



Engineer Kristin Hoffman  
DATE: 10/30/2003  
BHR NO. 03032

**SR 50 Basin 1A - 906+30 to 931+20  
PRE DEVELOPMENT - Pond 1A  
DRAINAGE AREA ASSESSMENT**

| SUB-BASIN NAME   | BASIN (ACRES) | Within R/W Impervious (ACRES) | Within R/W Pervious (ACRES) | Other (ACRES) | Within R/W Impervious CN | Within R/W Pervious CN | Other CN | COMPOSITE CN |
|------------------|---------------|-------------------------------|-----------------------------|---------------|--------------------------|------------------------|----------|--------------|
| Basin 1A Roadway | 9.11          | 5.66                          | 0.00                        | 3.45          | 98.00                    | 39.00                  | 74.00    | 88.9         |
| Good Homes North | 1.81          | 1.22                          | 0.59                        | 0.00          | 98.00                    | 39.00                  | 74.00    | 78.7         |
| LOWES            | 18.80         | 0.00                          | 18.80                       | 0.00          | 98.00                    | 39.00                  | 74.00    | 39.0         |
| <b>TOTALS</b>    | <b>29.72</b>  | <b>6.88</b>                   | <b>19.39</b>                | <b>3.45</b>   |                          |                        |          | <b>56.7</b>  |

**EQUIVALENT RUNOFF COEFFICIENT 'C'**

| SUB-BASIN NAME      | COMPOSITE CN | SOIL STORAGE S (in) | EQUIV. 'C' MEAN ANNUAL | EQUIV. 'C' 5 YEAR | EQUIV. 'C' 10 YEAR | EQUIV. 'C' 25 YEAR | EQUIV. 'C' 100 YEAR | EQUIV. 'C' 25 YR/96 HR |
|---------------------|--------------|---------------------|------------------------|-------------------|--------------------|--------------------|---------------------|------------------------|
| Basin 1A Roadway    | 89           | 1.25                | 0.78                   | 0.80              | 0.82               | 0.85               | 0.88                | 0.88                   |
| Good Homes North    | 79           | 2.71                | 0.60                   | 0.63              | 0.67               | 0.70               | 0.76                | 0.75                   |
| LOWES               | 39           | 15.64               | 0.07                   | 0.09              | 0.13               | 0.17               | 0.24                | 0.24                   |
| <b>ENTIRE BASIN</b> | <b>57</b>    | <b>7.63</b>         | <b>0.26</b>            | <b>0.30</b>       | <b>0.35</b>        | <b>0.40</b>        | <b>0.48</b>         | <b>0.48</b>            |

| (Pt) | Return Period<br>Rainfall Amount | MEAN YR. (in)<br>5.76 | 5 YR (in)<br>6.48 | 10 YR (in)<br>7.44 | 25 YR (in)<br>8.64 | 100 YR (in)<br>11.04 | 25 YR/96 HR (in)<br>11.00 |
|------|----------------------------------|-----------------------|-------------------|--------------------|--------------------|----------------------|---------------------------|
|------|----------------------------------|-----------------------|-------------------|--------------------|--------------------|----------------------|---------------------------|

$$C = 1 - (S/Pt) * (1.2 - (S / (Pt + 0.8*S)))$$

$$\text{Where } S = (1000/CN) - 10$$

SOURCES: SCS SOILS SURVEY FOR ORANGE COUNTY, FLORIDA  
SCS TR 55, URBAN HYDROLOGY FOR SMALL WATERSHEDS  
FDOT DRAINAGE MANUAL, VOLUME TWO (1987)

**SCS CURVE NUMBERS (Ref. FDOT Drainage Manual, Vol. IIA, Table 5-8,5-9,5-10)**

Impervious:

Assume Group D (Streets and Roads, Paved)

CN<sub>imp</sub> = 98

Pervious:

Soil Types/Hydrologic Group: Arents  
Hydrologic Group C

CN<sub>per</sub> = 74

Soil Type/Hydrologic Group: Tavares  
Hydrologic Group A

CN<sub>per</sub> = 39

Example: LOWES

CN = (Imp. Area \* CN<sub>imp</sub> + Perv. Area \* CN<sub>per</sub> + Offsite Area \* CN<sub>offsite</sub>) / Total Area

CN = 39

**ESTIMATE OF RUNOFF VOLUME**

| DESIGN STORM   | AGENCY                 | P (in) | S (in) | R (in) | V(R) (ac-ft) |
|----------------|------------------------|--------|--------|--------|--------------|
| 25 yr, 96 hr   | SJRWMD                 | 11.00  | 7.63   | 5.25   | 12.99        |
| 100 yr, 24 hr  | Orange County          | 11.04  | 7.63   | 5.28   | 13.07        |
| 100 yr, 240 hr | FDOT Critical Duration | 18.00  | 7.63   | 11.26  | 27.88        |

**SAMPLE CALCULATION:**

1) DETERMINE SOIL STORAGE - S

$$S = (1000 / CN) - 10$$

SOIL STORAGE (inches)

$$S = 7.63$$

2) DETERMINE RUNOFF - R

$$P = 11.5$$

$$R = (P - 0.2*S)^2 / (P + 0.8*S)$$

RUNOFF (inches)

$$R = 5.28$$

3) DETERMINE RUNOFF VOLUME - V(R)

$$V(R) = R / 12 * \text{AREA}$$

RUNOFF (Ac-ft)

$$V(R) = 13.07$$

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SJRWMD - PDS



Engineer Kristin Hoffman  
DATE: 10/30/2003  
BHR NO. 03032

ST. JOHNS WATER MANAGEMENT DISTRICT  
DRY RETENTION POND FOR:

**SR 50 Basin 1A - 906+30 to 931+20  
POST DEVELOPMENT - Pond 1A  
DRAINAGE AREA ASSESSMENT**

| SUB-BASIN NAME   | BASIN (ACRES) | Impervious (ACRES) | Pervious (ACRES) | (ACRES)     | Impervious CN | Pervious CN | CN    | COMPOSITE CN |
|------------------|---------------|--------------------|------------------|-------------|---------------|-------------|-------|--------------|
| Basin 1A Roadway | 9.11          | 6.98               | 1.32             | 0.81        | 98.00         | 74.00       | 39.00 | 89.3         |
| Good Homes North | 1.81          | 1.41               | 0.40             | 0.00        | 98.00         | 39.00       | 39.00 | 84.9         |
| LOWES            | 18.80         | 14.83              | 3.97             | 0.00        | 98.00         | 39.00       | 39.00 | 85.5         |
| <b>TOTALS</b>    | <b>29.72</b>  | <b>23.22</b>       | <b>5.69</b>      | <b>0.81</b> |               |             |       | <b>86.6</b>  |

**EQUVALENT RUNOFF COEFFICIENT 'C'**

| SUB-BASIN NAME      | COMPOSITE CN | SOIL STORAGE S (in) | EQUIV. 'C' MEAN ANNUAL | EQUIV. 'C' 5 YEAR | EQUIV. 'C' 10 YEAR | EQUIV. 'C' 25 YEAR | EQUIV. 'C' 100 YEAR | EQUIV. 'C' 25 YR/96 HR |
|---------------------|--------------|---------------------|------------------------|-------------------|--------------------|--------------------|---------------------|------------------------|
| Basin 1A Roadway    | 89           | 1.20                | 0.79                   | 0.81              | 0.83               | 0.85               | 0.88                | 0.88                   |
| Good Homes North    | 85           | 1.78                | 0.71                   | 0.73              | 0.76               | 0.79               | 0.83                | 0.83                   |
| LOWES               | 86           | 1.69                | 0.72                   | 0.74              | 0.77               | 0.80               | 0.84                | 0.84                   |
| <b>ENTIRE BASIN</b> | <b>87</b>    | <b>1.54</b>         | <b>0.74</b>            | <b>0.76</b>       | <b>0.79</b>        | <b>0.81</b>        | <b>0.85</b>         | <b>0.85</b>            |

| (Pt) | Return Period<br>Rainfall Amount | MEAN YR. (in)<br>5.76 | 5 YR (in)<br>6.48 | 10 YR (in)<br>7.44 | 25 YR (in)<br>8.64 | 100 YR (in)<br>11.04 | 25 YR/96 HR (in)<br>11.00 |
|------|----------------------------------|-----------------------|-------------------|--------------------|--------------------|----------------------|---------------------------|
|------|----------------------------------|-----------------------|-------------------|--------------------|--------------------|----------------------|---------------------------|

$$C = 1 - (S/Pt) * (1.2 - (S / (Pt + 0.8*S)))$$

$$\text{Where } S = (1000/CN) - 10$$

SOURCES: SCS SOILS SURVEY FOR ORANGE COUNTY, FLORIDA  
SCS TR 55, URBAN HYDROLOGY FOR SMALL WATERSHEDS  
FDOT DRAINAGE MANUAL, VOLUME TWO (1987)

