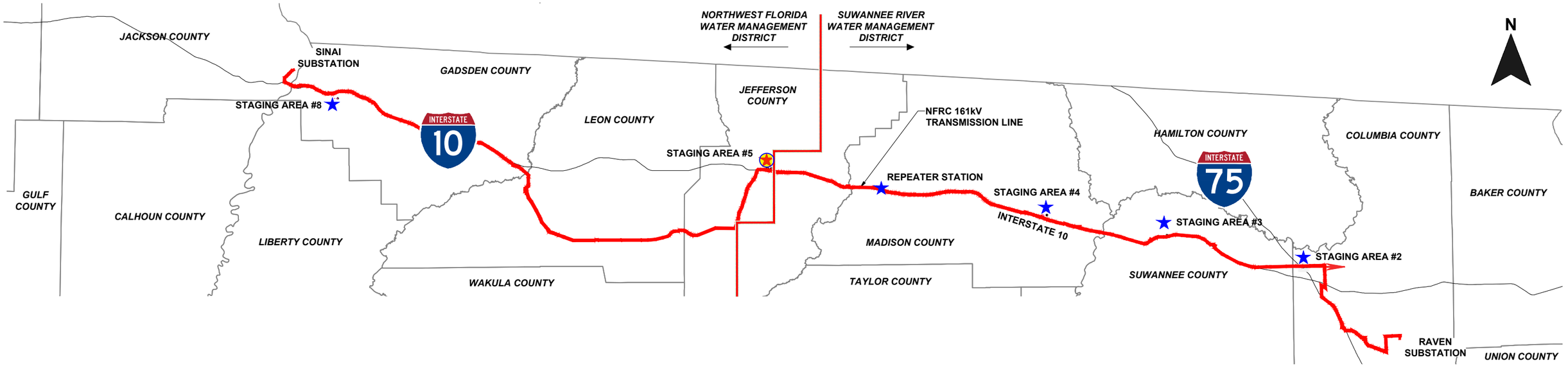
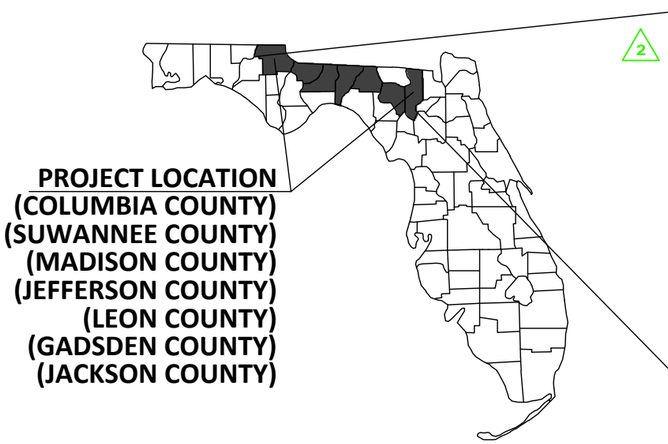
# GULF POWER COMPANY

## NFRC TRANSMISSION LINE PROJECT 2

## TEMPORARY STAGING AREA NO. 5

## SITE PLAN EXHIBIT

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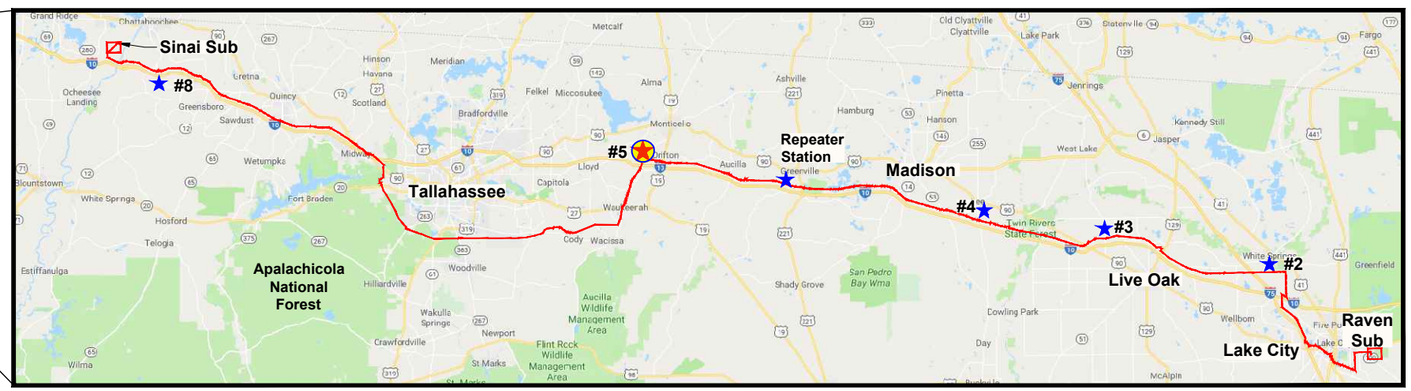


2 **LEGEND**

- PROPOSED STAGING AREAS & REPEATER STATION

811 Know what's **below.** before you dig.

**C O N T E N T S**



2

NOTICE:
CONTRACTOR SHALL VERIFY ALL CONDITIONS ON JOB SITE & NOTIFY PROJECT MANAGER AND ENGINEER OF ANY VARIATIONS FROM DIMENSIONS SHOWN ON THESE DRAWINGS BEFORE PROCEEDING WITH ANY CONSTRUCTION.


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5025 WEST GRACE STREET
TAMPA, FLORIDA 33607
PHONE: (813) 877-7770
CA #31323 LB #364


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STATE OF FLORIDA
03-17-20
MICHAEL K. LEAHY
FLORIDA LICENSED PROFESSIONAL ENGINEER No. 45287
PROFESSIONAL SURVEYOR & MAPPER No. 5658

Michael Leahy, P.E., P.S.M.
Digitally signed by Michael Leahy, P.E., P.S.M.
Date: 2020.03.18 10:57:34 -04'00'

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| 1 | 11/22/19 | REVISIONS, CLARIFICATIONS FOR RAI RESPONSE 11-22-19 | GCC | JJB | MKL |

*TRANSMISSION ENGINEERING DEPARTMENT*

NORTH FLORIDA RESILIENCY CONNECTION (NFRC)
STAGING AREA NO. 5 SITE PLAN EXHIBIT
FOR TEMPORARY USE AS LAYDOWN YARDS

| | | | |
|---|---|---|---|
| SCALE: N.T.S. | ENGINEER: MKL | SECTION: AS SHOWN | |
| DRAFTER: GCC | CHECKED: JJB | COUNTY: AS SHOWN | |
| SHEET: 1 OF 6 | | FILE NAME: 191021_EXH_SA05_R02.dwg | |

Gulf Power

*STAGING AREA NO. 5 SITE PLAN EXHIBIT*

CAD FILE: S:\Projects\108_Gulf Power\19-108-1002_Raven-Sinai 161kV Line Detailed Engineering\Drawings\Staging Areas Exhibit\NFRC_Exh_SA05_R02.dwg PLOT DATE/TIME: 3/18/2020 - 8:10am BY: Josh Baker

SEE SHEETS 3 - 4 FOR DETAILED PLAN & CROSS SECTION VIEWS

# GULF POWER COMPANY

## NFRC TRANSMISSION LINE PROJECT
## TEMPORARY STAGING AREA NO. 5
## SITE PLAN EXHIBIT

**SITE DATA:**

**STAGING AREA #5 - JEFFERSON COUNTY - NWFWMD**
**CAMPGROUND ROAD, MONTICELLO, FL**
**PID 14-1N-4E-0000-0042-0000**

PROJECT NARRATIVE:

TEMPORARY STAGING AREA NO. 5 IS REQUIRED TO STAGE AND STORE CONSTRUCTION MATERIALS (POLES, CONDUCTOR, INSULATORS, ETC.) AND EQUIPMENT (DRILL RIGS, LINE TRUCKS, CRANES, ETC.) FOR THE NORTH FLORIDA RESILIENCY CONNECTION (NFRC) PROJECT. THE NFRC PROJECT IS A 176 MILE LENGTH CORRIDOR THAT IS BROKEN UP INTO APPROXIMATELY 20 MILE SEGMENTS RESULTING IN THE NEED FOR FIVE (5) TOTAL TEMPORARY STAGING AREAS. EACH STAGING AREA IS SIZED TO BE ABLE TO STORE ITS PRO-RATA SHARE OF THE MATERIAL. THE AVERAGE SITE SELECTION CRITERIA IS FOR EACH STAGING AREA TO BE APPROXIMATELY 16.0 ACRES TOTAL WITH APPROXIMATELY 12.6 ACRES OF DEVELOPED AREA. THE DEVELOPED AREA WILL CONSIST OF AN AT GRADE #57 CRUSHED LIMEROCK SURFACE ON UNCOMPACTED SUBBASE TO FACILITATE THE STORAGE OF POLES AND EQUIPMENT ALONG WITH A GEOWEB SEDIMENT CONTAINMENT CELL PERIMETER ROAD OF #57 CRUSHED LIMEROCK FILL TO FACILITATE ACCESS.

TEMPORARY STAGING AREA NO. 5 SITE PLAN STORMWATER DESIGN HAS BEEN REVIEWED TO ENSURE THAT EXISTING SURFACE WATER FLOW WILL FLOW SIMILAR TO IT'S PREDEVELOPED CONDITION. THE DIFFERENCE BETWEEN PRE AND POST-DEVELOPED RUNOFF WILL BE STORED ON SITE WITH DRY RETENTION PONDS AND/OR THE ROCK VOIDS. DISCHARGE WILL NOT EXCEED THE PRE-DEVELOPED CONDITION FOR WATER TREATMENT AND RECOVERY. THIS SITE WILL USE A COMBINATION OF THE VOID SPACE BETWEEN THE #57 CRUSHED LIMEROCK AND A SERIES OF CHECK DAMN SYSTEMS MADE WITH WATER AND ROOT BARRIER SYSTEMS FOR STORAGE FOR THE FIRST 1" OR THE FIRST 1/2" OF RUNOFF, WHICH EVER IS GREATER, AS DIRECTED BY THE GOVERNING NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT STORMWATER DESIGN MANUAL REQUIREMENTS. GULF POWER HAS DONE EXTENSIVE TESTING ON THIS VOID RATIO AND HAS DETERMINED THAT A 35% VOID RATIO PROVIDES A GOOD CONSERVATIVE VALUE. ANY TREATMENT VOLUMES NOT ABLE TO RECOVER IN THE ROCK VOIDS WILL UTILIZE DRY RETENTION PONDS FOR THE REMAINING VOLUME. THE TREATMENT VOLUMES ARE DESIGNED TO RECOVER WITHIN THE 72 HOUR REQUIREMENT. SOIL BORINGS AND DOUBLE RING INFILTROMETER TESTING WAS PERFORMED AT EACH SITE TO FACILITATE THE DESIGN OF EACH DRY POND AND ROCK VOID STORAGE AREA. REFER TO GEOGRAPHICAL REPORT FOR DETAILS.

TEMPORARY STAGING ARE NO. 5 WILL REMAIN IN PLACE FOR THE DURATION OF THE PROJECT. AT THE CONCLUSION OF THE PROJECT, THIS SITE WILL BE RETURNED TO ITS PRE-CONSTRUCTION STATE BY THE CONTRACTOR. THE ANTICIPATED DURATION IS APPROXIMATELY 12 - 18 MONTHS.

**GENERAL SITE NOTES:**

1. CONSTRUCTION AND MAINTENANCE ACCESS TO TEMPORARY STAGING AREA NO. 5 WILL BE GAINED VIA EXISTING ROAD RIGHT-OF-WAY OF CAMPGROUND ROAD. CONNECTOR APRONS WILL BE CONSTRUCTED IN ACCORDANCE WITH COUNTY / STATE REQUIREMENTS.
2. TEMPORARY STAGING AREA NO. 5 EXISTS ON EASEMENTS MADE THRU LAND NEGOTIATIONS WITH CURRENT LANDOWNERS. THIS SITE HAS UNDERGONE A FULL EVALUATION / VETTING RELATIVE TO AVOIDANCE OF ENVIRONMENTAL, CULTURAL, AND WILDLIFE HABITAT IMPACT. NO TREE REMOVAL WILL BE NECESSARY TO FACILITATE CONSTRUCTION OF THIS SITE.
3. TEMPORARY STAGING AREA NO. 5 WILL CONFORM WITH ALL FEDERAL, STATE, AND LOCAL ORDINANCES AND REGULATIONS FOR LONG TERM STORAGE MATERIALS.
4. DELIVERIES AND ACTIVE USE OF THIS SITE WILL BE CONSISTENT WITH CONSTRUCTION HOURS.
5. ALL PROPOSED SEMI-PERVIOUS MATERIAL WILL BE INSTALLED AT THE EXISTING NATURAL GROUND ELEVATION THROUGHOUT THE SITE TO MINIMIZE IMPEDANCE OF THE EXISTING WATERSHED.
6. WHEN THE PROPOSED ACTIVITIES OCCUR ADJACENT TO WETLANDS, APPROPRIATE SEDIMENT CONTROL METHODS WILL BE USED, AS REQUIRED. SEDIMENT CONTROLS INCLUDE THE INSTALLATION OF STAKED SILT FENCES ALONG PROPOSED FILL ADJACENT WETLANDS. NO FILL OR GRADING WORK WILL OCCUR IN WETLAND AREAS.

**SURVEYOR'S NOTES:**

1. **NORTH, THE BEARINGS AND THE COORDINATES SHOWN HEREON ARE REFERENCE TO THE WEST ZONE OF THE FLORIDA STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM OF 1983 (NAD 83/ FLW-83) CORS 2011..**
2. **ELEVATIONS ARE TO NORTH AMERICAN VERTICAL DATUM OF 1988 AND ARE FOR REFERENCE AND GRAPHICAL DISPLAY PURPOSES ONLY. TEMPORARY BENCHMARKS WILL BE SET AT EACH CROSSING SITE LOCATION AS REQUIRED.**
3. **SURVEY INFORMATION SHOWN HEREON PERTAINING TO RIGHT-OF-WAY AND EASEMENTS IS BASED ON A SURVEYS PROVIDED BY GULF POWER.**
4. **NO UNDERGROUND UTILITIES AND/OR IMPROVEMENTS SHOWN HEREON A SUBSURFACE INVESTIGATION WAS NOT PERFORMED AS PART OF THIS SURVEY.**
5. **THE AERIAL IMAGERY SHOWN HEREIN ARE A COMBINATION OF 2015/2016/2017 ORTHOGRAPHIC IMAGES OBTAINED FROM THE FLORIDA DEPARTMENT OF TRANSPORTATION A+PLUS WEBSITE.**
6. **PROPERTY THE PROPOSED STAGING AREA IS LOCATED ON IS THERE BY GRANTED EASEMENT TO GULF POWER.**

**CONSTRUCTION NOTES:**

1. **CONTRACTOR SHALL INSTALL AND MAINTAIN BMP'S PER THE APPROVED SWPPP (STORM WATER POLLUTION PREVENTION PLAN, I.E. SILT FENCE, TURBIDITY BARRIER) AND WWACCM MANUAL AROUND THE PERIMETER TO THE WORK ZONES DURING CONSTRUCTION. BMP'S SHALL ONLY BE REMOVED AFTER ALL CONSTRUCTION HAS BEEN COMPLETED AND ESTABLISHED.**
2. **CONTRACTOR SHALL CONSTRUCT PONDS AND/OR SWALES AS SHOWN IN THE DRAWINGS. CONTRACTOR SHALL SOD THE SIDE SLOPES AFTER GRADING TO STABILIZE THE DISTURBED SOIL AND EMBANKMENTS AND TO CONTROL EROSION. SEEDING AND SODDING SHALL BE PERFORMED IN ACCORDANCE WITH THE LATEST FDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION. THE SIDES OF POND/SWALE AREAS SHALL BE SODDED AND THE BOTTOMS SHALL BE SEEDED AND MULCHED.CONTRACTOR SHALL DISC THE AREAS TO EMBED THE SEED AND MULCH AND SHALL THEN RE-COMPACT THE SURFACE.CONTRACTOR SHALL MAINTAIN THE SOD AND SEED UNTIL FINAL ACCEPTANCE OF THE WORK.**
3. **CONTRACTOR SHALL INSTALL CHECK DAMS ALONG THE EXISTING (1) ONE FOOT CONTOUR ELEVATIONS AS SHOWN ON THE PLANS AND ALONG THE INTERIOR OF THE ROADWAYS BETWEEN THE ROCK LAYDOWN AREAS AND THE EDGE OF GEOWEB ROAD. SEE DETAIL 3 ON SHEET 5.**
4. **CONTRACTOR SHALL REMOVE THE TOP LAYER OF VEGETATION ON THE SITE BEFORE BEGINNING ANY GRADING OR SITE WORK. SITE SHALL MAINTAIN EXISTING SLOPES AND GENERAL GRADING CHARACTERISTICS.**
5. **IF ANY OBSTRUCTIONS OR VARIANCES EXIST, CONTRACTOR MUST NOTIFY THE ENGINEER OF RECORD.**

**FLOOD ZONE NOTES:**

1. **FLOOD ZONE INFORMATION BASED ON THE JEFFERSON COUNTY, FLORIDA FLOOD INSURANCE RATE MAPS:**

   **MAP NUMBER 12065C0300C (DATED 02-05-14)**

2. **APPLICABLE FLOOD ZONE DELINEATIONS PER THE ABOVE REFERENCED FLOOD INSURANCE RATE MAP ARE AS FOLLOWS:**

   **ZONE X AREA OUTSIDE THE 100-YEAR FLOOD PLAIN**

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STATE OF FLORIDA
MICHAEL K. LEAHY
FLORIDA LICENSED PROFESSIONAL ENGINEER No. 45287
PROFESSIONAL SURVEYOR & MAPPER No. 5658
03-17-20

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*TRANSMISSION ENGINEERING DEPARTMENT*

NORTH FLORIDA RESILIENCY CONNECTION (NFRC)
STAGING AREA NO. 5 SITE PLAN EXHIBIT
FOR TEMPORARY LAYDOWN YARDS

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|---|---|---|---|
| SCALE: N.T.S. | ENGINEER: MKL | SECTION: AS SHOWN | |
| DRAFTER: GCC | CHECKED: JJB | COUNTY: AS SHOWN | |
| SHEET: 2 OF 6 | | FILE NAME: 191021_EXH_SA_R02.dwg | |

Gulf Power

*STAGING AREA NO. 5 SITE PLAN EXHIBIT*

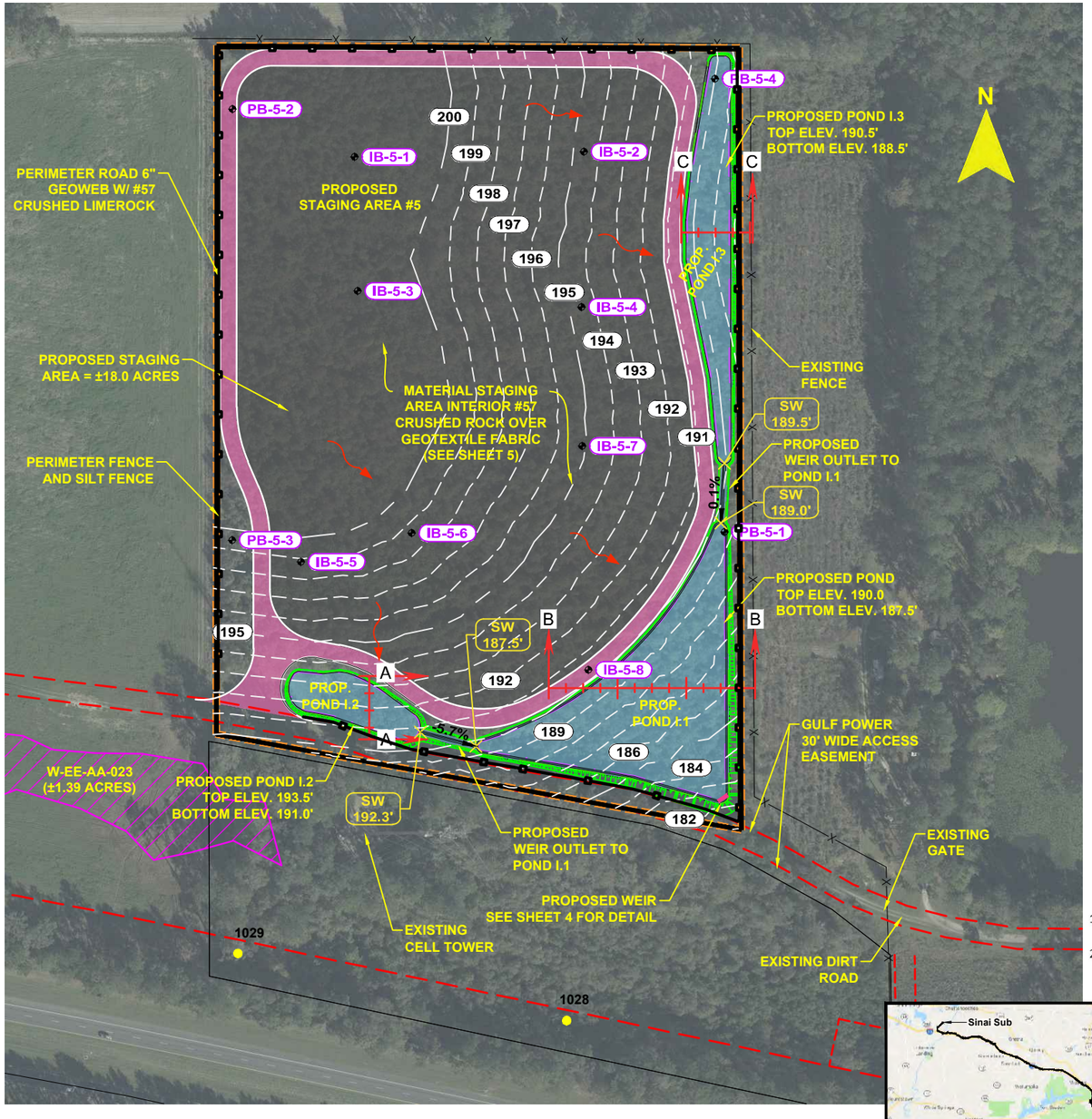
**Staging Area #5** - Jefferson County - NWFWMD
Campground Road, Monticello, FL
PID 14-1N-4E-0000-0042-0000

**Table 3: Pond Storage Data**

| Basin No. | Elevation (ft, NAVD 88) | | Area (ac) | Provided Volume (acft) | Required Volume (acft) | Provided Discharge at Weir (cfs) |
|---|---|---|---|---|---|---|
| I.1 Primary | Top of Pond | 190.0 | 1.45 | 2.10 | 2.10 | 29.28 |
| | Peak Water Elev. | 189.1 | | | | |
| | Weir Elev. | 188.0 | | | | |
| | Bottom of Pond | 187.5 | 1.31 | | | |
| I.2 West | Top of Pond | 193.5 | 0.27 | 0.58 | 0.58 | 0.00 |
| | Peak Water Elev. | 193.2 | | | | |
| | Bottom of Pond | 191.0 | 0.22 | | | |
| I.3 North | Top of Pond | 190.5 | 0.66 | 1.08 | 1.08 | 0.00 |
| | Peak Water Elev. | 190.3 | | | | |
| | Bottom of Pond | 188.5 | 0.55 | | | |

**Table 4: Summary of Treatment Volume and Recovery**

| Basin No. | Treatment Volume Required (acft) | Treatment Volume Provided (acft) | | Recovery Time (hrs) |
|---|---|---|---|---|
| | | Rock Voids | Water Quality Basins | |
| I | 0.81 | 2.29 | 3.21 | 72 |




**GENERAL NOTES:**

1. CHECK DAMS WILL BE INSTALLED ALONG EXISTING (1) ONE FOOT CONTOUR ELEVATIONS AS SHOWN, AND AS A BARRIER BETWEEN THE INTERIOR ROAD EDGE AND GRAVEL LAYDOWN AREA. SEE NOTES ON SHEET 2 AND DETAILS ON SHEET 5.
2. INFORMATION OF WATER TABLE DEPTHS FOR SEASONAL HIGH WATER (SHW) ELEVATIONS IS BASED ON GEOTECHNICAL REPORTS PROVIDED BY B.J. ROCK.
3. INTERIOR CRUSHED ROCK SHALL NOT BE COMPACTED (TYP.).
4. FILL SHALL NOT BE PLACED IN WETLAND AREAS (TYP.).

**L E G E N D**

PROPOSED TEMPORARY STAGING AREA MATERIALS
- L AT-GRADE ROCK LAYDOWN
- R AT-GRADE GEOWEB ROAD
- C CRUSHED ROCK APRON
- ×139.5 PROPOSED GRADE

PROPOSED PONDS & DITCHES
- TOP OF BANK
- GRADE BREAK
- TOE OF SLOPE
- P/D PROPOSED POND/DITCH

WETLAND AREAS
- WETLAND AREA
- SURFACE WATER AREA
- 139.5 EXISTING GRADE
- DRAINAGE BASIN AREA BOUNDARY

PROPOSED FENCE & GATES
- PROPOSED GATE
- PROPOSED FENCE

EXISTING BOUNDARIES
- FEMA 100-YEAR FLOOD PLAIN LINE
- EASEMENT
- PROPERTY LINE
- SECTION LINE
- RIGHT-OF-WAY LINE
- EXISTING FENCE
- PROPOSED SILT FENCE

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LICENSE NUMBER 45287
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0 50 100
1 INCH = 100 FEET

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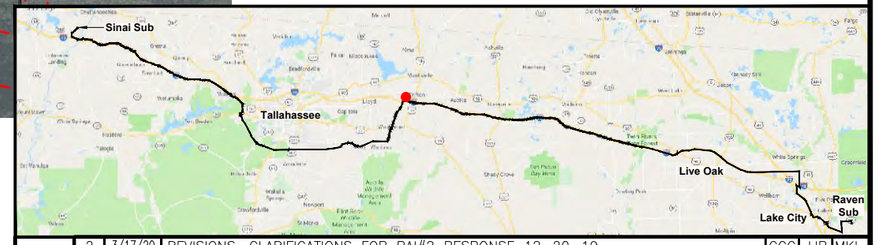


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STAGING AREA NO. 5 SITE PLAN EXHIBIT
FOR TEMPORARY LAYDOWN YARDS

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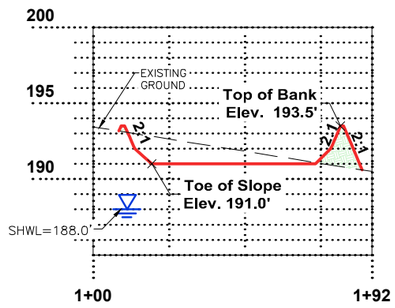
**NFRC STAGING AREA NUMBER 5 SITE PLAN**

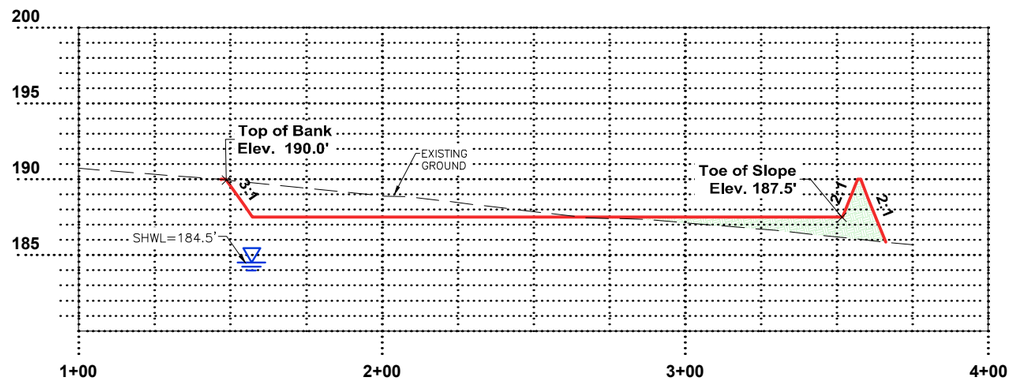
PLOT DATE/TIME: 3/18/2020 - 8:10am BY: Josh Baker
CAD FILE: S:\Projects\108_Gulf Power\19-108-1002_Raven-Sinai 161kV Line Detailed Engineering\Drawings\Staging Areas Exhibit\NFRC_Exh_SA05_R02.dwg

**Staging Area #5** - Jefferson County - NWFWMD
Campground Road, Monticello, FL
PID 14-1N-4E-0000-0042-0000

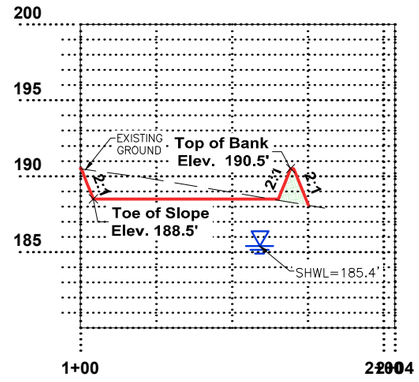
SEE SHEET 2 FOR NOTES & SITE DETAILS
SEE SHEET 5 FOR TYPICAL CONSTRUCTION DETAILS



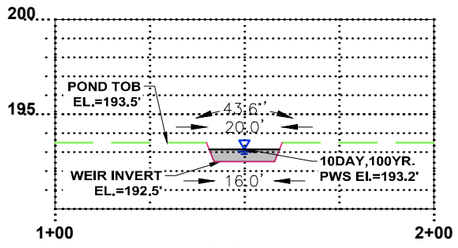

**WEST POND I.2**
**CROSS SECTION VIEW A-A**
LOOKING EAST
HORZ. SCALE = 1" = 50'
VERT. SCALE = 1" = 10'



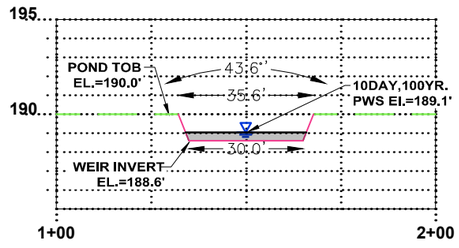

**PRIMARY POND I.1**
**CROSS SECTION VIEW B-B**
LOOKING EAST
HORZ. SCALE = 1" = 50'
VERT. SCALE = 1" = 10'



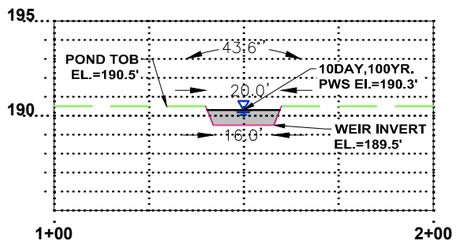

**NORTH POND I.3**
**CROSS SECTION VIEW C-C**
LOOKING EAST
HORZ. SCALE = 1" = 50'
VERT. SCALE = 1" = 10'




**WEST POND I.2**
**WEIR OUTLET TO POND I.1**
**CROSS SECTION**
HORZ. SCALE = 1" = 40'
VERT. SCALE = 1" = 8'




**PRIMARY POND**
**WEIR CROSS SECTION**
HORZ. SCALE = 1" = 40'
VERT. SCALE = 1" = 8'




**NORTH POND I.3**
**WEIR OUTLET TO POND I.1**
**CROSS SECTION**
HORZ. SCALE = 1" = 40'
VERT. SCALE = 1" = 8'

**GENERAL NOTES:**

1. INFORMATION OF WATER TABLE DEPTHS FOR SEASONAL HIGH WATER (SHW) ELEVATIONS IS BASED ON GEOTECHNICAL REPORTS PROVIDED BY B.J. ROCK.

