

**STORMWATER CALCULATIONS
FOR
STORMWATER MANAGEMENT
PERMIT APPLICATION
FOR
City of Fellsmere - South Regional Lake
Fellsmere, Florida
July 2018**

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Florida Reg. No. 70170

PREPARED BY

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EXECUTIVE SUMMARY

The purpose of this report is to aid The City of Fellsmere in the application for a permit from the St. Johns River Water Management District (SJRWMD) to permit the construction of a regional stormwater lake in Fellsmere, Florida. A proposed weir will divert water from the Fellsmere Water Control District's (FWCD) PL-18 canal through the proposed system, consisting of five lakes interconnected by shallow drainage swales. This report evaluates the flow way conveyance capacity impacts, if any, that the proposed weir and stormwater lake may cause to the basins upstream of the project.

The evaluation includes comparing the results of a 25-year 24-hour storm event for pre development and post development conditions. The post development routing was established using the existing FWCD Master Drainage model modified to include the proposed weir and stormwater lake. The two events compared the upstream conditions to determine the impacts as a result of the construction of the stormwater lake.

While the primary purpose of the lake is to provide treatment of stormwater runoff, the results of the analysis indicate that construction of the lake will also provide flood protection by lowering peak stages of the basin nodes upstream and downstream of the project. See the Conclusion section for a summary of the FWCD basin nodes that were compared and the results.

ON-SITE BASIN CURVE NUMBER CALCULATIONS

BSLAKE-1

				<u>Curve Number (CN)</u>
Basin Area:	3.074 Acres			85
Impervious Area:	1.346 Acres	43.8%		98
Open Area:	1.728 Acres	56.2%		74
		Note:	Soils Type B/D Tr-55 Table 2-2d. - Herbaceous, Good Condition	

BSLAKE-2

				<u>Curve Number (CN)</u>
Basin Area:	3.804 Acres			84
Impervious Area:	1.550 Acres	40.7%		98
Open Area:	2.254 Acres	59.3%		74
		Note:	Soils Type B/D Tr-55 Table 2-2d. - Herbaceous, Good Condition	

BSLAKE-3

				<u>Curve Number (CN)</u>
Basin Area:	6.845 Acres			81
Impervious Area:	2.043 Acres	29.9%		98
Open Area:	4.8016 Acres	70.1%		74
		Note:	Soils Type B/D Tr-55 Table 2-2d. - Herbaceous, Good Condition	

BSLAKE-4

			<u>Curve Number (CN)</u>
Basin Area:	6.521 Acres		84
Impervious Area:	2.683 Acres	41.2%	98
Open Area:	3.8375 Acres	58.8%	74
Note: Soils Type B/D Tr-55 Table 2-2d. - Herbaceous, Good Condition			

BSLAKE-5

			<u>Curve Number (CN)</u>
Basin Area:	12.992 Acres		84
Impervious Area:	5.677 Acres	43.7%	98
Open Area:	7.3145 Acres	56.3%	74
Note: Soils Type B/D Tr-55 Table 2-2d. - Herbaceous, Good Condition			

TIME OF CONCENTRATION CALCULATIONS

A time of concentration of ten (10) minutes was estimated for all of the on-site proposed lake basins. This was determined by utilizing a minimum value for the time of concentration which is necessary for the stability of the model.