**SCS CURVE NUMBERS (Ref. FDOT Drainage Manual, Vol. IIA, Table 5-8,5-9,5-10)**

Impervious:

Assume Group D (Streets and Roads, Paved)

CN<sub>imp</sub> = 98

Pervious:

Soil Types/Hydrologic Group: Arents  
Hydrologic Group C

CN<sub>per</sub> = 74

Soil Type/Hydrologic Group: Tavares  
Hydrologic Group A

CN<sub>per</sub> = 39

Example: LOWES

CN = (Imp. Area \* CN<sub>imp</sub> + Perv. Area \* CN<sub>per</sub> + Offsite Area \* CN<sub>offsite</sub>) / Total Area

CN = 86

**ESTIMATE OF RUNOFF VOLUME**

| DESIGN STORM   | AGENCY                 | P (in) | S (in) | R (in) | V(R) (ac-ft) |
|----------------|------------------------|--------|--------|--------|--------------|
| 25 yr, 96 hr   | SJRWMD                 | 11.00  | 1.54   | 9.34   | 23.14        |
| 100 yr, 24 hr  | Orange County          | 11.04  | 1.54   | 9.38   | 23.24        |
| 100 yr, 240 hr | FDOT Critical Duration | 18.00  | 1.54   | 16.27  | 40.30        |

**SAMPLE CALCULATION:**

**1) DETERMINE SOIL STORAGE - S**

$$S = (1000 / CN) - 10$$

CN = 83

SOIL STORAGE (inches)

$$S = 1.54$$

**2) DETERMINE RUNOFF - R**

P = 11.04

$$R = (P - 0.2*S)^2 / (P + 0.8*S)$$

RUNOFF (inches)

$$R = 9.38$$

**3) DETERMINE RUNOFF VOLUME - V(R)**

$$V(R) = R / 12 * \text{AREA}$$

RUNOFF (Ac-ft)

$$V(R) = 23.24$$

$$T = \frac{0.007 (nL)^{0.8}}{P^{2.0} \cdot 5 \cdot s^{0.4}}$$



Engineer Kristin Hoffman  
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### TIME OF CONCENTRATION

Tt = travel time (hr)

**Tt1 - Sheet Flow** (across median)

n = Manning's roughness coefficient  
L = Flow length  
P2 = 2-Year, 24 Hour rainfall (in)  
s = slope of hydraulic grade line

n = 0.012  
L = 9.5 ft  
P2 = 5.04 in  
s = 0.0200 ft/ft

$s = ((E-1) - (E-2)) / L$   
E-1 = N/A  
E-2 = N/A

(Upstream Invert)  
(Downstream Invert)

$Tt = (0.007 (nL)^{0.8} / ((P2)^{0.5} * s^{0.4}))$

**Tt1 = 0.0026 hrs**

**Tt2 - Overland Flow - Paved (Shallow Concentrated)**

(across inside lanes)

Tt = Travel Time (min)  
s = slope over plane surface  
L = Flow length (ft)  
V = Velocity (ft/s)

s = 0.0200 ft/ft  
L = 24 ft  
V = 2.87484161 ft/s

V = 16.1345 (s)<sup>0.5</sup> (Unpaved)  
V = 20.3282 (s)<sup>0.5</sup> (Paved)

$s = ((E-1) - (E-2)) / L$   
E-1 = N/A  
E-2 = N/A

(Upstream Invert)  
(Downstream Invert)

$Tt = (L / (V * 3600))$  hrs

**Tt2 = 0.0023 hrs**

**Tt3 - Overland Flow - Paved (Shallow Concentrated)**

(across outside lane to inlet)

Tt = Travel Time (min)  
s = slope over plane surface  
L = Flow length (ft)  
V = Velocity (ft/s)

s = 0.0300 ft/ft  
L = 16 ft  
V = 3.52094752 ft/s

V = 16.1345 (s)<sup>0.5</sup> (Unpaved)  
V = 20.3282 (s)<sup>0.5</sup> (Paved)

$s = ((E-1) - (E-2)) / L$   
E-1 = N/A  
E-2 = N/A

(Upstream Invert)  
(Downstream Invert)

$Tt = (L / (V * 3600))$  hrs

**Tt3 = 0.0013 hrs**

**Tt4 - Pipe Flow** (from inlet to pond)

L = Length of Pipe  
v = Velocity

L = 1800 ft  
v = 2.5 ft/sec

**Tt4 = 0.20 hrs**

**Total = 0.21 hrs**  
**= 12.37 min**



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**TREATMENT VOLUME CALCULATIONS**

DRAINAGE AREA (DA) 29.72 ACRES

IMPERVIOUS (IMP. DA) 23.22 ACRES

TREATMENT VOLUME  
 REQUIRED:

0.5" + 0.5" 0.5" X (1/12") X DA + 0.5" X (1/12") X DA (AC-FT) 2.48  
 1.25" + 0.5" 1.25" X (1/12") X IMP. DA + 0.5" X (1/12") X DA 3.66 GOVERNS

| POND | ELEVATION<br>(FEET) | AREA<br>(ACRES) | VOLUME<br>(ACRE-FT) |
|------|---------------------|-----------------|---------------------|
| TOB  | 90.20               | 2.2             | 16.86               |
|      | 85.00               | 1.5             | 7.13                |
| BOT  | 79.00               | 0.8             | 0.00                |

Total Pond  
 Volume =

16.86 ac-ft  
 734,235 cubic feet

Treatment  
 Volume =

3.66 ac-ft  
 159,274 cubic feet



ST JOHNS WATER MANAGEMENT DISTRICT  
DRY RETENTION POND FOR:

Engineer Kristin Hoffman  
DATE: 10/30/2003  
BHR NO. 03032

**SR 50 Basin 1A - 906+02 to 931+20**  
**Summary of Volume Estimates - Sizing Pond 1A**

**Summary of Attenuation Estimates:**

| DESIGN STORM   | AGENCY                 | RUNOFF VOLUME |              |                   |
|----------------|------------------------|---------------|--------------|-------------------|
|                |                        | PRE (ac-ft)   | POST (ac-ft) | Retention (ac-ft) |
| 25 yr, 96 hr   | SJRWMD                 | 12.99         | 23.14        | 10.15             |
| 100 yr, 24 hr  | Orange County          | 13.07         | 23.24        | 10.17             |
| 100 yr, 240 hr | FDOT Critical Duration | 27.88         | 40.30        | 12.42             |

Maximum Volume Required for Attenuation = 12.42 ac-ft  
= 541,083 cubic feet

Treatment Volume = 3.66 ac-ft  
= 159,274 cubic feet

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**Project Data**

Project Name: SR 50 Good Homes Road to Pine Hills  
Simulation Description: Permit Modifications to Existing Pond at Lowes with Good Homes Road  
WDA 1A  
Project Number: 03032  
Engineer : Kristin Hoffman, PE  
Supervising Engineer: David Shearer, PE  
Date: 12-07-2005

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 64.00  
Water Table Elevation, [WT] (ft datum): 69.00  
Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 13.88  
Fillable Porosity, [n] (%): 30.00  
Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 9.25  
Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 85757.0

**Geometry Data**

Equivalent Pond Length, [L] (ft): 317.2  
Equivalent Pond Width, [W] (ft): 241.3  
Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 78.00               | 64823.0                    |
| 83.00               | 76229.0                    |
| 88.00               | 85757.0                    |

**Discharge Structures**

**Discharge Structure #1 is active as orifice**

**Structure Parameters**

Description: Orifice

|                                   |      |
|-----------------------------------|------|
| Orifice elevation, (ft datum):    | 83.7 |
| Orifice coefficient:              | 4.8  |
| Orifice area, (ft <sup>2</sup> ): | .07  |
| Orifice exponent:                 | .5   |