**LEGEND**

EXISTING GROUND
PROPOSED GROUND

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STAGING AREA NO. 5 SITE PLAN EXHIBIT
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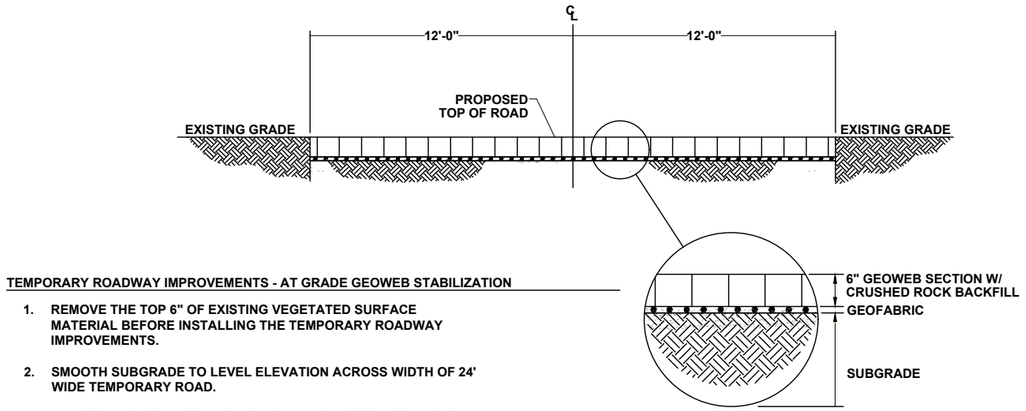
| SCALE: N.T.S. | ENGINEER: MKL | SECTION: AS SHOWN | |
| DRAFTER: GCC | CHECKED: JJB | COUNTY: JEFFERSON | |
| SHEET: 4 OF 6 | | FILE NAME: 191021_EXH_SA_R02.dwg | |

Gulf Power

*NFRC STAGING AREA NUMBER 5 SITE PLAN*

CAD FILE: S:\Projects\108_Gulf Power\19-108-1002_Raven-Sinai 161kV Line Detailed Engineering\Drawings\Staging Areas Exhibit\NFRC_Exh_SA05_R02.dwg PLOT DATE/TIME: 3/18/2020 - 8:11am BY: Josh Baker

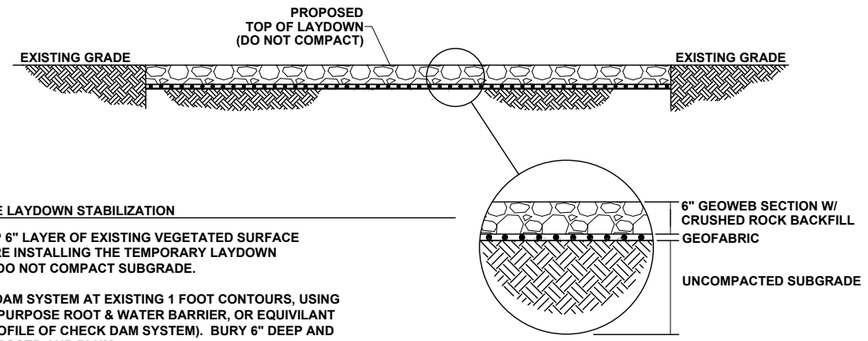



**TEMPORARY ROADWAY IMPROVEMENTS - AT GRADE GEOWEB STABILIZATION**

1. REMOVE THE TOP 6" OF EXISTING VEGETATED SURFACE MATERIAL BEFORE INSTALLING THE TEMPORARY ROADWAY IMPROVEMENTS.
2. SMOOTH SUBGRADE TO LEVEL ELEVATION ACROSS WIDTH OF 24' WIDE TEMPORARY ROAD.
3. PLACE ROAD BEDLINER, MIRAFI RS580i HIGH STRENGTH WOVEN GEOTEXTILE FABRIC, OR APPROVED EQUIVALENT. INSTALL GEOTEXTILE FABRIC PROVIDING MINIMUM LAP AS PER MANUFACTURER INSTALLATION INSTRUCTIONS AT THE LAP JOINT.
4. INSTALL 6" PERFORATED GEOWEB AND FILL WITH 4. NO 57 CRUSHED LIMEROCK.

DETAIL 1

TEMPORARY ROADWAY IMPROVEMENT
AT-GRADE GEOWEB STABILIZATION
WITH CRUSHED ROCK BACKFILL

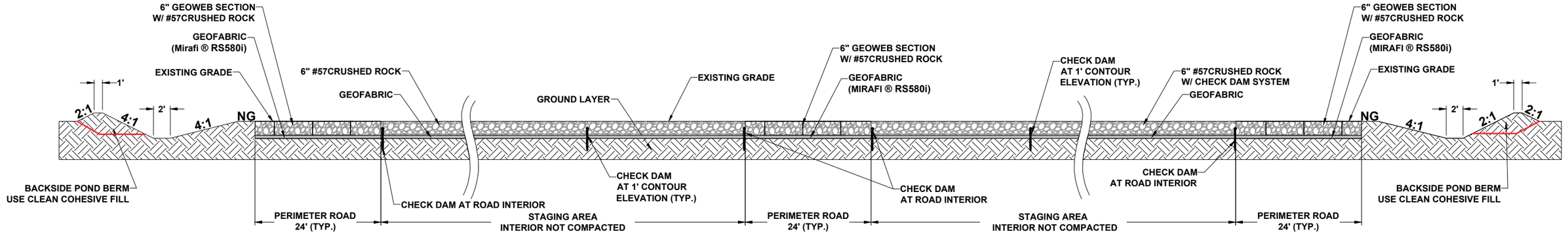



**TEMPORARY - AT GRADE LAYDOWN STABILIZATION**

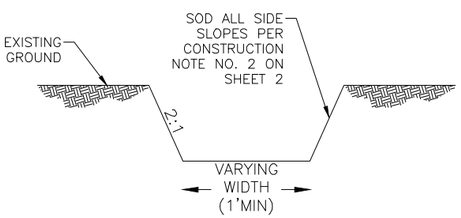
1. REMOVE THE TOP 6" LAYER OF EXISTING VEGETATED SURFACE MATERIAL BEFORE INSTALLING THE TEMPORARY LAYDOWN STABILIZATION. DO NOT COMPACT SUBGRADE.
2. INSTALL CHECK DAM SYSTEM AT EXISTING 1 FOOT CONTOURS, USING 12" CR-PE MULTI PURPOSE ROOT & WATER BARRIER, OR EQUIVILANT (SEE TYPICAL PROFILE OF CHECK DAM SYSTEM). BURY 6" DEEP AND LEAVE TOP 6" EXPOSED AND PLUM.
3. PLACE ROAD BEDLINER, MIRAFI RS580i HIGH STRENGTH WOVEN GEOTEXTILE FABRIC, OR APPROVED EQUIVALENT. INSTALL GEOTEXTILE FABRIC PROVIDING MINIMUM LAP AS PER MANUFACTURER INSTALLATION INSTRUCTIONS AT THE LAP JOINT.
4. INSTALL 6" WASHED NO 57 CRUSHED ROCK BACKFILL.

DETAIL 2

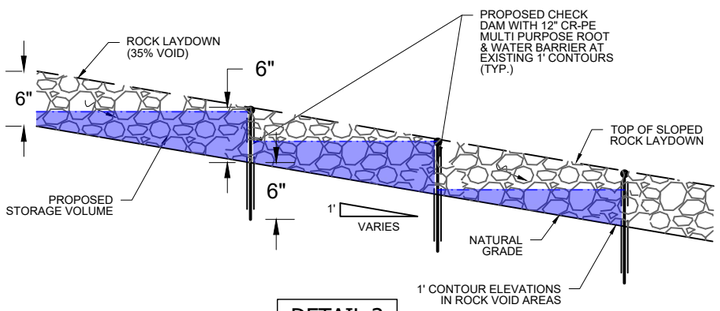
TEMPORARY LAYDOWN AREA IMPROVEMENT
AT-GRADE WASHED CRUSHED ROCK BACKFILL




TYPICAL CROSS SECTION PLAN
FOR TEMPORARY ROCK LAYDOWN YARDS




**STANDARD SWALE**
**CROSS SECTION**
**N.T.S.**




DETAIL 3

TYPICAL PROFILE OF CHECK DAM SYSTEM
FOR TEMPORARY ROCK LAYDOWN YARDS

NOTICE:
CONTRACTOR SHALL VERIFY ALL CONDITIONS ON JOB SITE & NOTIFY PROJECT MANAGER AND ENGINEER OF ANY VARIATIONS FROM DIMENSIONS SHOWN ON THESE DRAWINGS BEFORE PROCEEDING WITH ANY CONSTRUCTION.

PICKETT
SURVEYING • ENGINEERING
PICKETT AND ASSOCIATES, INC
5025 WEST GRACE STREET
TAMPA, FLORIDA 33607
PHONE: (813) 877-7770
CA #31323 LB #364

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STATE OF FLORIDA
MICHAEL KEVIN LEAHY
LICENSE NUMBER 45287
PROFESSIONAL ENGINEER
03-17-20

FLORIDA LICENSED PROFESSIONAL ENGINEER No. 45287
PROFESSIONAL SURVEYOR & MAPPER No. 5658

1. This document has been electronically signed and sealed by Michael Leahy, P.E., P.S.M. using a Digital Signature and date.
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| NO | DATE | REVISIONS AND RECORD OF ISSUE | BY | CHK | APP |
|---|---|---|---|---|---|
| 2 | 3/17/20 | REVISIONS, CLARIFICATIONS FOR RAI#2 RESPONSE 12-20-19 | GCC | JJB | MKL |
| 1 | 11/22/19 | REVISIONS, CLARIFICATIONS FOR RAI RESPONSE 11-22-19 | GCC | JJB | MKL |

*TRANSMISSION ENGINEERING DEPARTMENT*

NORTH FLORIDA RESILIENCY CONNECTION (NFRC)
STAGING AREA NO. 5 SITE PLAN EXHIBIT
FOR TEMPORARY LAYDOWN YARDS

| | | | |
|---|---|---|---|
| SCALE: N.T.S. | ENGINEER: MKL | SECTION: AS SHOWN | |
| DRAFTER: GCC | CHECKED: JJB | COUNTY: AS SHOWN | |
| SHEET: 5 OF 6 | | FILE NAME: 191021_EXH_SA_R02.dwg | |

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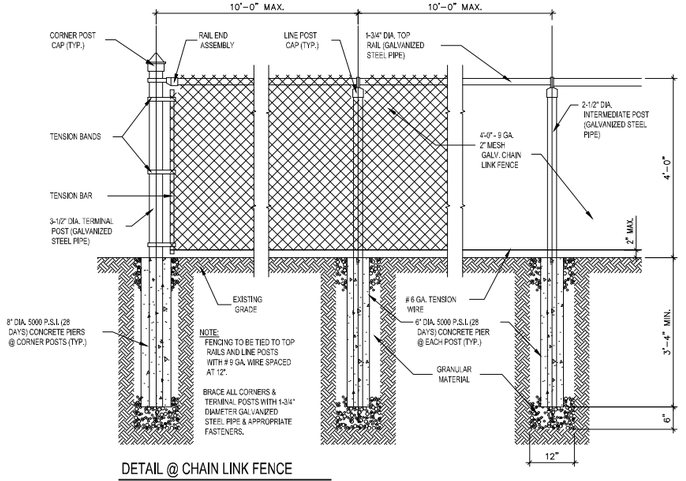
*NFRC STAGING AREA CONSTRUCTION DETAILS*

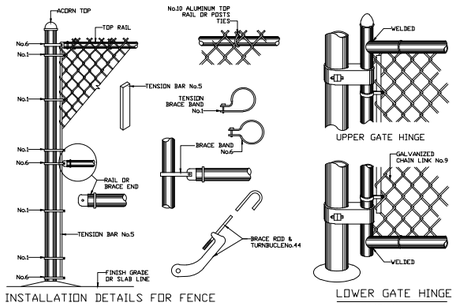
CAD FILE: S:\Projects\108_Gulf Power\19-108-1002_Raven-Sinai 161kV Line Detailed Engineering\Drawings\Staging Areas Exhibit\NFRC_Exh_SA05_R02.dwg PLOT DATE/TIME: 3/18/2020 - 8:11am BY: Josh Baker

# PERIMETER FENCE DETAILS




DETAIL @ CHAIN LINK FENCE

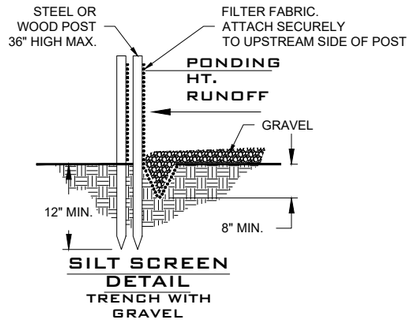
SCALE: 3/4" = 1'-0"



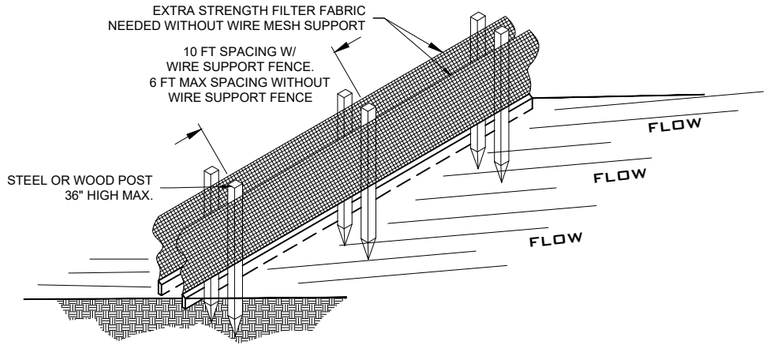

CHAIN LINK FENCE TYPICAL HARDWARE DETAILS

SCALE 3/4"=1'-0"

# EROSION CONTROL DETAILS




SILT SCREEN DETAIL
TRENCH WITH GRAVEL

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03-17-20

MICHAEL K. LEAHY
FLORIDA LICENSED PROFESSIONAL ENGINEER No. 45287
PROFESSIONAL SURVEYOR & MAPPER No. 5658

1. This document has been electronically signed and sealed by Michael Leahy, P.E., P.S.M. using a Digital Signature and date.
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*TRANSMISSION ENGINEERING DEPARTMENT*

NORTH FLORIDA RESILIENCY CONNECTION (NFRC)
STAGING AREA NO. 5 SITE PLAN EXHIBIT
FOR TEMPORARY LAYDOWN YARDS

| | | | |
|---|---|---|---|
| SCALE: N.T.S. | ENGINEER: MKL | SECTION: AS SHOWN | |
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**NFRC STAGING AREA FENCE AND BMP DETAILS**

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# Temporary Staging Area #5

# Stormwater Calculations

for the

# North Florida Resiliency Connection Project

Gulf Power
15430 Endeavor Drive
Jupiter, FL 33478

Prepared by:

Pickett and Associates, Inc.
5025 W. Grace Street
Tampa, FL 33607

## Table of Contents

## 1.0 Site Data:

Jefferson County – NWFWMD
Campground Road
Monticello, FL
PID 14-1N-4E-0000-0042-0000
Basin Area = 18.68 acres
Developed Area = 13.06 acres
Flood Zone X per FIRM Map 12065C0300C effective 02-05-14
Design Storm, 100 year, 24-hour duration.
Recovery (Attenuation)

1. Provide treatment volumes within 72 hours following the end of the design storm event.

## 2.0 Project Narrative

Temporary Staging Area #5 will stage and store construction materials (poles, conductor, insulators, etc.) and equipment (drill rigs, line trucks, cranes, etc.). The developed area will consist of an at grade #57 crushed limerock surface to facilitate the storage of poles and equipment along with a perimeter road to facilitate access. The site has been reviewed to ensure that existing surface water flow will not be impeded and existing water quality will not be adversely impacted. All proposed semi-pervious material will be installed at the existing natural ground elevation throughout the site to prevent impedance of the existing watershed.

The staging area will use the void space between the #57 crushed limerock for storage for the first 1" of runoff. Gulf Power has done extensive testing on this void ratio and has determined that a 35% void ratio provides a good conservative value. In addition to utilizing the voids for storage, each site will have a swale / berm constructed on the low side(s) of each to ensure no stormwater runoff escapes to adjacent properties. Each site will also have a dry retention pond to account for attenuation. The ponds will be designed to recover within 72 hours. Soil Borings and Double Ring Infiltrometer Testing have been performed at each site to facilitate the design of each dry pond. The site will use the interior uncompacted gravel as additional area for recovery by incorporating the use of a check dam system. Since the site has a slight grade change, an impervious, flexible water barrier (CR-PE12-20) will be installed along each contour line to slow the progression of water over the site to allow recovery within 72 hours. This is detailed in the construction drawings.

The staging area will remain in place for the duration of the project. At the conclusion of the project, each staging area will be returned to its pre-construction state. The anticipated duration is approximately 12 – 18 months.

Construction and maintenance access to each staging area will be gained via existing road right-of-way. Connector aprons will be constructed in accordance with county / state requirements.

Deliveries and active use of staging areas will be consistent with construction hours.

No tree removal will be necessary to facilitate construction of staging area #5.

# 3.0 Stormwater Calculations

The SCS TR-20 method was used to calculate the pre and post-development peak runoff. The time of concentration was generated from the sheet, shallow concentrated flow and Lag/CN method. A complete list of the procedure follows.

## Assumptions and Methodology

Per the NWFWMD Environmental Resource Permit Handbook, Section 3.3, the difference between the 25-year, 24-hour pre-developed and the 100-year, 24-hour post-developed storm volume shall be stored on-site with the maximum release rate not exceed the pre-developed flow, Q.

- Storm Frequency – 100 Year, 24-hour storm
- Runoff Curve Number – Weighted Curve Numbers were calculated for each area
    - Existing Conditions Curve Number Range: 58
    - Post-Developed Condition Curve Number Range: 58-85
- Calculation of Time of Concentrations
    - Lag/CN Method – Which is used for areas of 2000 acres or less. The formula is provided below:
        - $T_c = 0.00526 \times L^{0.8}(1000/CN-9)^{0.7} \times S^{-0.5}$
- Peak Flow Rate Calculations – HydroCAD Version 10.0
- Pond Recovery Calculations – PONDS Version 3.3

## Pre-Development Summary

Staging Area 5 has mild slopes of up to 4% and generally consists of grass. Table 1 below includes the results of the pre-development drainage area runoff calculations for the peak flow. These were developed using the topography which can be seen on the plan set and HydroCAD (Appendix B). Table 1 summarizes the peak flows for the 25-year, 24-hour Type III design storm in the pre-developed condition. The discharge from the site will not exceed this flow.

**Table 1: Pre-Developed Peak Discharge**

| Sub-Basin | Area (Acre) | Weighted CN | Time of Concentration (Min.) | Type III, 25-Year, 24-Hour Storm, $Q_{25}$ (CFS) |
|---|---|---|---|---|
| I | 18.68 | 58 | 32.2 | 30.37 |

## Post-Development Summary

Upon completion of construction, Staging Area 5 will consist of uncompacted gravel laydown yard with compacted gravel drives. The water quality basin will be located at the low point within the site. These were developed using the topography which can be seen on the plan set and HydroCAD (Appendix B). Table 2 below includes the results of the post- development calculations for the 100-year, 24-hour storm. The difference between the pre-development $Q_{25}$ and post-development storm $Q_{100}$ will be contained within the pond, and with the outflow not exceeding the pre-developed $Q_{25}$ through the outflow weir per the Northwest Florida Water Management District Design Requirements.

| Table 2: Post-Developed Peak Discharge | | | | |
|---|---|---|---|---|
| **Sub-Basin** | **Area (Acre)** | **Weighted CN** | **Time of Concentration (Min.)** | **Type III, 100-Year, 24-Hour Storm, $Q_{100}$ (CFS)** |
| I | 18.68 | 66 | 19.5 | 66.83 |

Table 3 below summarizes the stormwater quality basin design and key pond elevations with required and provided volumes. It shows that the basin provides the required amount of freeboard (1-foot) and storage required to retain the peak runoff. Peak water surface elevation calculations for detention ponds were developed using HydroCAD (Appendix B).

| Table 3: Pond Storage Data | | | | | | |
|---|---|---|---|---|---|---|
| **Basin No.** | **Elevation (ft, NAVD 88)** | | **Area (ac)** | **Provided Volume (acft)** | **Required Volume (acft)** | **Provided Discharge at Weir (cfs)** |
| I.1 Primary | Top of Pond | 190.0 | 1.45 | 2.10 | 2.10 | 29.28 |
| | Peak Water Elev. | 189.1 | | | | |
| | Weir Elev. | 188.0 | | | | |
| | Bottom of Pond | 187.5 | 1.31 | | | |
| I.2 West | Top of Pond | 193.5 | 0.27 | 0.53 | 0.53 | 0.00 |
| | Peak Water Elev. | 193.2 | | | | |
| | Bottom of Pond | 191.0 | 0.22 | | | |
| I.3 North | Top of Pond | 190.5 | 0.66 | 1.08 | 1.08 | 0.00 |
| | Peak Water Elev. | 190.3 | | | | |
| | Bottom of Pond | 188.5 | 0.55 | | | |

## Water Quality/Treatment Methodology

The NWFWMD Handbook requires that all stormwater management systems provide the minimum state water quality treatment requirements. The method utilized for this project consists of one or a combination of percolation in the existing soils within the rock voids of the laydown storage and/or percolation within the stormwater quality basin. To determine the treatment runoff volume, the first 1.0-inch of rainfall was used along with the composite runoff coefficient for each sub-basin. This was compared with the volume from the first 0.5-inch rainfall without the coefficient. The greater volume was used for treatment evaluation and recovery. The calculations can be found starting on Page 6.

