APPENDICES

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APPENDIX A – EA COORDINATION

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Agency Coordination List

Jacksonville Aviation Authority Cecil Airport
Environmental Assessment

Federal

FAA
Ms. Amy Reed
FAA, Orlando Airports District Office
8427 Southpark Circle, STE 524
Orlando, FL 32819
407-487-7297
Amy.M. Reed@faa.gov

U.S. Fish and Wildlife Service
Ms. Annie Dziergowski
Fish and Wildlife Biologist
Jacksonville Ecological Services Field Office
U.S. Fish and Wildlife Service
7915 Baymeadows Way, Suite 200
Jacksonville, FL 32256-7517
(904)-731-3089
annie_dziergowski@fws.gov

U.S. Environmental Protection Agency
Mr. Christopher Militscher, Chief
NEPA Program Office
U.S. Environmental Protection Agency Region 4
61 Forsyth Street, SW
Atlanta, GA 30303
(404) 562-9512
militscher.chris@epa.gov

U.S. Army Corps of Engineers
Mr. Brad Carey
Jacksonville District Office
U.S. Army Corps of Engineers
701 San Marco Blvd
Jacksonville, FL 32207
(904)-232-2405
brad.j.carey@usace.army.mil

State

Environmental Review Clearinghouse
Mr. Chris Stahl
Florida Department of Environmental Protection
Environmental Review Clearinghouse
3900 Commonwealth Blvd., MS 47
Tallahassee, FL 32399
(850)-717-9045
State.Clearinghouse@FloridaDEP.gov

St. Johns River Water Management District
Mr. Douglas Conkey
Intergovernmental Coordinator
SJRWMD Jacksonville Service Center
7775 Baymeadows Way, Suite 102
Jacksonville, Fl 32256
904-730-6287
dconkey@sjrwmd.com

Local

City of Jacksonville (COJ) Planning and Development
Ms. Kristen D. Reed, Chief
Community Planning Division
Ed Ball Building
214 N. Hogan Street, Suite 300
Jacksonville, FL 32202
(904)-255-7837
KReed@coj.net

COJ Development Services Division
Ms. Ellyn Cavin, P.E., Chief
Edward Ball Building
214 N. Hogan St., Room 2100 (2nd Floor)
Jacksonville, FL 32202
Phone: (904) 255-8310
Fax: (904) 255-8311
ECavin@coj.net

Agency Coordination List

Jacksonville Aviation Authority Cecil Airport
Environmental Assessment

COJ Development Services Division
Mr. William Joyce, P.E., Operations Director
214 N. Hogan Street 10th floor
Jacksonville, Florida 32202
904-255-8786
joyce@coj.net

Cecil Commerce Center
Mr. Ed Randolph
Office of Economic Development
(904)-255-5450
edr@coj.net

Agency Coordination List

Jacksonville Aviation Authority Cecil Airport
Environmental Assessment

Native American Tribes[1]

Coushatta Tribe of Louisiana
Kristian Poncho, THPO
PO Box 10
Elton, LA 70532
337-275-1350
kponcho@couchatta.org

Miccosukee Tribe of Indians
Talbert Cypress, Chairperson
Tamiami Station, PO Box 440021
Miami, FL 33144
305-223-8380
marlap@miccosukeetribe.com

Muscogee (Creek) Nation
Corain Lowe-Zepeda, THPO
PO Box 580
Okmulgee, OK 74447
918-732-7835
raebutler@mcn-nsn.gov

[1] FAA to conduct coordination if necessary.

RS&H

10748 Deerwood Park Boulevard S
Jacksonville, Florida 32256
O 904-256-2500
F 904-256-2501
rsandh.com

DATE

NAME
AGENCY
STREET ADDRESS
CITY, STATE, ZIP
via email:

RE: Cecil Airport – Approach Road and Utility Corridor Extension EA – Early Coordination

Dear _______________,

The Jacksonville Aviation Authority (Authority) proposes to construct an extension to Approach Road at Cecil Airport (Airport or VQQ) in Duval County, Jacksonville, Florida (see **Figure 1**, attached). The Proposed Project consists of constructing an approximate 6,200-foot extension of Approach Road and an approximate 4,200 foot extension of the utility corridor adjacent to Approach Road ending at the Cecil Spaceport. The Proposed Project is shown in **Figure 2,** attached. Construction of the Proposed Project would begin in 2023 and be completed by June 2024.

The Authority will request the Federal Aviation Administration's (FAA) unconditional approval of the improvements on its Airport Layout Plan. This request is a Federal action, and through the requirement for the Authority to meet FAA grant assurances, RS&H, Inc. will prepare an Environmental Assessment (EA) for the Proposed Project.

In accordance with the National Environmental Policy Act (NEPA) and FAA Orders 1050.1F, *Environmental Impacts: Policies and Procedures* and 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions of Airport Actions*, the EA will analyze the potential environmental effects of the Proposed Project. A project study area has been developed for the EA (see **Figure 3**, attached). Preliminary environmental analysis indicates that the Proposed Project has the potential to result in impacts to, but not limited to, the following environmental categories: biological resources, floodplains, natural resources and energy supply, socioeconomics, and wetlands.

On behalf of the Authority, we are sending you this early notification letter to:

1. Advise your agency of the preparation of the EA;
2. Request any relevant information that your agency may have regarding the project site or environs; and
3. Solicit early comments regarding potential environmental, social, and economic issues for consideration during the preparation of the EA.

You may send any information and comments to me via email at David.Alberts@rsandh.com or to the address provided at the top of this letter. We would appreciate your prompt response within 30 days.

On behalf of the Authority, we would like to thank you for your interest in this project and look forward to working with you as we prepare the EA. If you have any questions or need additional information regarding the Proposed Project or EA, please do not hesitate to contact me at (904) 256-2469.