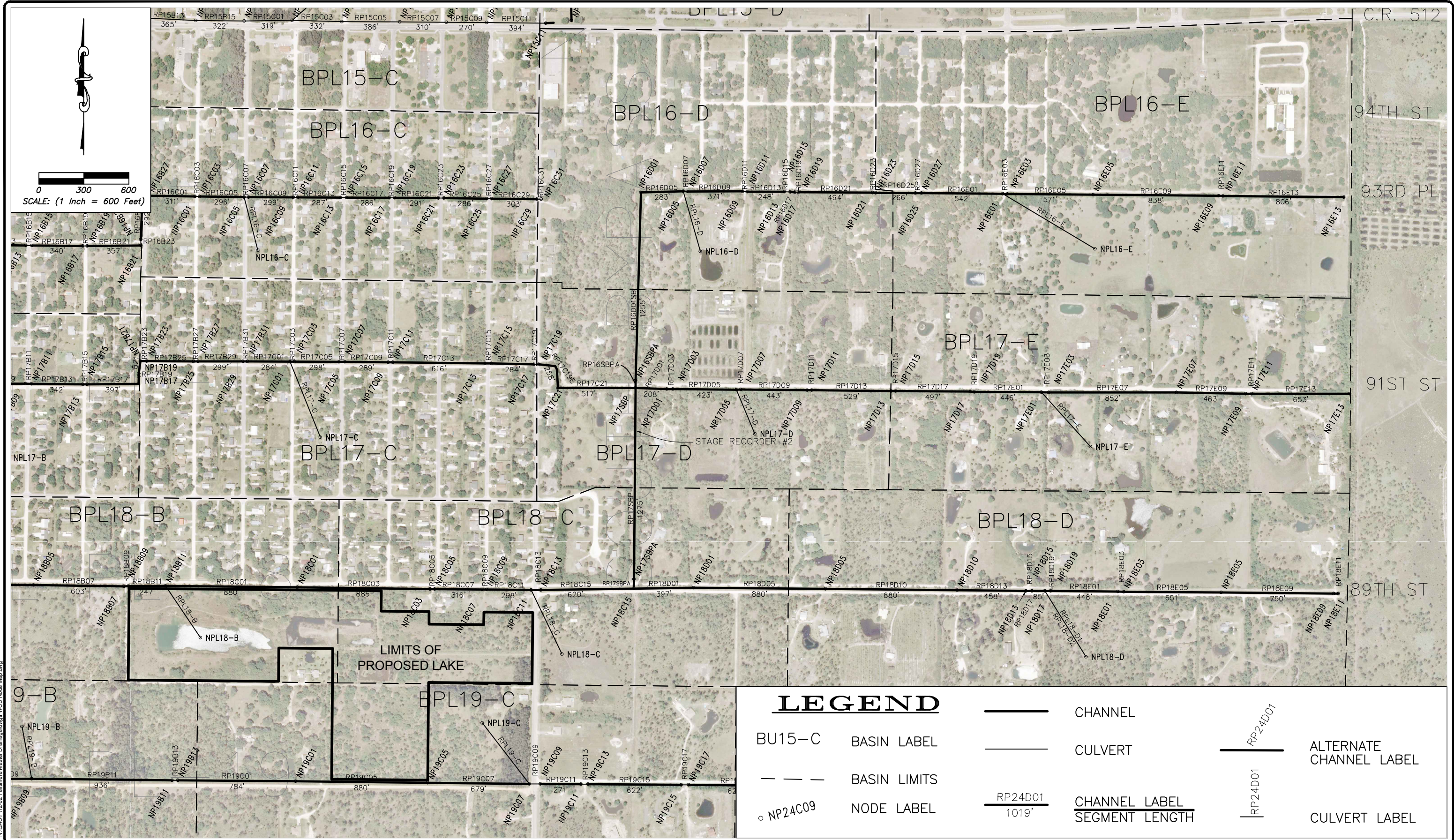
CONCLUSION

Based on the computer model results, the construction of the proposed stormwater lake has no adverse effect on the upstream nodes during the modeled storm event. In expected, the stormwater lake reduces the peak stages of the FWCD nodes in the immediate vicinity of the project. This was as expected due to the increased amount of storage provided by the proposed lake. The weir was set at an optimal elevation, 19.5 (NAVD88), in order to allow for the stormwater to be routed and treated through the system without causing upstream flooding during large storm events, as displayed by the results of the computer model. A brief summary of the results are noted below.

25yr-24Hr			
Node	Pre Development Stage	Post Development Stage	Difference in Stage
	NAVD88	NAVD88	Feet
Ditch Nodes			
NP16D01	23.50	23.40	-0.10
NP16D27	24.23	24.22	-0.01
NP16E13	24.24	24.23	-0.01
NP16SBPA	23.50	23.40	-0.10
NP17D01	23.51	23.41	-0.10
NP17D11	23.74	23.68	-0.06
NP17D19	23.90	23.86	-0.04
NP17E13	23.90	23.86	-0.04
NP17SBPA	23.49	23.38	-0.12
NP18A01	22.01	22.00	-0.01
NP18A10	22.07	22.06	-0.01
NP18B01	22.14	22.13	-0.01
NP18B07	22.33	22.27	-0.06
NP18B11	22.94	22.49	-0.45
NP18C01	23.00	22.72	-0.28
NP18C09	23.38	23.21	-0.18
NP18C15	23.48	23.36	-0.13
NP18D01	23.48	23.36	-0.12
NP18D13	23.50	23.38	-0.12
NP18D19	23.71	23.62	-0.09
NP18E01	23.71	23.62	-0.09
NP18E11	23.71	23.62	-0.09
Basin Nodes			
NPL16-D	24.11	24.11	0.00
NPL16-E	24.31	24.30	-0.01
NPL17-D	24.02	24.02	0.00
NPL17-E	24.01	23.99	-0.02
NPL18-A	22.94	22.93	0.00
NPL18-B	23.06	22.85	-0.21
NPL18-C	23.90	23.87	-0.03
NPL18-D	24.04	24.02	-0.02