Recovery was calculated utilizing the PONDS software, as approved by the district. The rate of recovery was calculated within both the rock voids and if needed, the water quality basins. To model the rock voids, we calculated the available void space within the laydown area using a 35% uncompacted void ratio. An adjusted stage-storage table was input into the PONDS model utilizing a one-half foot increment stage, which corresponds to the height of the check dam. In this instance, the rock voids were not sufficient in recovering the entire water treatment volume within 72-hours. 0.16-acft of the treatment volume requires the pond for recovery. See Table 4 for a summary of treatment volumes and

recovery times for each sub-basin within the staging area. All treatment volumes recover within 72-hours.

| Table 4: Summary of Treatment Volume and Recovery | | | | |
|---|---|---|---|---|
| **Basin No.** | **Treatment Volume Required (acft)** | **Treatment Volume Provided (acft)** | | **Recovery Time (hrs)** |
| | | **Rock Voids** | **Water Quality Basins** | |
| I | 0.81 | 2.29 | 3.21 | 72 |

## Water Quality Recovery Volume Calculations

**Areas:**

$$Crushed\ Rock\ for\ Laydown\ Area = (568{,}981\ S.F.) \times \left(\frac{1Ac.}{43{,}560\ S.F.}\right) = 13.06Ac.$$

$$Crushed\ Rock\ Road\ Area\ = (79{,}933\ S.F.) \times \left(\frac{1Ac.}{43{,}560\ S.F.}\right) = 1.84Ac.$$

$$Pond\ Area = (63{,}336\ S.F.) \times \left(\frac{1Ac.}{43{,}560\ S.F.}\right) = 1.45Ac.$$

$$Grass\ Area = (813{,}265\ S.F.) \times \left(\frac{1Ac.}{43{,}560\ S.F.}\right) = 18.67\ Ac. - 13.06\ Ac. - 1.84\ Ac. - 1.45\ Ac. = 2.32\ Ac.$$

**Composite Runoff Coefficient:**

$$C\ = \frac{[(C_{rock\ laydown\ area}\ x\ Area)\ +\ (C_{rock\ road\ area}\ x\ Area)\ +\ (C_{pond\ area} x\ Area)\ +\ (C_{grass\ area}\ x\ Area)]}{Total\ Project\ Area}$$

$$C\ = \frac{[(0.5\ x\ 13.06\ Ac.)\ +\ (0.7\ x\ 1.84\ Ac.)\ +\ (1.0\ x\ 1.45\ Ac.)\ +\ (0.17\ x\ 2.32)]}{18.67} = 0.52$$

**Total Treatment Volume from 1 inch of Rainfall:**

$$Treatment\ Volume\ = (C) \times\ (1\ inch) \times\ (Project\ Contributing\ area)$$

$$Treatment\ Volume\ =\ (.52) \times\ (1\ in.) \times\ (18.67Ac.) \times \left(\frac{1Ft.}{12\ in.}\right) = 0.81\ Ac. - Ft.$$

**Total Treatment Volume from ½ inch of Rainfall:**

$$Treatment\ Volume\ = (0.5\ inch) \times\ (Project\ Contributing\ area)$$

$$Treatment\ Volume\ =\ (0.5in.) \times\ (18.67Ac.) \times \left(\frac{1Ft.}{12\ in.}\right) = 0.78\ Ac. - Ft.$$

The treatment volume for the project is the larger value, **0.81 Ac.-Ft.**

# Appendix A – Geotechnical Investigation

BJ ROCK GEOENGINEERING

# GEOTECHNICAL REPORT

PICKETT SURVEYING • ENGINEERING

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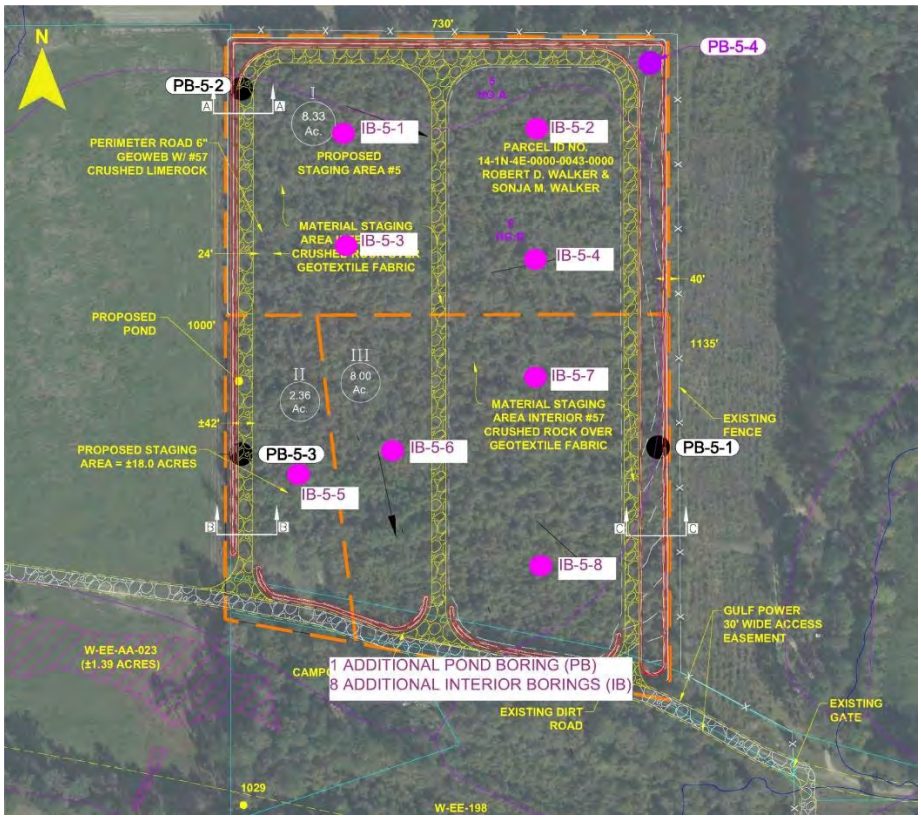
# NFRC STAGING AREA NO. 5




## JEFFERSON COUNTY, FLORIDA

**MARCH 2020**

**BJR 19-198B**

March 13, 2020

Mike Leahy, P.E.
**Pickett & Associates**
5025 W. Grace Street
Tampa, FL 33607

**Geotechnical Exploration Report**
**NFRC Staging Area No. 5**
**Jefferson County, Florida**
**BJR No. 19-198B**

Dear Mr. Leahy:

**BJ Rock, LLC (BJR)** has completed the geotechnical exploration for the referenced project as authorized by Pickett & Associates for Gulf Power. The purposes of this study were to explore general subsurface conditions for the proposed staging areas and to use the data obtained to develop engineering recommendations to guide the design of the planned ponds/swales. This report describes our exploration procedure, presents the data obtained, and presents our conclusions and recommendations regarding the geotechnical engineering aspects of the design.

BJR appreciates the opportunity to participate in this project and we trust that the information included in this report is sufficient for your design. If you have any questions or comments concerning the contents of this report, please contact us.

Sincerely,

**BJ Rock, LLC**
BJR FL Certificate of Authorization No. 29100

JOHN CHANNING PEAK LICENSE No. 57018 STATE OF FLORIDA PROFESSIONAL ENGINEER
03/13/2020

John C. Peak, P.E.
Sr. Geotechnical Engineer
FL P.E. License No. 57018

TABLE OF CONTENTS



ATTACHMENTS

## PROJECT INFORMATION

### Existing Site

Based on the information provided for our review from Pickett & Associates, we understand a staging area is planned off Campground Road, Monticello, Jefferson County, Florida (Figure 1).

### Project Approach

The objective of the geotechnical investigation for the proposed project was to obtain information concerning the subsurface conditions in order to make geotechnical engineering estimates and recommendations in each of the following areas:

- Soil stratigraphy at the boring locations and the development of the approximate soil profile.
- General location and description of potentially deleterious materials which may interfere with construction or new structure performance, including buried or surficial existing fills, organics, construction debris, etc.
- Identification of some critical design or construction details, including present groundwater levels, estimated wet season levels, and seasonal fluctuations in the specified areas.

### Scope of Work

In order to address the above objectives, our scope of work for this project included the following:

- Reviewed available published information on the site, including the United States Department of Agriculture (USDA) National Resources Conservation Service (NRCS) soil survey data for Jefferson County.
- Conducted a subsurface exploration program consisting of the advancement of auger borings with DRI / field permeability testing for the pond/swales, subsurface sampling, and field testing.
- Measured the stabilized groundwater levels at the boring locations.
- Reviewed and visually classified the recovered soils in the laboratory using the Unified Soil Classification System (ASTM D 2487). Developed the general soil stratigraphy at the boring locations.
- Performed geotechnical engineering studies and analyses in order to develop geotechnical engineering recommendations for each of the objectives previously discussed for the proposed project.
- Performed stormwater pond recovery analysis per referenced staging area. Analysis performed by our subconsultant, Native GeoSciences, Inc.
- Prepared a geotechnical report that summarizes the course of our study, the field and laboratory data generated, the subsurface conditions encountered, stormwater pond recovery analysis results and our geotechnical engineering recommendations for the proposed project.

### Soil Survey Review

According to the USDA NRCS "Soil Survey of Jefferson County", the soil types generally present on the site are attached in the appendix and are generalized as follows: *Plummer fine sand, Fuquay fine sand, Dothan loamy fine sand.*

## SUBSURFACE EXPLORATION

### Field Exploration Procedures

The procedures used by BJ Rock, LLC for field sampling and testing are in general accordance with industry standards of care and established geotechnical engineering practice. BJR performed 12 auger borings to approximate depths of up to 10 feet each with 12 field permeability tests at the proposed locations.

Our staff located the staked borings in the field per the plans and field information provided by Pickett & Associates. The approximate testing locations are noted on the provided Field Test Location Plan (Figure 1) in the Appendix. The standards and procedures for the Standard Penetration Test (SPT) Boring and soil sample handling and classification are described in our Field Testing Standards and Procedures in the Appendix.

### Field Exploration Results

#### *Subsurface Conditions*

The auger borings generally encountered fine to silty/clayey fine sands, sandy clays and clays to an approximate depth of 10 feet below existing grade. The soil testing results are shown on the attached Soil Boring Logs (Figure 2) in the Appendix.

#### *Field Permeability Test*

The field permeability falling head tests were performed at the specified location on the site as shown on Figure 2 in the Appendix. The tests were performed at approximate depths of 1.5 to $2^{+/-}$ feet below existing grade. The tests were performed utilizing slotted casing seated in a uniform soil condition. The results of the tests are as follows:

| Recommended Existing Groundwater Parameters for Pond Design<br>STAGING AREA 5 - NFRC TRANSMISSION LINE FPL | | | | |
|---|---|---|---|---|
| **PB Test** | **Test Depth (ft)** | **Vertical Infiltration (ft/day)** | **Estimated Horizontal Infiltration (ft/day)*** | **Recommended SHGWL Depth (ft)** |
| IB-5-1 | 2 | 0.1 | 0.2 | 3 |
| IB-5-2 | 2 | 0.1 | 0.2 | 3 |
| IB-5-3 | 2 | 0.15 | 0.3 | 3 |
| IB-5-4 | 2 | 0.05 | 0.1 | 3 |
| IB-5-5 | 2 | 0.1 | 0.2 | 3 |
| IB-5-6 | 2 | 0.1 | 0.2 | 3 |
| IB-5-7 | 1.5 | 0.05 | 0.1 | 3.5 |
| IB-5-8 | 2 | 0.2 | 0.4 | 3.5 |
| PB 5-1 | 2 | 0.05 | 0.1 | 3.5 |
| PB 5-2 | 2 | 0.05 | 0.1 | 3 |
| PB 5-3 | 2 | 0.04 | 0.08 | 3 |
| PB-5-4 | 2 | 0.15 | 0.3 | 3 |
| * | Estimated horizontal permeability rate is 2x the vertical permeability test result. | | | |
| Note: | Horizontal and vertical permeability rates do not include a factor of safety. | | | |

### *Groundwater*

Groundwater was not encountered to an approximate depth of 10 feet below existing ground surface in the soil test borings performed in November 2019 and February 2020. Based on our past site experience, the results of our investigation, and our review of the NRCS soil survey, it is our opinion that the seasonal high groundwater table will be encountered at approximate depths of 3 to $3.5^{+/-}$ feet below existing ground surface in the areas of borings performed. Significant fluctuations in the groundwater levels should be expected due to seasonal variations in rainfall, runoff, and other site-specific factors across the site such as shallow perched conditions due to encountered clayey soils.

### *Stormwater Pond Recovery Analysis*

Native GeoSciences (NGS) completed the stormwater pond recovery analysis for the staging area(s). NGS utilized the commercially available software PONDS (version 3.3) to perform the stormwater pond recovery analysis. The analysis included recovery of the treatment volume within 30 days. The description of the input parameters and a Copy of the PONDS software outputs are included in the Attachments in the Appendix.

## SITE PREPARATION RECOMMENDATIONS

### *Site Stripping*

Prior to any construction, the site must be properly prepared. To prepare the site for construction, all existing topsoil, muck, debris, vegetation, and large roots down to finger-size should be removed, including a 5-foot margin in a horizontal direction away from the footprints of the structures. The resulting excavations should be backfilled with soils as discussed in the structural fill section of this report.

### *Proofrolling*

Following site stripping and any related excavation activity, and prior to any fill placement, proofrolling of the on-site soils should be performed. We recommend using a vibratory roller having a static weight of at least ten tons. Placement of fill materials may then proceed. Compaction of the fill materials should continue until the roller has made at least ten passes over all areas of the site and the soils appear to be relatively firm and unyielding. Half of the roller passes should be perpendicular to the direction of travel of the other passes. Proofrolling should be closely monitored by our engineering technician to look for unusual deflection of the soils beneath the compacting equipment. If unusual or excessive deflection is observed, the areas should be undercut to firm soils and backfilled with structural fill placed in maximum one-foot thick lifts. Backfill soils should be of the same composition and should be compacted to the same criteria as structural fill soils.

### Structural Fill

### *Definition*

Soil used for structural fill can be defined as clean fine sand containing less than twelve percent material by weight that is finer than a number 200 sieve (fines) (material conforming to SP to SP-SM in the Unified Soil Classification System) and less than 5 percent organics by weight. However, materials containing up to 25 percent fines (materials conforming to SC or SM in the Unified Soil Classification System) may be utilized as structural fill, if their plasticity index is less than 20 and the working subgrade is at least 2 feet above water or groundwater level.

If fill material with higher fines content is used (< 25 percent fines), the material will require the use of compaction equipment designed for clayey soils. This includes a sheeps foot or vibratory pad foot roller. In addition, a disk could be required to assist with drying the clayey soils in order to place them at or near their optimum moisture content. These materials must be placed in 6-inch thick maximum lifts so that they can be effectively compacted with a vibratory pad foot roller.

### *Soil Suitability Recommendations*

Based on the results of the auger borings in Figure 3, the soil materials encountered in the borings appear to be acceptable general and/or structural fill from ground surface to 1 to $6^{+}$ feet below existing grade excluding any organic material, clays and unsuitable rock/shell/limestone, etc. Stratum 1 (SP/SP-SM) can be utilized as structural fill material. Stratum 2 (SM/SC) can be utilized as general fill material.

### *Placement*

Fill should be placed in lifts not to exceed one foot thick. The fill material should be compacted to at least 95 percent of its modified Proctor maximum dry density (ASTM D 1557). Confined areas, such as utility trenches, should be compacted with manually operated vibratory compaction equipment.

## TESTING AND MONITORING

Construction monitoring and testing are essential to proper site construction and performance. Compliance with the recommended foundation specification must be verified by our engineering technician familiar with the project construction. Observation of site preparation work is an integral part of the engineering recommendations contained in this report.

Safe working conditions are necessary. Temporary excavations should be sloped and/or braced as required by applicable local, state, and federal safety regulations, as well as the current Occupational Safety and Health Organization (OSHA) Excavation and Trench Safety Standards. Generally, the grading contractor is responsible for constructing stable, temporary excavations that are dewatered, shored, sloped and/or benched to maintain stability of the sides and bottom of the trench.

## LIMITATIONS

This report has been prepared for the exclusive use of **Pickett & Associates and Gulf Power** for the specific application to the project previously discussed. Our conclusions and recommendations have been rendered using generally accepted standards of geotechnical engineering geology practice in the state of Florida. No other warranty is expressed or implied.

Our conclusions and recommendations are based on the design information furnished to us, the data obtained from the previously described subsurface exploration, and our experience. They do not reflect variations in the subsurface conditions that are likely to exist in the region of our boring and in unexplored areas of the site. These variations are due to the inherent variability of the subsurface conditions in this geologic region. Should variations become apparent during construction, it will be necessary to re-evaluate our conclusions and recommendations based upon our on-site observations of the conditions.

The site is underlain by limestone bedrock that is susceptible to dissolution and the subsequent development of karst features such as voids and sinkholes in the natural soil overburden. Construction in a sinkhole prone area is therefore accompanied by some risk that internal soil

erosion and ground subsidence could affect new structures in the future. It is not possible to investigate or design to completely eliminate the possibility of future sinkhole-related problems. In any event, the Owner must understand and accept this risk.

The scope of our services does not include any environmental assessments or investigations for the possible presence of hazardous or toxic substances in the soil, groundwater, or surface water within or in the general vicinity of the site studied. Any statements made in this report or shown on the test boring log regarding unusual subsurface conditions and/or composition, odor, staining, origin, or other characteristics of the surface and/or subsurface materials are strictly for the information of our client and may or may not be indicative of an environmental problem.

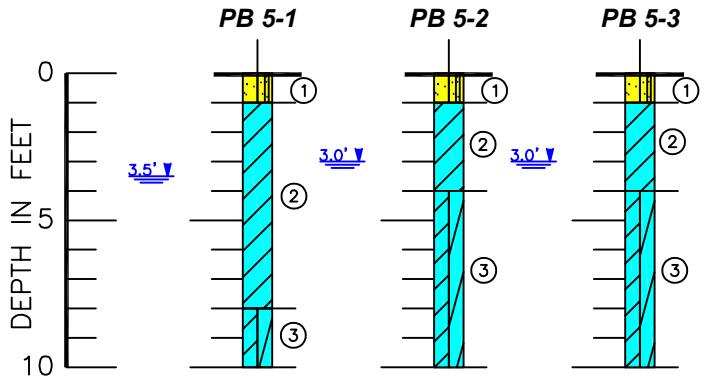
If changes are made in the overall design or the location of the proposed structure(s), the recommendations presented in this report must not be considered valid unless the changes are reviewed by our firm and recommendations modified or verified in writing. We should be given the opportunity to review the foundation plan and the applicable portions of the project specifications when the design is finalized. This review will allow us to check whether these documents are consistent with the intent of our recommendations.

# APPENDIX


BJ ROCK GEOENGINEERING

# NFRC STAGING AREA NO. 5
# FIELD TEST LOCATION PLAN
# JEFFERSON COUNTY, FLORIDA

| | | |
|---|---|---|
| DATE: 03/10/20 | SCALE: NOT TO SCALE | JOB NO. 19-198B |
| DRAWN BY: J. PEAK | | FIGURE 1 |
| CK'D BY: B. JORY | | |




## LEGEND

1 = GRAY, BROWN, DARK GRAY/BROWN FINE TO SLIGHTLY SILTY FINE SANDS (SP)/(SP–SM)

2 = ORANGE, BROWN SANDY CLAY (CL)

3 = ORANGE, BROWN CLAY (CL)/(CH)

(SP) = UNIFIED SOIL CLASSIFICATION GROUP SYMBOL

0.0' = ESTIMATED SEASONAL HIGH GROUNDWATER LEVEL

NOTES: HAND AUGER BORINGS PERFORMED NOVEMBER 18, 2019.

EXISTING GROUNDWATER LEVEL NOT ENCOUNTERED TO 10 FEET.

BJ ROCK GEOENGINEERING

# NFRC STAGING AREA 5
# SOIL BORING LOGS
# JEFFERSON COUNTY, FL

| DATE: | SCALE: | JOB NO. |
|---|---|---|
| 11/19/19 | AS SHOWN | 19-198A |
| DRAWN BY: E. COLO'N | | FIGURE 2 |
| CK'D BY: J. PEAK | | |

# LEGEND

 (1) = GRAY, WHITE, TAN, BROWN, DARK BROWN FINE TO SLIGHTLY SILTY FINE SANDS (SP)/(SP–SM)

 (2) = GRAY, TAN, ORANGE, BROWN SILTY TO CLAYEY FINE SANDS (SM)/(SC)

 (3) = GRAY, ORANGE, BROWN SILTY/SANDY CLAY (CL)

*(SP)* = UNIFIED SOIL CLASSIFICATION GROUP SYMBOL

*N* = STANDARD PENETRATION RESISTANCE IN BLOWS PER FOOT CORRELATED FROM CPT READINGS

*R* = REFUSAL MATERIAL

 = EXISTING GROUNDWATER LEVEL (IF ENCOUNTERED)

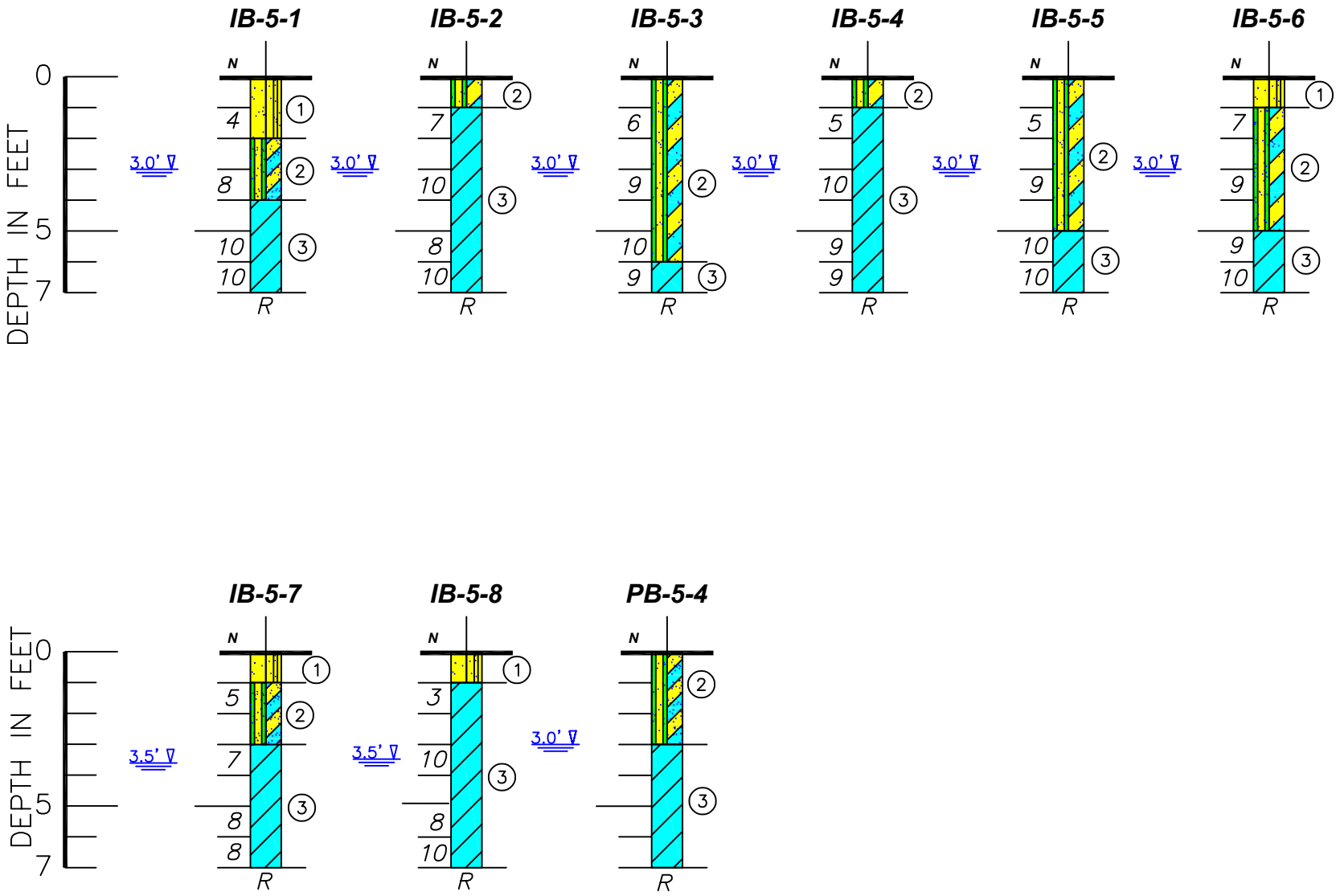
 = ESTIMATED SEASONAL HIGH GROUNDWATER LEVEL

NOTE: TESTING PERFORMED FEBRUARY 12, 2020.

BJ ROCK GEOENGINEERING

**NFRC STAGING AREA 5**
**SOIL BORING LOGS**
**JEFFERSON COUNTY, FL**

| DATE: | SCALE: | JOB NO. |
|---|---|---|
| 2-18-20 | AS SHOWN | 19-198B |
| DRAWN BY: E. COLO'N | | FIGURE 2 |
| CK'D BY: J. PEAK | | SHEET 1 OF 2 |




**BJ ROCK GEOENGINEERING**

# NFRC STAGING AREA 4
# SOIL BORING LOGS
# COLUMBIA COUNTY, FL

| DATE: | SCALE: | JOB NO. |
|---|---|---|
| 2-18-20 | AS SHOWN | 19-198B |
| DRAWN BY: E. COLO'N | | FIGURE 2 |
| CK'D BY: J. PEAK | | SHEET 2 OF 2 |

March 13, 2020

**Re: Stormwater Pond Recovery Analysis**
NFRC Staging Areas
Staging Area No. 5 – Basin I
Jefferson County, Florida
*BJR Job No: 19-198(B)*

As authorized, BJ Rock, LLC (BJR) has completed the stormwater pond recovery analysis for the above-referenced staging area. The project site is located on Campground Road in Monticello, Jefferson County, Florida.

We understand that one crushed rock material laydown area will be constructed along with one dry stormwater management pond within the proposed project. The pond will be constructed within the southeast corner of the project. The Staging Area consists of one drainage basin (I).

We used soil and groundwater information collected during the geotechnical exploration on the site and provided in the BJR Geotechnical data. In addition, we used site survey data, crushed rock laydown area design, and stormwater pond design information provided by Pickett Surveying and Engineering. We utilized the commercially available software PONDS (version 3.3) to perform the stormwater recovery analysis. Copies of the PONDS software outputs are included in the Attachments.

The PONDS software is generally limited to analyzing flat bottom stormwater ponds. Since the rock laydown area is planned to be constructed at existing grade and will be sloping, it was necessary to analyze the area as a flat basin using average soil and groundwater parameters. We understand that you plan to utilize CR-PE Multi-Purpose Root & Water Barrier Molded Rolls by Century Products (or similar) to retain water within the laydown area for recharge before discharging excess water to the pond. Based on this plan, it is our opinion that using average soil and groundwater parameters for this analysis is appropriate. Please note that the treatment volume was not recovered within the rock laydown basin area within 72 hours. Therefore, discharge and recovery of excess water within the stormwater pond was necessary.

Below are Average Soil and Groundwater Calculations and Model Input Parameters for the basin. We assumed a Base of Aquifer depth below the Seasonal High Water Table (SHWT) of 2 feet or less. This depth is generally conservative based on our experience with similar projects in soils with relatively high silt/clay content. The actual Base of Aquifer is likely deeper.

Lastly, we assumed a porosity of 35% for the crushed rock for void space storage.

**Stormwater Recovery Analysis – Staging Area No. 5 – Basin I (Rock Voids)**
*Average Soil and Groundwater Calculations*

Below are the average soil and groundwater calculations for the stormwater pond recovery analysis.

| Staging Area No. 5 | | |
|---|---|---|
| **Basin I** | | |
| **Rock Laydown Elevation** | | |
| **Low El. (ft)** | **High El. (ft)** | **Average El. (ft.)** |
| 190 | 200 | **195** |
| **Boring** | **Horizontal Saturated Hydraulic Conductivity (ft/day)*** | **Depth to SHWT (ft)** |
| PB-5-1 | 0.05 | 3.5 |
| PB-5-2 | 0.05 | 3 |
| PB-5-3 | 0.04 | 3 |
| PB-5-4 | 0.15 | 3 |
| IB-5-1 | 0.1 | 3 |
| IB-5-2 | 0.1 | 3 |
| IB-5-3 | 0.15 | 3 |
| IB-5-4 | 0.05 | 3 |
| IB-5-5 | 0.1 | 3 |
| IB-5-6 | 0.1 | 3 |
| IB-5-7 | 0.05 | 3.5 |
| IB-5-8 | 0.2 | 3.5 |
| **AVG.** | **0.1** | **3.125** |
| **Average SHWT Elevation (ft)** | | **191.88** |
| * Hydraulic conductivity values include a factor of safety of 2 based on the field test results. | | |

*Model Input Parameters*

Below are the input parameters used for the stormwater pond recovery analysis.

***Aquifer and Geometry Data***

| Input Parameter | STAGING AREA NO.5 - BASIN I |
|---|---|
| **Base of Aquifer Elevation (feet)** | 190 |
| **Water Table Elevation (feet)** | 191.88 |
| **Horizontal Saturated Hydraulic Conductivity (ft/day)*** | 0.1 |
| **Fillable Porosity (%)** | 25 |
| **Unsaturated Vertical Infiltration Rate (ft/day)*, **** | 0.0475 |
| **Maximum Area for Unsaturated Infiltration ($ft^2$)** | 199146.2 |
| **Equivalent Pond Length (ft)** | 500 |
| **Equivalent Pond Width (ft)** | 390 |
| * Hydraulic conductivity values include a factor of safety of 2 based on the field test results. | |
| ** Unsaturated vertical Infiltration rate is 1/2 the field tested Horizontal Saturated Hydraulic Conductivity rate. | |

***Stage vs Area Data for STAGING AREA 5 – BASIN I***

| Stage (ft) | Area ($ft^2$) |
|---|---|
| 195 | 199146.2 |
| 195.5 | 199146.2 |

***Stormwater Input Data***

| | | |
|---|---|---|
| **STAGING AREA NO. 5 BASIN I** | **Hydrograph Type** | slug load |
| | **Treatment Volume ($ft^3$)** | 35283.6 |

**Stormwater Recovery Analysis – Staging Area No. 5 – Basin I (Pond)**

The rock laydown area still contained 6,905.3 cubic feet of water at 72 hours. Therefore, that volume was allowed to recover in the stormwater pond.

*Average Soil and Groundwater Calculations*

Below are the average soil and groundwater calculations for the stormwater pond recovery analysis.

| **Staging Area No. 5** | | |
|---|---|---|
| **Basin I** | | |
| **Stormwater Pond** | | |
| **Low El. (ft)** | **High El. (ft)** | **Average El. (ft.)** |
| 183 | 190 | **186.5** |
| **Boring** | **Horizontal Saturated Hydraulic Conductivity (ft/day)*** | **Depth to SHWT (ft)** |
| PB-5-1 | 0.05 | 3.5 |
| PB-5-2 | 0.05 | 3 |
| PB-5-3 | 0.04 | 3 |
| PB-5-4 | 0.15 | 3 |
| IB-5-1 | 0.1 | 3 |
| IB-5-2 | 0.1 | 3 |
| IB-5-3 | 0.15 | 3 |
| IB-5-4 | 0.05 | 3 |
| IB-5-5 | 0.1 | 3 |
| IB-5-6 | 0.1 | 3 |
| IB-5-7 | 0.05 | 3.5 |
| IB-5-8 | 0.2 | 3.5 |
| **AVG.** | **0.1** | **3.125** |
| **Average SHWT Elevation (ft)** | | **183.38** |
| * Hydraulic conductivity values include a factor of safety of 2 based on the field test results. | | |

*Model Input Parameters*

Below are the input parameters used for the stormwater pond recovery analysis.