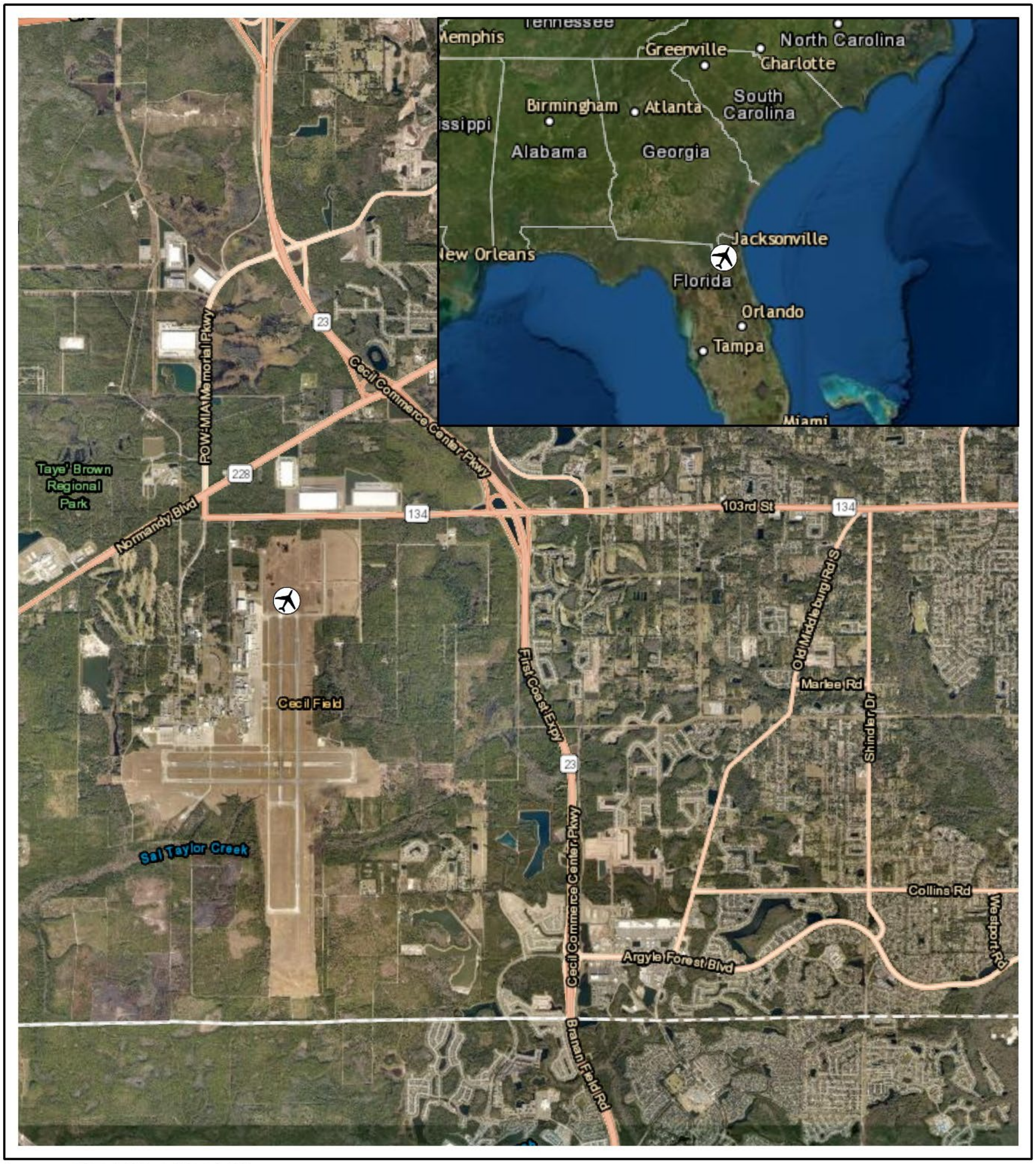
Sincerely,

D. D. Alberts

David Alberts
Project Manager
RS&H, Inc.

Attachments

cc: Jacksonville Aviation Authority
Project File



Sources: ESRI, 2022; RS&H, 2022.

Figure is not to scale and is for graphic purposes only.

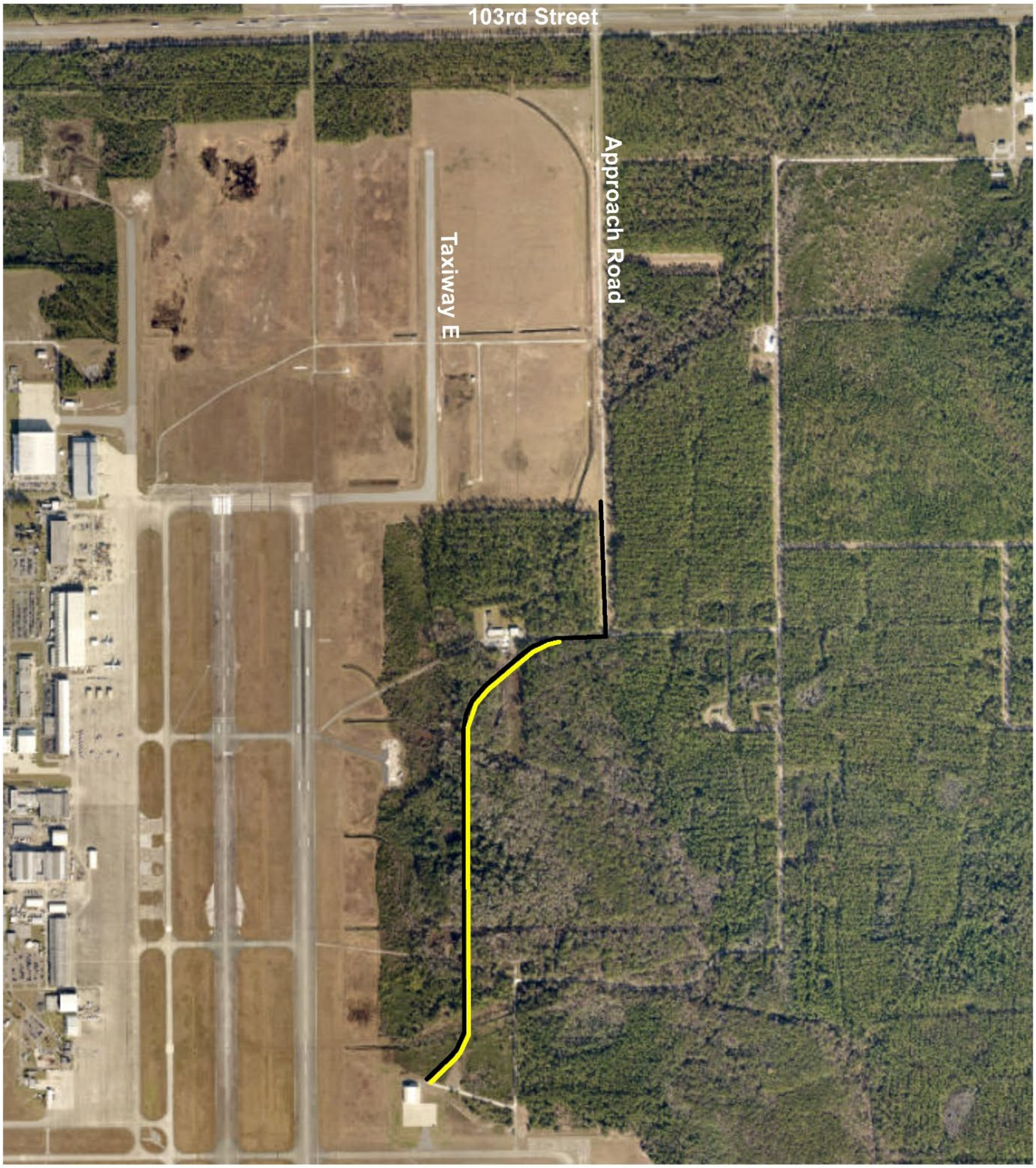
N

Legend

Airport Location

RS&H

Figure 1
Airport Location



Sources:ESRI, 2022; RS&H, 2022.

Figure is not to scale and is for graphic purposes only.

N

Legend

Utility Corridor

Approach Road Extension

RS&H

Figure 2
Proposed Project

Sources:ESRI, 2022; RS&H, 2022.

Figure is not to scale and
is for graphic purposes only.

N

Legend

Project Study Area

RS&H

Figure 3
Project Study Area

FLORIDA DEPARTMENT OF
Environmental Protection

Northeast District
8800 Baymeadows Way West, Suite 100
Jacksonville, Florida 32256

Ron DeSantis
Governor

Jeanette Nuñez
Lt. Governor

Shawn Hamilton
Secretary

June 21, 2022

Sent via email to: David.Alberts@rsandh.com

Mr. David Alberts, Project Manager
RS&H, Inc.
10748 Deerwood Park Boulevard, S.
Jacksonville, Florida 32256

RE: Early Coordination Review
Cecil Airport – Approach Road and Utility Corridor Extension
Jacksonville, Florida – Duval County

Dear Mr. Alberts,

The Northeast District office of the Florida Department of Environmental Protection (DEP) has received your notification letter regarding an early coordination review effort for the proposed construction to extend Approach Road at Cecil Airport, located in Jacksonville, Florida.