APPENDIX A

– NODE MAPS



NO.	REVISION	BY	DATE

CITY OF FELLSMERE

22 S. ORANGE STREET

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SOUTH REGIONAL LAKE

FELLSMERE, FLORIDA

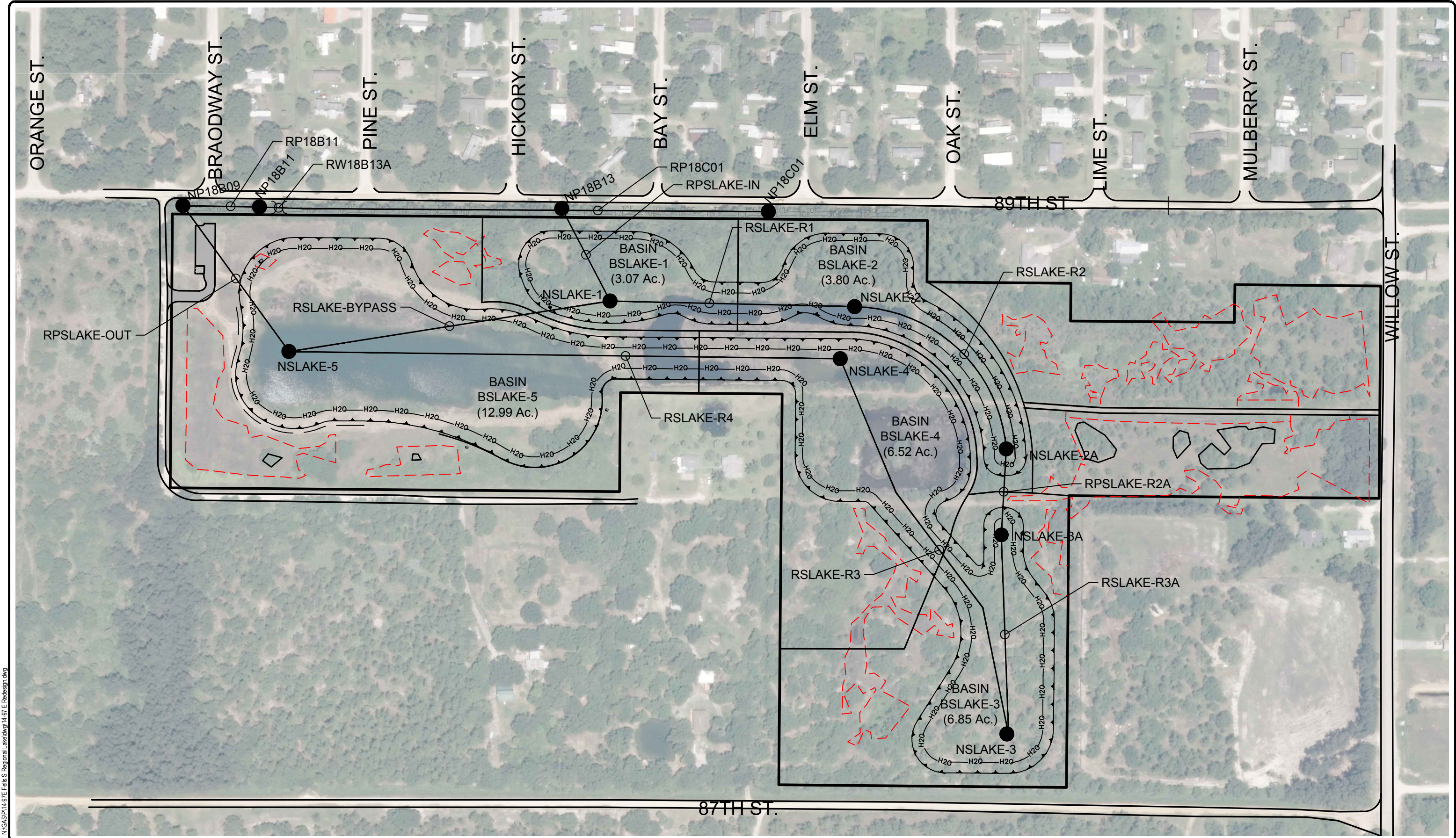
INDIAN RIVER COUNTY

FWCD NODE MAP

SHEET

1 OF 1

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NO.	REVISION	BY	DATE
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SOUTH REGIONAL LAKE
FELLSMERE, FLORIDA
INDIAN RIVER COUNTY
POST DEVELOPMENT NODE MAP