***Aquifer and Geometry Data***

| Input Parameter | STAGING AREA NO.5 - POND |
|---|---|
| Base of Aquifer Elevation (feet) | 182.38 |
| Water Table Elevation (feet) | 183.38 |
| Horizontal Saturated Hydraulic Conductivity (ft/day)* | 0.1 |
| Fillable Porosity (%) | 25 |
| Unsaturated Vertical Infiltration Rate (ft/day)* | 0.0475 |
| Maximum Area for Unsaturated Infiltration ($ft^2$) | 56901 |
| Equivalent Pond Length (ft) | 280 |
| Equivalent Pond Width (ft) | 200 |
| * Hydraulic conductivity values include a factor of safety of 2 based on the field test results. | |
| ** Unsaturated vertical Infiltration rate is 1/2 the field tested Horizontal Saturated Hydraulic Conductivity rate. | |

***Stage vs Area Data for STAGING AREA 5 – POND***

| Stage (ft) | Area ($ft^2$) |
|---|---|
| 187.5 | 56901.0 |
| 190 | 63315.0 |

***Stormwater Input Data***

| | | |
|---|---|---|
| STAGING AREA NO. 5 POND | Hydrograph Type | slug load |
| | Treatment Volume ($ft^3$) | 6905.3 |

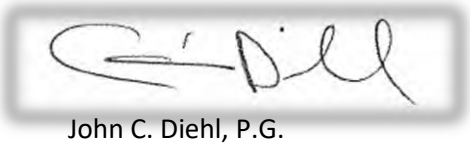
**Results**

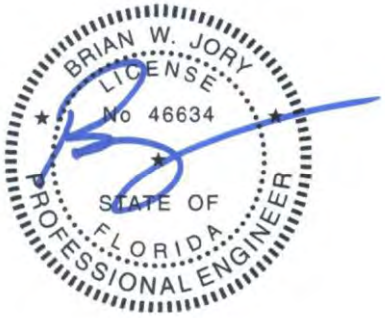
Based on the results of this analysis, the proposed crushed rock laydown area and stormwater pond recover the associated treatment volume within 72 hours as a combined system.

**Closing**

We appreciate the opportunity to be of service to you on this project and look forward to a continued relationship. Should you have any questions or concerns regarding this report, please feel free to call us at (407) 342-1443.

Sincerely,
**Native Geoscience, Inc.**
Certificate of Authorization No. 30474






John C. Diehl, P.G.
Principal Geologist
P.G. 2460

Brian W. Jory, P.E.
Principal Engineer
P.E. 46634
3/13/20

**Attachments:**

- PONDS Output – Staging Area No. 5 – Basin I – Rock Voids (7 pages)
- PONDS Output – Staging Area No. 5 – Basin I – Pond (7 pages)

**PONDS Version 3.3.0278**
**Retention Pond Recovery - Refined Method**
**Copyright 2012**
**Devo Seereeram, Ph.D., P.E.**

## Project Data

| | |
|---|---|
| Project Name: | NFRC Staging Area |
| Simulation Description: | Staging Area No. 5 - Basin I - Rock Voids |
| Project Number: | BJR 19-198A |
| Engineer : | CW |
| Supervising Engineer: | JCD |
| Date: | 03-11-2020 |

## Aquifer Data

| | |
|---|---|
| Base Of Aquifer Elevation, [B] (ft datum): | 190.00 |
| Water Table Elevation, [WT] (ft datum): | 191.88 |
| Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): | 0.10 |
| Fillable Porosity, [n] (%): | 25.00 |
| Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): | 0.0475 |
| Maximum Area For Unsaturated Infiltration, [Av] (ft²): | 199146.2 |

## Geometry Data

| | |
|---|---|
| Equivalent Pond Length, [L] (ft): | 500.0 |
| Equivalent Pond Width, [W] (ft): | 390.0 |

Ground water mound is expected to intersect the pond bottom

## Stage vs Area Data

| Stage (ft datum) | Area (ft²) |
|---|---|
| 195.00 | 199146.2 |
| 195.50 | 199146.2 |

## Ditch Data

Ditch (or interceptor trench) parallel to length axis is inactive

Ditch (or interceptor trench) parallel to width axis is inactive

## Discharge Structures

**Discharge Structure #1 is inactive**

**Discharge Structure #2 is inactive**

## Discharge Structures (cont'd.)

**Discharge Structure #3 is inactive**

## Scenario Input Data

*Scenario 1 :: 35283.6 ft³ slug load*

Hydrograph Type: Slug Load
Modflow Routing: Routed with infiltration

Treatment Volume (ft³) 35283.6

Initial ground water level (ft datum) 191.88 (default)

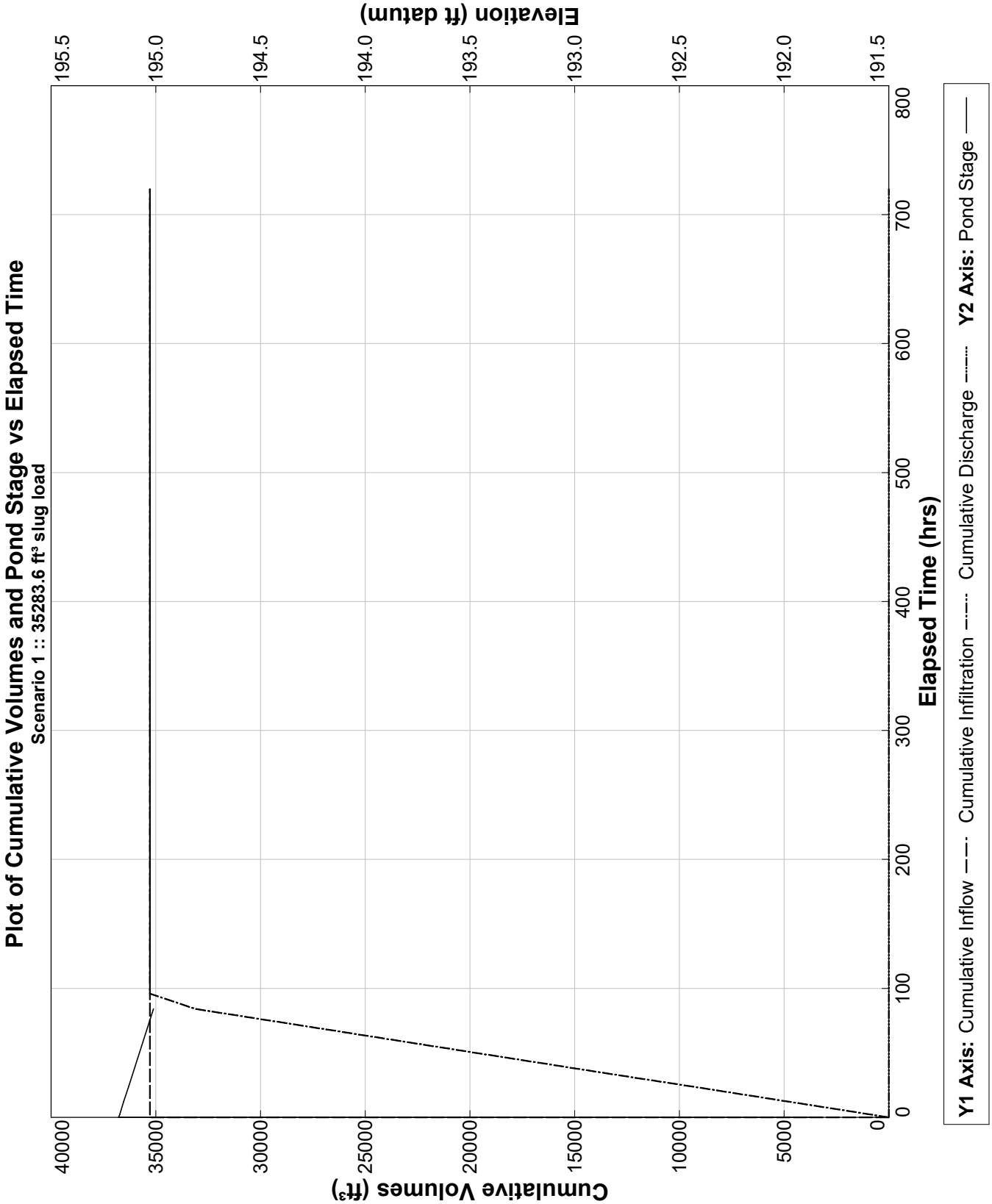
| Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) |
|---|---|---|---|---|
| 0.100 | 4.000 | 8.500 | 16.000 | 25.000 |
| 0.250 | 4.500 | 9.000 | 17.000 | 26.000 |
| 0.500 | 5.000 | 9.500 | 18.000 | 27.000 |
| 1.000 | 5.500 | 10.000 | 19.000 | 28.000 |
| 1.500 | 6.000 | 11.000 | 20.000 | 29.000 |
| 2.000 | 6.500 | 12.000 | 21.000 | 30.000 |
| 2.500 | 7.000 | 13.000 | 22.000 | |
| 3.000 | 7.500 | 14.000 | 23.000 | |
| 3.500 | 8.000 | 15.000 | 24.000 | |

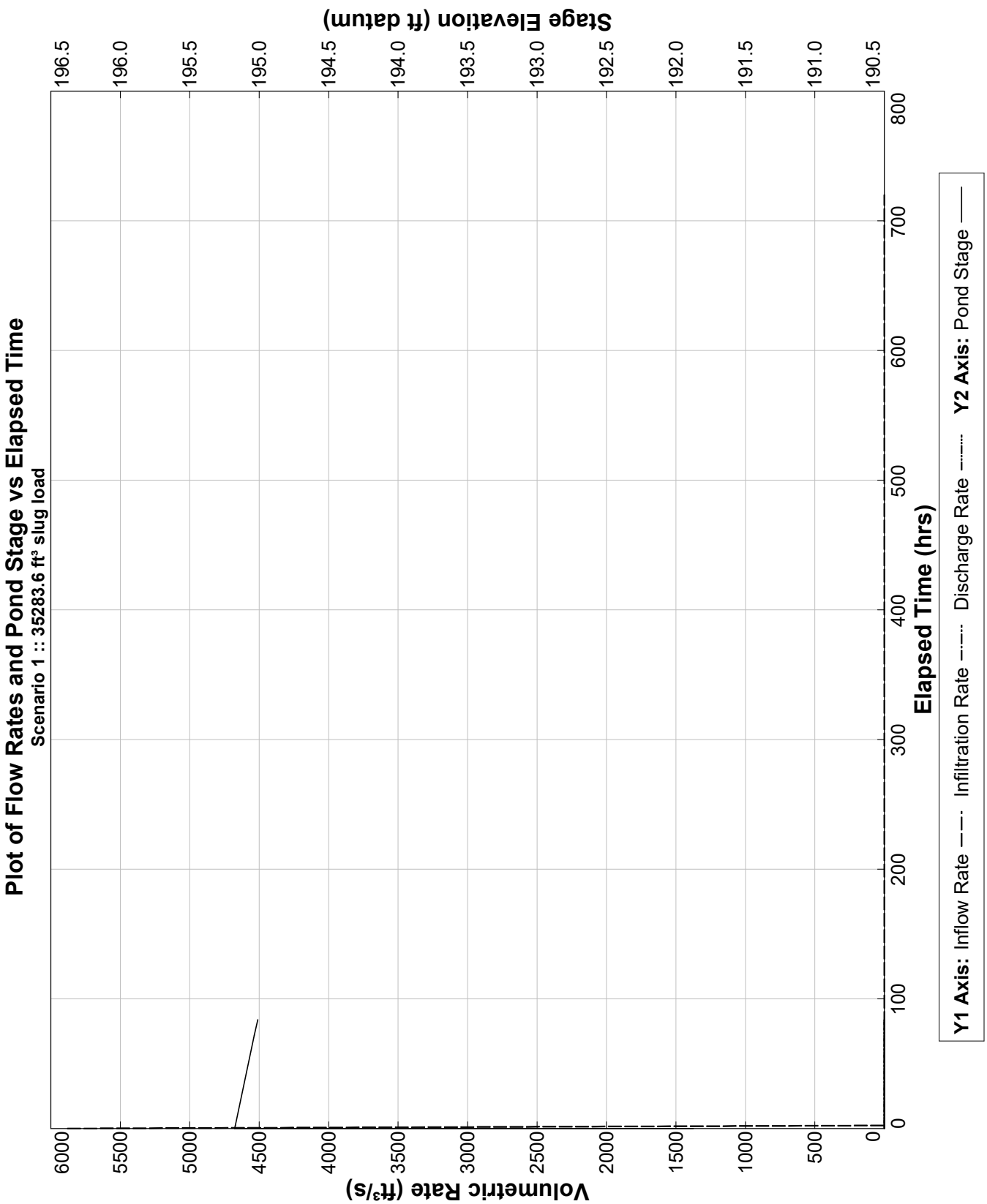
## Detailed Results *:: Scenario 1 :: 35283.6 ft³ slug load*

| Elapsed Time (hours) | Instantaneous Inflow Rate (ft³/s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft³/s) | Combined Instantaneous Discharge Rate (ft³/s) | Cumulative Inflow Volume (ft³) | Cumulative Infiltration Volume (ft³) | Combined Cumulative Discharge (ft³) | Flow Type |
|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 5880.6000 | 0.00000 | 191.87500 | 0.00000 | 0 | 0.000 | 0.0 | 0 | N.A. |
| 0.002 | 5880.6000 | 0.00000 | 195.17720 | 0.10948 | 0 | 35283.600 | 0.7 | 0 | U/P |
| 2.400 | 0.0000 | 0.00000 | 195.17240 | 0.10948 | 0 | 35283.600 | 945.9 | 0 | U/P |
| 6.000 | 0.0000 | 0.00000 | 195.16530 | 0.10948 | 0 | 35283.600 | 2364.9 | 0 | U/P |
| 12.000 | 0.0000 | 0.00000 | 195.15340 | 0.10948 | 0 | 35283.600 | 4729.7 | 0 | U/P |
| 24.000 | 0.0000 | 0.00000 | 195.12970 | 0.10948 | 0 | 35283.600 | 9459.4 | 0 | U/P |
| 36.000 | 0.0000 | 0.00000 | 195.10590 | 0.10948 | 0 | 35283.600 | 14189.2 | 0 | U/P |
| 48.000 | 0.0000 | 0.00000 | 195.08220 | 0.10948 | 0 | 35283.600 | 18918.9 | 0 | U/P |
| 60.000 | 0.0000 | 0.00000 | 195.05840 | 0.10948 | 0 | 35283.600 | 23648.6 | 0 | U/P |
| 72.000 | 0.0000 | 0.00000 | 195.03470 | 0.10948 | 0 | 35283.600 | 28378.3 | 0 | U/P |
| 84.000 | 0.0000 | 0.00000 | 195.01090 | 0.05474 | 0 | 35283.600 | 33108.1 | 0 | U/P |
| 96.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 108.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 120.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 132.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 144.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 156.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 168.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 180.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 192.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 204.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 216.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 228.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 240.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 264.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 288.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 312.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 336.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 360.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 384.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 408.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 432.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 456.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 480.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 504.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 528.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 552.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 576.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 600.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 624.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 648.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 672.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 696.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |
| 720.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 35283.600 | 35283.6 | 0 | dry |

**Summary of Results** *:: Scenario 1 :: 35283.6 ft³ slug load*

| | Time (hours) | Stage (ft datum) | Rate (ft³/s) | Volume (ft³) |
|---|---|---|---|---|
| Stage | | | | |
| Minimum | 0.000 | 191.88 | | |
| Maximum | 0.002 | 195.18 | | |
| Inflow | | | | |
| Rate - Maximum - Positive | 0.002 | | 5880.6000 | |
| Rate - Maximum - Negative | None | | None | |
| Cumulative Volume - Maximum Positive | 0.002 | | | 35283.6 |
| Cumulative Volume - Maximum Negative | None | | | None |
| Cumulative Volume - End of Simulation | 720.000 | | | 35283.6 |
| Infiltration | | | | |
| Rate - Maximum - Positive | 0.002 | | 0.1095 | |
| Rate - Maximum - Negative | None | | None | |
| Cumulative Volume - Maximum Positive | 84.000 | | | 33108.1 |
| Cumulative Volume - Maximum Negative | None | | | None |
| Cumulative Volume - End of Simulation | 720.000 | | | 35283.6 |
| 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 | 720.000 | | | 0.0 |
| Discharge Structure 1 - 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 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 | 195.11 | | 14189.2 |
| 72 Hour Stage and Infiltration Volume | 72.000 | 195.03 | | 28378.3 |


Plot of Cumulative Volumes and Pond Stage vs Elapsed Time
Scenario 1 :: 35283.6 ft³ slug load
Cumulative Volumes (ft³)
Elevation (ft datum)
Elapsed Time (hrs)
0
5000
10000
15000
20000
25000
30000
35000
40000
191.5
192.0
192.5
193.0
193.5
194.0
194.5
195.0
195.5
0
100
200
300
400
500
600
700
800
Y1 Axis: Cumulative Inflow
Cumulative Infiltration
Cumulative Discharge
Y2 Axis: Pond Stage


Plot of Flow Rates and Pond Stage vs Elapsed Time
Scenario 1 :: 35283.6 ft³ slug load
Volumetric Rate (ft³/s)
Stage Elevation (ft datum)
Elapsed Time (hrs)
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
190.5
191.0
191.5
192.0
192.5
193.0
193.5
194.0
194.5
195.0
195.5
196.0
196.5
0
100
200
300
400
500
600
700
800
Y1 Axis: Inflow Rate Infiltration Rate Discharge Rate
Y2 Axis: Pond Stage

**PONDS Version 3.3.0278**
**Retention Pond Recovery - Refined Method**
**Copyright 2012**
**Devo Seereeram, Ph.D., P.E.**

## Project Data

| | |
|---|---|
| Project Name: | NFRC Staging Area |
| Simulation Description: | Staging Area No. 5 - Basin I - Pond |
| Project Number: | BJR 19-198A |
| Engineer : | CW |
| Supervising Engineer: | JCD |
| Date: | 03-12-2020 |

## Aquifer Data

| | |
|---|---|
| Base Of Aquifer Elevation, [B] (ft datum): | 182.38 |
| Water Table Elevation, [WT] (ft datum): | 183.38 |
| Horizontal Saturated Hydraulic Conductivity, [Kh] (ft/day): | 0.10 |
| Fillable Porosity, [n] (%): | 25.00 |
| Unsaturated Vertical Infiltration Rate, [Iv] (ft/day): | 0.0475 |
| Maximum Area For Unsaturated Infiltration, [Av] (ft²): | 56901.0 |

## Geometry Data

| | |
|---|---|
| Equivalent Pond Length, [L] (ft): | 280.0 |
| Equivalent Pond Width, [W] (ft): | 200.0 |

Ground water mound is expected to intersect the pond bottom

## Stage vs Area Data

| Stage (ft datum) | Area (ft²) |
|---|---|
| 187.50 | 56901.0 |
| 190.00 | 63315.0 |

## Ditch Data

Ditch (or interceptor trench) parallel to length axis is inactive

Ditch (or interceptor trench) parallel to width axis is inactive

## Discharge Structures

**Discharge Structure #1 is inactive**

**Discharge Structure #2 is inactive**

## Discharge Structures (cont'd.)

**Discharge Structure #3 is inactive**

## Scenario Input Data

*Scenario 1 :: 6905.3 ft³ slug load*

Hydrograph Type: Slug Load
Modflow Routing: Routed with infiltration

Treatment Volume (ft³) 6905.3

Initial ground water level (ft datum) 183.38 (default)

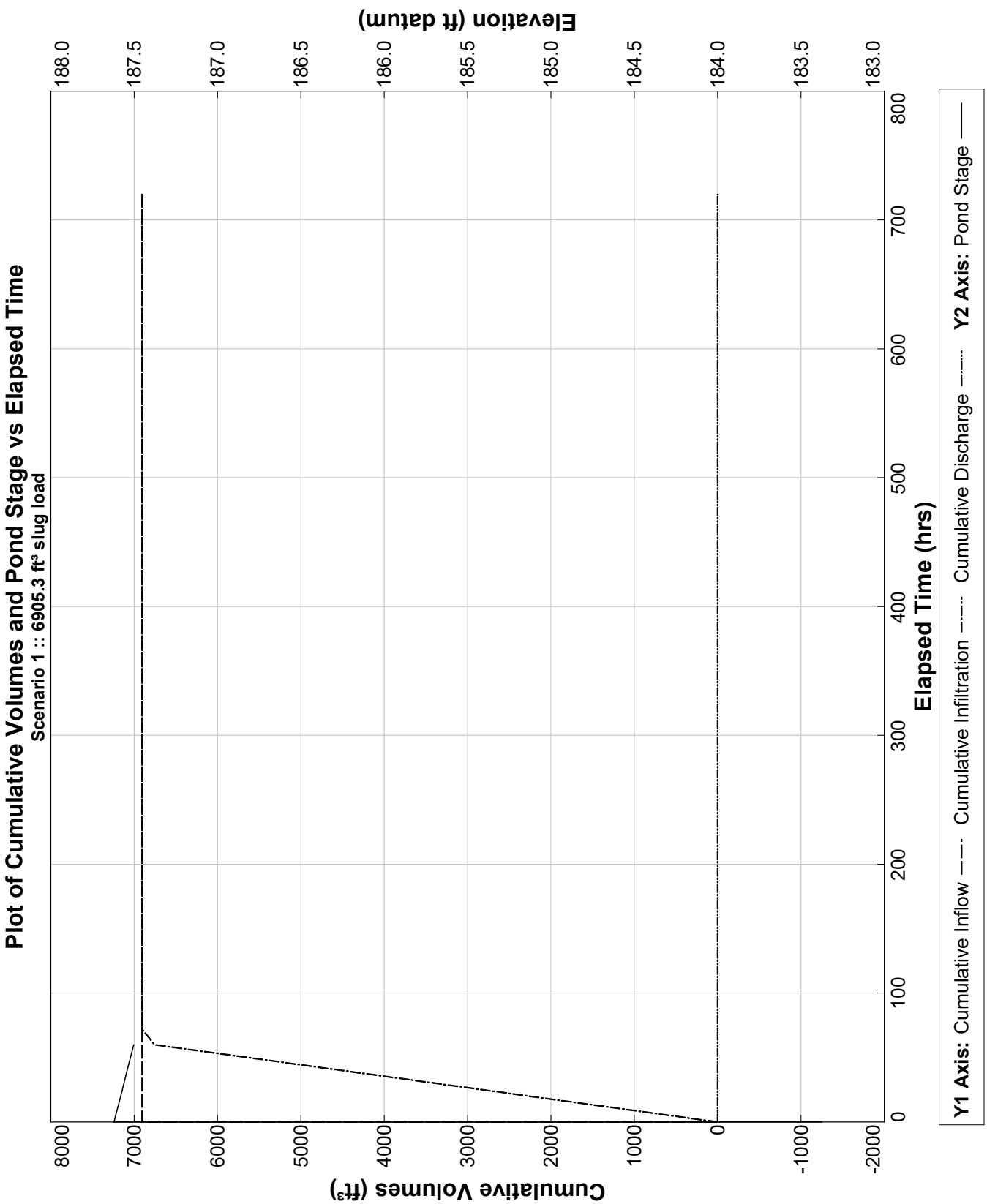
| Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) | Time After Storm Event (days) |
|---|---|---|---|---|
| 0.100 | 4.000 | 8.500 | 16.000 | 25.000 |
| 0.250 | 4.500 | 9.000 | 17.000 | 26.000 |
| 0.500 | 5.000 | 9.500 | 18.000 | 27.000 |
| 1.000 | 5.500 | 10.000 | 19.000 | 28.000 |
| 1.500 | 6.000 | 11.000 | 20.000 | 29.000 |
| 2.000 | 6.500 | 12.000 | 21.000 | 30.000 |
| 2.500 | 7.000 | 13.000 | 22.000 | |
| 3.000 | 7.500 | 14.000 | 23.000 | |
| 3.500 | 8.000 | 15.000 | 24.000 | |

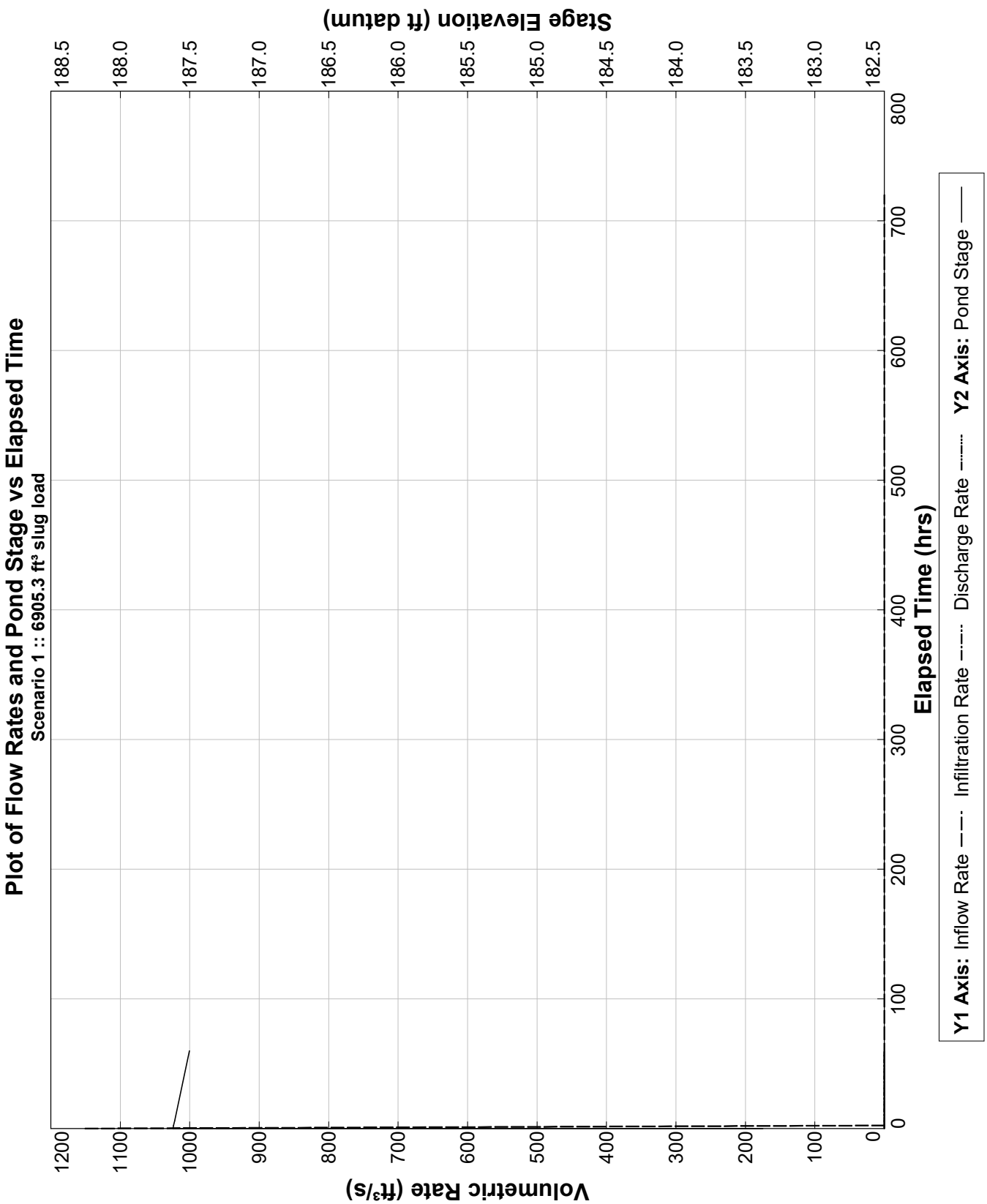
## Detailed Results *:: Scenario 1 :: 6905.3 ft³ slug load*