Based on the information provided, the following comments and recommendations are offered for this project:

Air Permitting

Please note that any open burning that may take place during this project shall be in compliance with Rule 62-256, Florida Administrative Code (F.A.C.), and any local ordinances.

Please contact the City of Jacksonville's Environmental Quality Division's (COJ EQD) Air Quality Branch, concerning any necessary air permitting for the potential burning of land clearing debris and any installation of emergency generators. You may contact the COJ EQD Air Quality Branch directly at (904) 630-2489, regarding these requirements.

Solid Waste

Solid waste including construction and demolition debris (C&D) that may be generated by this construction project should be managed in accordance with the applicable, state solid waste regulations of Chapter 62-701, F.A.C. The C&D waste may be taken to a permitted C&D or Class III Disposal Facility, materials recovery facility, or transfer station. The land clearing debris may also be taken to a registered yard trash processing facility, composting facility, or permitted yard trash disposal facility. Any Class I waste should be taken to a permitted Class I facility such as a landfill or waste processing facility.

However, pursuant to Rule 62-701.220(2)(g), F.A.C., Chapter 62-701 F.A.C., does not apply to the following exceptions:

- '(g) The collection and processing of soil, rocks, vegetative debris, asphalt, and similar materials normally associated with and actually from construction and routine maintenance of roads, as defined in Section 33403(23), Florida Statute (F S), when such materials are beneficially used or reused by the generator as part of a road construction or maintenance project. Street sweepings, ditch scrapings, shoulder scrapings, and catch basin sediments are included in this exemption. provided that any significant amounts of solid waste, such as tires, furniture, white goods, and automobile parts, are removed prior to use or reuse. This exception does not apply when materials are contaminated by a spill or other unusual event Storage of these materials at transfer stations or off-site waste storage areas is addressed in Rule 62-701.710(1)(c)5., F.A.C.'

Please contact Julia Boesch, of NED's Permitting Program, at (904) 256-1577, or via email at Julia Boesch@FloridaDEP.gov, regarding these requirements.

Tanks
Please note that if this project includes the installation of a petroleum storage tank system to fuel an emergency generator, and the tank storing the fuel is larger than a 550-gallon aboveground storage tank (AST) or larger than a 110-gallon underground storage tank (UST), then the tank will be regulated by the Department and the facility must comply with Chapter 62-761 or 62-762, F.A.C., as applicable.

In addition, 30 to 45 days' prior notice for the installation of the tank is required, and the tank must be registered with the Department.

Please contact Brierra Mack, of NED's Tanks Section, at (904) 256-1679, or via email at Brierra.Mack@FloridaDEP.gov, regarding these requirements.

Environmental Resource Permitting and Stormwater Permitting
The proposed project should be reviewed by the St. Johns River Water Management District's (SJRWMD) Environmental Resource Permitting Program, according to the Operating Agreement between FDEP and SJRWMD. Please contact the SJRWMD at (800) 451-7106, to request a permit determination, or if you have questions about permitting requirements.

If you have any questions or need further assistance, please contact Vic Ford at Victoria.Ford@FloridaDEP.gov, or by phone at (904) 256-1505.

Thank you

Sincerely,

Gregory J. Strong
District Director

GS/vic

cc Monica Hamblin, Monica.Hamblin@rsandh.com

St. Johns River Water Management District
4049 Reid Street
Palatka, Florida 32177

November 14, 2022

RE: DHR Project File No.: 2022-7070, Received by DHR: October 14, 2022
Application No.: 70452-126
Project: Cecil Airport Approach Road
County: Duval

To whom it may concern:

Our office reviewed the referenced project in accordance with Chapters 267.061 and 373.414, *Florida Statutes*, and implementing state regulations, for possible effects on historic properties listed, or eligible for listing, in the *National Register of Historic Places*, or otherwise of historical, architectural or archaeological value.

It is the opinion of this office that the proposed project is unlikely to affect historic properties. However, since unexpected finds may occur during ground disturbing activities, we request that the permit, if issued, include the following special condition regarding inadvertent discoveries:

- If prehistoric or historic artifacts, such as pottery or ceramics, projectile points, dugout canoes, metal implements, historic building materials, or any other physical remains that could be associated with Native American, early European, or American settlement are encountered at any time within the project site area, the permitted project shall cease all activities involving subsurface disturbance in the vicinity of the discovery. The applicant shall contact the Florida Department of State, Division of Historical Resources, Compliance and Review Section at (850)-245-6333. Project activities shall not resume without verbal and/or written authorization. In the event that unmarked human remains are encountered during permitted activities, all work shall stop immediately and the proper authorities notified in accordance with Section 872.05, *Florida Statutes*.

If you have any questions, please contact Daniel Vasquez, Historic Sites Specialist, by email at *Daniel.Vasquez@dos.myflorida.com*.

Sincerely,

Kelly L Chase
For

Alissa S. Lotane
Director, Division of Historical Resources
& State Historic Preservation Officer

7775 Baymeadows Way • Suite 102 • Jacksonville, FL 32256 • 904-730-6270 • www.sjrwmd.com

November 09, 2022

Andrew Samberg
RS&H
Sent via email: andrew.samberg@rsandh.com

Re: Cecil Airport Approach Road
Application Number 70452-126
(Please reference the application number on all correspondence.)

Dear Mr. Samberg:

The St. Johns River Water Management District (District) has received your Individual Environmental Resource Permit application. Upon review of the proposed project, the following technical information is needed to sufficiently review the application. This information is being requested under the authority granted to the District by sections 373.413(2) and 373.4131, Florida Statutes (F.S.), and rules 62-330.054, 62-330.060, 62-330.301 and 62-330.302, Florida Administrative Code (F.A.C.).

In order to expedite the review of your application, please use the application number referenced above and respond electronically through e-Permitting at sjrwmd.com/permitting or submit all requested information to the District.

1. Please change all references to retention pond to underdrain pond wherever used on the plans and in the calculations. [Section 6.0, A.H. Volume II]

2. Please submit an underdrain design based on the ellipse equation found in Section 6.0, Underdrain Design and Performance Criteria. [Section 6.0 A.H. Volume II]

3. Please demonstrate that indigenous soil, or an appropriate underdrain soil media replacement, will be used for the 2-foot minimum depth material in the underdrain bed. Uniform filter sand is not a District criterion approved material for use in underdrain design. Please change the plan detail notation in this regard as well. [Section 6.5, A.H. Volume II]

4. The proposed project generally appears to remain within the roadway impact corridor authorized by conceptual permits 70452-1,45 and most recently 55; however, please provide assurance (such as an overlayed graphic) that the project was designed to remain within the approved corridor. Please note, permit

70452-1 states that impacts for stormwater facilities were not quantified and therefore deviations in footprint/acreage due to ponds will not be considered inconsistent with the conceptual design in this instance. [62-330.301, F.A.C., 62-330.302, F.A.C.; 10.0 A.H. Vol I]

5. As discussed, a site inspection may be required to verify proposed impacts are consistent with the conceptual permit (70452-55). If it is determined that a site inspection will be required, please contact Nick Madderom to schedule a meeting. [62-330.301, F.A.C., 62-330.302, F.A.C.; 10.0 A.H. Vol I]

6. The proposed underdrain control elevations of several SWMF ponds (examples include 2 & 3) appear to be set below the adjacent wetlands. Please provide reasonable assurance that the proposed systems will not adversely impact the existing hydrology of the adjacent wetlands. If hydrologic drawdown to adjacent wetlands cannot be avoided, additional direct impacts will be assessed and mitigation for the impacts will be required. [Subsection 10.2.2.4, A.H.]