SHEET
1 OF 1
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APPENDIX B

– ICPR MODEL INPUT AND RESULTS

Fellsmere South Regional Lake - July 2018
Max Node Report

Name	Group	Simulation	Max Time Stage hrs	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Time Inflow hrs	Max Inflow cfs	Max Time Outflow hrs	Max Outflow cfs
NP16D01	P18	25yr-24hr-Ra	24.46	23.401	26.580	-0.0003	24789	59.58	12.904	63.71	13.753
NP16D27	P18	25yr-24hr-Ra	24.10	24.220	26.580	0.0002	5832	13.48	13.019	13.84	11.284
NP16E13	P18	25yr-24hr-Ra	24.10	24.225	28.080	0.0005	8637	0.00	0.000	35.78	0.355
NP16SBPA	P18	25yr-24hr-Ra	24.46	23.399	26.580	0.0003	13436	15.10	10.349	15.19	8.901
NP17D01	P18	25yr-24hr-Ra	24.47	23.407	26.080	0.0033	2350	13.72	17.360	20.01	16.597
NP17D11	P18	25yr-24hr-Ra	24.53	23.678	26.080	0.0002	5386	63.65	10.705	63.66	10.752
NP17D19	P18	25yr-24hr-Ra	24.32	23.860	26.330	0.0002	4981	63.17	10.523	63.34	10.565
NP17E13	P18	25yr-24hr-Ra	24.31	23.862	28.080	0.0002	5390	0.00	0.000	0.00	1.039
NP17SBPA	P18	25yr-24hr-Ra	24.60	23.375	25.080	0.0003	16148	17.47	22.986	17.68	22.484
NP18A01	P18	25yr-24hr-Ra	27.34	22.001	24.080	-0.5000	668277	35.64	56.022	38.64	62.135
NP18A10	P18	25yr-24hr-Ra	27.59	22.063	24.080	0.0002	24748	35.78	55.699	35.73	55.864
NP18B01	P18	25yr-24hr-Ra	27.90	22.129	23.080	0.0004	22279	35.67	47.539	35.62	47.681
NP18B07	P18	25yr-24hr-Ra	28.44	22.270	23.080	0.0005	7609	35.68	47.386	35.69	47.429
NP18B11	P18	25yr-24hr-Ra	28.79	22.490	23.080	0.0005	2790	17.42	42.946	17.22	42.472
NP18C01	P18	25yr-24hr-Ra	28.56	22.722	23.580	0.0002	22180	17.40	56.848	17.41	55.957
NP18C09	P18	25yr-24hr-Ra	25.27	23.205	23.580	0.0007	3520	17.28	57.618	17.31	57.495
NP18C15	P18	25yr-24hr-Ra	24.76	23.355	23.580	0.0003	13183	18.01	36.760	18.27	36.453
NP18D01	P18	25yr-24hr-Ra	24.76	23.358	28.080	0.0002	16486	45.77	16.129	45.76	16.328
NP18D13	P18	25yr-24hr-Ra	24.71	23.382	28.080	0.0006	5198	16.58	16.238	16.65	15.998
NP18D19	P18	25yr-24hr-Ra	24.38	23.617	28.080	0.0001	5172	0.09	2.700	0.10	2.664
NP18E01	P18	25yr-24hr-Ra	24.38	23.617	28.080	0.0001	5196	0.07	2.755	0.09	2.700
NP18E11	P18	25yr-24hr-Ra	24.39	23.617	28.080	-0.0022	115	0.00	0.000	55.98	0.991
NPL16-D	P18	25yr-24hr-Ra	24.00	24.109	26.580	0.0001	2665039	12.50	223.473	24.00	9.650
NPL16-E	P18	25yr-24hr-Ra	24.00	24.301	28.080	0.0001	3246153	12.50	309.405	13.46	32.349
NPL17-D	P18	25yr-24hr-Ra	19.79	24.024	26.080	0.0001	1869212	12.50	152.259	19.94	10.353
NPL17-E	P18	25yr-24hr-Ra	24.00	23.988	28.080	0.0001	2175964	12.50	212.588	14.89	17.537
NPL18-A	P18	25yr-24hr-Ra	20.90	22.934	24.080	0.0001	1854646	12.75	128.300	19.12	10.884
NPL18-B	P18	25yr-24hr-Ra	16.14	22.845	23.080	0.0003	1253707	12.50	194.606	13.37	29.311
NPL18-D	P18	25yr-24hr-Ra	16.50	23.870	23.580	0.0003	1847347	12.50	217.367	12.79	35.349
NPL18-C	P18	25yr-24hr-Ra	20.67	24.018	28.080	0.0001	2503430	12.75	194.307	15.35	21.554
NSLAKE-1	SLAKE	25yr-24hr-Ra	30.15	22.560	24.500	0.0002	80581	16.22	38.688	16.22	34.025
NSLAKE-2	SLAKE	25yr-24hr-Ra	30.15	22.561	24.500	0.0002	123942	16.16	30.517	29.36	75.673
NSLAKE-2A	SLAKE	25yr-24hr-Ra	30.15	22.560	24.500	0.0004	17876	29.36	75.673	15.11	23.132
NSLAKE-3	SLAKE	25yr-24hr-Ra	30.23	22.548	24.500	0.0002	143093	29.83	184.375	14.30	16.507
NSLAKE-3A	SLAKE	25yr-24hr-Ra	30.23	22.551	24.500	0.0006	7567	15.11	23.132	29.83	184.375
NSLAKE-4	SLAKE	25yr-24hr-Ra	30.23	22.548	24.500	0.0002	192264	11.99	49.954	34.21	18.015
NSLAKE-5	SLAKE	25yr-24hr-Ra	30.23	22.548	24.500	0.0002	321818	12.00	100.248	40.95	20.015

Fellsmere South Regional Lake - July 2018
On-Site Basin Summary

Basin Name: BSLAKE-1
Group Name: SLAKE
Simulation: 25Yr-24Hr-Ra
Node Name: NSLAKE-1
Basin Type: SCS Unit Hydrograph

Unit Hydrograph: Uh323
Peaking Fator: 323.0
Spec Time Inc (min): 1.33
Comp Time Inc (min): 1.33
Rainfall File: Scsii-24
Rainfall Amount (in): 9.200
Storm Duration (hrs): 24.00
Status: Onsite
Time of Conc (min): 10.00
Time Shift (hrs): 0.00
Area (ac): 3.074
Vol of Unit Hyd (in): 1.001
Curve Number: 85.000
DCIA (%): 0.000

Time Max (hrs): 12.04
Flow Max (cfs): 23.962
Runoff Volume (in): 7.379
Runoff Volume (ft3): 82339.058

Basin Name: BSLAKE-2
Group Name: SLAKE
Simulation: 25Yr-24Hr-Ra
Node Name: NSLAKE-2
Basin Type: SCS Unit Hydrograph

Unit Hydrograph: Uh323
Peaking Fator: 323.0
Spec Time Inc (min): 1.33
Comp Time Inc (min): 1.33
Rainfall File: Scsii-24
Rainfall Amount (in): 9.200
Storm Duration (hrs): 24.00
Status: Onsite
Time of Conc (min): 10.00
Time Shift (hrs): 0.00
Area (ac): 3.804
Vol of Unit Hyd (in): 1.000
Curve Number: 84.000
DCIA (%): 0.000

Time Max (hrs): 12.04
Flow Max (cfs): 29.321
Runoff Volume (in): 7.256
Runoff Volume (ft3): 100190.506

Basin Name: BSLAKE-3
Group Name: SLAKE
Simulation: 25Yr-24Hr-Ra
Node Name: NSLAKE-3
Basin Type: SCS Unit Hydrograph

Unit Hydrograph: Uh323
Peaking Fator: 323.0
Spec Time Inc (min): 1.33
Comp Time Inc (min): 1.33
Rainfall File: Scsii-24
Rainfall Amount (in): 9.200
Storm Duration (hrs): 24.00
Status: Onsite
Time of Conc (min): 10.00
Time Shift (hrs): 0.00
Area (ac): 6.845
Vol of Unit Hyd (in): 1.000
Curve Number: 81.000
DCIA (%): 0.000