Tailwater - disabled, free discharge

**Discharge Structure #2 is inactive**

**Discharge Structure #3 is inactive**

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**Scenario Input Data**

*Scenario 1 :: Treatment Volume Infiltration*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 159274

Initial ground water level (ft datum) default, 69.00

| Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) |
|-------------------------------------|-------------------------------------|
| 0.100                               | 2.000                               |
| 0.250                               | 2.500                               |
| 0.500                               | 3.000                               |
| 1.000                               | 3.500                               |
| 1.500                               | 4.000                               |

*Scenario 2 :: 25 year - 24 hour Storm Event*

Hydrograph Type: Inline SCS  
 Modflow Routing: Routed with infiltration  
 Repetitions: 1

Basin Area (acres) 29.720  
 Time Of Concentration (minutes) 12.4  
 DCIA (%) 0.0  
 Curve Number 87  
 Design Rainfall Depth (inches) 8.6  
 Design Rainfall Duration (hours) 24.0  
 Shape Factor UHG 484  
 Rainfall Distribution SCS Type II Florida Modified

Initial ground water level (ft datum) default, 69.00

| Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| 0.100                               | 1.000                               | 5.000                               | 10.000                              |
| 0.200                               | 1.500                               | 6.000                               |                                     |
| 0.300                               | 2.000                               | 7.000                               |                                     |
| 0.400                               | 3.000                               | 8.000                               |                                     |
| 0.500                               | 4.000                               | 9.000                               |                                     |

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**Scenario Input Data (cont'd.)**

*Scenario 3 :: 25 year - 96 hour Storm Event*

Hydrograph Type:     Inline SCS  
Modflow Routing:     Routed with infiltration  
Repetitions:         1

Basin Area (acres)             29.720  
Time Of Concentration (minutes)   12.4  
DCIA (%)                     0.0  
Curve Number                 87  
Design Rainfall Depth (inches)   11.0  
Design Rainfall Duration (hours)   96.0  
Shape Factor                 UHG 484  
Rainfall Distribution             Saint Johns River WMD 96 Hour

Initial ground water level (ft datum)   default, 69.00

| Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| 0.100                               | 1.000                               | 5.000                               | 10.000                              |
| 0.200                               | 1.500                               | 6.000                               |                                     |
| 0.300                               | 2.000                               | 7.000                               |                                     |
| 0.400                               | 3.000                               | 8.000                               |                                     |
| 0.500                               | 4.000                               | 9.000                               |                                     |

*Scenario 4 :: 3 year - 24 hour Storm Event*

Hydrograph Type:     Inline SCS  
Modflow Routing:     Routed with infiltration  
Repetitions:         1

Basin Area (acres)             29.720  
Time Of Concentration (minutes)   12.4  
DCIA (%)                     0.0  
Curve Number                 87  
Design Rainfall Depth (inches)   5.6  
Design Rainfall Duration (hours)   24.0  
Shape Factor                 UHG 484  
Rainfall Distribution             SCS Type II Florida Modified

Initial ground water level (ft datum)   default, 69.00

| Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| 0.100                               | 1.000                               | 5.000                               | 10.000                              |
| 0.200                               | 1.500                               | 6.000                               |                                     |
| 0.300                               | 2.000                               | 7.000                               |                                     |
| 0.400                               | 3.000                               | 8.000                               |                                     |
| 0.500                               | 4.000                               | 9.000                               |                                     |

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**Scenario Input Data (cont'd.)**

*Scenario 6 ::*

Hydrograph Type:      Slug Load  
Modflow Routing:      Routed with infiltration

Treatment Volume (ft<sup>3</sup>)              442134

Initial ground water level (ft datum)      default, 69.00

| <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> | <u>Time After<br/>Storm Event<br/>(days)</u> |
|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| 0.100                                        | 2.000                                        | 5.000                                        |
| 0.250                                        | 2.500                                        | 7.000                                        |
| 0.500                                        | 3.000                                        | 10.000                                       |
| 1.000                                        | 3.500                                        | 20.000                                       |
| 1.500                                        | 4.000                                        | 30.000                                       |

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**Summary of Results** :: Scenario 1 :: Treatment Volume Infiltration

|                                        | Time<br>(hours) | Stage<br>(ft datum) | Rate<br>(ft <sup>3</sup> /s) | Volume<br>(ft <sup>3</sup> ) |
|----------------------------------------|-----------------|---------------------|------------------------------|------------------------------|
| Stage                                  |                 |                     |                              |                              |
| Minimum                                | 0.000           | 69.00               |                              |                              |
| Maximum                                | 0.002           | 80.36               |                              |                              |
| Inflow                                 |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 0.002           |                     | 26545.6700                   |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | 0.002           |                     |                              | 159274.0                     |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 96.000          |                     |                              | 159274.0                     |
| Infiltration                           |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 0.002           |                     | 6.9404                       |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | 2.400           |                     |                              | 64934.6                      |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 96.000          |                     |                              | 159274.0                     |
| Combined Discharge                     |                 |                     |                              |                              |
| Rate - Maximum - Positive              | None            |                     | None                         |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | None            |                     |                              | None                         |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 96.000          |                     |                              | 0.0                          |
| Discharge Structure 1 - simple orifice |                 |                     |                              |                              |
| Rate - Maximum - Positive              | None            |                     | None                         |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | None            |                     |                              | None                         |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 96.000          |                     |                              | 0.0                          |
| Discharge Structure 2 - inactive       |                 |                     |                              |                              |
| Rate - Maximum - Positive              | disabled        |                     | disabled                     |                              |
| Rate - Maximum - Negative              | disabled        |                     | disabled                     |                              |
| Cumulative Volume - Maximum Positive   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - Maximum Negative   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - End of Simulation  | disabled        |                     |                              | disabled                     |
| Discharge Structure 3 - inactive       |                 |                     |                              |                              |
| Rate - Maximum - Positive              | disabled        |                     | disabled                     |                              |
| Rate - Maximum - Negative              | disabled        |                     | disabled                     |                              |
| Cumulative Volume - Maximum Positive   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - Maximum Negative   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - End of Simulation  | disabled        |                     |                              | disabled                     |
| Pollution Abatement:                   |                 |                     |                              |                              |
| 36 Hour Stage and Infiltration Volume  | 36.000          | 0.00                |                              | 159274.0                     |
| 72 Hour Stage and Infiltration Volume  | 72.000          | 0.00                |                              | 159274.0                     |

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**Summary of Results** :: Scenario 2 :: 25 year - 24 hour Storm Event

|                                        | Time<br>(hours) | Stage<br>(ft datum) | Rate<br>(ft <sup>3</sup> /s) | Volume<br>(ft <sup>3</sup> ) |
|----------------------------------------|-----------------|---------------------|------------------------------|------------------------------|
| Stage                                  |                 |                     |                              |                              |
| Minimum                                | 0.000           | 69.00               |                              |                              |
| Maximum                                | 24.111          | 83.87               |                              |                              |
| Inflow                                 |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 12.014          |                     | 141.4875                     |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | 24.662          |                     |                              | 763517.8                     |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 264.690         |                     |                              | 763517.8                     |
| Infiltration                           |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 16.726          |                     | 18.1746                      |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | 264.690         |                     |                              | 647017.0                     |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 264.690         |                     |                              | 647017.0                     |
| Combined Discharge                     |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 24.111          |                     | 0.1398                       |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | 27.090          |                     |                              | 1842.7                       |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 264.690         |                     |                              | 1842.7                       |
| Discharge Structure 1 - simple orifice |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 24.111          |                     | 0.1398                       |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | 27.090          |                     |                              | 1842.7                       |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 264.690         |                     |                              | 1842.7                       |
| Discharge Structure 2 - inactive       |                 |                     |                              |                              |
| Rate - Maximum - Positive              | disabled        |                     | disabled                     |                              |
| Rate - Maximum - Negative              | disabled        |                     | disabled                     |                              |
| Cumulative Volume - Maximum Positive   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - Maximum Negative   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - End of Simulation  | disabled        |                     |                              | disabled                     |
| Discharge Structure 3 - inactive       |                 |                     |                              |                              |
| Rate - Maximum - Positive              | disabled        |                     | disabled                     |                              |
| Rate - Maximum - Negative              | disabled        |                     | disabled                     |                              |
| Cumulative Volume - Maximum Positive   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - Maximum Negative   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - End of Simulation  | disabled        |                     |                              | disabled                     |
| Pollution Abatement:                   |                 |                     |                              |                              |
| 36 Hour Stage and Infiltration Volume  | N.A.            | N.A.                |                              | N.A.                         |
| 72 Hour Stage and Infiltration Volume  | N.A.            | N.A.                |                              | N.A.                         |