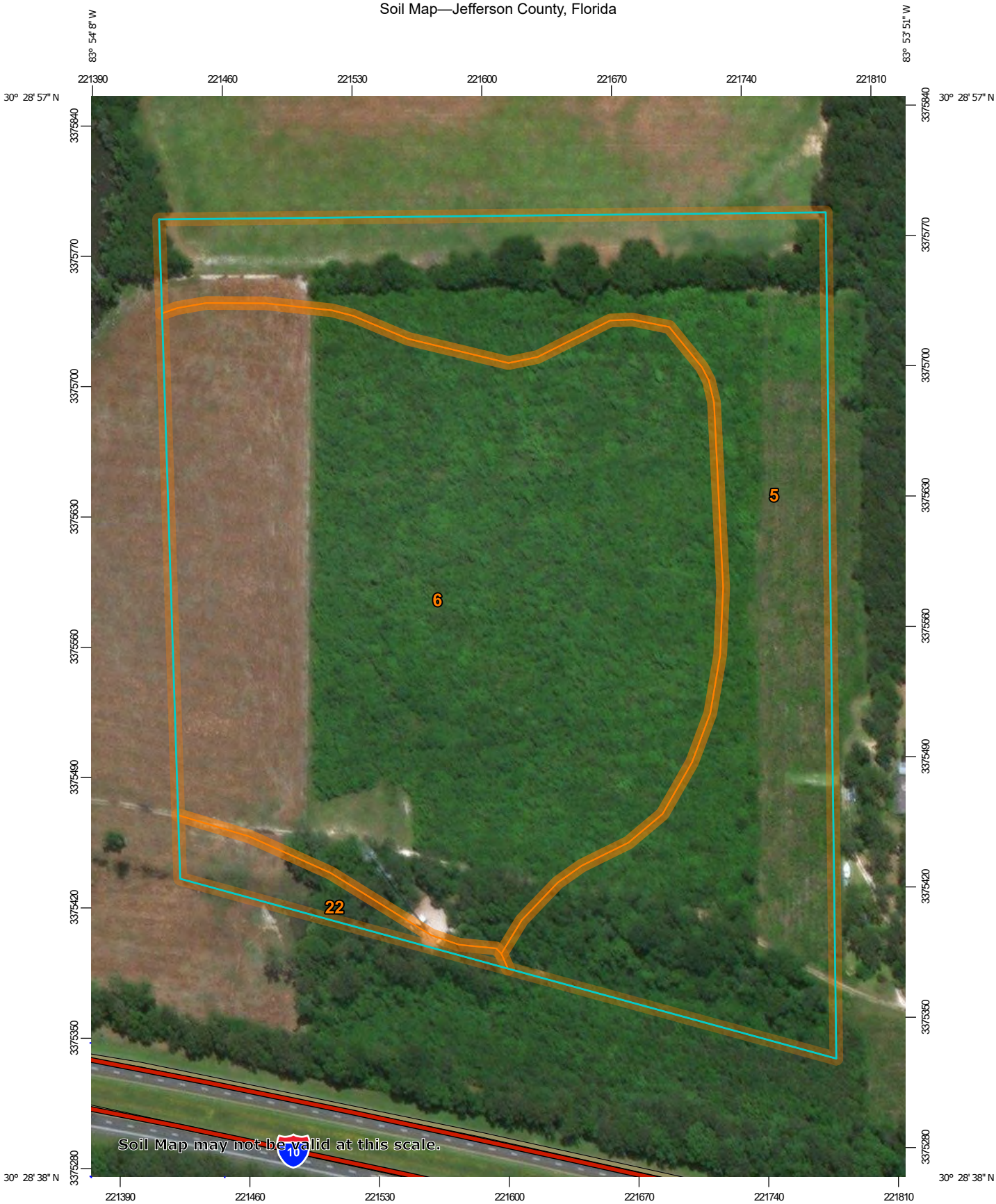
| Elapsed Time (hours) | Instantaneous Inflow Rate (ft³/s) | Outside Recharge (ft/day) | Stage Elevation (ft datum) | Infiltration Rate (ft³/s) | Combined Instantaneous Discharge Rate (ft³/s) | Cumulative Inflow Volume (ft³) | Cumulative Infiltration Volume (ft³) | Combined Cumulative Discharge (ft³) | Flow Type |
|---|---|---|---|---|---|---|---|---|---|
| 0.000 | 1150.8830 | 0.00000 | 183.37500 | 0.00000 | 0 | 0.000 | 0.0 | 0 | N.A. |
| 0.002 | 1150.8830 | 0.00000 | 187.62100 | 0.03128 | 0 | 6905.300 | 0.2 | 0 | U/P |
| 2.400 | 0.0000 | 0.00000 | 187.61630 | 0.03128 | 0 | 6905.300 | 270.3 | 0 | U/P |
| 6.000 | 0.0000 | 0.00000 | 187.60920 | 0.03128 | 0 | 6905.300 | 675.7 | 0 | U/P |
| 12.000 | 0.0000 | 0.00000 | 187.59740 | 0.03128 | 0 | 6905.300 | 1351.4 | 0 | U/P |
| 24.000 | 0.0000 | 0.00000 | 187.57370 | 0.03128 | 0 | 6905.300 | 2702.8 | 0 | U/P |
| 36.000 | 0.0000 | 0.00000 | 187.55000 | 0.03128 | 0 | 6905.300 | 4054.2 | 0 | U/P |
| 48.000 | 0.0000 | 0.00000 | 187.52630 | 0.03128 | 0 | 6905.300 | 5405.6 | 0 | U/P |
| 60.000 | 0.0000 | 0.00000 | 187.50260 | 0.01564 | 0 | 6905.300 | 6757.0 | 0 | U/P |
| 72.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 84.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 96.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 108.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 120.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 132.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 144.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 156.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 168.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 180.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 192.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 204.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 216.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 228.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 240.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 264.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 288.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 312.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 336.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 360.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 384.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 408.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 432.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 456.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 480.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 504.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 528.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 552.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 576.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 600.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 624.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 648.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 672.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 696.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |
| 720.000 | 0.0000 | 0.00000 | ---- | ---- | ---- | 6905.300 | 6905.3 | 0 | dry |

**Summary of Results** *:: Scenario 1 :: 6905.3 ft³ slug load*

| | Time (hours) | Stage (ft datum) | Rate (ft³/s) | Volume (ft³) |
|---|---|---|---|---|
| Stage | | | | |
| Minimum | 0.000 | 183.38 | | |
| Maximum | 0.002 | 187.62 | | |
| Inflow | | | | |
| Rate - Maximum - Positive | 0.002 | | 1150.8830 | |
| Rate - Maximum - Negative | None | | None | |
| Cumulative Volume - Maximum Positive | 0.002 | | | 6905.3 |
| Cumulative Volume - Maximum Negative | None | | | None |
| Cumulative Volume - End of Simulation | 720.000 | | | 6905.3 |
| Infiltration | | | | |
| Rate - Maximum - Positive | 0.002 | | 0.0313 | |
| Rate - Maximum - Negative | None | | None | |
| Cumulative Volume - Maximum Positive | 60.000 | | | 6757.0 |
| Cumulative Volume - Maximum Negative | None | | | None |
| Cumulative Volume - End of Simulation | 720.000 | | | 6905.3 |
| 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 | 720.000 | | | 0.0 |
| Discharge Structure 1 - 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 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 | 187.55 | | 4054.2 |
| 72 Hour Stage and Infiltration Volume | 72.000 | Dry | | 6905.3 |


Plot of Cumulative Volumes and Pond Stage vs Elapsed Time
Scenario 1 :: 6905.3 ft³ slug load
Cumulative Volumes (ft³)
Elevation (ft datum)
Elapsed Time (hrs)
8000
7000
6000
5000
4000
3000
2000
1000
0
-1000
-2000
188.0
187.5
187.0
186.5
186.0
185.5
185.0
184.5
184.0
183.5
183.0
0
100
200
300
400
500
600
700
800
Y1 Axis: Cumulative Inflow
Cumulative Infiltration
Cumulative Discharge
Y2 Axis: Pond Stage


Plot of Flow Rates and Pond Stage vs Elapsed Time
Scenario 1 :: 6905.3 ft³ slug load
Volumetric Rate (ft³/s)
Stage Elevation (ft datum)
Elapsed Time (hrs)
0
100
200
300
400
500
600
700
800
100
200
300
400
500
600
700
800
900
1000
1100
1200
182.5
183.0
183.5
184.0
184.5
185.0
185.5
186.0
186.5
187.0
187.5
188.0
188.5
Y1 Axis: Inflow Rate Infiltration Rate Discharge Rate
Y2 Axis: Pond Stage




Map Scale: 1:2,830 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 40 80 160 240

Feet
0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

## MAP LEGEND

**Area of Interest (AOI)**

- Area of Interest (AOI)

**Soils**

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

**Special Point Features**

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

**Water Features**

- Streams and Canals

**Transportation**

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

**Background**

- Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Jefferson County, Florida
Survey Area Data: Version 16, Sep 16, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 1, 2011—Mar 10, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

# Map Unit Legend

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|---|---|---|---|
| 5 | Fuquay fine sand, 0 to 5 percent slopes | 13.6 | 38.2% |
| 6 | Dothan loamy fine sand, 2 to 5 percent slopes | 21.1 | 59.2% |
| 22 | Plummer fine sand | 0.9 | 2.6% |
| **Totals for Area of Interest** | | **35.7** | **100.0%** |

# Jefferson County, Florida

## 5—Fuquay fine sand, 0 to 5 percent slopes

### Map Unit Setting

*National map unit symbol:* 2tdqg
*Elevation:* 100 to 450 feet
*Mean annual precipitation:* 40 to 69 inches
*Mean annual air temperature:* 55 to 70 degrees F
*Frost-free period:* 190 to 310 days
*Farmland classification:* Farmland of local importance

### Map Unit Composition

*Fuquay and similar soils:* 85 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Fuquay

#### Setting

*Landform:* Ridges
*Landform position (two-dimensional):* Shoulder, summit
*Landform position (three-dimensional):* Interfluve
*Down-slope shape:* Convex
*Across-slope shape:* Linear
*Parent material:* Sandy marine deposits over loamy marine deposits

#### Typical profile

*Ap - 0 to 7 inches:* fine sand
*E1 - 7 to 23 inches:* fine sand
*E2 - 23 to 37 inches:* fine sand
*Btv1 - 37 to 43 inches:* sandy loam
*Btv2 - 43 to 54 inches:* sandy clay loam
*Btv3 - 54 to 80 inches:* sandy clay loam

#### Properties and qualities

*Slope:* 0 to 5 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Well drained
*Runoff class:* Very low
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.57 in/hr)
*Depth to water table:* About 43 to 54 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
*Sodium adsorption ratio, maximum in profile:* 4.0
*Available water storage in profile:* Moderate (about 6.7 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 4e
*Hydrologic Soil Group:* A
*Forage suitability group:* Sandy over loamy soils on knolls and ridges of mesic uplands (G133AA211FL)
*Hydric soil rating:* No

**Minor Components**

**Bonifay**

*Percent of map unit:* 5 percent
*Landform:* Knolls on marine terraces, ridges on marine terraces
*Landform position (two-dimensional):* Summit, backslope, shoulder
*Landform position (three-dimensional):* Interfluve
*Down-slope shape:* Convex
*Across-slope shape:* Convex, linear
*Hydric soil rating:* No

**Lucy**

*Percent of map unit:* 5 percent
*Landform:* Broad interstream divides
*Landform position (two-dimensional):* Backslope, summit, shoulder
*Landform position (three-dimensional):* Interfluve, rise
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Dothan**

*Percent of map unit:* 3 percent
*Landform:* Interfluves
*Landform position (two-dimensional):* Summit
*Landform position (three-dimensional):* Interfluve
*Down-slope shape:* Convex
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Miccosukee**

*Percent of map unit:* 2 percent
*Landform:* Depressions on flats
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Dip, talf
*Down-slope shape:* Convex, concave
*Across-slope shape:* Linear, concave
*Hydric soil rating:* No

# Data Source Information

Soil Survey Area: Jefferson County, Florida
Survey Area Data: Version 16, Sep 16, 2019

# Jefferson County, Florida

## 6—Dothan loamy fine sand, 2 to 5 percent slopes

**Map Unit Setting**

*National map unit symbol:* 2tdqb
*Elevation:* 100 to 400 feet
*Mean annual precipitation:* 40 to 69 inches
*Mean annual air temperature:* 55 to 70 degrees F
*Frost-free period:* 190 to 310 days
*Farmland classification:* All areas are prime farmland

**Map Unit Composition**

*Dothan and similar soils:* 80 percent
*Minor components:* 20 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Dothan**

**Setting**

*Landform:* Interfluves
*Landform position (two-dimensional):* Summit
*Landform position (three-dimensional):* Interfluve
*Down-slope shape:* Convex
*Across-slope shape:* Linear
*Parent material:* Loamy marine deposits derived from sedimentary rock

**Typical profile**

*Ap - 0 to 9 inches:* loamy fine sand
*Bt1 - 9 to 17 inches:* fine sandy loam
*Bt2 - 17 to 49 inches:* sandy clay loam
*Btv1 - 49 to 62 inches:* sandy clay loam
*Btv2 - 62 to 80 inches:* sandy clay loam

**Properties and qualities**

*Slope:* 2 to 5 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Well drained
*Runoff class:* Very low
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.57 in/hr)
*Depth to water table:* About 39 to 55 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
*Available water storage in profile:* Moderate (about 7.4 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 2e
*Hydrologic Soil Group:* B
*Forage suitability group:* Loamy and clayey soils on rises and knolls of mesic uplands (G133AA321FL)
*Hydric soil rating:* No

**Minor Components**

**Fuquay**
*Percent of map unit:* 5 percent
*Landform:* Hillslopes
*Landform position (two-dimensional):* Shoulder
*Landform position (three-dimensional):* Interfluve
*Down-slope shape:* Convex
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Nankin**
*Percent of map unit:* 5 percent
*Landform:* Broad interstream divides
*Landform position (two-dimensional):* Backslope, shoulder, summit
*Landform position (three-dimensional):* Interfluve, side slope
*Down-slope shape:* Convex
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Cowarts**
*Percent of map unit:* 5 percent
*Landform:* Interfluves
*Landform position (two-dimensional):* Backslope, shoulder, summit
*Landform position (three-dimensional):* Interfluve, side slope
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Clarendon**
*Percent of map unit:* 5 percent
*Landform:* Flats on broad interstream divides
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

# Data Source Information

Soil Survey Area: Jefferson County, Florida
Survey Area Data: Version 16, Sep 16, 2019

# Jefferson County, Florida

## 22—Plummer fine sand

### Map Unit Setting

*National map unit symbol:* rhx9
*Elevation:* 10 to 450 feet
*Mean annual precipitation:* 54 to 62 inches
*Mean annual air temperature:* 63 to 70 degrees F
*Frost-free period:* 234 to 264 days
*Farmland classification:* Not prime farmland

### Map Unit Composition

*Plummer, hydric, and similar soils:* 65 percent
*Plummer, non-hydric, and similar soils:* 20 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Plummer, Hydric

#### Setting

*Landform:* Flats on marine terraces
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Sandy and loamy marine deposits

#### Typical profile

*A - 0 to 6 inches:* fine sand
*Eg - 6 to 69 inches:* fine sand
*Btg - 69 to 80 inches:* sandy clay loam

#### Properties and qualities

*Slope:* 0 to 2 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Poorly drained
*Runoff class:* Very low
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)
*Depth to water table:* About 0 to 6 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
*Sodium adsorption ratio, maximum in profile:* 4.0
*Available water storage in profile:* Moderate (about 7.2 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 4w
*Hydrologic Soil Group:* A/D

*Forage suitability group:* sandy soils on flats of mesic or hydric lowlands (G133AA141FL)
*Hydric soil rating:* Yes

### Description of Plummer, Non-hydric

#### Setting

*Landform:* Flats on marine terraces
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Sandy and loamy marine deposits

#### Typical profile

*A - 0 to 6 inches:* fine sand
*Eg - 6 to 69 inches:* fine sand
*Btg - 69 to 80 inches:* sandy clay loam

#### Properties and qualities

*Slope:* 0 to 2 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Poorly drained
*Runoff class:* Very low
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)
*Depth to water table:* About 6 to 18 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
*Sodium adsorption ratio, maximum in profile:* 4.0
*Available water storage in profile:* Moderate (about 7.2 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 4w
*Hydrologic Soil Group:* A/D
*Forage suitability group:* sandy soils on flats of mesic or hydric lowlands (G133AA141FL)
*Hydric soil rating:* No

### Minor Components

#### Pelham

*Percent of map unit:* 7 percent
*Landform:* Flats on marine terraces
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Convex
*Across-slope shape:* Linear
*Hydric soil rating:* No

#### Sapelo

*Percent of map unit:* 5 percent
*Landform:* Flatwoods on marine terraces

*Landform position (three-dimensional):* Talf
*Down-slope shape:* Convex
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Surrency**

*Percent of map unit:* 3 percent
*Landform:* Depressions on marine terraces
*Landform position (three-dimensional):* Dip
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

# Data Source Information

Soil Survey Area: Jefferson County, Florida
Survey Area Data: Version 16, Sep 16, 2019

# FIELD TESTING STANDARDS AND PROCEDURES

***Standard Penetration Test (SPT) Boring***

The SPT borings were advanced by means of a truck or track mounted drill rig employing wet rotary drilling techniques. The SPT testing was performed continuously in the upper ten feet and at five-foot intervals thereafter. The soil samples were obtained at the depths where the SPT testing was performed. The soil samples were then classified in the field, placed in sealed containers, and returned to our laboratory for further evaluation by a geotechnical engineer.

The SPT borings were performed in general compliance with standard field penetration test procedures (ASTM D 1586-99). After drilling to the sampling depth and flushing the borehole, the standard two-inch O.D. split-barrel sampler was seated by driving it six inches into the undisturbed soil at the bottom of the borehole. The sampler was then driven an additional 12 inches by a 140-pound hammer falling 30 inches. The number of blows required to produce the 12 inches of penetration is recorded as the standard penetration test value (N). These values are plotted on the left side of the boring log Figure 3.

In the upper ten feet sampling was performed by driving the split-barrel sampler 24 inches and the blows required to drive the sampler the middle two 6-inch increments were recorded as the "N" value. Through this technique, the upper ten feet of the soil was sampled continuously. Detailed descriptions of the soils encountered during the advancement of the SPT boring are presented in the Boring Logs.

***Soil Sample Handling and Classification***

The soil samples obtained from the SPT borings were placed in sealed containers to retain moisture and returned to our laboratory. The samples were then reviewed by a geotechnical engineer to confirm classifications, visually estimate the relative percentages of the soil's constituents (sand, clay, etc.), and identify pertinent structural features. We visually classified the soils according to the Unified Soil Classification System (ASTM D 2487). The stratification lines shown on the boring logs in Figure 3 represent our interpretation of approximate boundaries between soil types. The transition between strata may be gradual. Our classifications are based on a visual estimation of the soil properties and our engineering experience with the soils found in this geologic area.

The SPT "N" values are presented adjacent along the left side of the boring logs. The correlation of the SPT "N" values with relative density, unconfined compressive strength, and consistency are provided in the following table:

| **Coarse-Grained Soils** | | **Fine Grained Soils** | | |
|---|---|---|---|---|
| Penetration Resistance N (blows/ft) | Relative Density of Sand | Penetration Resistance N (blows/ft) | Unconfined Compressive Strength of Clay (tons/ft$^2$) | Consistency of Clay |
| 0-4 | Very Loose | <2 | <0.25 | Very Soft |
| 4-10 | Loose | 2-4 | 0.25-0.50 | Soft |
| 10-30 | Medium-Dense | 4-8 | 0.50-1.00 | Medium |
| 30-50 | Dense | 8-15 | 1.00-2.00 | Stiff |
| >50 | Very Dense | 15-30 | 2.00-4.00 | Very Stiff |
| | | >30 | >4.00 | Hard |

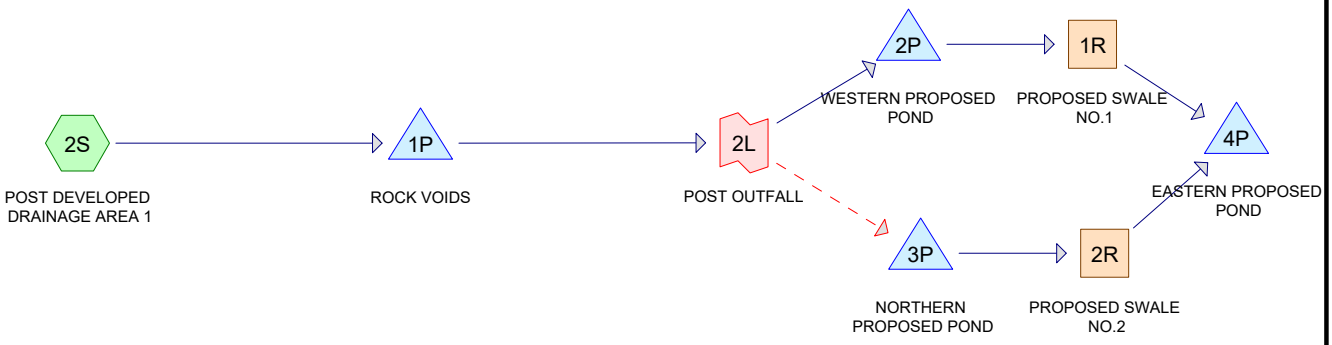
***Hand Auger Borings***

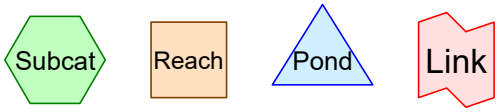
The auger borings were performed with a manually advanced hand auger. The auger was advanced by rotating it into the ground in approximate 6-inch increments. After each incremental penetration, the auger was retracted, and the soils collected in the auger bucket were placed in sealed containers. The samples were then reviewed by a geotechnical engineer and classified as described above. Detailed descriptions of the soils encountered in the auger borings are presented in the Auger Boring Logs.

# Appendix B – HydroCAD Report

**PRE-DEVELOPED SITE**


**POST DEVELOPED SITE**



Time span=5.00-20.00 hrs, dt=0.20 hrs, 76 points
Runoff by SCS TR-20 method, UH=Georgia-323, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment1S: PRE DEVELOPED** Runoff Area=813,644 sf 0.00% Impervious Runoff Depth>2.78"
Flow Length=809' Slope=0.0280 '/' Tc=29.2 min CN=58 Runoff=30.37 cfs 4.324 af

**Subcatchment2S: POST DEVELOPED** Runoff Area=813,644 sf 0.00% Impervious Runoff Depth>3.64"
Flow Length=508' Slope=0.0197 '/' Tc=19.5 min CN=66 Runoff=47.32 cfs 5.672 af

**Reach 1R: PROPOSED SWALE NO.1** Avg. Flow Depth=0.54' Max Vel=4.45 fps Inflow=14.72 cfs 1.258 af
n=0.035 L=85.3' S=0.0410 '/' Capacity=51.80 cfs Outflow=13.88 cfs 1.258 af

**Reach 2R: PROPOSED SWALE NO.2** Avg. Flow Depth=1.02' Max Vel=2.44 fps Inflow=21.07 cfs 2.395 af
n=0.035 L=86.0' S=0.0058 '/' Capacity=19.50 cfs Outflow=19.76 cfs 2.392 af

**Pond 1P: ROCK VOIDS** Peak Elev=196.53' Storage=39,829 cf Inflow=47.32 cfs 5.672 af
Discarded=0.13 cfs 0.112 af Primary=59.45 cfs 4.654 af Outflow=59.58 cfs 4.766 af

**Pond 2P: WESTERN PROPOSED POND** Peak Elev=192.95' Storage=20,536 cf Inflow=20.81 cfs 1.629 af
Outflow=14.72 cfs 1.258 af

**Pond 3P: NORTHERN PROPOSED POND** Peak Elev=190.06' Storage=40,646 cf Inflow=38.64 cfs 3.025 af
Outflow=21.07 cfs 2.395 af

**Pond 4P: EASTERN PROPOSED POND** Peak Elev=188.77' Storage=74,583 cf Inflow=33.50 cfs 3.649 af
Discarded=0.01 cfs 0.009 af Primary=7.01 cfs 2.079 af Outflow=7.02 cfs 2.088 af

**Link 1L: EXISTING OUTFALL LOCATION** Inflow=30.37 cfs 4.324 af
Primary=30.37 cfs 4.324 af

**Link 2L: POST OUTFALL** x 0.35 Inflow=59.45 cfs 4.654 af
Primary=20.81 cfs 1.629 af Secondary=38.64 cfs 3.025 af

## Summary for Subcatchment 1S: PRE DEVELOPED DRAINAGE AREA 1

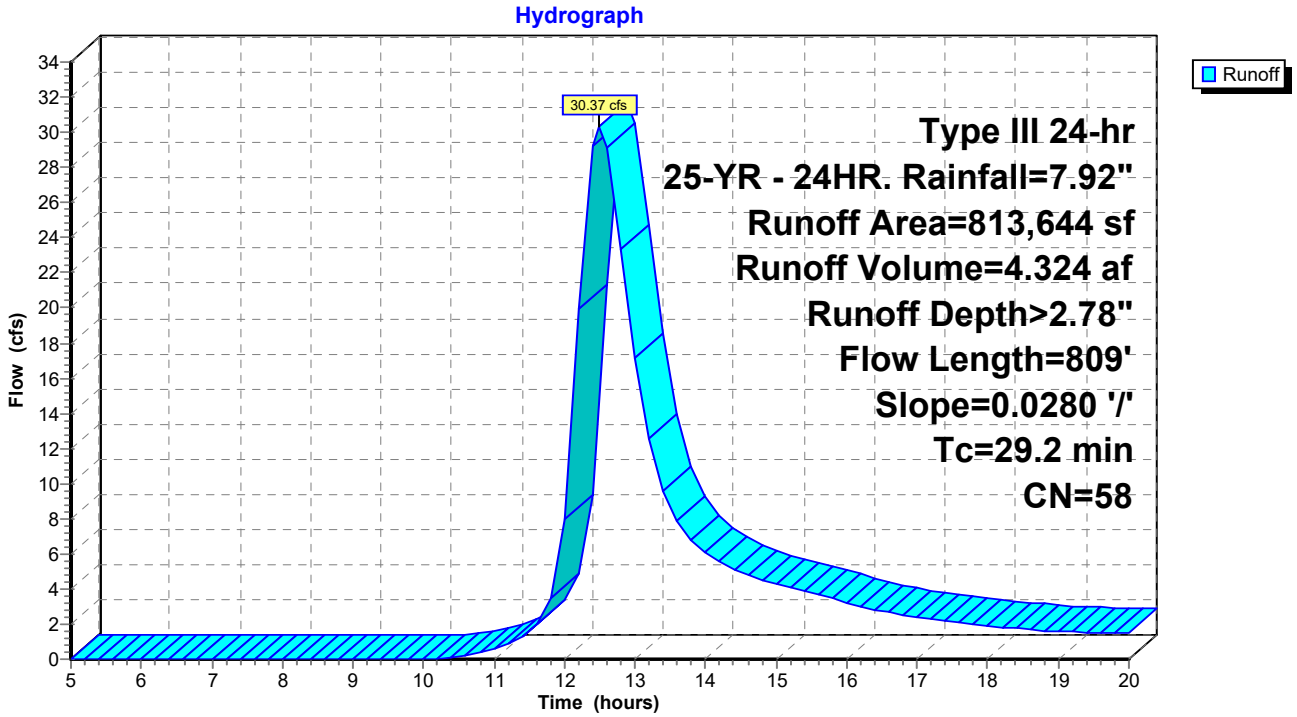
Runoff = 30.37 cfs @ 12.50 hrs, Volume= 4.324 af, Depth> 2.78"

Runoff by SCS TR-20 method, UH=Georgia-323, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.20 hrs
Type III 24-hr 25-YR - 24HR. Rainfall=7.92"

| Area (sf) | CN | Description |
|---|---|---|
| 813,644 | 58 | Meadow, non-grazed, HSG B |
| 813,644 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 29.2 | 809 | 0.0280 | 0.46 | | **Lag/CN Method, Staging Area No.2** |