7. There are impacts associated with outfall pipes and structures (examples include pond 2 & 3) located outside of the identified impact areas and not identified as impacts to wetlands or other surface waters. Please quantify all proposed work within wetlands or other surface waters and ensure all impacts are indicated. Additionally, please revise all figures and plans accordingly. [62-330, F.A.C.; 10.0 A.H. Vol I]

8. Per the submitted environmental narrative, secondary impacts are proposed to be mitigated for at a ratio of 2:1; however, secondary impacts have been mitigated for at a 25% of proposed impact under recent permits (examples include permit #s 70452-65 & 113). Please update any figures, narratives and calculations to reflect any necessary changes. [Subsection 10.0 A.H. Vol I.]

9. A component of the mitigation plan is upland preservation encumbered by a conservation easement. Per the conceptual mitigation plan and subsequent construction permits, two separate ratios (10:1 within the corridor and 14.2:1 outside the corridor) were utilized for upland preservation dependent upon whether the area is located within the approved “corridor.” Please provide documentation and supporting figures identifying where the preservation areas are located in relation to the corridor in order to determine the appropriate mitigation ratio value is being utilized. Additionally, please update any figures, narratives and calculations to reflect any necessary changes. [Subsection 10.0 A.H. Vol I.]

10. Please provide reasonable assurance the proposed project will not result in adverse direct, secondary or cumulative impacts to the value of functions provided to fish and wildlife by wetlands and other surface waters. [Chapter 62-330.301 and .302, F.A.C.]

11. The proposed mitigation plan includes recording a conservation easement. Once the loss of wetland and other surface water function as result of the proposed

project is finalized, please provide all the information requested in the attached "Checklist for Submitting a Complete Conservation Easement Package" and demonstrate that the loss of function is fully offset by appropriate mitigation. [62-330.060(3), F.A.C. 62-330.301, F.A.C., 62-330.302, F.A.C.; 10.3.3, A.H. Vol I, 10.3.8, A.H. Vol. I]

Please note per District rules, you have 90 days to respond to this RAI letter. An automated courtesy reminder email will be sent to you on day 80 if you have not yet submitted a formal response to this RAI letter.

Please be aware, suggestions or other direction provided by District staff are offered to assist applicants in complying with District rules. However, applicants bear the burden of demonstrating that their application meets the applicable rule requirements. Although District staff may provide suggestions to applicants that would allow staff to recommend approval of an application to the District's Executive Director or delegatee, the final decision regarding the approval of a permit application is up to the District's Executive Director or delegatee. If an application is recommended for substantive denial, the application will be scheduled for consideration by the District's Governing Board. Applicants are hereby advised the Governing Board and the Executive Director or delegatee are not bound by previous statements or recommendations of District staff regarding an application.

If the applicant desires to dispute the necessity for any information requested on an application form or in a letter requesting additional information, he or she may, pursuant to section 373.4141, F.S, and section 5.5.3.6, Environmental Resource Permit Applicant's Handbook Volume I (ERP A.H. Volume I) request that District staff process the application without the requested information. If the applicant is then unsatisfied with the District's decision regarding issuance or denial of the application, the applicant may request a section 120.569, F.S. hearing pursuant to chapter 28-106 and rule 40C-1.1007, F.A.C.

Please be advised that under section 5.5.3.5, ERP A.H. Volume I, the applicant has 90 days from the date the District makes a timely request for additional information to submit that information to the District. If an applicant requires more than 90 days to respond, it must notify the District in writing of the circumstances, at which time the application shall remain in active status for one additional period of up to 90 days. The District will grant additional extensions for good cause shown by the applicant. A showing that the applicant is making a diligent effort to obtain the requested additional information, and that the additional time period is both reasonable and necessary to supply the information will be considered good cause. In such case, the District will grant a specified amount of additional time.

If the applicant chooses not to, or is unable to, respond to the request for additional information within the above time frames, the application will be administratively denied. An administrative denial is not a determination of the merit of an application and does not preclude the applicant from reapplying at a later time. However, the applicant will not receive a refund of processing fees submitted, and the District will not apply those processing fees to a subsequently submitted permit application or notice. If an applicant cannot provide the information within the applicable time frames, the applicant may wish to withdraw the application in accordance with section 5.5.3.7, ERP A.H. Volume I. Please note, pursuant to Rule 62-330.020(2), F.A.C., no construction may begin on the proposed project until a permit is issued by the District.

If you have any questions, please contact Everett Frye at (904) 448-7913 or by email at efrye@sjrwmd.com and Nicholas Madderom, at (904) 224-2959 or by e-mail: NMadderom@sjrwmd.com.

Sincerely,

Everett Frye

Everett Frye
Supervising Professional Engineer
Division of Regulatory Services

Nick Madderom
Regulatory Scientist
Division of Regulatory Services

CC: Regulatory File

Thomas O Brumfield
Sent via email: TBrumfield@ses-grp.com

Walt Esser:
Sent via email: wesser@ses-grp.com

Northeast District
Sent via email: DEP_NED@dep.state.fl.us

From: Nicholas Madderom
To: Walt Esser
Subject: [EXTERNAL] RE: Cecil Approach Road
Date: Monday, December 5, 2022 10:22:53 AM
Attachments: image001.png

[EXTERNAL]

Hey Walt, hope you had a nice Thanksgiving as well.

Based on the provided narrative and associated graphic, I agree that the design is consistent with the conceptual and acceptable to move forward. The impacts closely follow the roadway corridor and proposed impacts are to the same systems that were conceptually authorized. Additionally, and as noted in the RAI, the impact section of the initial sequence (70452-1) TSR states, " *No attempt has been made to quantify the impacts that could occur from construction of the proposed stormwater management system. Any impacts associated with the construction of the stormwater management system will be addressed during review of the construction permits. (See other condition 10.)*" which further supports justification of the discrepancies in impact areas. A site review for the impact areas will not be required to proceed.

Once comments 6 and 7 are addressed such that all impacts are quantified and/or hydrologic drawdown is precluded, please feel free to contact me anytime if you would like to discuss comment 8 and determine an appropriate ratio for types of impacts and areas to be encumbered based on the location of proposed CEs.

Thanks,
Nick

Nick Madderom
Regulatory Scientist III
Bureau of Environmental Resource Regulation
Division of Regulatory Services
St. Johns River Water Management District
Jacksonville Service Center
7775 Baymeadows Way, Suite 102 • Jacksonville, FL 32256
Cell: (315)723-4840 Desk: (904)224-2959
Email: nmaddero@sjrwmd.com
Website: www.sjrwmd.com
Connect with us: Newsletter, Facebook, Twitter, YouTube

From: Walt Esser <wesser@ses-grp.com>
Sent: Tuesday, November 29, 2022 7:14 AM
To: Nicholas Madderom <NMadderom@sjrwmd.com>
Subject: FW: Cecil Approach Road

Hey Nick, hope you had a great thanksgiving. Have you had a chance to review the attached map and my associated email below?

Thanks,
Walt

Walt Esser | Senior Environmental Scientist/FAA Qualified Airport Wildlife Biologist
Environmental Resource Solutions
A Division of SES Energy Services LLC
3550 St. Johns Bluff Road South
Jacksonville, Florida 32224
Phone - 904-285-1397
Fax - 904-285-1929
wesser@ersenvironmental.com

From: Walt Esser
Sent: Wednesday, November 16, 2022 1:27 PM
To: Nicholas Madderom <NMadderom@sjrwmd.com>
Subject: Cecil Approach Road

Hey Nick,

Please see attached graphic depicting the proposed limits of the Cecil Approach Road in relation to the permitted conceptual impacts. Of a total 18.42 acres of proposed impact, approximately 12.20 align with the conceptual, leaving approximately 6.22 acres of impact not contemplated by the conceptual within the proposed Approach Road limits. I would like to note that the majority of these “not identified” impacts occur to systems identical to the systems identified in the conceptual. Additionally, a very important point is that the conceptual also identified an additional 8.27 acres of direct impact that is not being incurred by the roadway project in comparison to the conceptual, so the project results in a net decrease of impact by 2.05 acres. Please note that these “abandoned impacts” were to occur to the same wetland system that is being impacted by the approach road project.