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**Summary of Results** :: Scenario 3 :: 25 year - 96 hour Storm Event

|                                        | Time<br>(hours) | Stage<br>(ft datum) | Rate<br>(ft <sup>3</sup> /s) | Volume<br>(ft <sup>3</sup> ) |
|----------------------------------------|-----------------|---------------------|------------------------------|------------------------------|
| Stage                                  |                 |                     |                              |                              |
| Minimum                                | 0.000           | 69.00               |                              |                              |
| Maximum                                | 96.086          | 84.94               |                              |                              |
| Inflow                                 |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 59.988          |                     | 166.7531                     |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | 96.665          |                     |                              | 1013501.0                    |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 336.692         |                     |                              | 1013501.0                    |
| Infiltration                           |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 58.941          |                     | 11.3072                      |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | 336.692         |                     |                              | 736958.0                     |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 336.692         |                     |                              | 736958.0                     |
| Combined Discharge                     |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 96.086          |                     | 0.3742                       |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | 144.692         |                     |                              | 72241.2                      |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 336.692         |                     |                              | 72241.2                      |
| Discharge Structure 1 - simple orifice |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 96.086          |                     | 0.3742                       |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | 144.692         |                     |                              | 72241.2                      |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 336.692         |                     |                              | 72241.2                      |
| Discharge Structure 2 - inactive       |                 |                     |                              |                              |
| Rate - Maximum - Positive              | disabled        |                     | disabled                     |                              |
| Rate - Maximum - Negative              | disabled        |                     | disabled                     |                              |
| Cumulative Volume - Maximum Positive   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - Maximum Negative   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - End of Simulation  | disabled        |                     |                              | disabled                     |
| Discharge Structure 3 - inactive       |                 |                     |                              |                              |
| Rate - Maximum - Positive              | disabled        |                     | disabled                     |                              |
| Rate - Maximum - Negative              | disabled        |                     | disabled                     |                              |
| Cumulative Volume - Maximum Positive   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - Maximum Negative   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - End of Simulation  | disabled        |                     |                              | disabled                     |
| Pollution Abatement:                   |                 |                     |                              |                              |
| 36 Hour Stage and Infiltration Volume  | N.A.            | N.A.                |                              | N.A.                         |
| 72 Hour Stage and Infiltration Volume  | N.A.            | N.A.                |                              | N.A.                         |

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**Summary of Results** :: Scenario 4 :: 3 year - 24 hour Storm Event

|                                        | Time<br>(hours) | Stage<br>(ft datum) | Rate<br>(ft <sup>3</sup> /s) | Volume<br>(ft <sup>3</sup> ) |
|----------------------------------------|-----------------|---------------------|------------------------------|------------------------------|
| Stage                                  |                 |                     |                              |                              |
| Minimum                                | 0.000           | 69.00               |                              |                              |
| Maximum                                | 13.695          | 81.02               |                              |                              |
| Inflow                                 |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 12.014          |                     | 86.1013                      |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | 24.662          |                     |                              | 450469.0                     |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 264.690         |                     |                              | 450469.0                     |
| Infiltration                           |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 18.820          |                     | 14.4998                      |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | 144.690         |                     |                              | 450469.0                     |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 264.690         |                     |                              | 450469.0                     |
| Combined Discharge                     |                 |                     |                              |                              |
| Rate - Maximum - Positive              | None            |                     | None                         |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | None            |                     |                              | None                         |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 264.690         |                     |                              | 0.0                          |
| Discharge Structure 1 - simple orifice |                 |                     |                              |                              |
| Rate - Maximum - Positive              | None            |                     | None                         |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | None            |                     |                              | None                         |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 264.690         |                     |                              | 0.0                          |
| Discharge Structure 2 - inactive       |                 |                     |                              |                              |
| Rate - Maximum - Positive              | disabled        |                     | disabled                     |                              |
| Rate - Maximum - Negative              | disabled        |                     | disabled                     |                              |
| Cumulative Volume - Maximum Positive   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - Maximum Negative   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - End of Simulation  | disabled        |                     |                              | disabled                     |
| Discharge Structure 3 - inactive       |                 |                     |                              |                              |
| Rate - Maximum - Positive              | disabled        |                     | disabled                     |                              |
| Rate - Maximum - Negative              | disabled        |                     | disabled                     |                              |
| Cumulative Volume - Maximum Positive   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - Maximum Negative   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - End of Simulation  | disabled        |                     |                              | disabled                     |
| Pollution Abatement:                   |                 |                     |                              |                              |
| 36 Hour Stage and Infiltration Volume  | N.A.            | N.A.                |                              | N.A.                         |
| 72 Hour Stage and Infiltration Volume  | N.A.            | N.A.                |                              | N.A.                         |

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**Retention Pond Recovery - Refined Method**  
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**Summary of Results**    :: Scenario 6 ::

|                                        | Time<br>(hours) | Stage<br>(ft datum) | Rate<br>(ft <sup>3</sup> /s) | Volume<br>(ft <sup>3</sup> ) |
|----------------------------------------|-----------------|---------------------|------------------------------|------------------------------|
| Stage                                  |                 |                     |                              |                              |
| Minimum                                | 0.000           | 69.00               |                              |                              |
| Maximum                                | 0.002           | 84.16               |                              |                              |
| Inflow                                 |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 0.002           |                     | 73689.0000                   |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | 0.002           |                     |                              | 442134.0                     |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 720.000         |                     |                              | 442134.0                     |
| Infiltration                           |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 2.400           |                     | 8.3198                       |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | 120.000         |                     |                              | 441152.9                     |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 720.000         |                     |                              | 441152.9                     |
| Combined Discharge                     |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 0.002           |                     | 0.2271                       |                              |
| Rate - Maximum - Negative              | 6.000           |                     | 0.0000                       |                              |
| Cumulative Volume - Maximum Positive   | 2.400           |                     |                              | 981.1                        |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 720.000         |                     |                              | 981.1                        |
| Discharge Structure 1 - simple orifice |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 0.002           |                     | 0.2271                       |                              |
| Rate - Maximum - Negative              | 6.000           |                     | 0.0000                       |                              |
| Cumulative Volume - Maximum Positive   | 2.400           |                     |                              | 981.1                        |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 720.000         |                     |                              | 981.1                        |
| Discharge Structure 2 - inactive       |                 |                     |                              |                              |
| Rate - Maximum - Positive              | disabled        |                     | disabled                     |                              |
| Rate - Maximum - Negative              | disabled        |                     | disabled                     |                              |
| Cumulative Volume - Maximum Positive   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - Maximum Negative   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - End of Simulation  | disabled        |                     |                              | disabled                     |
| Discharge Structure 3 - inactive       |                 |                     |                              |                              |
| Rate - Maximum - Positive              | disabled        |                     | disabled                     |                              |
| Rate - Maximum - Negative              | disabled        |                     | disabled                     |                              |
| Cumulative Volume - Maximum Positive   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - Maximum Negative   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - End of Simulation  | disabled        |                     |                              | disabled                     |
| Pollution Abatement:                   |                 |                     |                              |                              |
| 36 Hour Stage and Infiltration Volume  | 36.000          | 79.17               |                              | 363540.7                     |
| 72 Hour Stage and Infiltration Volume  | 72.000          | 78.49               |                              | 409339.2                     |

### **Basin 1C - Pre-Development**

Basin 1C extends from SR 408 to just south of SR 50 on Good Homes Road. Existing ditches, inlets and cross culverts provide conveyance to an existing pond. This existing pond drains to Lake Sherwood, as Basins 1A and 1B do.

See the following pages for an explanation of the time of concentration, drainage area quantities and curve numbers.