## Subcatchment 1S: PRE DEVELOPED DRAINAGE AREA 1



## Summary for Subcatchment 2S: POST DEVELOPED DRAINAGE AREA 1

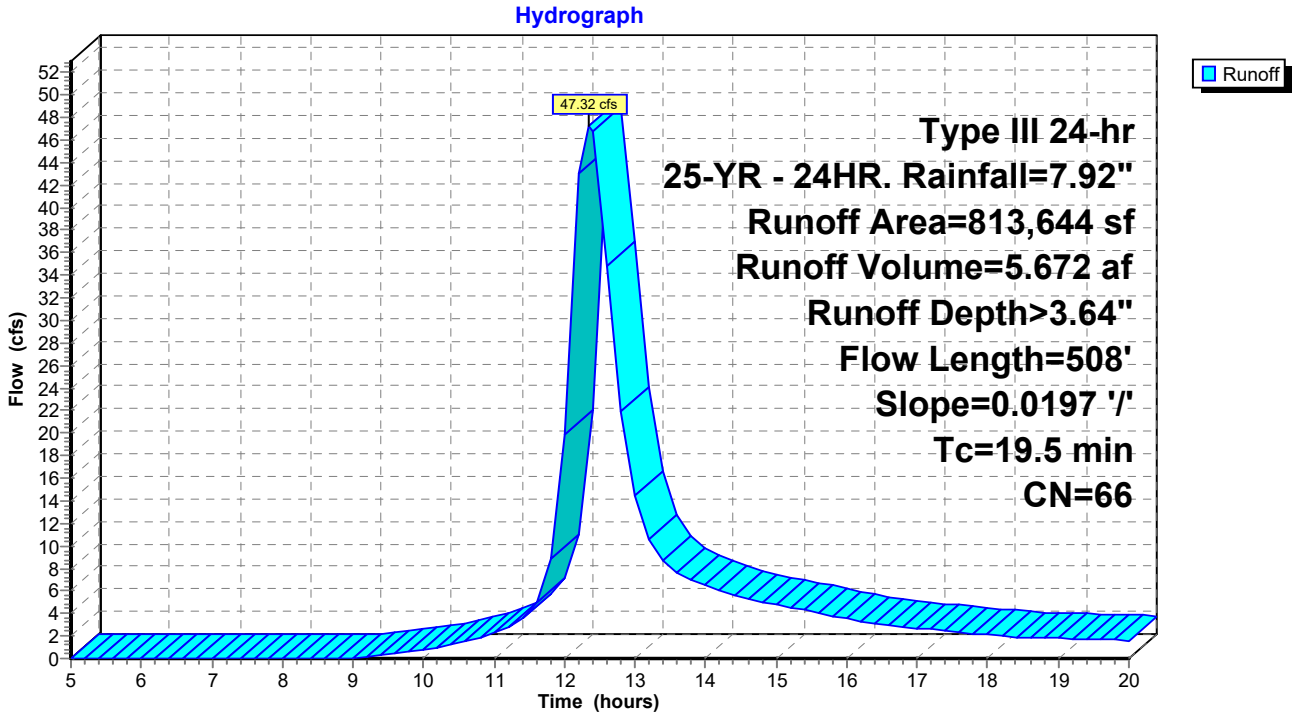
Runoff = 47.32 cfs @ 12.35 hrs, Volume= 5.672 af, Depth> 3.64"

Runoff by SCS TR-20 method, UH=Georgia-323, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.20 hrs
Type III 24-hr 25-YR - 24HR. Rainfall=7.92"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 79,939 | 85 | Gravel roads, HSG B |
| | 164,716 | 58 | Meadow, non-grazed, HSG B |
| * | 568,989 | 65 | Uncompacted Gravel (35% Void Ratio) |
| | 813,644 | 66 | Weighted Average |
| | 813,644 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 19.5 | 508 | 0.0197 | 0.43 | | **Lag/CN Method,** |

## Subcatchment 2S: POST DEVELOPED DRAINAGE AREA 1



## Summary for Reach 1R: PROPOSED SWALE NO.1

Inflow Area = 18.679 ac, 0.00% Impervious, Inflow Depth > 0.81" for 25-YR - 24HR. event
Inflow = 14.72 cfs @ 12.65 hrs, Volume= 1.258 af
Outflow = 13.88 cfs @ 12.66 hrs, Volume= 1.258 af, Atten= 6%, Lag= 0.9 min

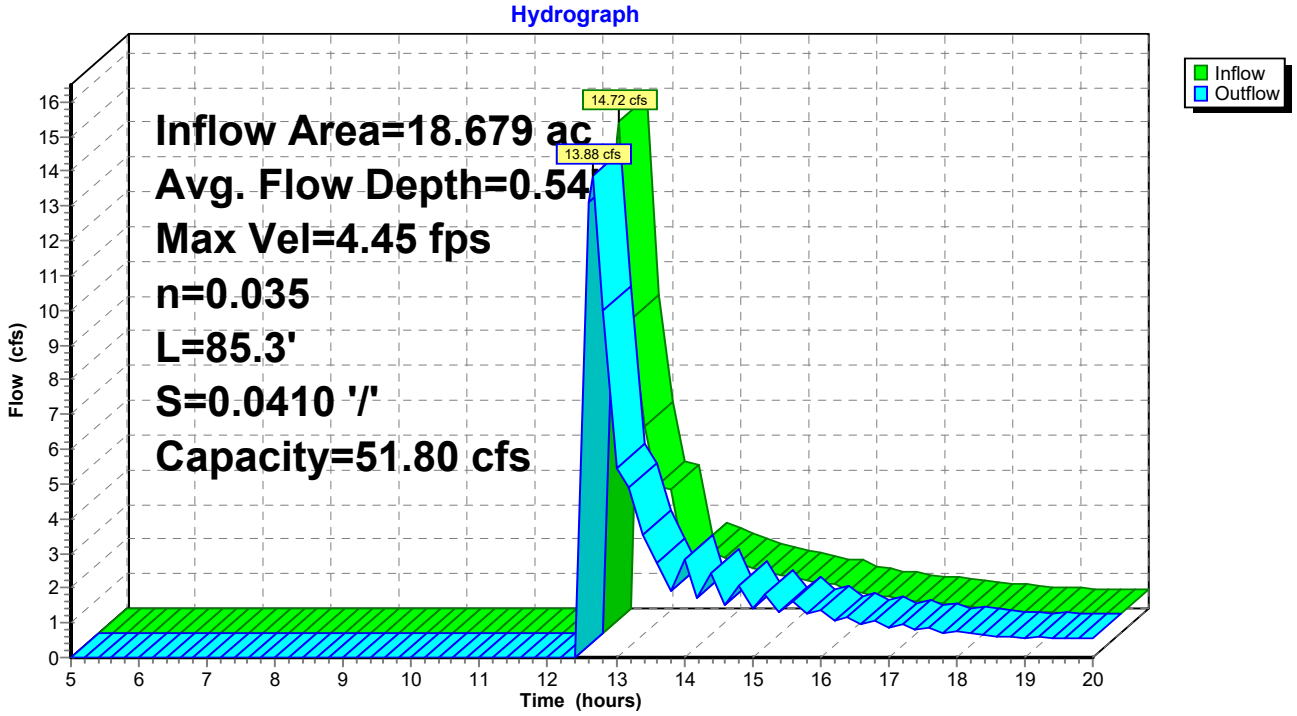
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.20 hrs
Max. Velocity= 4.45 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.18 fps, Avg. Travel Time= 0.7 min

Peak Storage= 276 cf @ 12.67 hrs
Average Depth at Peak Storage= 0.54'
Bank-Full Depth= 1.00' Flow Area= 8.0 sf, Capacity= 51.80 cfs

4.00' x 1.00' deep channel, n= 0.035 High grass
Side Slope Z-value= 4.0 '/' Top Width= 12.00'
Length= 85.3' Slope= 0.0410 '/'
Inlet Invert= 192.50', Outlet Invert= 189.00'

‡

## Reach 1R: PROPOSED SWALE NO.1



## Summary for Reach 2R: PROPOSED SWALE NO.2

Inflow = 21.07 cfs @ 12.69 hrs, Volume= 2.395 af
Outflow = 19.76 cfs @ 12.75 hrs, Volume= 2.392 af, Atten= 6%, Lag= 3.7 min

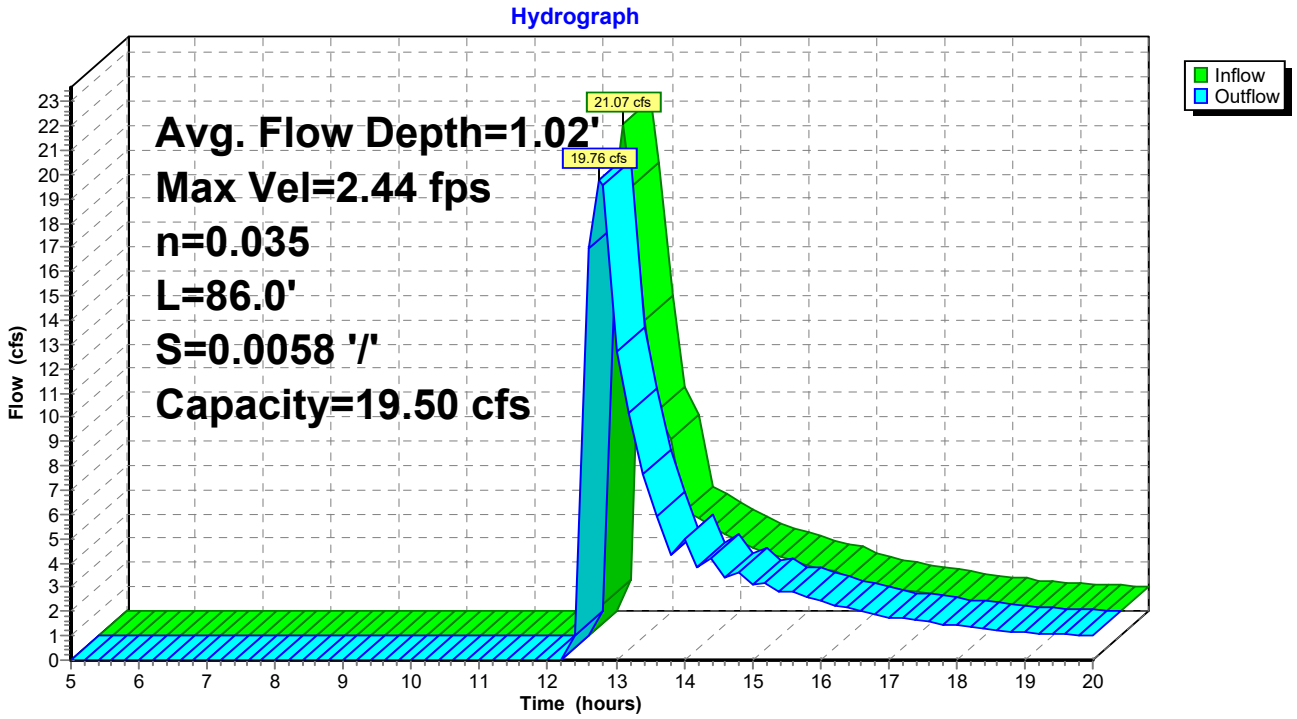
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.20 hrs
Max. Velocity= 2.44 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.39 fps, Avg. Travel Time= 1.0 min

Peak Storage= 702 cf @ 12.74 hrs
Average Depth at Peak Storage= 1.02'
Bank-Full Depth= 1.00' Flow Area= 8.0 sf, Capacity= 19.50 cfs

4.00' x 1.00' deep channel, n= 0.035 High grass
Side Slope Z-value= 4.0 '/' Top Width= 12.00'
Length= 86.0' Slope= 0.0058 '/'
Inlet Invert= 189.50', Outlet Invert= 189.00'

‡

## Reach 2R: PROPOSED SWALE NO.2



## Summary for Pond 1P: ROCK VOIDS

Inflow Area = 18.679 ac, 0.00% Impervious, Inflow Depth > 3.64" for 25-YR - 24HR. event
Inflow = 47.32 cfs @ 12.35 hrs, Volume= 5.672 af
Outflow = 59.58 cfs @ 12.39 hrs, Volume= 4.766 af, Atten= 0%, Lag= 2.5 min
Discarded = 0.13 cfs @ 10.60 hrs, Volume= 0.112 af
Primary = 59.45 cfs @ 12.39 hrs, Volume= 4.654 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.20 hrs
Peak Elev= 196.53' @ 12.39 hrs Surf.Area= 568,989 sf Storage= 39,829 cf

Plug-Flow detention time= 64.2 min calculated for 4.703 af (83% of inflow)
Center-of-Mass det. time= 22.6 min ( 833.3 - 810.8 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 195.30' | 39,829 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>113,798 cf Overall x 35.0% Voids |

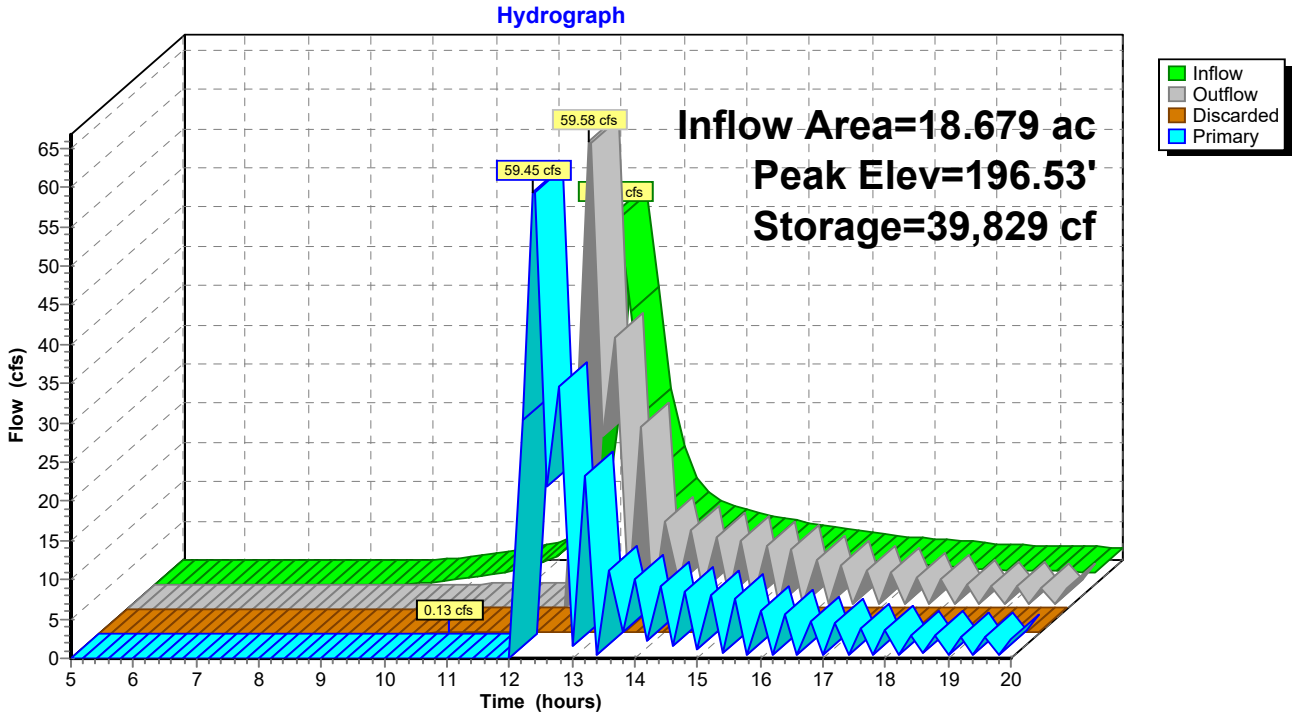
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 195.30 | 568,989 | 0 | 0 |
| 195.50 | 568,989 | 113,798 | 113,798 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 195.30' | **0.010 in/hr Exfiltration over Surface area** Phase-In= 0.01' |
| #2 | Primary | 195.45' | **16.0' long x 0.5' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00<br>Coef. (English) 2.80 2.92 3.08 3.30 3.32 |

**Discarded OutFlow** Max=0.13 cfs @ 10.60 hrs HW=195.32' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.13 cfs)

**Primary OutFlow** Max=57.39 cfs @ 12.39 hrs HW=196.50' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 57.39 cfs @ 3.41 fps)

## Pond 1P: ROCK VOIDS



## Summary for Pond 2P: WESTERN PROPOSED POND

Inflow Area = 18.679 ac, 0.00% Impervious, Inflow Depth > 1.05" for 25-YR - 24HR. event
Inflow = 20.81 cfs @ 12.39 hrs, Volume= 1.629 af
Outflow = 14.72 cfs @ 12.65 hrs, Volume= 1.258 af, Atten= 29%, Lag= 15.5 min
Primary = 14.72 cfs @ 12.65 hrs, Volume= 1.258 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.20 hrs
Peak Elev= 192.95' @ 12.66 hrs Surf.Area= 11,447 sf Storage= 20,536 cf

Plug-Flow detention time= 88.7 min calculated for 1.258 af (77% of inflow)
Center-of-Mass det. time= 32.4 min ( 864.2 - 831.8 )

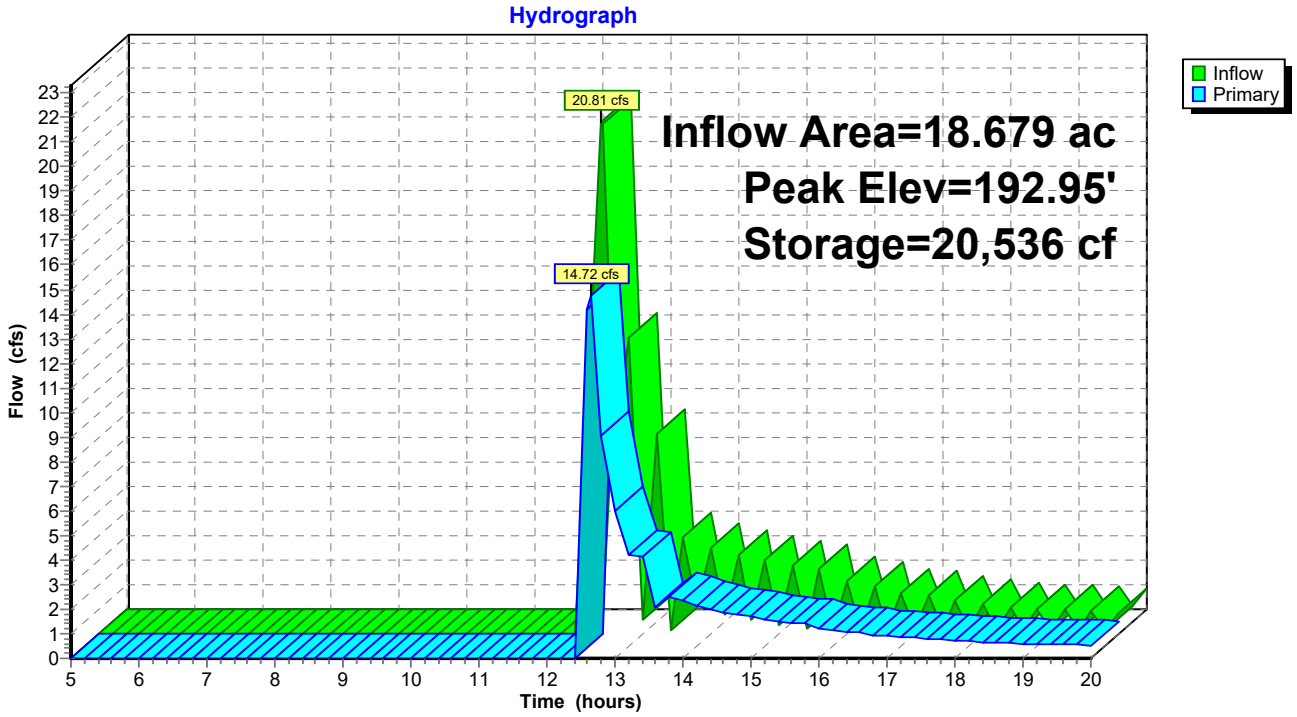
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 191.00' | 26,983 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 191.00 | 9,639 | 0 | 0 |
| 191.50 | 10,092 | 4,933 | 4,933 |
| 192.50 | 11,018 | 10,555 | 15,488 |
| 193.50 | 11,972 | 11,495 | 26,983 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 192.50' | **43.5 deg x 16.0' long x 1.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.56 (C= 3.20) |

**Primary OutFlow** Max=12.92 cfs @ 12.65 hrs HW=192.90' (Free Discharge)
↑—**1=Sharp-Crested Vee/Trap Weir** (Weir Controls 12.92 cfs @ 2.01 fps)

## Pond 2P: WESTERN PROPOSED POND



## Summary for Pond 3P: NORTHERN PROPOSED POND

| | | | | | |
|---|---|---|---|---|---|
| Inflow | = | 38.64 cfs @ | 12.39 hrs, | Volume= | 3.025 af |
| Outflow | = | 21.07 cfs @ | 12.69 hrs, | Volume= | 2.395 af, Atten= 45%, Lag= 18.4 min |
| Primary | = | 21.07 cfs @ | 12.69 hrs, | Volume= | 2.395 af |

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.20 hrs
Peak Elev= 190.06' @ 12.69 hrs Surf.Area= 27,914 sf Storage= 40,646 cf

Plug-Flow detention time= 85.4 min calculated for 2.363 af (78% of inflow)
Center-of-Mass det. time= 34.8 min ( 866.6 - 831.8 )

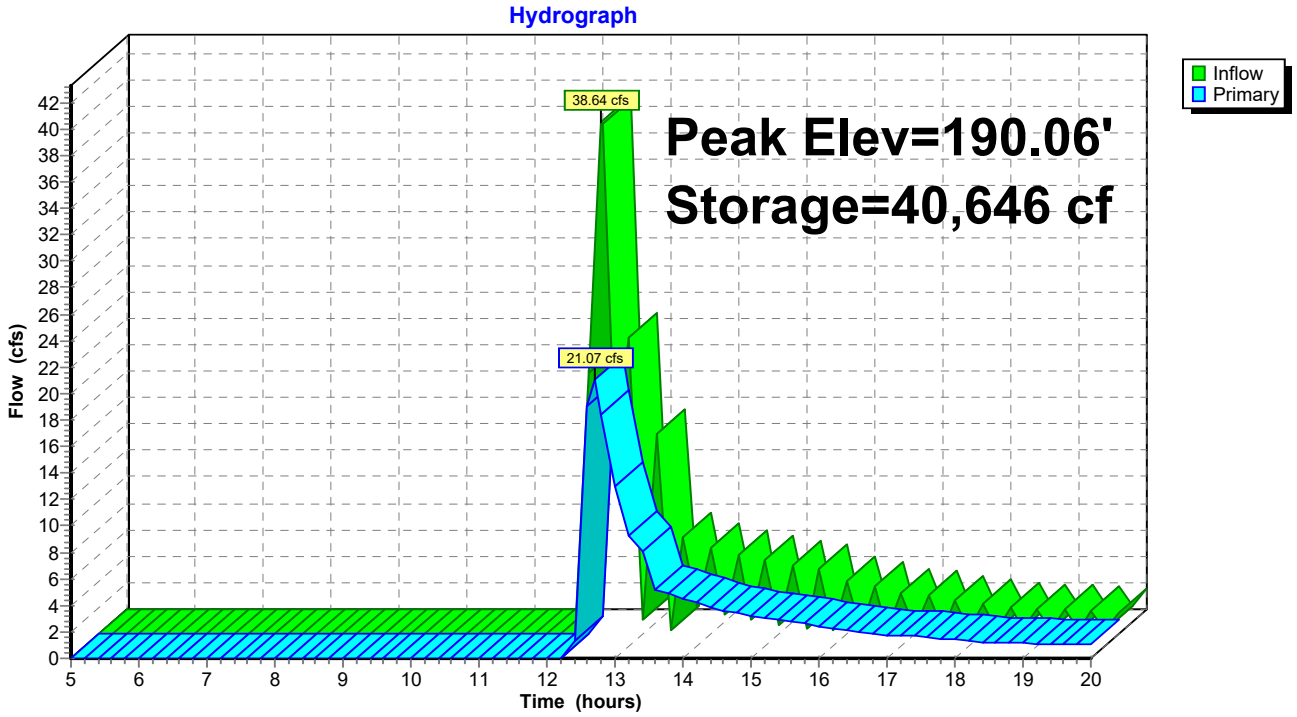
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 188.50' | 53,062 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 188.50 | 24,085 | 0 | 0 |
| 189.50 | 26,525 | 25,305 | 25,305 |
| 190.50 | 28,989 | 27,757 | 53,062 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 189.50' | **43.5 deg x 16.0' long x 1.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.56 (C= 3.20) |

**Primary OutFlow** Max=18.78 cfs @ 12.69 hrs HW=190.01' (Free Discharge)
**1=Sharp-Crested Vee/Trap Weir** (Weir Controls 18.78 cfs @ 2.28 fps)

## Pond 3P: NORTHERN PROPOSED POND



## Summary for Pond 4P: EASTERN PROPOSED POND

Inflow Area = 18.679 ac, 0.00% Impervious, Inflow Depth > 2.34" for 25-YR - 24HR. event
Inflow = 33.50 cfs @ 12.70 hrs, Volume= 3.649 af
Outflow = 7.02 cfs @ 13.93 hrs, Volume= 2.088 af, Atten= 79%, Lag= 74.2 min
Discarded = 0.01 cfs @ 13.93 hrs, Volume= 0.009 af
Primary = 7.01 cfs @ 13.93 hrs, Volume= 2.079 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.20 hrs
Peak Elev= 188.77' @ 13.93 hrs Surf.Area= 60,153 sf Storage= 74,583 cf

Plug-Flow detention time= 168.2 min calculated for 2.088 af (57% of inflow)
Center-of-Mass det. time= 84.5 min ( 951.2 - 866.7 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 187.50' | 150,242 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

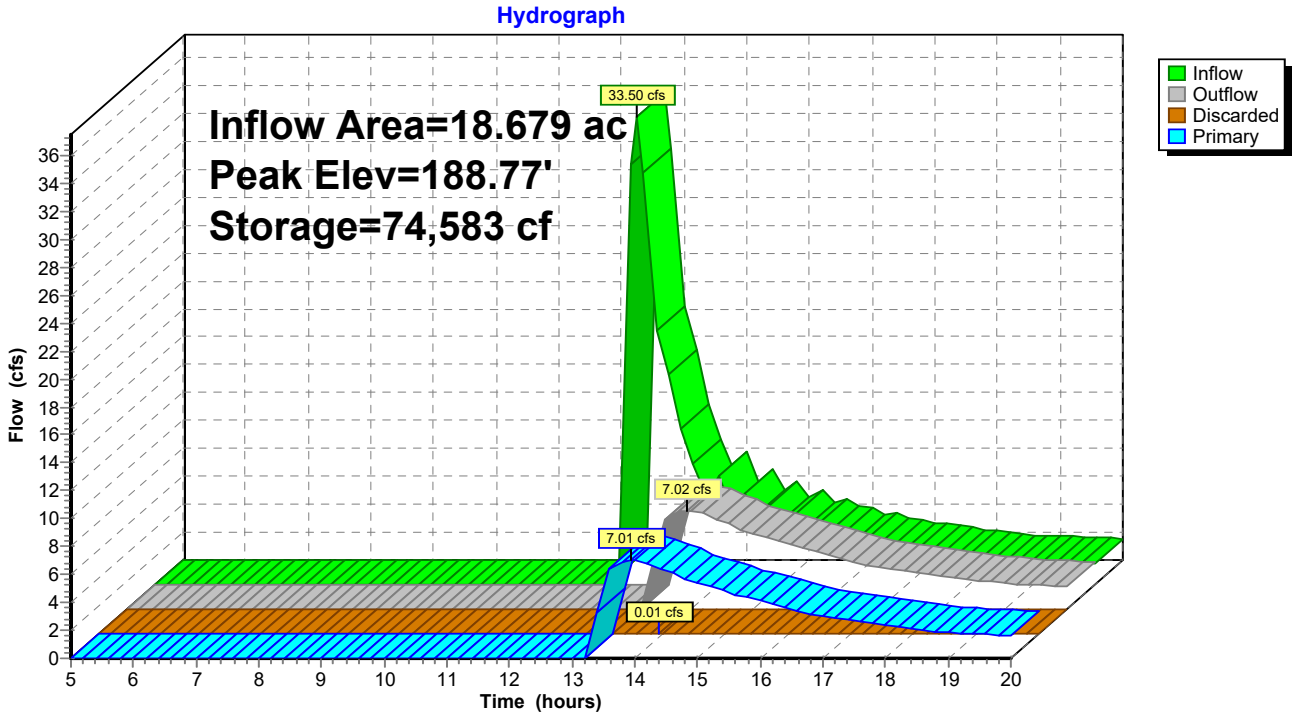
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 187.50 | 56,901 | 0 | 0 |
| 188.00 | 58,171 | 28,768 | 28,768 |
| 189.00 | 60,731 | 59,451 | 88,219 |
| 190.00 | 63,315 | 62,023 | 150,242 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 187.50' | **0.010 in/hr Exfiltration over Surface area** Phase-In= 0.01' |
| #2 | Primary | 188.60' | **43.5 deg x 30.0' long x 1.40' rise Sharp-Crested Vee/Trap Weir** Cv= 2.56 (C= 3.20) |