In summary, I believe that the proposed impact plan is preferable over the conceptual impacts, and that the project is consistent with the intent of the issued conceptual permit. Therefore, we would propose that mitigation remain consistent with previously issued permits under this conceptual sequence. Please review this information and if you would like to proceed with a site visit please give me some dates that work for you.

Thanks,

Walt

Walt Esser | Senior Environmental Scientist/FAA Qualified Airport Wildlife Biologist
Environmental Resource Solutions
A Division of SES Energy Services LLC
3550 St. Johns Bluff Road South
Jacksonville, Florida 32224
Phone - 904-285-1397
Fax - 904-285-1929
wesser@ersenvironmental.com

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

08012
Alenia

REPLY TO
ATTENTION OF

March 12, 2009

Regulatory Division
North Permits Branch
Jacksonville Permits Section
SAJ-2008-1502(SP-BAL)
Modification-1

Mr. J. Derek Powder, P.E.
Jacksonville Aviation Authority
14201 Pecan Park Boulevard
Jacksonville, Florida 32218

Dear Mr. Powder:

The U.S. Army Corps of Engineers has completed the review and evaluation of your permit request that was received on December 22, 2008. You asked for additional impacts at the aviation facility at Cecil Commerce Center which was previously authorized by Department of the Army permit number SAJ-2008-1502(SP-BAL). The project site surrounds the boundary of the existing Cecil Field runway facilities that is located at Cecil Commerce Center, in Sections 23, 24, 25, 35 & 36, Township 3 South, Range 24 East, Jacksonville, Duval County, Florida. Specifically,

You requested to eliminate 152.32 acres of wetland impacts for the construction of aircraft hangers, taxiway extensions, maintenance facilities and aviation-related support facilities including business offices, and warehouses. In addition, the modification request needs to match the expiration date of other permits issued for Cecil Commerce Center.

The following special conditions have been added as a result of the modification:

1. **St. Johns River Water Management District(SJRWMD) Permits:** The permittee shall submit to the Corps a copy of any and all future State of Florida Environmental Resource Permits and/or St. Johns River Water Management District(SJRWMD) permits **for each work component** associated with the project, or any portion of the overall work associated with this project, within 30 days of the issuance of such permits.

2. **Mitigation:** Within 30 days from the date of receiving the SJRWMD permit, the Permittee shall submit to the Corps a site plan and the Wetland Rapid Assessment Procedures (WRAP) scores for the work component for review and approval. The permittee cannot begin work until they receive verification from the Corps that the credits are available at the Mitigation Area or appropriate compensatory wetland mitigation has been reviewed and accepted by the Corps.

3. **Disconnecting Aquatic Resources**: The permittee acknowledges that no work authorized by this permit instrument shall in any way serve to hydrologically disconnect aquatic resources considered jurisdictional waters of the United States from other waters of the United States thereby rendering those resources non-jurisdictional. Also, compensatory wetland mitigation may be required if the aquatic resource has been altered by construction and no longer functioning at the assessed value.

4. **Regulatory Agency Changes**: Should any other regulatory agency require changes to the work authorized or obligated by this permit, the Permittee is advised that a modification to this permit instrument is required prior to initiation of those changes. It is the Permittee's responsibility to request a modification of this permit from the Jacksonville Regulatory Office.

The impact of your proposal on navigation and the environment have been reviewed and found to be insignificant. The permit is hereby modified in accordance with your request. The modification must be completed in accordance with the enclosed impact drawings dated January 26, 2009, which are incorporated in, and made a part of the permit. Also, the timeframe for the existing permit has been extended until **22 September 2023.** You should attach this letter to the permit. All other conditions of the permit remain in full force and effect.

If you have any questions concerning the permit modification, please contact the project manager Bev Lawrence at (904) 232-2517 or at the above letterhead address or by electronic mail at beverlee.a.lawrence@usace.army.mil.

Thank you for your cooperation with our permit program. The Corps Jacksonville District Regulatory Division is committed to improving service to our customers. We strive to perform our duty in a friendly and timely manner while working to preserve our environment. We invite you to take a few minutes to visit the following link and complete our automated Customer Service Survey:
http://www.saj.usace.army.mil/permit/forms/customer_service.htm. Your input is appreciated - favorable or otherwise.

BY AUTHORITY OF THE SECRETARY OF THE ARMY:

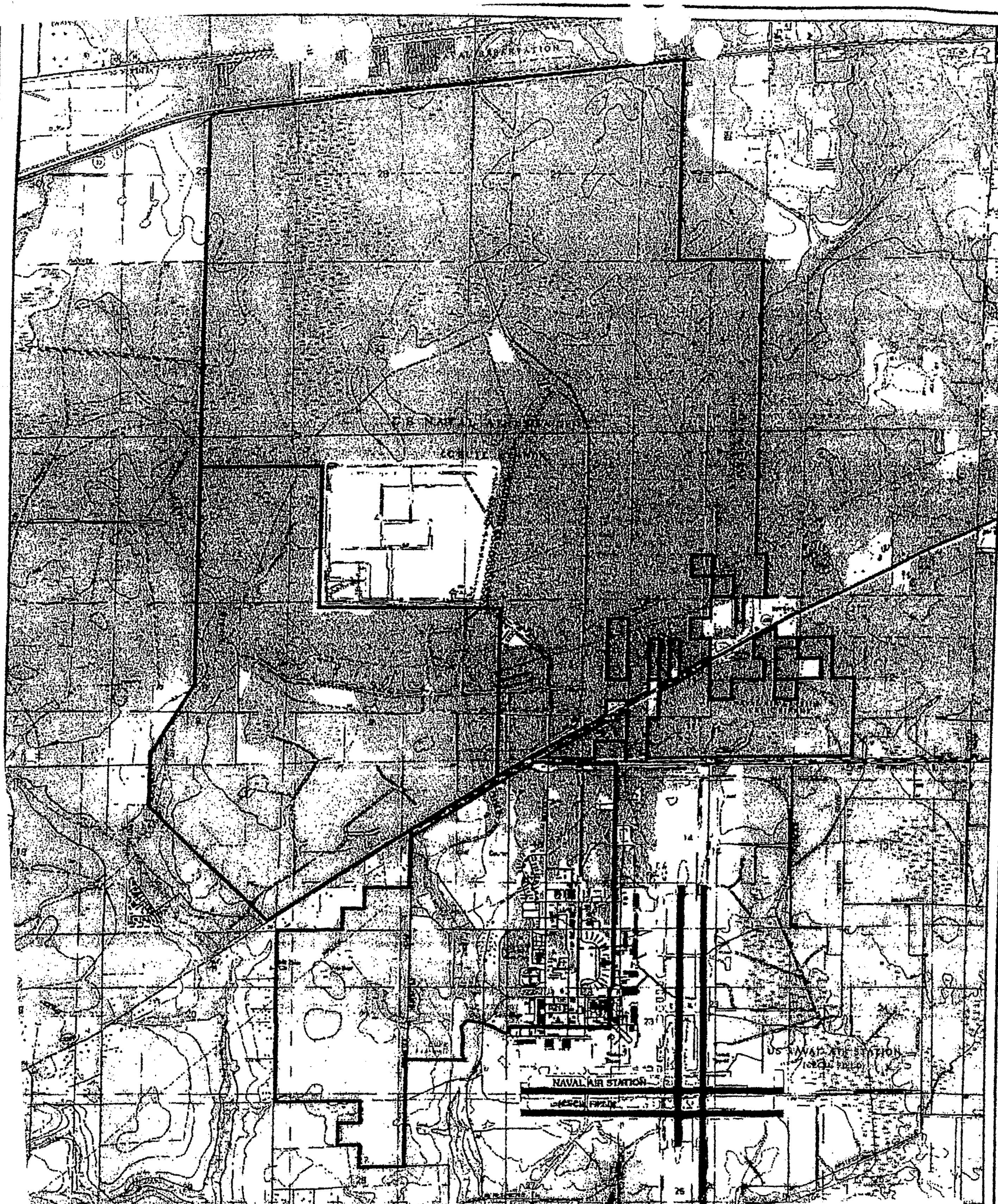
Paul L. Grosskruger
Colonel, U.S. Army
District Commander