Engineer Kristin Hoffman  
DATE: 9/1/2005  
BHR NO. 03032

Existing information from original permit (1988)

**SR 50 Basin 1C- Good Homes Road South  
PRE DEVELOPMENT - Pond 1C  
DRAINAGE AREA ASSESSMENT**

| SUB-BASIN<br>NAME | BASIN<br>(ACRES) | Within R/W<br>Impervious<br>(ACRES) | Within R/W<br>Pervious<br>(ACRES) | Other<br>(ACRES) | Within R/W<br>Impervious<br>CN | Within R/W<br>Pervious<br>CN | Other<br>CN | COMPOSITE<br>CN |
|-------------------|------------------|-------------------------------------|-----------------------------------|------------------|--------------------------------|------------------------------|-------------|-----------------|
| Roadway           | 1.76             | 1.66                                | 0.10                              |                  | 98.00                          | 39.00                        | 39.00       | 94.6            |
| Offsite           | 2.90             | 0.00                                | 0.00                              | 2.90             | 98.00                          | 39.00                        | 39.00       | 39.0            |
| TOTALS            | 4.66             | 1.66                                | 0.10                              | 2.90             | 98.00                          | 39.00                        | 39.00       | 60.0            |

**EQUIVALENT RUNOFF COEFFICIENT 'C'**

| SUB-BASIN<br>NAME | COMPOSITE<br>CN | SOIL STORAGE<br>S (in) | EQUIV. 'C'<br>MEAN ANNUAL | EQUIV. 'C'<br>5 YEAR | EQUIV. 'C'<br>10 YEAR | EQUIV. 'C'<br>25 YEAR | EQUIV. 'C'<br>100 YEAR | EQUIV. 'C'<br>25 YR/96 HR |
|-------------------|-----------------|------------------------|---------------------------|----------------------|-----------------------|-----------------------|------------------------|---------------------------|
| Roadway           | 95              | 0.57                   | 0.89                      | 0.90                 | 0.91                  | 0.93                  | 0.94                   | 0.94                      |
| Offsite           | 39              | 15.64                  | 0.07                      | 0.09                 | 0.13                  | 0.17                  | 0.24                   | 0.24                      |
| ENTIRE BASIN      | 60              | 6.66                   | 0.31                      | 0.35                 | 0.39                  | 0.44                  | 0.52                   | 0.52                      |

| (Pt) | Return Period<br>Rainfall Amount | MEAN YR. (in) | 5 YR (in) | 10 YR (in) | 25 YR (in) | 100 YR (in) | 25 YR/96 HR (in) |
|------|----------------------------------|---------------|-----------|------------|------------|-------------|------------------|
|      |                                  | 5.76          | 6.48      | 7.44       | 8.64       | 11.04       | 11.00            |

$$C = 1 - (S/Pt) * (1.2 - (S / (Pt + 0.8*S)))$$

$$\text{Where } S = (1000/CN) - 10$$

SOURCES: SCS SOILS SURVEY FOR ORANGE COUNTY, FLORIDA  
SCS TR 55, URBAN HYDROLOGY FOR SMALL WATERSHEDS  
FDOT DRAINAGE MANUAL, VOLUME TWO (1987)

**SCS CURVE NUMBERS (Ref. FDOT Drainage Manual, Vol. IIA, Table 5-8,5-9,5-10)**

Impervious:

Assume Group D (Streets and Roads, Paved)

CNimp = 98

Pervious:

Soil Types/Hydrologic Group: Arents  
Hydrologic Group C

CNper = 74

Soil Type/Hydrologic Group: Tavares  
Hydrologic Group A

CNper = 39

Example: LOWES

CN=(Imp. Area\*CNimp + Perv. Area\*CNper + Offsite Area\*CNoffsite) / Total Area

CN = 0

**ESTIMATE OF RUNOFF VOLUME**

| DESIGN STORM   | AGENCY                 | P<br>(in) | S<br>(in) | R<br>(in) | V(R)<br>(ac-ft) |
|----------------|------------------------|-----------|-----------|-----------|-----------------|
| 25 yr, 96 hr   | SJRWMD                 | 11.00     | 6.66      | 5.72      | 2.22            |
| 100 yr, 24 hr  | Orange County          | 11.04     | 6.66      | 5.76      | 2.24            |
| 100 yr, 240 hr | FDOT Critical Duration | 18.00     | 6.66      | 11.91     | 4.62            |

SAMPLE CALCULATION:

1) DETERMINE SOIL STORAGE - S

$$S = (1000 / CN) - 10$$

SOIL STORAGE  
(inches)

$$S = 6.66$$

2) DETERMINE RUNOFF - R

$$P = 11.5$$

$$R = (P - 0.2*S)^2 / (P + 0.8*S)$$

RUNOFF (inches)

$$R = 5.76$$

3) DETERMINE RUNOFF VOLUME - V(R)

$$V(R) = R / 12 * \text{AREA}$$

RUNOFF (Ac-ft)

$$V(R) = 2.24$$

**Basin 1C – Post-Development – WDA 1C**

Basin 1C will consist of 5.22 acres onsite and will extend from station 30+00 to station 47+43.5 of Good Homes Road.

WDA 1C is an existing pond that Good Homes Road currently drains to and is located east of Good Homes Road at approximately station 34+50. This pond is of an adequate size to hold the additional runoff from the road. The existing permit includes an offsite area to the west of Good Homes Road that is no longer draining to the pond. The existing pond will hold the additional runoff, so the pond will not require modification. The existing permit will have to be updated.

All calculations that pertain to the pond design are included.



Engineer Kristin Hoffman  
DATE: 9/1/2005  
BHR NO. 03032

Existing information from original permit (1988)  
ST. JOHNS WATER MANAGEMENT DISTRICT  
DRY RETENTION POND FOR:

**SR 50 Basin 1C- Good Homes Road South  
POST DEVELOPMENT - Pond 1C  
DRAINAGE AREA ASSESSMENT**

| SUB-BASIN NAME | BASIN (ACRES) | Impervious (ACRES) | Pervious (ACRES) | (ACRES) | Impervious CN | Pervious CN | CN    | COMPOSITE CN |
|----------------|---------------|--------------------|------------------|---------|---------------|-------------|-------|--------------|
| GHR Roadway    | 5.22          | 2.64               | 2.58             | 0.00    | 98.00         | 39.00       | 39.00 | 68.8         |
|                |               |                    | 0.00             | 0.00    | 98.00         | 39.00       | 39.00 |              |
|                |               |                    | 0.00             | 0.00    | 98.00         | 39.00       | 39.00 |              |
| TOTALS         | 5.22          | 2.64               | 2.58             | 0.00    |               |             |       | 68.8         |

**EQUIVALENT RUNOFF COEFFICIENT 'C'**

| SUB-BASIN NAME | COMPOSITE CN | SOIL STORAGE S (in) | EQUIV. 'C' MEAN ANNUAL | EQUIV. 'C' 5 YEAR | EQUIV. 'C' 10 YEAR | EQUIV. 'C' 25 YEAR | EQUIV. 'C' 100 YEAR | EQUIV. 'C' 25 YR/96 HR |
|----------------|--------------|---------------------|------------------------|-------------------|--------------------|--------------------|---------------------|------------------------|
| GHR Roadway    | 69           | 4.53                | 0.44                   | 0.47              | 0.52               | 0.56               | 0.63                | 0.63                   |
| ENTIRE BASIN   | 69           | 4.53                | 0.44                   | 0.47              | 0.52               | 0.56               | 0.63                | 0.63                   |

| (Pt) | Return Period   | MEAN YR. (in) | 5 YR (in) | 10 YR (in) | 25 YR (in) | 100 YR (in) | 25 YR/96 HR (in) |
|------|-----------------|---------------|-----------|------------|------------|-------------|------------------|
|      | Rainfall Amount | 5.76          | 6.48      | 7.44       | 8.64       | 11.04       | 11.00            |

$$C = 1 - (S/Pt) * (1.2 - (S / (Pt + 0.8*S)))$$

$$\text{Where } S = (1000/CN) - 10$$

SOURCES: SCS SOILS SURVEY FOR ORANGE COUNTY, FLORIDA  
SCS TR 55, URBAN HYDROLOGY FOR SMALL WATERSHEDS  
FDOT DRAINAGE MANUAL, VOLUME TWO (1987)