Time Max (hrs): 12.04
Flow Max (cfs): 50.826
Runoff Volume (in): 6.885
Runoff Volume (ft3): 171070.588

Fellsmere South Regional Lake - July 2018
On-Site Basin Summary

Basin Name: BSLAKE-4
Group Name: SLAKE
Simulation: 25Yr-24Hr-Ra
Node Name: NSLAKE-4
Basin Type: SCS Unit Hydrograph

Unit Hydrograph: Uh323
Peaking Fator: 323.0
Spec Time Inc (min): 1.33
Comp Time Inc (min): 1.33
Rainfall File: Scsii-24
Rainfall Amount (in): 9.200
Storm Duration (hrs): 24.00
Status: Onsite
Time of Conc (min): 10.00
Time Shift (hrs): 0.00
Area (ac): 6.521
Vol of Unit Hyd (in): 1.000
Curve Number: 84.000
DCIA (%): 0.000

Time Max (hrs): 12.04
Flow Max (cfs): 50.263
Runoff Volume (in): 7.256
Runoff Volume (ft3): 171751.391

Basin Name: BSLAKE-5
Group Name: SLAKE
Simulation: 25Yr-24Hr-Ra
Node Name: NSLAKE-5
Basin Type: SCS Unit Hydrograph

Unit Hydrograph: Uh323
Peaking Fator: 323.0
Spec Time Inc (min): 1.33
Comp Time Inc (min): 1.33
Rainfall File: Scsii-24
Rainfall Amount (in): 9.200
Storm Duration (hrs): 24.00
Status: Onsite
Time of Conc (min): 10.00
Time Shift (hrs): 0.00
Area (ac): 12.992
Vol of Unit Hyd (in): 1.000
Curve Number: 84.000
DCIA (%): 0.000

Time Max (hrs): 12.04
Flow Max (cfs): 100.141
Runoff Volume (in): 7.256
Runoff Volume (ft3): 342185.872

Fellsmere South Regional Lake - July 2018
Input Report

=====

Basins

```

Name: BSLAKE-1          Node: NSLAKE-1          Status: Onsite
Group: SLAKE            Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh323      Peaking Factor: 323.0
Rainfall File:             Storm Duration(hrs): 0.00
Rainfall Amount(in): 0.000  Time of Conc(min): 10.00
                          Area(ac): 3.074      Time Shift(hrs): 0.00
                          Curve Number: 85.00   Max Allowable Q(cfs): 999999.000
                          DCIA(%): 0.00

```

```

-----
Name: BSLAKE-2          Node: NSLAKE-2          Status: Onsite
Group: SLAKE            Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh323      Peaking Factor: 323.0
Rainfall File:             Storm Duration(hrs): 0.00
Rainfall Amount(in): 0.000  Time of Conc(min): 10.00
                          Area(ac): 3.804      Time Shift(hrs): 0.00
                          Curve Number: 84.00   Max Allowable Q(cfs): 999999.000
                          DCIA(%): 0.00

```

```

-----
Name: BSLAKE-3          Node: NSLAKE-3          Status: Onsite
Group: SLAKE            Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh323      Peaking Factor: 323.0
Rainfall File:             Storm Duration(hrs): 0.00
Rainfall Amount(in): 0.000  Time of Conc(min): 10.00
                          Area(ac): 6.845      Time Shift(hrs): 0.00
                          Curve Number: 81.00   Max Allowable Q(cfs): 999999.000
                          DCIA(%): 0.00

```

```

-----
Name: BSLAKE-4          Node: NSLAKE-4          Status: Onsite
Group: SLAKE            Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh323      Peaking Factor: 323.0
Rainfall File:             Storm Duration(hrs): 0.00
Rainfall Amount(in): 0.000  Time of Conc(min): 10.00
                          Area(ac): 6.521      Time Shift(hrs): 0.00
                          Curve Number: 84.00   Max Allowable Q(cfs): 999999.000
                          DCIA(%): 0.00

```

```

-----
Name: BSLAKE-5          Node: NSLAKE-5          Status: Onsite
Group: SLAKE            Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh323      Peaking Factor: 323.0
Rainfall File:             Storm Duration(hrs): 0.00
Rainfall Amount(in): 0.000  Time of Conc(min): 10.00
                          Area(ac): 12.992     Time Shift(hrs): 0.00
                          Curve Number: 84.00   Max Allowable Q(cfs): 999999.000
                          DCIA(%): 0.00

```

=====

Nodes

```

Name: NSLAKE-1          Base Flow(cfs): 0.000      Init Stage(ft): 19.000
Group: SLAKE            Warn Stage(ft): 24.500
Type: Stage/Area

```

Stage(ft)	Area(ac)
9.000	0.4960
18.000	1.2470
19.000	1.3460
20.000	1.4570
21.000	1.5680
22.000	1.6800

Fellsmere South Regional Lake - July 2018
Input Report

23.000	1.7920
24.000	2.5000
25.000	3.0700

Name: NSLAKE-2	Base Flow(cfs): 0.000	Init Stage(ft): 19.000
Group: SLAKE		Warn Stage(ft): 24.500
Type: Stage/Area		

Stage(ft)	Area(ac)
9.000	0.2980
18.000	1.3840
19.000	1.5500
20.000	1.7660
21.000	1.9850
22.000	2.2060
23.000	2.4290
24.000	3.2500
25.000	3.8000