Enclosure

Copies Furnished:

Ms. Amy Wester, Environmental Resource Solutions, Inc., 1597 The Greens Way, Suite 200, Jacksonville Beach, FL 32250

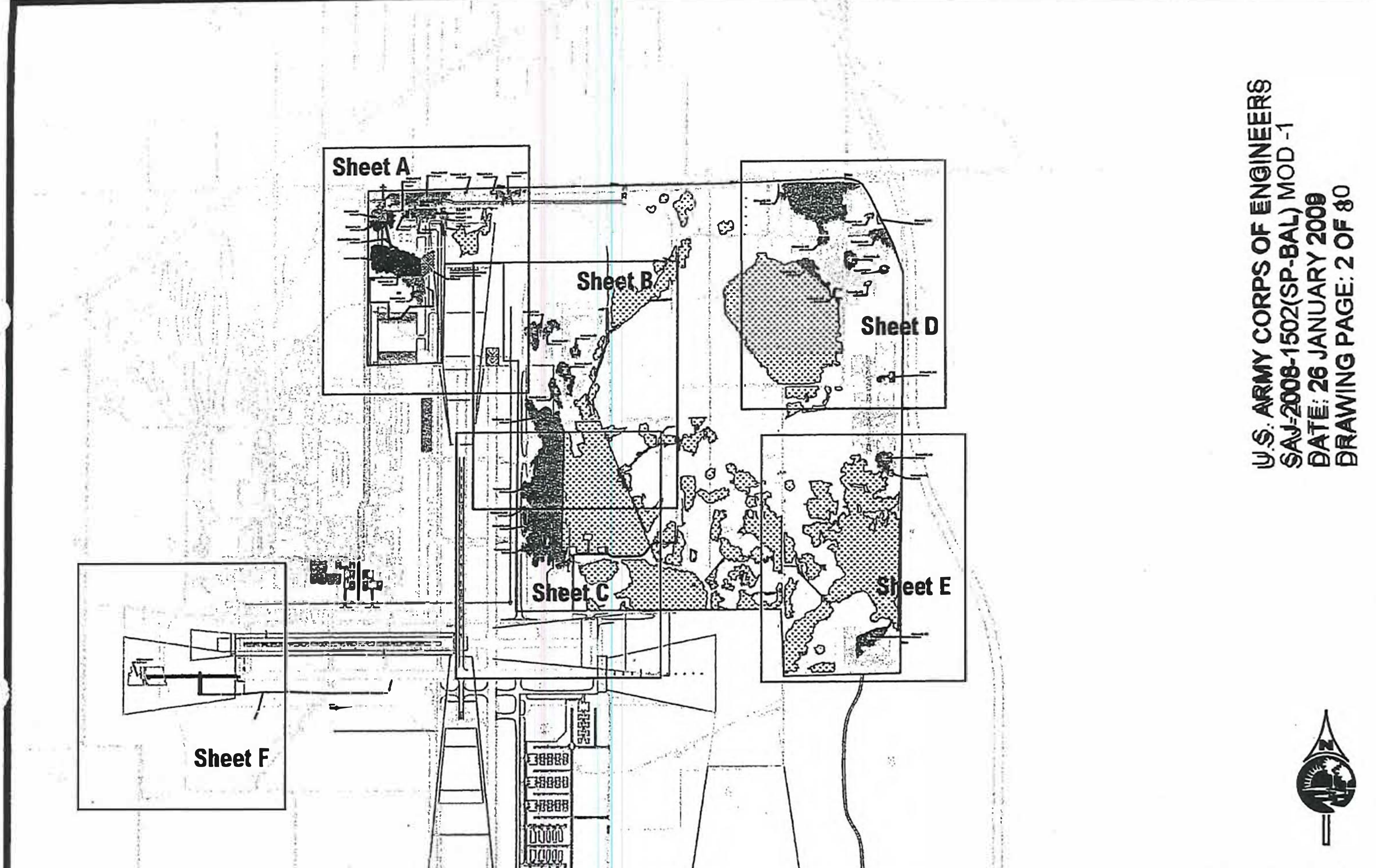
CESAJ-RD-PE



Environmental Resource Solutions Inc.
1597 The Greens Way, Suite 200
Jacksonville Beach, FL 32250

USGS 7.5' Topographic Quadrangles:
Baldwin, Marietta, Jacksonville Heights, Fiftone, Florida.

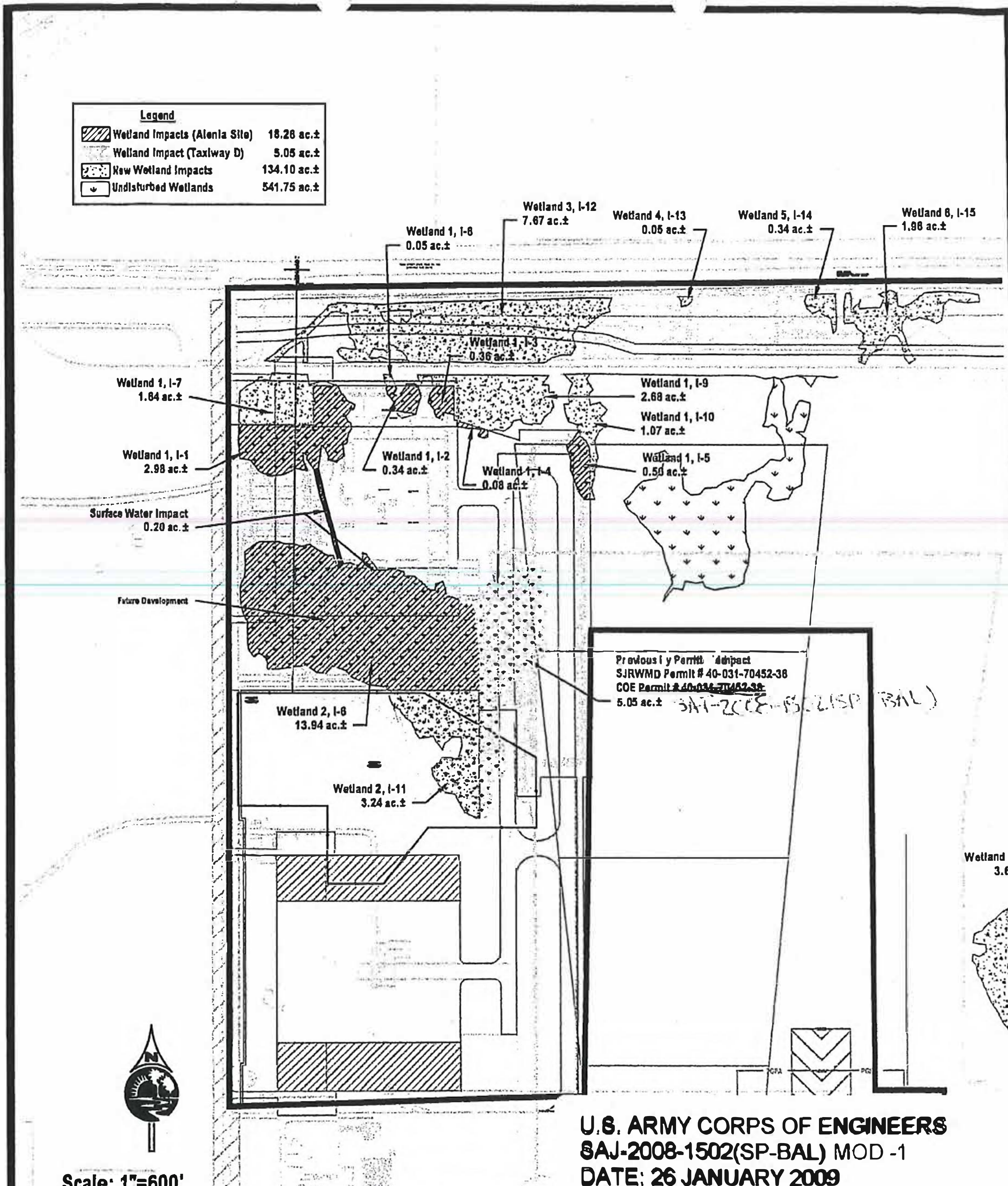
U.S. ARMY CORPS OF ENGINEERS
SAJ-2008-1502(SP-BAL) MOD -1
DATE: 26 JANUARY 2009
DRAWING PAGE: 1 OF 80