**SCS CURVE NUMBERS (Ref. FDOT Drainage Manual, Vol. IIA, Table 5-8,5-9,5-10)**

|                                                                                                                                      |                     |    |
|--------------------------------------------------------------------------------------------------------------------------------------|---------------------|----|
| Impervious:<br>Assume Group D (Streets and Roads, Paved)                                                                             | CN <sub>imp</sub> = | 98 |
| Pervious:<br>Soil Types/Hydrologic Group: Arents<br>Hydrologic Group C                                                               | CN <sub>per</sub> = | 74 |
| Soil Type/Hydrologic Group: Tavares<br>Hydrologic Group A                                                                            | CN <sub>per</sub> = | 39 |
| Example: LOWES<br>CN=(Imp. Area*CN <sub>imp</sub> + Perv. Area*CN <sub>per</sub> + Offsite Area*CN <sub>offsite</sub> ) / Total Area | CN =                | 0  |

**ESTIMATE OF RUNOFF VOLUME**

| DESIGN STORM   | AGENCY                 | P (in) | S (in) | R (in) | V(R) (ac-ft) |
|----------------|------------------------|--------|--------|--------|--------------|
| 25 yr, 96 hr   | SJRWMD                 | 11.00  | 4.53   | 6.97   | 3.03         |
| 100 yr, 24 hr  | Orange County          | 11.04  | 4.53   | 7.01   | 3.05         |
| 100 yr, 240 hr | FDOT Critical Duration | 18.00  | 4.53   | 13.52  | 5.88         |

**SAMPLE CALCULATION:**

- 1) DETERMINE SOIL STORAGE - S  
 $S = (1000 / CN) - 10$   
CN = 83  
SOIL STORAGE (inches) S = 4.53
- 2) DETERMINE RUNOFF - R  
P = 11.04  
 $R = (P - 0.2*S)^2 / (P + 0.8*S)$   
RUNOFF (inches) R = 7.01
- 3) DETERMINE RUNOFF VOLUME - V(R)  
 $V(R) = R / 12 * \text{AREA}$   
RUNOFF (Ac-ft) V(R) = 3.05  
T =  $0.007 (nL)^{0.8} / P^{2*0.5 * s^{0.4}}$



Engineer Kristin Hoffman  
DATE: 9/1/2005  
BHR NO. 03032

Existing information from original permit (1988)

### TIME OF CONCENTRATION

T<sub>t</sub> = travel time (hr)

#### Tt1 - Sheet Flow (across median)

n = Manning's roughness coefficient  
L = Flow length  
P2 = 2-Year, 24 Hour rainfall (in)  
s = slope of hydraulic grade line

n = 0.012  
L = 9.5 ft  
P2 = 5.04 in  
s = 0.0200 ft/ft

$s = ((E-1) - (E-2)) / L$  E-1 = N/A (Upstream Invert)  
E-2 = N/A (Downstream Invert)

$Tt = (0.007 (nL)^{0.8}) / [(P2)^{0.5} \cdot s^{0.4}]$

**Tt1 = 0.0026 hrs**

#### Tt2 - Overland Flow - Paved (Shallow Concentrated)

(across inside lanes)

T<sub>t</sub> = Travel Time (min)  
s = slope over plane surface  
L = Flow length (ft)  
V = Velocity (ft/s)

s = 0.0200 ft/ft  
L = 24 ft  
V = 2.87484161 ft/s

V = 16.1345 (s)<sup>0.5</sup> (Unpaved)  
V = 20.3282 (s)<sup>0.5</sup> (Paved)

$s = ((E-1) - (E-2)) / L$  E-1 = N/A (Upstream Invert)  
E-2 = N/A (Downstream Invert)

$Tt = (L / (V \cdot 3600))$  hrs

**Tt2 = 0.0023 hrs**

#### Tt3 - Overland Flow - Paved (Shallow Concentrated)

(across outside lane to inlet)

T<sub>t</sub> = Travel Time (min)  
s = slope over plane surface  
L = Flow length (ft)  
V = Velocity (ft/s)

s = 0.0300 ft/ft  
L = 16 ft  
V = 3.52094752 ft/s

V = 16.1345 (s)<sup>0.5</sup> (Unpaved)  
V = 20.3282 (s)<sup>0.5</sup> (Paved)

$s = ((E-1) - (E-2)) / L$  E-1 = N/A (Upstream Invert)  
E-2 = N/A (Downstream Invert)

$Tt = (L / (V \cdot 3600))$  hrs

**Tt3 = 0.0013 hrs**

#### Tt4 - Pipe Flow (from inlet to pond)

L = Length of Pipe  
v = Velocity

L = 1800 ft  
v = 2.5 ft/sec

**Tt4 = 0.20 hrs**

**Ttotal = 0.21 hrs**  
**= 12.37 min**



Existing information from original permit (1988)

Engineer Kristin Hoffman  
DATE: 9/1/2005  
BHR NO. 03032

### TREATMENT VOLUME CALCULATIONS

DRAINAGE AREA (DA) 5.22 ACRES

IMPERVIOUS (IMP. DA) 2.64 ACRES

TREATMENT VOLUME  
REQUIRED:

$0.5" + 0.5" \quad 0.5" \times (1/12") \times DA + 0.5" \times (1/12") \times DA$  (AC-FT) 0.44  
 $1.25" + 0.5" \quad 1.25" \times (1/12") \times IMP. DA + 0.5" \times (1/12") \times DA$  **0.49** GOVERNS

| POND | ELEVATION<br>(FEET) | AREA<br>(ACRES) | VOLUME<br>(ACRE-FT) |
|------|---------------------|-----------------|---------------------|
| weir | 94.70               | 0.9             | 2.81                |
| BOT  | 91.20               | 0.7             | 0.00                |

Total Pond  
Volume = 2.81 ac-ft  
122,547 cubic feet

Treatment  
Volume = 0.49 ac-ft  
21,453 cubic feet



ST JOHNS WATER MANAGEMENT DISTRICT  
DRY RETENTION POND FOR:

Engineer Kristin Hoffman  
DATE: 10/30/2005  
BHR NO. 03032

**SR 50 Basin 1C - Good Homes Road  
Summary of Volume Estimates - Sizing Pond 1C**

**Summary of Attenuation Estimates:**

| DESIGN STORM   | AGENCY                 | RUNOFF VOLUME |              |                   |
|----------------|------------------------|---------------|--------------|-------------------|
|                |                        | PRE (ac-ft)   | POST (ac-ft) | Retention (ac-ft) |
| 25 yr, 96 hr   | SJRWMD                 | 2.22          | 3.03         | 0.81              |
| 100 yr, 24 hr  | Orange County          | 2.24          | 3.05         | 0.81              |
| 100 yr, 240 hr | FDOT Critical Duration | 4.62          | 5.88         | 1.26              |

Maximum Volume Required for Attenuation = 1.26 ac-ft  
= 54,670 cubic feet

Treatment Volume = 0.49 ac-ft  
= 21,453 cubic feet

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**Project Data**

Project Name: SR 50 Good Homes Road to Pine Hills

Simulation Description: Permit Modifications to Existing Pond on Good Homes Road  
WDA 1C

Project Number: 03032

Engineer : Kristin Hoffman, PE

Supervising Engineer: David Shearer, PE

Date: 12-07-2005

**Aquifer Data**

Base Of Aquifer Elevation, [B] (ft datum): 83.50

Water Table Elevation, [WT] (ft datum): 88.50

Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): 13.50

Fillable Porosity, [n] (%): 30.00

Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): 9.0

Maximum Area For Unsaturated Infiltration, [Av] (ft<sup>2</sup>): 39806.0

**Geometry Data**

Equivalent Pond Length, [L] (ft): 300.0

Equivalent Pond Width, [W] (ft): 220.0

Ground water mound is expected to intersect the pond bottom

**Stage vs Area Data**

| Stage<br>(ft datum) | Area<br>(ft <sup>2</sup> ) |
|---------------------|----------------------------|
| 91.20               | 32266.0                    |
| 92.00               | 35284.0                    |
| 93.00               | 37462.0                    |
| 94.00               | 37761.0                    |
| 95.00               | 42253.2                    |
| 95.50               | 44867.0                    |