Name: NSLAKE-2A	Base Flow(cfs): 0.000	Init Stage(ft): 19.000
Group: SLAKE		Warn Stage(ft): 24.500
Type: Stage/Area		

Stage(ft)	Area(ac)
-----------	----------

Name: NSLAKE-3	Base Flow(cfs): 0.000	Init Stage(ft): 19.000
Group: SLAKE		Warn Stage(ft): 24.500
Type: Stage/Area		

Stage(ft)	Area(ac)
9.000	0.8580
10.000	0.9330
11.000	1.0110
12.000	1.0920
13.000	1.1760
14.000	1.2620
15.000	1.4180
16.000	1.5550
17.000	1.6930
18.000	1.8670
19.000	2.0430
20.000	2.2560
21.000	2.4720
22.000	2.6900
23.000	2.9110
24.000	5.5000
25.000	6.8450

Name: NSLAKE-3A	Base Flow(cfs): 0.000	Init Stage(ft): 19.000
Group: SLAKE		Warn Stage(ft): 24.500
Type: Stage/Area		

Stage(ft)	Area(ac)
-----------	----------

Name: NSLAKE-4	Base Flow(cfs): 0.000	Init Stage(ft): 19.000
Group: SLAKE		Warn Stage(ft): 24.500
Type: Stage/Area		

Stage(ft)	Area(ac)
9.000	1.2380
10.000	1.3290
11.000	1.4260
12.000	1.5280
13.000	1.6350
14.000	1.7470
15.000	1.9850
16.000	2.1500

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Input Report

17.000	2.3130
18.000	2.4990
19.000	2.6830
20.000	2.9190
21.000	3.1550
22.000	3.3910
23.000	3.6280
24.000	5.5000
25.000	6.5210

```

-----
Name: NSLAKE-5          Base Flow(cfs): 0.000      Init Stage(ft): 19.000
Group: SLAKE            Warn Stage(ft): 24.500
Type: Stage/Area

```

Stage(ft)	Area(ac)
9.000	3.1910
10.000	3.3660
11.000	3.5450
12.000	3.7280
13.000	3.9160
14.000	4.1070
15.000	4.4040
16.000	4.6330
17.000	4.8630
18.000	5.1790
19.000	5.4990
20.000	5.8470
21.000	6.1990
22.000	6.5540
23.000	7.0000
24.000	8.0000
25.000	10.0000
26.000	12.9920

```

=====
=== Cross Sections =====
=====

```

```

Name: SLAKE-SEC-1          Group: SLAKE
Encroachment: No

```

Station(ft)	Elevation(ft)	Manning's N
0.000	23.000	0.060000
24.000	19.000	0.060000
44.000	14.000	0.030000
50.000	14.000	0.030000
70.000	19.000	0.030000
94.000	23.000	0.060000

```

-----
Name: SLAKE-SEC-2          Group: SLAKE
Encroachment: No

```

Station(ft)	Elevation(ft)	Manning's N
0.000	23.000	0.060000
24.000	19.000	0.060000
44.000	14.000	0.030000
64.000	19.000	0.030000
88.000	23.000	0.060000

```

=====
=== Pipes =====
=====

```

```

Name: RPSLAKE-2A          From Node: NSLAKE-2A      Length(ft): 159.00
Group: SLAKE              To Node: NSLAKE-3A        Count: 1
                          Friction Equation: Automatic
                          Solution Algorithm: Most Restrictive
                          Flow: Both
                          Entrance Loss Coef: 0.00
                          Exit Loss Coef: 1.00
                          Bend Loss Coef: 0.00
                          Outlet Ctrl Spec: Use dc or tw
                          Inlet Ctrl Spec: Use dc
                          Stabilizer Option: None

UPSTREAM                DOWNSTREAM
Geometry: Circular      Circular
Span(in): 60.00         60.00
Rise(in): 60.00         60.00
Invert(ft): 14.000      14.000
Manning's N: 0.012000   0.012000
Top Clip(in): 0.000     0.000
Bot Clip(in): 0.000     0.000

```

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Upstream FHWA Inlet Edge Description:
Circular CMP: Projecting

Downstream FHWA Inlet Edge Description:
Circular CMP: Projecting

```
-----
Name: RPSLAKE-IN      From Node: NP18B13      Length(ft): 85.00
Group: SLAKE           To Node: NSLAKE-1      Count: 1
                        Friction Equation: Automatic
                        Solution Algorithm: Most Restrictive
                        Flow: Both
                        Entrance Loss Coef: 0.90
                        Exit Loss Coef: 1.00
                        Bend Loss Coef: 0.00
                        Outlet Ctrl Spec: Use dc or tw
                        Inlet Ctrl Spec: Use dc
                        Stabilizer Option: None

      UPSTREAM      DOWNSTREAM
Geometry: Circular  Circular
Span(in): 48.00     48.00
Rise(in): 48.00     48.00
Invert(ft): 17.500  12.500
Manning's N: 0.012000 0.012000
Top Clip(in): 0.000  0.000
Bot Clip(in): 0.000  0.000
```