U.S. ARMY CORPS OF ENGINEERS
SAJ-2008-1502(SP-BAL) MOD -1
DATE: 26 JANUARY 2009
DRAWING PAGE: 2 OF 80

Scale: 1"=3000'

Environmental Resource Solutions Inc. 1597 The Greens Way Suite 200 Jacksonville Beach, FL 32250	**Cecil Commerce Center** **Wetland Impact Key Map**	Source:	Project No.: **08012**
			Date: **1-22-09** Rev:
		File: **08012_Impact_1-22-09**	By: **JK** Exhibit No: **4Key**



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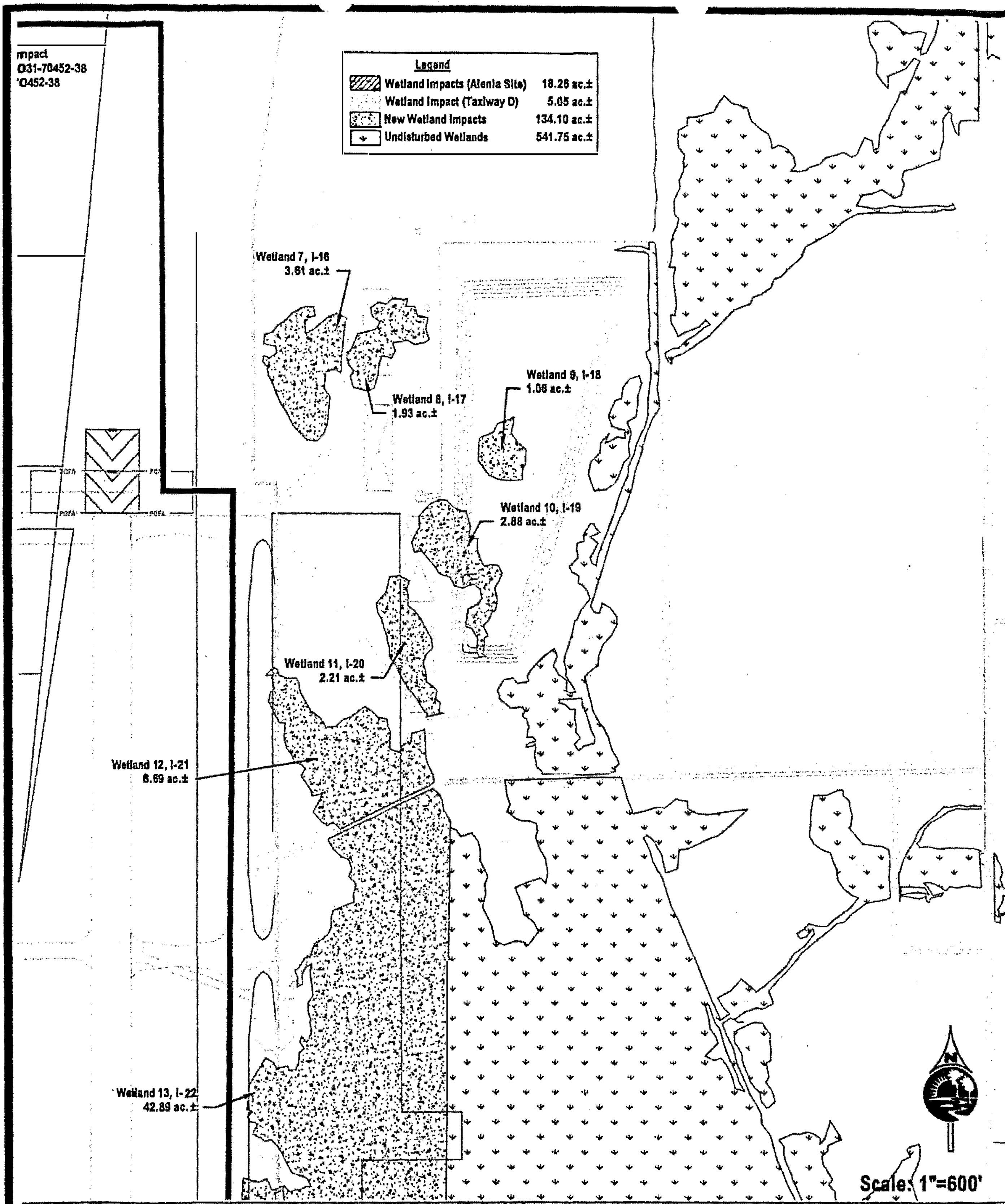
SAJ-2008-1502(SP-BAL) MOD -1
DATE: 26 JANUARY 2009
DRAWING PAGE: 3 OF 80

Environmental Resource Solutions Inc. 1597 The Greens Way Suite 200 Jacksonville Beach, FL 32250	**Cecil Commerce** **Wetland Impact Map (Sheet A)**	Date: **1-22-09**	Rev.:
	Source:	File: 08012_Impact_1-22-09	By: JK / Exhibit No.: **4A**



Environmental Resource Solutions Inc.
1597 The Greens Way
Suite 200
Jacksonville Beach, FL 32250

Cecil Commerce Cen
Wetland Impact Map (Sl

Source:.

