.21

<i>B</i>	<i>Site Recharge Summary</i>	<i>Value</i>	<i>Units</i>
1	R(T) = Total Site Recharge	38.67	inches/yr
2	R = Site Recharge Volume	46,811,716	cu ft/yr
3	R = Site Recharge Volume	350,175,978	gal/yr
4	R = Site Recharge Volume	350.18	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