Upstream FHWA Inlet Edge Description:
Circular CMP: Projecting

Downstream FHWA Inlet Edge Description:
Circular CMP: Projecting

==== Channels =====

```
-----
Name: RSLAKE-R1      From Node: NSLAKE-1      Length(ft): 105.00
Group: SLAKE          To Node: NSLAKE-2      Count: 1
                        Friction Equation: Automatic
                        Solution Algorithm: Automatic
                        Flow: Both
                        Contraction Coef: 0.100
                        Expansion Coef: 0.300
                        Entrance Loss Coef: 0.000
                        Exit Loss Coef: 0.000
                        Outlet Ctrl Spec: Use dc or tw
                        Inlet Ctrl Spec: Use dc
                        Stabilizer Option: None

      UPSTREAM      DOWNSTREAM
Geometry: Irregular Irregular
Invert(ft): 14.000  14.000
TClpInitZ(ft): 9999.000 9999.000
Manning's N:
Top Clip(ft):
Bot Clip(ft):
Main XSec: SLAKE-SEC-1 SLAKE-SEC-1
AuxElev1(ft): 0.000  0.000
Aux XSec1:
AuxElev2(ft): 0.000  0.000
Aux XSec2:
Top Width(ft):
Depth(ft):
Bot Width(ft):
LtSdSlp(h/v):
RtSdSlp(h/v):
```

```
-----
Name: RSLAKE-R2      From Node: NSLAKE-2      Length(ft): 400.00
Group: SLAKE          To Node: NSLAKE-2A     Count: 1
                        Friction Equation: Automatic
                        Solution Algorithm: Automatic
                        Flow: Both
                        Contraction Coef: 0.100
                        Expansion Coef: 0.300
                        Entrance Loss Coef: 0.000
                        Exit Loss Coef: 0.000
                        Outlet Ctrl Spec: Use dc or tw
                        Inlet Ctrl Spec: Use dc
                        Stabilizer Option: None

      UPSTREAM      DOWNSTREAM
Geometry: Irregular Irregular
Invert(ft): 14.000  14.000
TClpInitZ(ft): 9999.000 9999.000
Manning's N:
Top Clip(ft):
Bot Clip(ft):
Main XSec: SLAKE-SEC-1 SLAKE-SEC-1
AuxElev1(ft): 0.000  0.000
Aux XSec1:
AuxElev2(ft): 0.000  0.000
Aux XSec2:
Top Width(ft):
Depth(ft):
Bot Width(ft):
LtSdSlp(h/v):
RtSdSlp(h/v):
```

```
-----
Name: RSLAKE-R3      From Node: NSLAKE-3      Length(ft): 320.00
Group: SLAKE          To Node: NSLAKE-4      Count: 1
```

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UPSTREAM Geometry: Irregular Invert(ft): 14.000 TClpInitZ(ft): 9999.000 Manning's N: Top Clip(ft): Bot Clip(ft): Main XSec: SLAKE-SEC-2 AuxElev1(ft): 0.000 Aux XSec1: AuxElev2(ft): 0.000 Aux XSec2: Top Width(ft): Depth(ft): Bot Width(ft): LtSdSlp(h/v): RtSdSlp(h/v):	DOWNSTREAM Irregular 14.000 9999.000 SLAKE-SEC-2 0.000 0.000 SLAKE-SEC-2 0.000 0.000	Friction Equation: Automatic Solution Algorithm: Automatic Flow: Both Contraction Coef: 0.100 Expansion Coef: 0.300 Entrance Loss Coef: 0.000 Exit Loss Coef: 0.000 Outlet Ctrl Spec: Use dc or tw Inlet Ctrl Spec: Use dc Stabilizer Option: None
--	---	---

Name: RSLAKE-R3A	From Node: NSLAKE-3A	Length(ft): 180.00
Group: SLAKE	To Node: NSLAKE-3	Count: 1

UPSTREAM Geometry: Irregular Invert(ft): 14.000 TClpInitZ(ft): 9999.000 Manning's N: Top Clip(ft): Bot Clip(ft): Main XSec: SLAKE-SEC-2 AuxElev1(ft): 0.000 Aux XSec1: AuxElev2(ft): 0.000 Aux XSec2: Top Width(ft): Depth(ft): Bot Width(ft): LtSdSlp(h/v): RtSdSlp(h/v):	DOWNSTREAM Irregular 14.000 9999.000 SLAKE-SEC-2 0.000 0.000 SLAKE-SEC-2 0.000 0.000	Friction Equation: Automatic Solution Algorithm: Automatic Flow: Both Contraction Coef: 0.100 Expansion Coef: 0.300 Entrance Loss Coef: 0.000 Exit Loss Coef: 0.000 Outlet Ctrl Spec: Use dc or tw Inlet Ctrl Spec: Use dc Stabilizer Option: None
--	---	---

Name: RSLAKE-R4	From Node: NSLAKE-4	Length(ft): 580.00
Group: SLAKE	To Node: NSLAKE-5	Count: 1

UPSTREAM Geometry: Irregular Invert(ft): 14.000 TClpInitZ(ft): 9999.000 Manning's N: Top Clip(ft): Bot Clip(ft): Main XSec: SLAKE-SEC-1 AuxElev1(ft): 0.000 Aux XSec1: AuxElev2(ft): 0.000 Aux XSec2: Top Width(ft): Depth(ft): Bot Width(ft): LtSdSlp(h/v): RtSdSlp(h/v):	DOWNSTREAM Irregular 14.000 9999.000 SLAKE-SEC-1 0.000 0.000 SLAKE-SEC-1 0.000 0.000	Friction Equation: Automatic Solution Algorithm: Automatic Flow: Both Contraction Coef: 0.100 Expansion Coef: 0.300 Entrance Loss Coef: 0.000 Exit Loss Coef: 0.000 Outlet Ctrl Spec: Use dc or tw Inlet Ctrl Spec: Use dc Stabilizer Option: None
--	---	---