**Discarded OutFlow** Max=0.01 cfs @ 13.93 hrs HW=188.77' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

**Primary OutFlow** Max=6.98 cfs @ 13.93 hrs HW=188.77' (Free Discharge)
↑**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 6.98 cfs @ 1.33 fps)

## Pond 4P: EASTERN PROPOSED POND

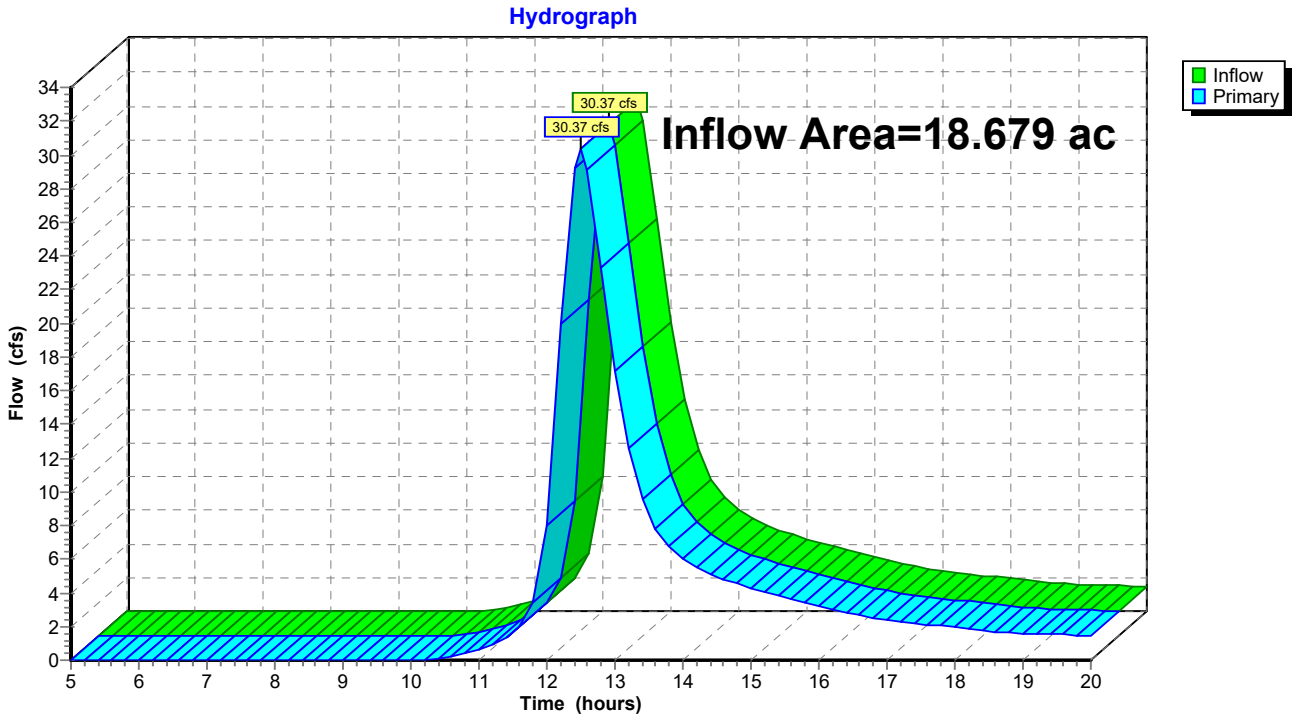


## Summary for Link 1L: EXISTING OUTFALL LOCATION

Inflow Area = 18.679 ac, 0.00% Impervious, Inflow Depth > 2.78" for 25-YR - 24HR. event
Inflow = 30.37 cfs @ 12.50 hrs, Volume= 4.324 af
Primary = 30.37 cfs @ 12.50 hrs, Volume= 4.324 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.20 hrs

## Link 1L: EXISTING OUTFALL LOCATION

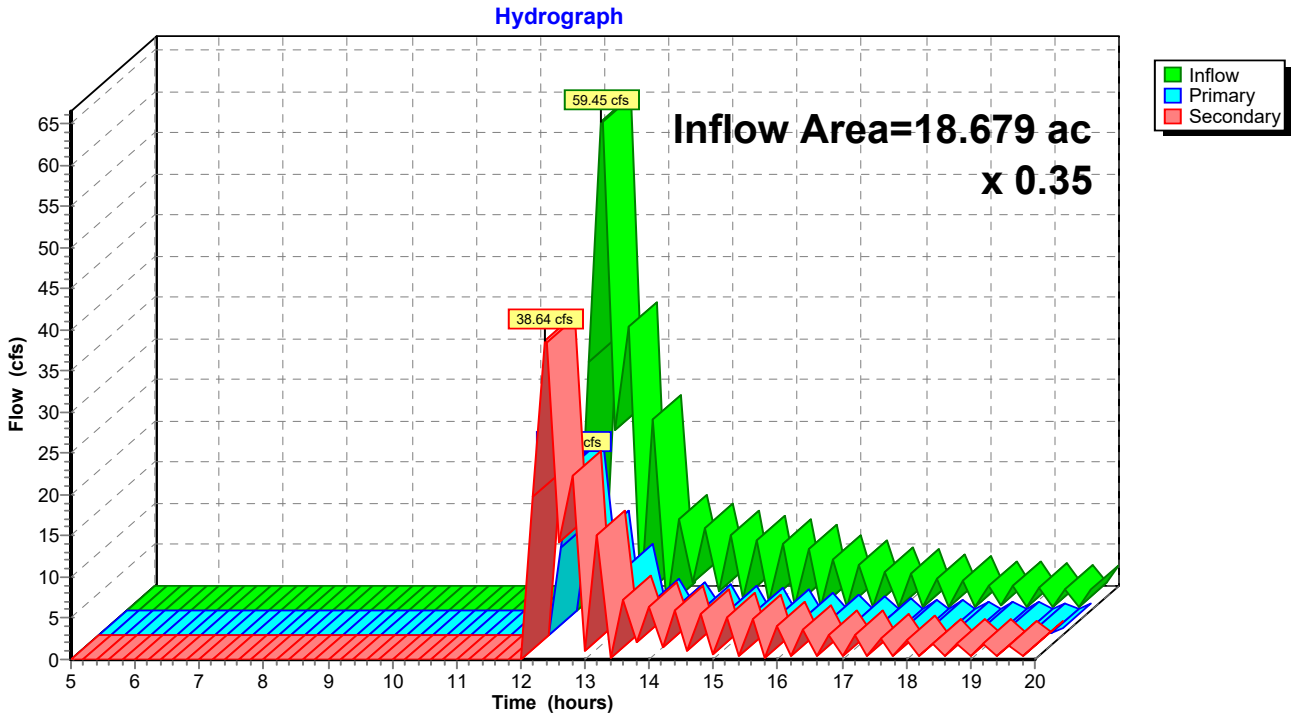


## Summary for Link 2L: POST OUTFALL

Inflow Area = 18.679 ac, 0.00% Impervious, Inflow Depth > 2.99" for 25-YR - 24HR. event
Inflow = 59.45 cfs @ 12.39 hrs, Volume= 4.654 af
Primary = 20.81 cfs @ 12.39 hrs, Volume= 1.629 af, Atten= 65%, Lag= 0.0 min
Secondary = 38.64 cfs @ 12.39 hrs, Volume= 3.025 af

Primary outflow = Inflow x 0.35, Time Span= 5.00-20.00 hrs, dt= 0.20 hrs

## Link 2L: POST OUTFALL



Time span=5.00-20.00 hrs, dt=0.20 hrs, 76 points
Runoff by SCS TR-20 method, UH=Georgia-323, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment1S: PRE DEVELOPED** Runoff Area=813,644 sf 0.00% Impervious Runoff Depth>4.13"
Flow Length=809' Slope=0.0280 '/' Tc=29.2 min CN=58 Runoff=45.71 cfs 6.428 af

**Subcatchment2S: POST DEVELOPED** Runoff Area=813,644 sf 0.00% Impervious Runoff Depth>5.17"
Flow Length=508' Slope=0.0197 '/' Tc=19.5 min CN=66 Runoff=66.83 cfs 8.042 af

**Reach 1R: PROPOSED SWALE NO.1** Avg. Flow Depth=0.73' Max Vel=5.18 fps Inflow=25.51 cfs 2.082 af
n=0.035 L=85.3' S=0.0410 '/' Capacity=51.80 cfs Outflow=24.43 cfs 2.081 af

**Reach 2R: PROPOSED SWALE NO.2** Avg. Flow Depth=1.47' Max Vel=2.80 fps Inflow=36.85 cfs 3.920 af
n=0.035 L=86.0' S=0.0058 '/' Capacity=19.50 cfs Outflow=37.88 cfs 3.916 af

**Pond 1P: ROCK VOIDS** Peak Elev=196.64' Storage=39,829 cf Inflow=66.83 cfs 8.042 af
Discarded=0.13 cfs 0.121 af Primary=68.90 cfs 6.994 af Outflow=69.03 cfs 7.115 af

**Pond 2P: WESTERN PROPOSED POND** Peak Elev=193.15' Storage=22,877 cf Inflow=24.11 cfs 2.448 af
Outflow=25.51 cfs 2.082 af

**Pond 3P: NORTHERN PROPOSED POND** Peak Elev=190.30' Storage=47,177 cf Inflow=44.78 cfs 4.546 af
Outflow=36.85 cfs 3.920 af

**Pond 4P: EASTERN PROPOSED POND** Peak Elev=189.05' Storage=91,366 cf Inflow=58.57 cfs 5.997 af
Discarded=0.01 cfs 0.009 af Primary=29.27 cfs 4.408 af Outflow=29.28 cfs 4.417 af

**Link 1L: EXISTING OUTFALL LOCATION** Inflow=45.71 cfs 6.428 af
Primary=45.71 cfs 6.428 af

**Link 2L: POST OUTFALL** x 0.35 Inflow=68.90 cfs 6.994 af
Primary=24.11 cfs 2.448 af Secondary=44.78 cfs 4.546 af

## Summary for Subcatchment 1S: PRE DEVELOPED DRAINAGE AREA 1

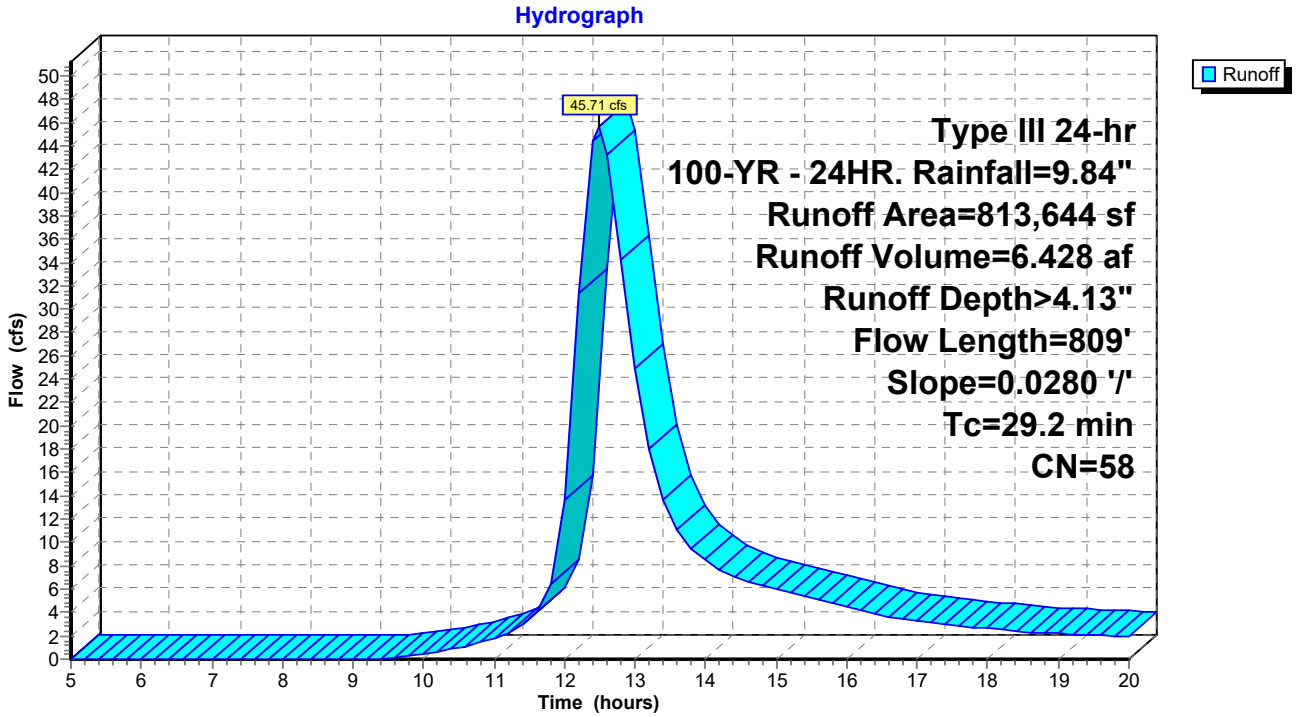
Runoff = 45.71 cfs @ 12.48 hrs, Volume= 6.428 af, Depth> 4.13"

Runoff by SCS TR-20 method, UH=Georgia-323, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.20 hrs
Type III 24-hr 100-YR - 24HR. Rainfall=9.84"

| Area (sf) | CN | Description |
|---|---|---|
| 813,644 | 58 | Meadow, non-grazed, HSG B |
| 813,644 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 29.2 | 809 | 0.0280 | 0.46 | | **Lag/CN Method, Staging Area No.2** |

## Subcatchment 1S: PRE DEVELOPED DRAINAGE AREA 1



## Summary for Subcatchment 2S: POST DEVELOPED DRAINAGE AREA 1

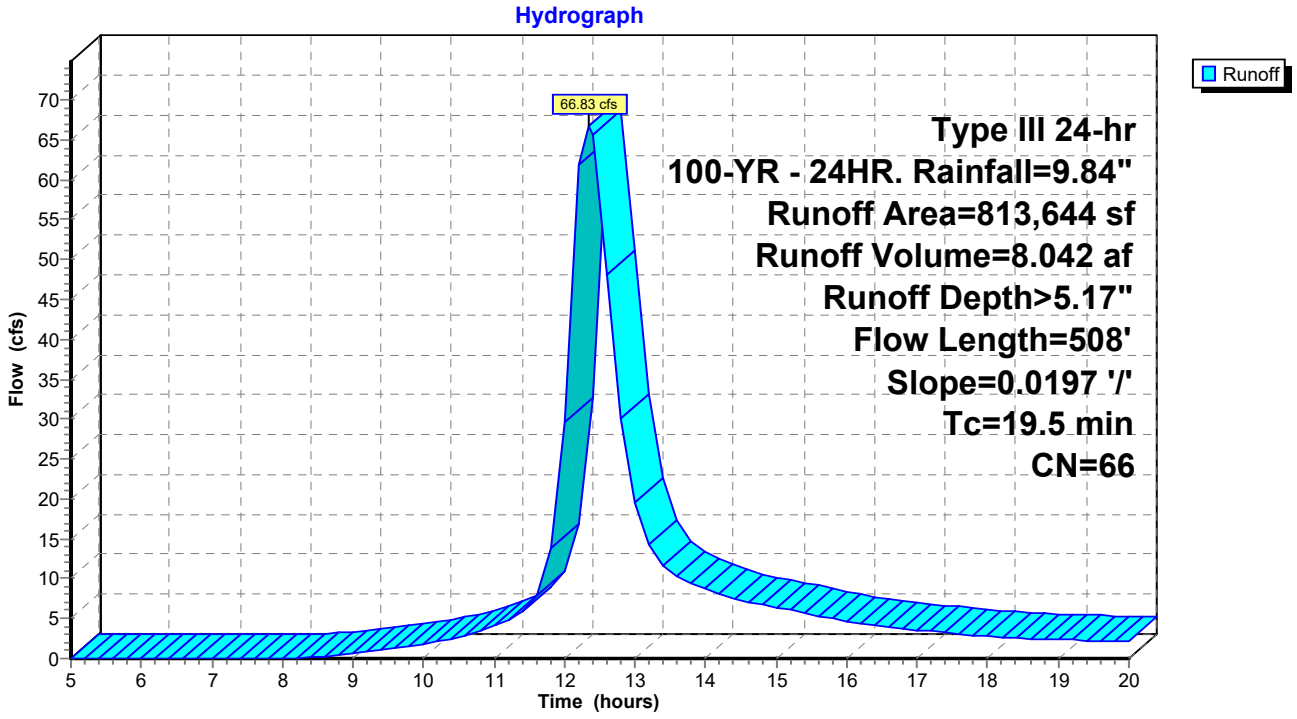
Runoff = 66.83 cfs @ 12.34 hrs, Volume= 8.042 af, Depth> 5.17"

Runoff by SCS TR-20 method, UH=Georgia-323, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.20 hrs
Type III 24-hr 100-YR - 24HR. Rainfall=9.84"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 79,939 | 85 | Gravel roads, HSG B |
| | 164,716 | 58 | Meadow, non-grazed, HSG B |
| * | 568,989 | 65 | Uncompacted Gravel (35% Void Ratio) |
| | 813,644 | 66 | Weighted Average |
| | 813,644 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 19.5 | 508 | 0.0197 | 0.43 | | **Lag/CN Method,** |

## Subcatchment 2S: POST DEVELOPED DRAINAGE AREA 1



## Summary for Reach 1R: PROPOSED SWALE NO.1

Inflow Area = 18.679 ac, 0.00% Impervious, Inflow Depth > 1.34" for 100-YR - 24HR. event
Inflow = 25.51 cfs @ 12.46 hrs, Volume= 2.082 af
Outflow = 24.43 cfs @ 12.48 hrs, Volume= 2.081 af, Atten= 4%, Lag= 1.0 min

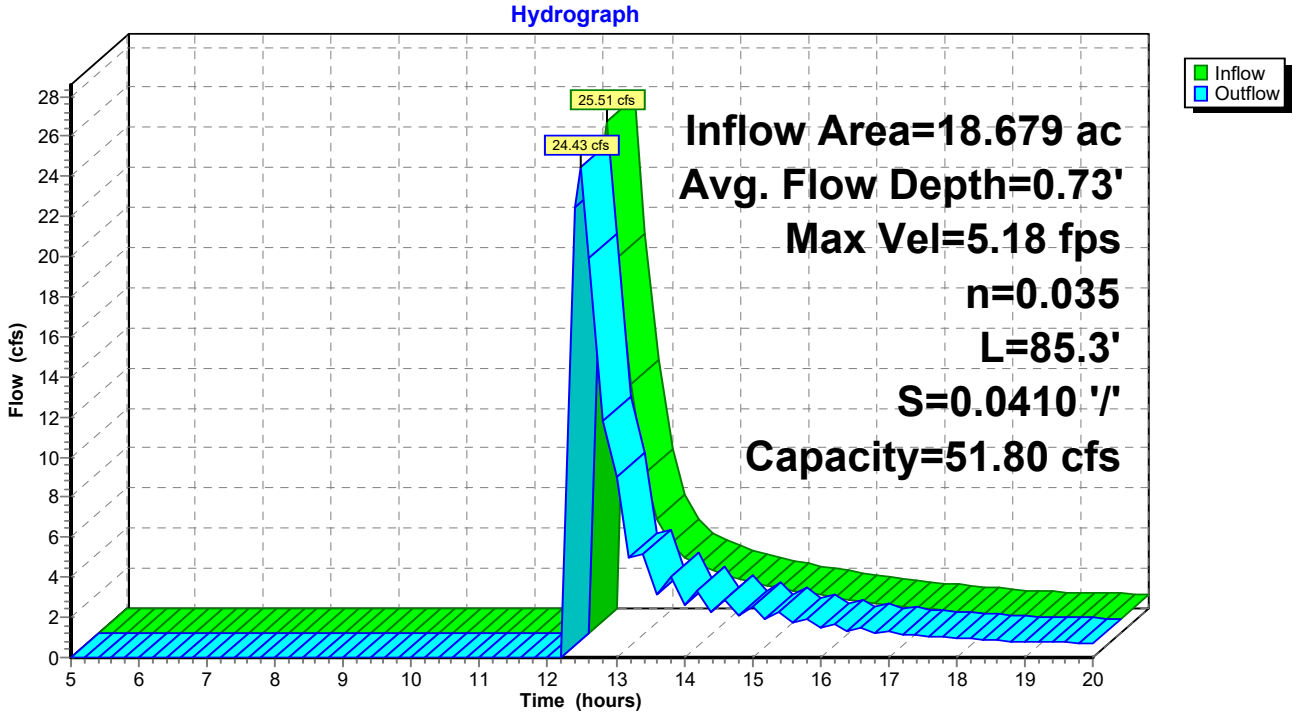
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.20 hrs
Max. Velocity= 5.18 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.49 fps, Avg. Travel Time= 0.6 min

Peak Storage= 413 cf @ 12.48 hrs
Average Depth at Peak Storage= 0.73'
Bank-Full Depth= 1.00' Flow Area= 8.0 sf, Capacity= 51.80 cfs

4.00' x 1.00' deep channel, n= 0.035 High grass
Side Slope Z-value= 4.0 '/' Top Width= 12.00'
Length= 85.3' Slope= 0.0410 '/'
Inlet Invert= 192.50', Outlet Invert= 189.00'

‡

## Reach 1R: PROPOSED SWALE NO.1



## Summary for Reach 2R: PROPOSED SWALE NO.2

Inflow = 36.85 cfs @ 12.56 hrs, Volume= 3.920 af
Outflow = 37.88 cfs @ 12.59 hrs, Volume= 3.916 af, Atten= 0%, Lag= 1.6 min

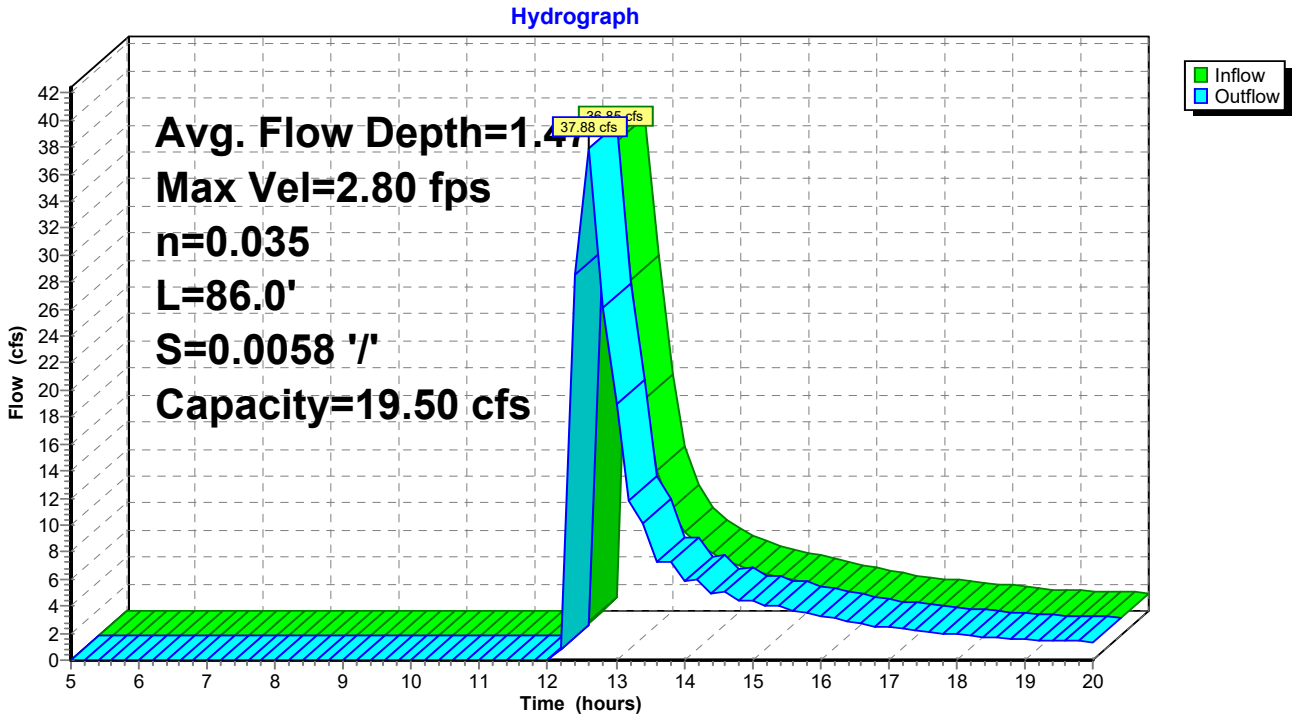
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.20 hrs
Max. Velocity= 2.80 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.54 fps, Avg. Travel Time= 0.9 min

Peak Storage= 1,175 cf @ 12.58 hrs
Average Depth at Peak Storage= 1.47'
Bank-Full Depth= 1.00' Flow Area= 8.0 sf, Capacity= 19.50 cfs

4.00' x 1.00' deep channel, n= 0.035 High grass
Side Slope Z-value= 4.0 '/' Top Width= 12.00'
Length= 86.0' Slope= 0.0058 '/'
Inlet Invert= 189.50', Outlet Invert= 189.00'

‡

## Reach 2R: PROPOSED SWALE NO.2



## Summary for Pond 1P: ROCK VOIDS

Inflow Area = 18.679 ac, 0.00% Impervious, Inflow Depth > 5.17" for 100-YR - 24HR. event
Inflow = 66.83 cfs @ 12.34 hrs, Volume= 8.042 af
Outflow = 69.03 cfs @ 12.29 hrs, Volume= 7.115 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.13 cfs @ 9.80 hrs, Volume= 0.121 af
Primary = 68.90 cfs @ 12.29 hrs, Volume= 6.994 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.20 hrs
Peak Elev= 196.64' @ 12.29 hrs Surf.Area= 568,989 sf Storage= 39,829 cf

Plug-Flow detention time= 49.6 min calculated for 7.021 af (87% of inflow)
Center-of-Mass det. time= 17.1 min ( 820.0 - 802.9 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 195.30' | 39,829 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>113,798 cf Overall x 35.0% Voids |