**Discharge Structures**

**Discharge Structure #1 is active as orifice**

Structure Parameters

Description: Orifice

|                                |      |
|--------------------------------|------|
| Orifice elevation, (ft datum): | 92.4 |
| Orifice coefficient:           | 4.8  |
| Orifice area, (ft²):           | .07  |
| Orifice exponent:              | .5   |

Tailwater - disabled, free discharge

**Discharge Structure #2 is active as weir**

Structure Parameters

Description: Overflow Weir

|                             |       |
|-----------------------------|-------|
| Weir elevation, (ft datum): | 94.75 |
| Weir coefficient:           | 2.861 |
| Weir length, (ft):          | 15.85 |
| Weir exponent:              | 1.5   |

Tailwater - disabled, free discharge

**Discharge Structure #3 is inactive**

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**Scenario Input Data**

*Scenario 1 :: Treatment Volume Infiltration*

Hydrograph Type: Slug Load  
 Modflow Routing: Routed with infiltration

Treatment Volume (ft³) 21453

Initial ground water level (ft datum) default, 88.50

| Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) |
|-------------------------------------|-------------------------------------|
| 0.100                               | 2.000                               |
| 0.250                               | 2.500                               |
| 0.500                               | 3.000                               |
| 1.000                               | 3.500                               |
| 1.500                               | 4.000                               |

*Scenario 2 :: 25 year - 24 hour Storm Event*

Hydrograph Type: Inline SCS  
 Modflow Routing: Routed with infiltration  
 Repetitions: 1

Basin Area (acres) 5.220  
 Time Of Concentration (minutes) 15.0  
 DCIA (%) 0.0  
 Curve Number 69  
 Design Rainfall Depth (inches) 8.6  
 Design Rainfall Duration (hours) 24.0  
 Shape Factor UHG 484  
 Rainfall Distribution SCS Type II Florida Modified

Initial ground water level (ft datum) default, 88.50

| Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| 0.100                               | 1.000                               | 5.000                               | 10.000                              |
| 0.200                               | 1.500                               | 6.000                               |                                     |
| 0.300                               | 2.000                               | 7.000                               |                                     |
| 0.400                               | 3.000                               | 8.000                               |                                     |
| 0.500                               | 4.000                               | 9.000                               |                                     |

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**Scenario Input Data (cont'd.)**

*Scenario 3 :: 25 year - 96 hour Storm Event*

Hydrograph Type:     Inline SCS  
Modflow Routing:     Routed with infiltration  
Repetitions:         1

Basin Area (acres)             5.220  
Time Of Concentration (minutes)   15.0  
DCIA (%)                     0.0  
Curve Number                 69  
Design Rainfall Depth (inches)   11.0  
Design Rainfall Duration (hours)   96.0  
Shape Factor                 UHG 484  
Rainfall Distribution             Saint Johns River WMD 96 Hour

Initial ground water level (ft datum)   default, 88.50

| Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| 0.100                               | 1.000                               | 5.000                               | 10.000                              |
| 0.200                               | 1.500                               | 6.000                               |                                     |
| 0.300                               | 2.000                               | 7.000                               |                                     |
| 0.400                               | 3.000                               | 8.000                               |                                     |
| 0.500                               | 4.000                               | 9.000                               |                                     |

*Scenario 4 :: 3 year - 24 hour Storm Event*

Hydrograph Type:     Inline SCS  
Modflow Routing:     Routed with infiltration  
Repetitions:         1

Basin Area (acres)             5.220  
Time Of Concentration (minutes)   15.0  
DCIA (%)                     0.0  
Curve Number                 69  
Design Rainfall Depth (inches)   5.6  
Design Rainfall Duration (hours)   24.0  
Shape Factor                 UHG 484  
Rainfall Distribution             SCS Type II Florida Modified

Initial ground water level (ft datum)   default, 88.50

| Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| 0.100                               | 1.000                               | 5.000                               | 10.000                              |
| 0.200                               | 1.500                               | 6.000                               |                                     |
| 0.300                               | 2.000                               | 7.000                               |                                     |
| 0.400                               | 3.000                               | 8.000                               |                                     |
| 0.500                               | 4.000                               | 9.000                               |                                     |

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**Scenario Input Data (cont'd.)**

*Scenario 6 ::*

Hydrograph Type: Slug Load  
Modflow Routing: Routed with infiltration

Treatment Volume (ft<sup>3</sup>) 54670

Initial ground water level (ft datum) default, 88.50

| Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) | Time After<br>Storm Event<br>(days) |
|-------------------------------------|-------------------------------------|-------------------------------------|
| 0.100                               | 2.000                               | 5.000                               |
| 0.250                               | 2.500                               | 7.000                               |
| 0.500                               | 3.000                               | 10.000                              |
| 1.000                               | 3.500                               | 20.000                              |
| 1.500                               | 4.000                               | 30.000                              |

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**Summary of Results** :: Scenario 1 :: Treatment Volume Infiltration

|                                        | Time<br>(hours) | Stage<br>(ft datum) | Rate<br>(ft <sup>3</sup> /s) | Volume<br>(ft <sup>3</sup> ) |
|----------------------------------------|-----------------|---------------------|------------------------------|------------------------------|
| Stage                                  |                 |                     |                              |                              |
| Minimum                                | 0.000           | 88.50               |                              |                              |
| Maximum                                | 0.002           | 91.84               |                              |                              |
| Inflow                                 |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 0.002           |                     | 3575.5000                    |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | 0.002           |                     |                              | 21453.0                      |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 96.000          |                     |                              | 21453.0                      |
| Infiltration                           |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 0.002           |                     | 3.3587                       |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | 0.002           |                     |                              | 20.2                         |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 96.000          |                     |                              | 21453.0                      |
| Combined Discharge                     |                 |                     |                              |                              |
| Rate - Maximum - Positive              | None            |                     | None                         |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | None            |                     |                              | None                         |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 96.000          |                     |                              | 0.0                          |
| Discharge Structure 1 - simple orifice |                 |                     |                              |                              |
| Rate - Maximum - Positive              | None            |                     | None                         |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | None            |                     |                              | None                         |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 96.000          |                     |                              | 0.0                          |
| Discharge Structure 2 - simple weir    |                 |                     |                              |                              |
| Rate - Maximum - Positive              | None            |                     | None                         |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | None            |                     |                              | None                         |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 96.000          |                     |                              | 0.0                          |
| Discharge Structure 3 - inactive       |                 |                     |                              |                              |
| Rate - Maximum - Positive              | disabled        |                     | disabled                     |                              |
| Rate - Maximum - Negative              | disabled        |                     | disabled                     |                              |
| Cumulative Volume - Maximum Positive   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - Maximum Negative   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - End of Simulation  | disabled        |                     |                              | disabled                     |
| Pollution Abatement:                   |                 |                     |                              |                              |
| 36 Hour Stage and Infiltration Volume  | 36.000          | 0.00                |                              | 21453.0                      |
| 72 Hour Stage and Infiltration Volume  | 72.000          | 0.00                |                              | 21453.0                      |

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**Summary of Results**    :: Scenario 2 :: 25 year - 24 hour Storm Event

|                                        | Time<br>(hours) | Stage<br>(ft datum) | Rate<br>(ft <sup>3</sup> /s) | Volume<br>(ft <sup>3</sup> ) |
|----------------------------------------|-----------------|---------------------|------------------------------|------------------------------|
| Stage                                  |                 |                     |                              |                              |
| Minimum                                | 0.000           | 88.50               |                              |                              |
| Maximum                                | 24.133          | 92.39               |                              |                              |
| Inflow                                 |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 12.033          |                     | 17.9965                      |                              |
| Rate - Maximum - Negative              | 24.800          |                     | 0.0000                       |                              |
| Cumulative Volume - Maximum Positive   | 24.800          |                     |                              | 92864.6                      |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 264.867         |                     |                              | 92864.6                      |
| Infiltration                           |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 12.800          |                     | 3.7002                       |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | 216.867         |                     |                              | 92864.6                      |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 264.867         |                     |                              | 92864.6                      |
| Combined Discharge                     |                 |                     |                              |                              |
| Rate - Maximum - Positive              | None            |                     | None                         |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | None            |                     |                              | None                         |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 264.867         |                     |                              | 0.0                          |
| Discharge Structure 1 - simple orifice |                 |                     |                              |                              |
| Rate - Maximum - Positive              | None            |                     | None                         |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | None            |                     |                              | None                         |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 264.867         |                     |                              | 0.0                          |
| Discharge Structure 2 - simple weir    |                 |                     |                              |                              |
| Rate - Maximum - Positive              | None            |                     | None                         |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | None            |                     |                              | None                         |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 264.867         |                     |                              | 0.0                          |
| Discharge Structure 3 - inactive       |                 |                     |                              |                              |
| Rate - Maximum - Positive              | disabled        |                     | disabled                     |                              |
| Rate - Maximum - Negative              | disabled        |                     | disabled                     |                              |
| Cumulative Volume - Maximum Positive   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - Maximum Negative   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - End of Simulation  | disabled        |                     |                              | disabled                     |
| Pollution Abatement:                   |                 |                     |                              |                              |
| 36 Hour Stage and Infiltration Volume  | N.A.            | N.A.                |                              | N.A.                         |
| 72 Hour Stage and Infiltration Volume  | N.A.            | N.A.                |                              | N.A.                         |