==== Drop Structures =====

Name: RPSLAKE-OUT	From Node: NSLAKE-5	Length(ft): 125.00
Group: SLAKE	To Node: NP18B09	Count: 1

UPSTREAM Geometry: Circular Span(in): 48.00 Rise(in): 48.00 Invert(ft): 15.000 Manning's N: 0.012000 Top Clip(in): 0.000 Bot Clip(in): 0.000	DOWNSTREAM Circular 48.00 48.00 18.000 0.012000 0.000 0.000	Friction Equation: Automatic Solution Algorithm: Most Restrictive Flow: Both Entrance Loss Coef: 0.500 Exit Loss Coef: 0.000 Outlet Ctrl Spec: Use dc or tw Inlet Ctrl Spec: Use dc Solution Incs: 10
---	--	--

Upstream FHWA Inlet Edge Description:
Circular CMP: Headwall

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Downstream FHWA Inlet Edge Description:
Circular CMP: Projecting

*** Weir 1 of 2 for Drop Structure RPSLAKE-OUT ***

TABLE

Count: 1	Bottom Clip(in): 0.000
Type: Horizontal	Top Clip(in): 0.000
Flow: Both	Weir Disc Coef: 3.200
Geometry: Rectangular	Orifice Disc Coef: 0.600
Span(in): 79.00	Invert(ft): 21.000
Rise(in): 36.00	Control Elev(ft): 21.000

*** Weir 2 of 2 for Drop Structure RPSLAKE-OUT ***

TABLE

Count: 1	Bottom Clip(in): 0.000
Type: Vertical: Mavis	Top Clip(in): 0.000
Flow: Both	Weir Disc Coef: 3.200
Geometry: Rectangular	Orifice Disc Coef: 0.600
Span(in): 24.00	Invert(ft): 19.000
Rise(in): 24.00	Control Elev(ft): 19.000

Name: RSLAKE-BYPASS	From Node: NSLAKE-1	Length(ft): 88.00
Group: SLAKE	To Node: NSLAKE-5	Count: 1
UPSTREAM	DOWNSTREAM	Friction Equation: Automatic
Geometry: Circular	Circular	Solution Algorithm: Most Restrictive
Span(in): 36.00	36.00	Flow: Both
Rise(in): 36.00	36.00	Entrance Loss Coef: 0.000
Invert(ft): 15.000	14.000	Exit Loss Coef: 1.000
Manning's N: 0.012000	0.012000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dc
Bot Clip(in): 0.000	0.000	Solution Incs: 10

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular CMP: Projecting

*** Weir 1 of 1 for Drop Structure RSLAKE-BYPASS ***

TABLE

Count: 1	Bottom Clip(in): 0.000
Type: Horizontal	Top Clip(in): 0.000
Flow: Both	Weir Disc Coef: 3.200
Geometry: Rectangular	Orifice Disc Coef: 0.600
Span(in): 49.00	Invert(ft): 20.500
Rise(in): 37.00	Control Elev(ft): 20.500

==== Hydrology Simulations =====

Name: 25Yr-24Hr-Ra
Filename: N:\GAS\P\14-97E Fells S Regional Lake\Calcs\25Yr-24Hr-Ra.R32

Override Defaults: Yes
Storm Duration(hrs): 24.00
Rainfall File: Scsii-24
Rainfall Amount(in): 9.20

Time(hrs)	Print Inc(min)
-----	-----
24.000	15.00

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=====

==== Routing Simulations =====

=====

Name: 25yr-24hr-Ra Hydrology Sim: 25Yr-24Hr-Ra
Filename: N:\GAS\P\14-97E Fells S Regional Lake\Calcs\25yr-24hr-Ra.I32

Execute: Yes Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 0.30 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000
Start Time(hrs): -6.000 End Time(hrs): 72.00
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 10.0000
Boundary Stages: 9-INCH Boundary Flows:

Time(hrs) Print Inc(min)

72.000 60.000

Group Run

BOOKER	Yes
BOUNDARY	Yes
FJV	Yes
FMAIN	Yes
FOA-BW	Yes
I01	Yes
I02	Yes
I03	Yes
I04	Yes
I05	Yes
I06	Yes
I07	Yes
I08	Yes
I25	Yes
I75	Yes
LI	Yes
LINCOLN	Yes
LU	Yes
MID LAT SEEPAGE	Yes
P01	Yes
P02	Yes
P03	Yes
P04	Yes
P05	Yes
P06	Yes
P07	Yes
P08	Yes
P09	Yes
P10	Yes
P11	Yes
P12	Yes
P13a	Yes
P13b	Yes
P14	Yes
P15	Yes
P16	Yes
P17	Yes
P18	Yes
P19	Yes
P20	Yes
P21	Yes
P22	Yes
P23	Yes
P24	Yes
P25	Yes
P35	Yes
P45	Yes
P55	Yes
PL	Yes
SEEPAGE P	Yes
SEEPAGE U	Yes
SLAKE	Yes
STATE	Yes
U01	Yes
U02	Yes
U03	Yes
U04	Yes
U05	Yes
U06	Yes
U07	Yes
U08	Yes
U09	Yes
U10	Yes
U11	Yes
U12	Yes
U13	Yes
U14	Yes

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U15	Yes
U16	Yes
U17	Yes
U18	Yes
U19	Yes
U20	Yes
U21	Yes
U55	Yes

=====
==== Boundary Conditions =====
=====

Name: 9-INCH

Node: NF-10

Type: Stage

Time(hrs)	Stage(ft)
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0.000	1.500
12.000	3.000
96.000	2.500