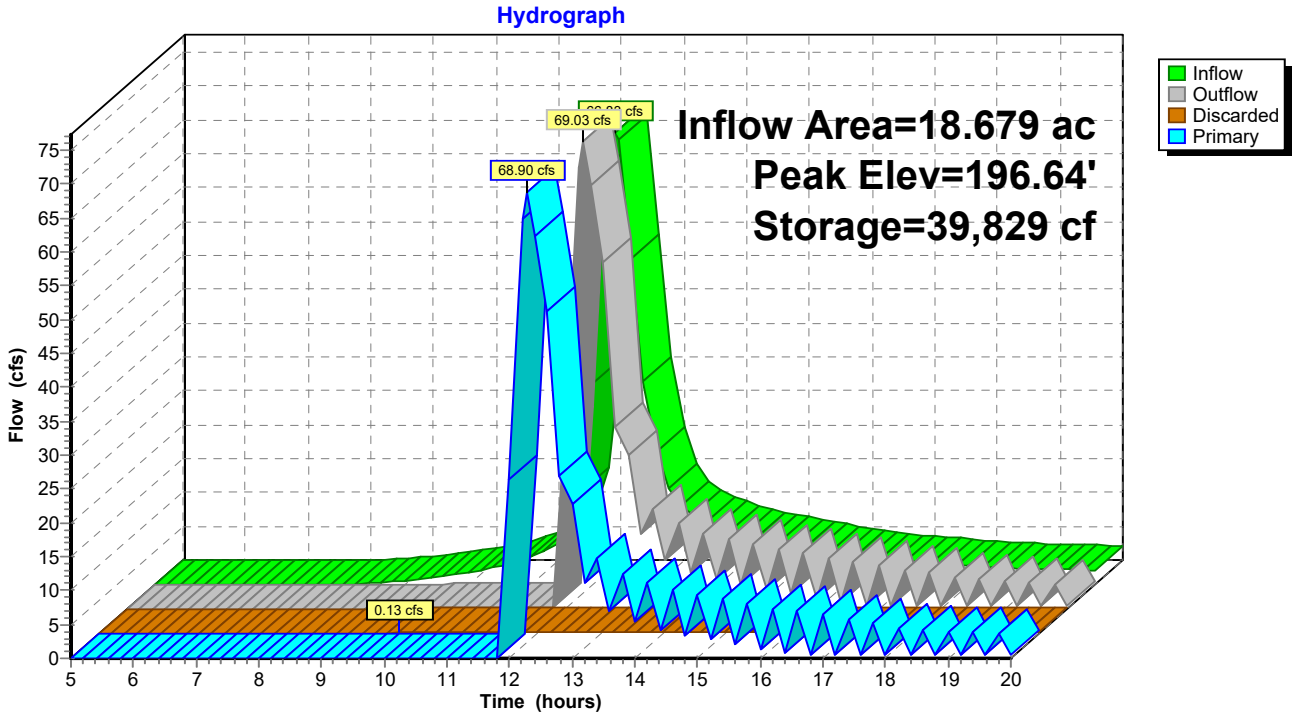
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 195.30 | 568,989 | 0 | 0 |
| 195.50 | 568,989 | 113,798 | 113,798 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 195.30' | **0.010 in/hr Exfiltration over Surface area** Phase-In= 0.01' |
| #2 | Primary | 195.45' | **16.0' long x 0.5' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00<br>Coef. (English) 2.80 2.92 3.08 3.30 3.32 |

**Discarded OutFlow** Max=0.13 cfs @ 9.80 hrs HW=195.32' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.13 cfs)

**Primary OutFlow** Max=63.83 cfs @ 12.29 hrs HW=196.58' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 63.83 cfs @ 3.53 fps)

## Pond 1P: ROCK VOIDS



## Summary for Pond 2P: WESTERN PROPOSED POND

Inflow Area = 18.679 ac, 0.00% Impervious, Inflow Depth > 1.57" for 100-YR - 24HR. event
Inflow = 24.11 cfs @ 12.29 hrs, Volume= 2.448 af
Outflow = 25.51 cfs @ 12.46 hrs, Volume= 2.082 af, Atten= 0%, Lag= 10.5 min
Primary = 25.51 cfs @ 12.46 hrs, Volume= 2.082 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.20 hrs
Peak Elev= 193.15' @ 12.48 hrs Surf.Area= 11,640 sf Storage= 22,877 cf

Plug-Flow detention time= 60.9 min calculated for 2.055 af (84% of inflow)
Center-of-Mass det. time= 22.3 min ( 841.4 - 819.1 )

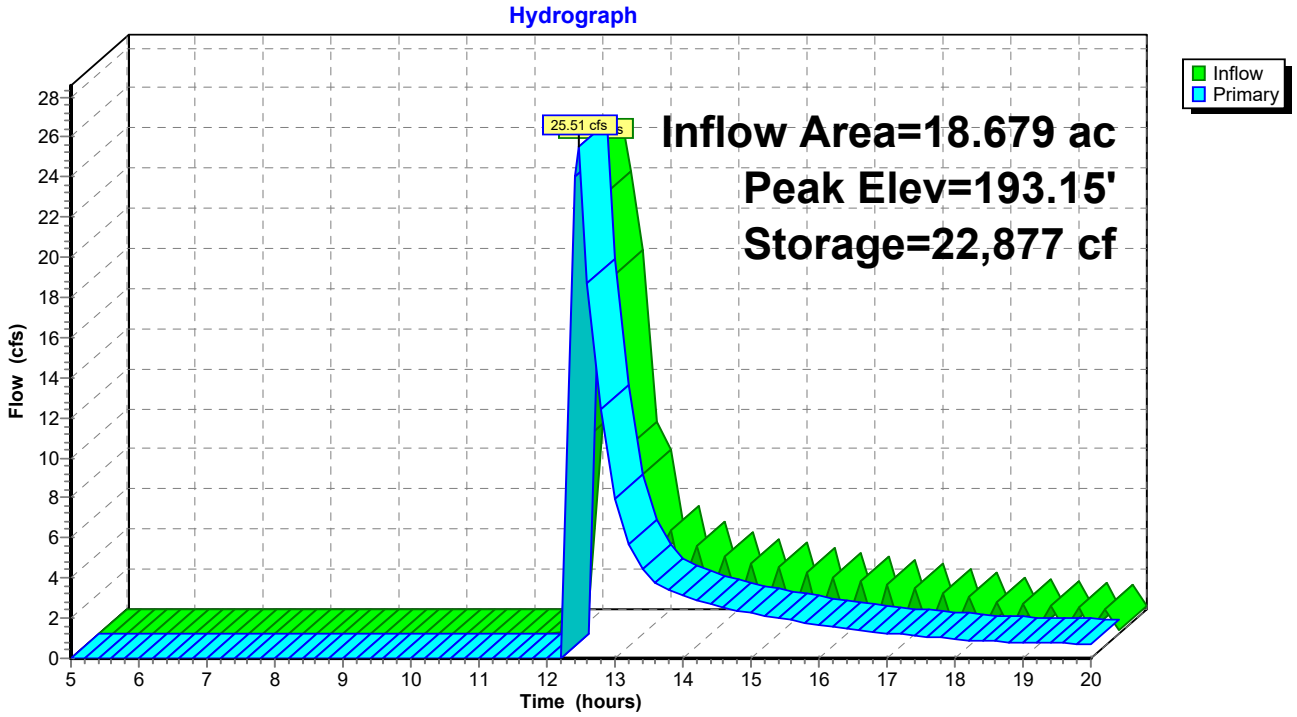
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 191.00' | 26,983 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 191.00 | 9,639 | 0 | 0 |
| 191.50 | 10,092 | 4,933 | 4,933 |
| 192.50 | 11,018 | 10,555 | 15,488 |
| 193.50 | 11,972 | 11,495 | 26,983 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 192.50' | **43.5 deg x 16.0' long x 1.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.56 (C= 3.20) |

**Primary OutFlow** Max=22.27 cfs @ 12.46 hrs HW=193.07' (Free Discharge)
↑—**1=Sharp-Crested Vee/Trap Weir** (Weir Controls 22.27 cfs @ 2.41 fps)

## Pond 2P: WESTERN PROPOSED POND



## Summary for Pond 3P: NORTHERN PROPOSED POND

| | | | | | |
|---|---|---|---|---|---|
| Inflow | = | 44.78 cfs @ | 12.29 hrs, | Volume= | 4.546 af |
| Outflow | = | 36.85 cfs @ | 12.56 hrs, | Volume= | 3.920 af, Atten= 18%, Lag= 16.4 min |
| Primary | = | 36.85 cfs @ | 12.56 hrs, | Volume= | 3.920 af |

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.20 hrs
Peak Elev= 190.30' @ 12.56 hrs Surf.Area= 28,484 sf Storage= 47,177 cf

Plug-Flow detention time= 62.0 min calculated for 3.868 af (85% of inflow)
Center-of-Mass det. time= 25.5 min ( 844.6 - 819.1 )

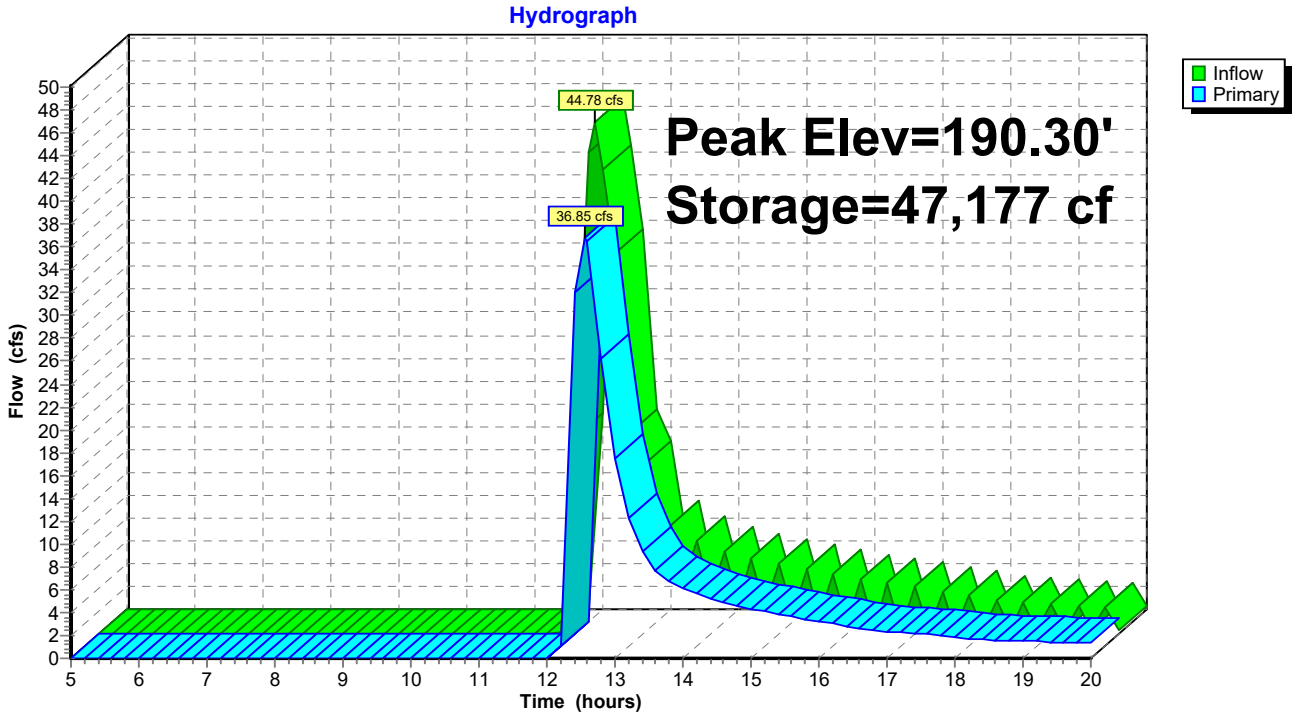
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 188.50' | 53,062 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 188.50 | 24,085 | 0 | 0 |
| 189.50 | 26,525 | 25,305 | 25,305 |
| 190.50 | 28,989 | 27,757 | 53,062 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 189.50' | **43.5 deg x 16.0' long x 1.00' rise Sharp-Crested Vee/Trap Weir** Cv= 2.56 (C= 3.20) |

**Primary OutFlow** Max=35.68 cfs @ 12.56 hrs HW=190.28' (Free Discharge)
↑**1=Sharp-Crested Vee/Trap Weir** (Weir Controls 35.68 cfs @ 2.81 fps)

## Pond 3P: NORTHERN PROPOSED POND



## Summary for Pond 4P: EASTERN PROPOSED POND

Inflow Area = 18.679 ac, 0.00% Impervious, Inflow Depth > 3.85" for 100-YR - 24HR. event
Inflow = 58.57 cfs @ 12.55 hrs, Volume= 5.997 af
Outflow = 29.28 cfs @ 13.03 hrs, Volume= 4.417 af, Atten= 50%, Lag= 28.8 min
Discarded = 0.01 cfs @ 13.03 hrs, Volume= 0.009 af
Primary = 29.27 cfs @ 13.03 hrs, Volume= 4.408 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.20 hrs
Peak Elev= 189.05' @ 13.03 hrs Surf.Area= 60,865 sf Storage= 91,366 cf

Plug-Flow detention time= 104.6 min calculated for 4.359 af (73% of inflow)
Center-of-Mass det. time= 46.4 min ( 890.7 - 844.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 187.50' | 150,242 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

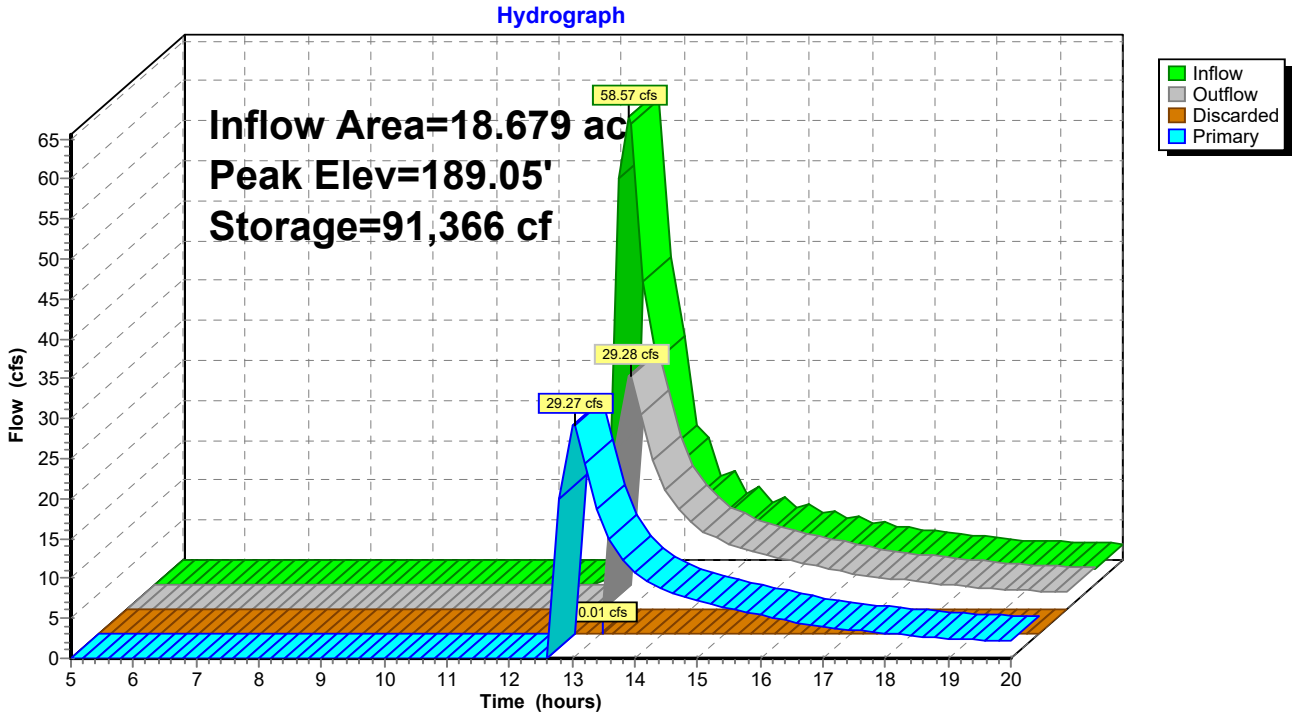
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 187.50 | 56,901 | 0 | 0 |
| 188.00 | 58,171 | 28,768 | 28,768 |
| 189.00 | 60,731 | 59,451 | 88,219 |
| 190.00 | 63,315 | 62,023 | 150,242 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 187.50' | **0.010 in/hr Exfiltration over Surface area** Phase-In= 0.01' |
| #2 | Primary | 188.60' | **43.5 deg x 30.0' long x 1.40' rise Sharp-Crested Vee/Trap Weir** Cv= 2.56 (C= 3.20) |

**Discarded OutFlow** Max=0.01 cfs @ 13.03 hrs HW=189.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

**Primary OutFlow** Max=28.34 cfs @ 13.03 hrs HW=189.04' (Free Discharge)
↑**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 28.34 cfs @ 2.12 fps)

## Pond 4P: EASTERN PROPOSED POND

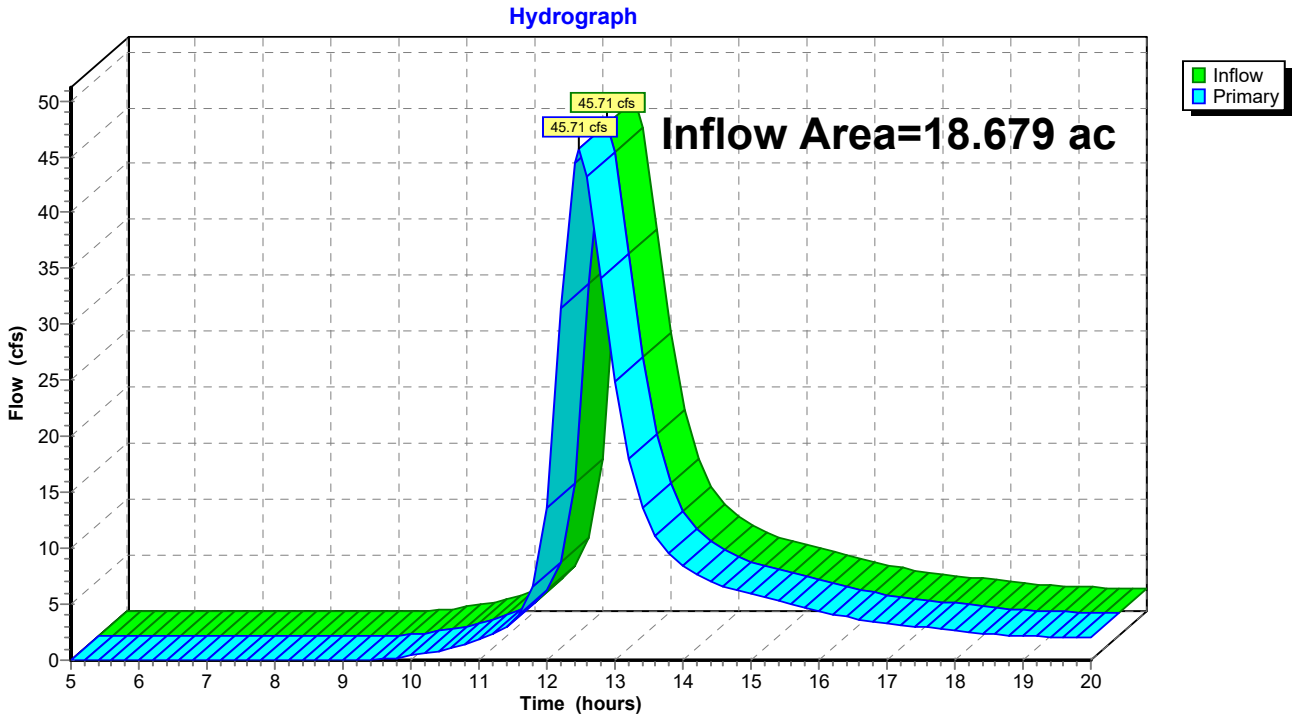


## Summary for Link 1L: EXISTING OUTFALL LOCATION

Inflow Area = 18.679 ac, 0.00% Impervious, Inflow Depth > 4.13" for 100-YR - 24HR. event
Inflow = 45.71 cfs @ 12.48 hrs, Volume= 6.428 af
Primary = 45.71 cfs @ 12.48 hrs, Volume= 6.428 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.20 hrs

## Link 1L: EXISTING OUTFALL LOCATION

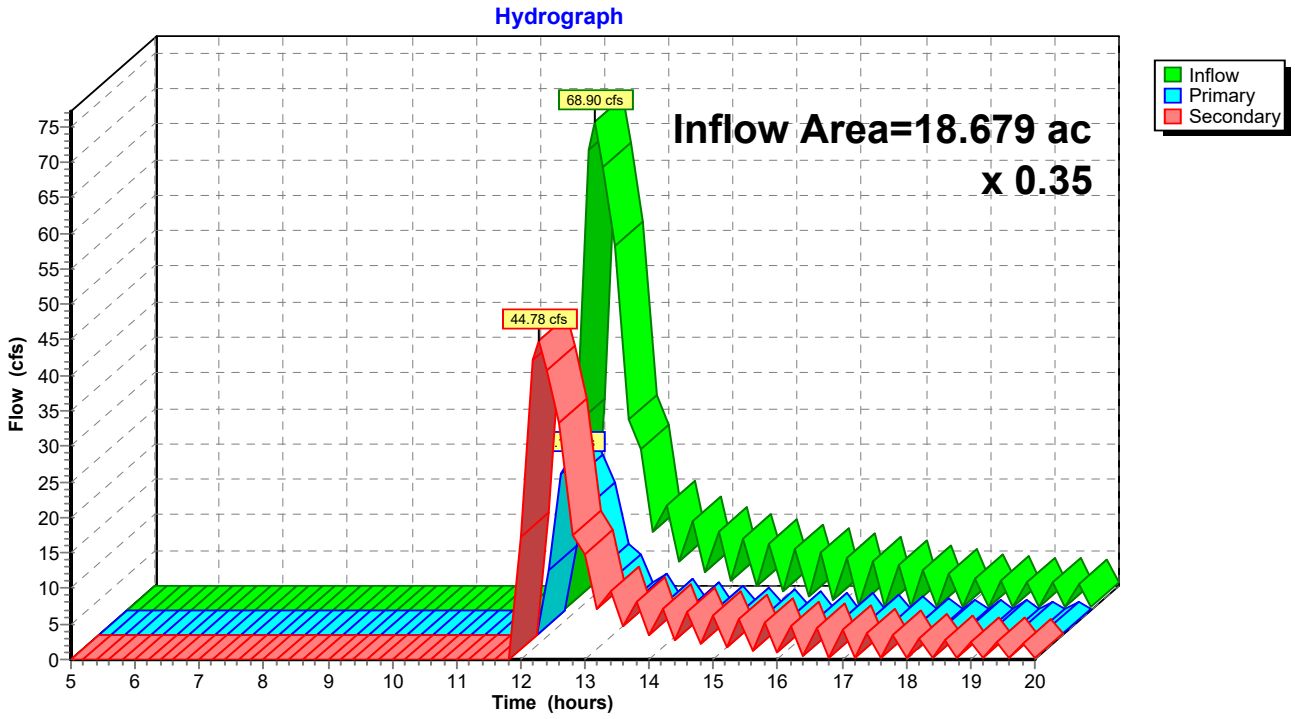


## Summary for Link 2L: POST OUTFALL

Inflow Area = 18.679 ac, 0.00% Impervious, Inflow Depth > 4.49" for 100-YR - 24HR. event
Inflow = 68.90 cfs @ 12.29 hrs, Volume= 6.994 af
Primary = 24.11 cfs @ 12.29 hrs, Volume= 2.448 af, Atten= 65%, Lag= 0.0 min
Secondary = 44.78 cfs @ 12.29 hrs, Volume= 4.546 af

Primary outflow = Inflow x 0.35, Time Span= 5.00-20.00 hrs, dt= 0.20 hrs

## Link 2L: POST OUTFALL



# Appendix C – FEMA Firm Map

# National Flood Hazard Layer FIRMette


## Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

**SPECIAL FLOOD HAZARD AREAS**
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

**OTHER AREAS OF FLOOD HAZARD**
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

**OTHER AREAS**
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

**GENERAL STRUCTURES**
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

**OTHER FEATURES**
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

**MAP PANELS**
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 10/26/2019 at 2:02:44 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

# Appendix D – Rainfall Distribution Data

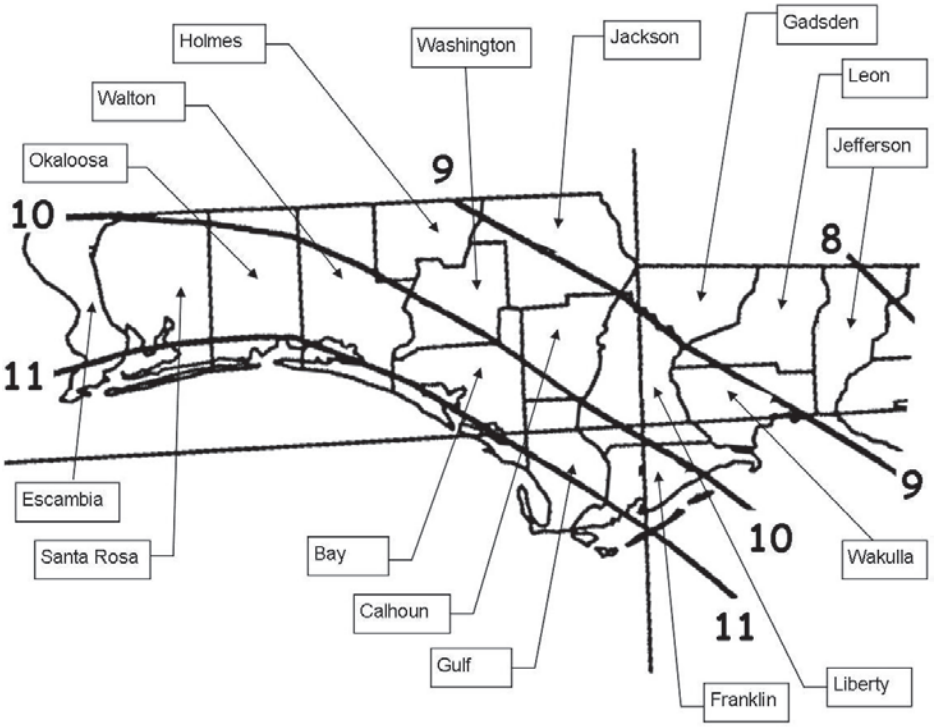



**Figure 3.3-1 Rainfall Depths Associated with the 25-year, 24-hour Storm Event**

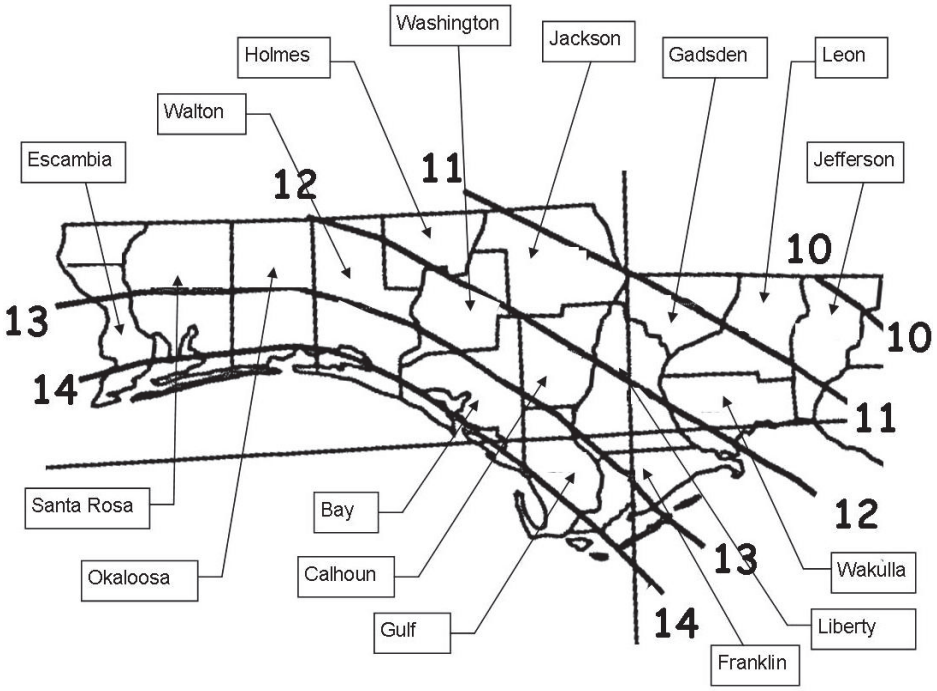



**Figure 3.3-2 Rainfall Depths Associated with the 100-year, 24-hour Storm Event**

# Appendix E – Water Management District Boundary


ALABAMA
Escambia
Santa Rosa
Okaloosa
Walton
Holmes
Washington
Jackson
Bay
Calhoun
Gulf
Liberty
Franklin
Gadsden
Wakulla
Leon
Jefferson
GEORGIA
STAGING AREA 8
Tallahassee
Panama City
Ft. Walton
Lake Seminole
Gulf of Mexico
Gulf of Mexico
S.R.W.M.D.
NORTHWEST FLORIDA
WATER MANAGEMENT DISTRICT
LEGEND
- NWFWMD HEADQUARTERS
- DISTRICT FIELD OFFICES
- TALLAHASSEE
- MARIANNA
- ECONFINA
- CRESTVIEW
- MILTON
- DISTRICT OWNERSHIP (FEE)
FLORIDA
N
0 5 10 20 30 40
Miles