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**Summary of Results**    :: Scenario 3 :: 25 year - 96 hour Storm Event

|                                        | Time<br>(hours) | Stage<br>(ft datum) | Rate<br>(ft <sup>3</sup> /s) | Volume<br>(ft <sup>3</sup> ) |
|----------------------------------------|-----------------|---------------------|------------------------------|------------------------------|
| Stage                                  |                 |                     |                              |                              |
| Minimum                                | 0.000           | 88.50               |                              |                              |
| Maximum                                | 68.267          | 92.68               |                              |                              |
| Inflow                                 |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 60.033          |                     | 23.7555                      |                              |
| Rate - Maximum - Negative              | 96.800          |                     | 0.0000                       |                              |
| Cumulative Volume - Maximum Positive   | 96.800          |                     |                              | 132546.5                     |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 336.867         |                     |                              | 132546.5                     |
| Infiltration                           |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 60.200          |                     | 4.2611                       |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | 336.867         |                     |                              | 109713.1                     |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 336.867         |                     |                              | 109713.1                     |
| Combined Discharge                     |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 68.267          |                     | 0.1787                       |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | 104.067         |                     |                              | 19853.9                      |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 336.867         |                     |                              | 19853.9                      |
| Discharge Structure 1 - simple orifice |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 68.267          |                     | 0.1787                       |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | 104.067         |                     |                              | 19853.9                      |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 336.867         |                     |                              | 19853.9                      |
| Discharge Structure 2 - simple weir    |                 |                     |                              |                              |
| Rate - Maximum - Positive              | None            |                     | None                         |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | None            |                     |                              | None                         |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 336.867         |                     |                              | 0.0                          |
| Discharge Structure 3 - inactive       |                 |                     |                              |                              |
| Rate - Maximum - Positive              | disabled        |                     | disabled                     |                              |
| Rate - Maximum - Negative              | disabled        |                     | disabled                     |                              |
| Cumulative Volume - Maximum Positive   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - Maximum Negative   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - End of Simulation  | disabled        |                     |                              | disabled                     |
| Pollution Abatement:                   |                 |                     |                              |                              |
| 36 Hour Stage and Infiltration Volume  | N.A.            | N.A.                |                              | N.A.                         |
| 72 Hour Stage and Infiltration Volume  | N.A.            | N.A.                |                              | N.A.                         |

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**Summary of Results**    :: Scenario 4 :: 3 year - 24 hour Storm Event

|                                        | Time<br>(hours) | Stage<br>(ft datum) | Rate<br>(ft <sup>3</sup> /s) | Volume<br>(ft <sup>3</sup> ) |
|----------------------------------------|-----------------|---------------------|------------------------------|------------------------------|
| Stage                                  |                 |                     |                              |                              |
| Minimum                                | 0.000           | 88.50               |                              |                              |
| Maximum                                | 12.633          | 91.47               |                              |                              |
| Inflow                                 |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 12.033          |                     | 8.8760                       |                              |
| Rate - Maximum - Negative              | 24.800          |                     | 0.0000                       |                              |
| Cumulative Volume - Maximum Positive   | 24.800          |                     |                              | 46153.4                      |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 264.867         |                     |                              | 46153.4                      |
| Infiltration                           |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 12.667          |                     | 3.4652                       |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | 27.267          |                     |                              | 46153.4                      |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 264.867         |                     |                              | 46153.4                      |
| Combined Discharge                     |                 |                     |                              |                              |
| Rate - Maximum - Positive              | None            |                     | None                         |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | None            |                     |                              | None                         |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 264.867         |                     |                              | 0.0                          |
| Discharge Structure 1 - simple orifice |                 |                     |                              |                              |
| Rate - Maximum - Positive              | None            |                     | None                         |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | None            |                     |                              | None                         |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 264.867         |                     |                              | 0.0                          |
| Discharge Structure 2 - simple weir    |                 |                     |                              |                              |
| Rate - Maximum - Positive              | None            |                     | None                         |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | None            |                     |                              | None                         |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 264.867         |                     |                              | 0.0                          |
| Discharge Structure 3 - inactive       |                 |                     |                              |                              |
| Rate - Maximum - Positive              | disabled        |                     | disabled                     |                              |
| Rate - Maximum - Negative              | disabled        |                     | disabled                     |                              |
| Cumulative Volume - Maximum Positive   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - Maximum Negative   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - End of Simulation  | disabled        |                     |                              | disabled                     |
| Pollution Abatement:                   |                 |                     |                              |                              |
| 36 Hour Stage and Infiltration Volume  | N.A.            | N.A.                |                              | N.A.                         |
| 72 Hour Stage and Infiltration Volume  | N.A.            | N.A.                |                              | N.A.                         |

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**Summary of Results**    :: Scenario 6 ::

|                                        | Time<br>(hours) | Stage<br>(ft datum) | Rate<br>(ft <sup>3</sup> /s) | Volume<br>(ft <sup>3</sup> ) |
|----------------------------------------|-----------------|---------------------|------------------------------|------------------------------|
| Stage                                  |                 |                     |                              |                              |
| Minimum                                | 0.000           | 88.50               |                              |                              |
| Maximum                                | 0.002           | 92.76               |                              |                              |
| Inflow                                 |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 0.002           |                     | 9111.6670                    |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | 0.002           |                     |                              | 54670.0                      |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 720.000         |                     |                              | 54670.0                      |
| Infiltration                           |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 0.002           |                     | 3.3614                       |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | 36.000          |                     |                              | 53793.1                      |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 720.000         |                     |                              | 53793.1                      |
| Combined Discharge                     |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 0.002           |                     | 0.2030                       |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | 2.400           |                     |                              | 876.9                        |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 720.000         |                     |                              | 876.9                        |
| Discharge Structure 1 - simple orifice |                 |                     |                              |                              |
| Rate - Maximum - Positive              | 0.002           |                     | 0.2030                       |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | 2.400           |                     |                              | 876.9                        |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 720.000         |                     |                              | 876.9                        |
| Discharge Structure 2 - simple weir    |                 |                     |                              |                              |
| Rate - Maximum - Positive              | None            |                     | None                         |                              |
| Rate - Maximum - Negative              | None            |                     | None                         |                              |
| Cumulative Volume - Maximum Positive   | None            |                     |                              | None                         |
| Cumulative Volume - Maximum Negative   | None            |                     |                              | None                         |
| Cumulative Volume - End of Simulation  | 720.000         |                     |                              | 0.0                          |
| Discharge Structure 3 - inactive       |                 |                     |                              |                              |
| Rate - Maximum - Positive              | disabled        |                     | disabled                     |                              |
| Rate - Maximum - Negative              | disabled        |                     | disabled                     |                              |
| Cumulative Volume - Maximum Positive   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - Maximum Negative   | disabled        |                     |                              | disabled                     |
| Cumulative Volume - End of Simulation  | disabled        |                     |                              | disabled                     |
| Pollution Abatement:                   |                 |                     |                              |                              |
| 36 Hour Stage and Infiltration Volume  | 36.000          | 91.12               |                              | 53793.1                      |
| 72 Hour Stage and Infiltration Volume  | 72.000          | 90.78               |                              | 53793.1                      |