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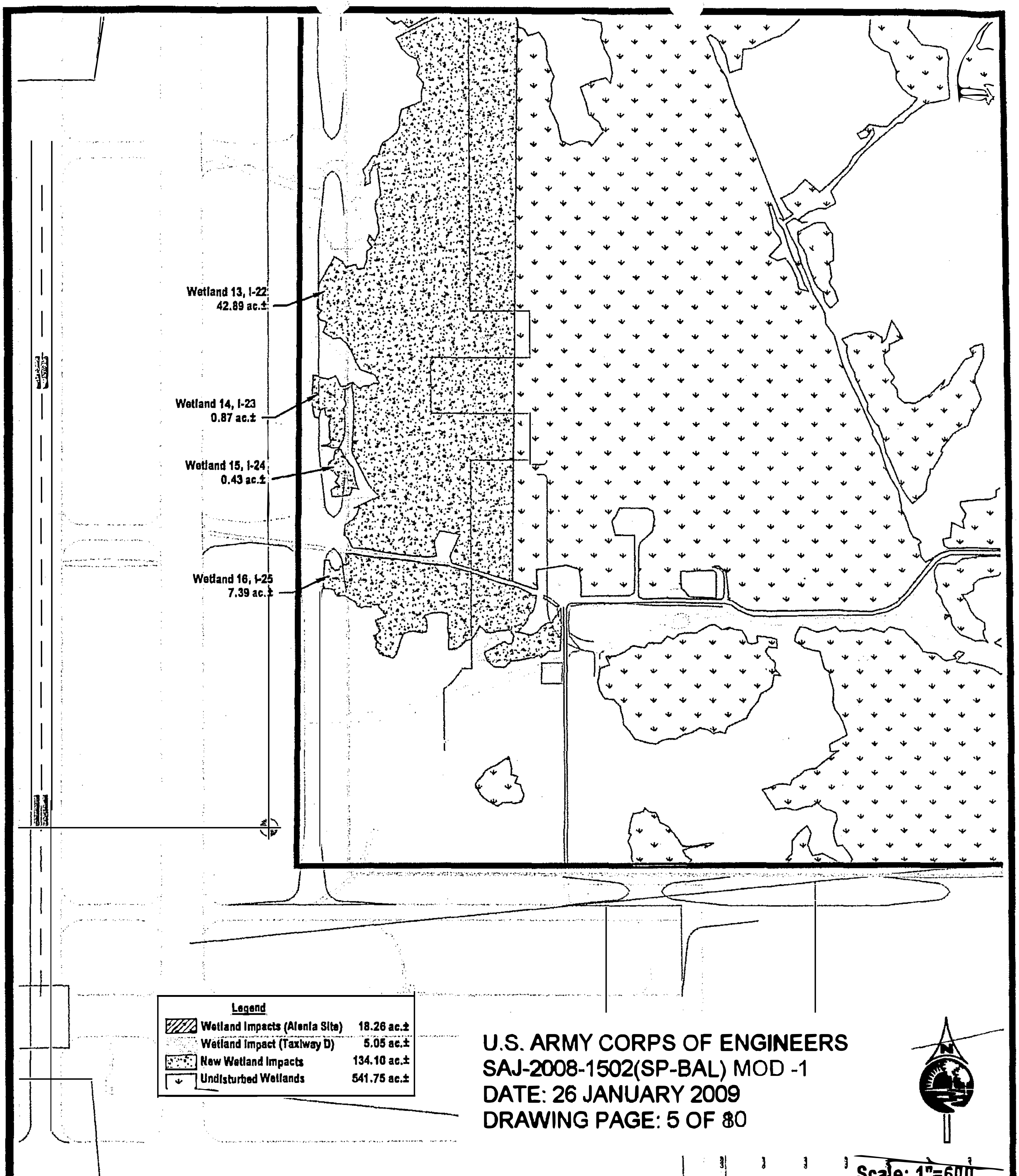
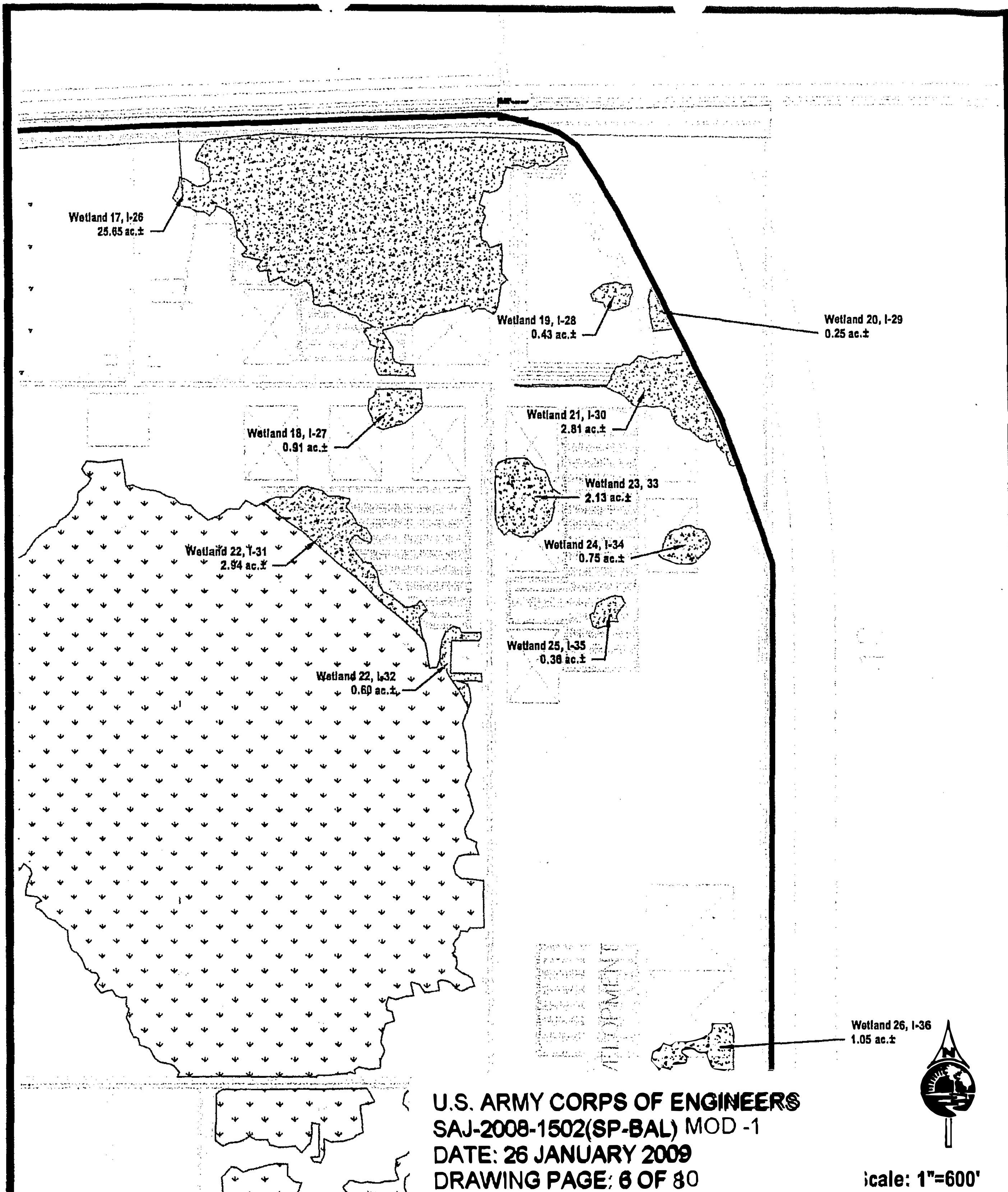
DATE: 26 JANUARY 2009
DRAWING PAGE: 4 OF 80



Environmental Resource Solutions Inc. 1597 The Greens Way Suite 200 Jacksonville Beach, FL 32250	**Cecil Commerce Center Wetland Impact Map (Sheet C)**	Project No.: 08012
		Date: 1-22-09 / Rev.:
	Source: / File: 08012_Impact_1-22-09	By: JK / Exhibit No.: 4C



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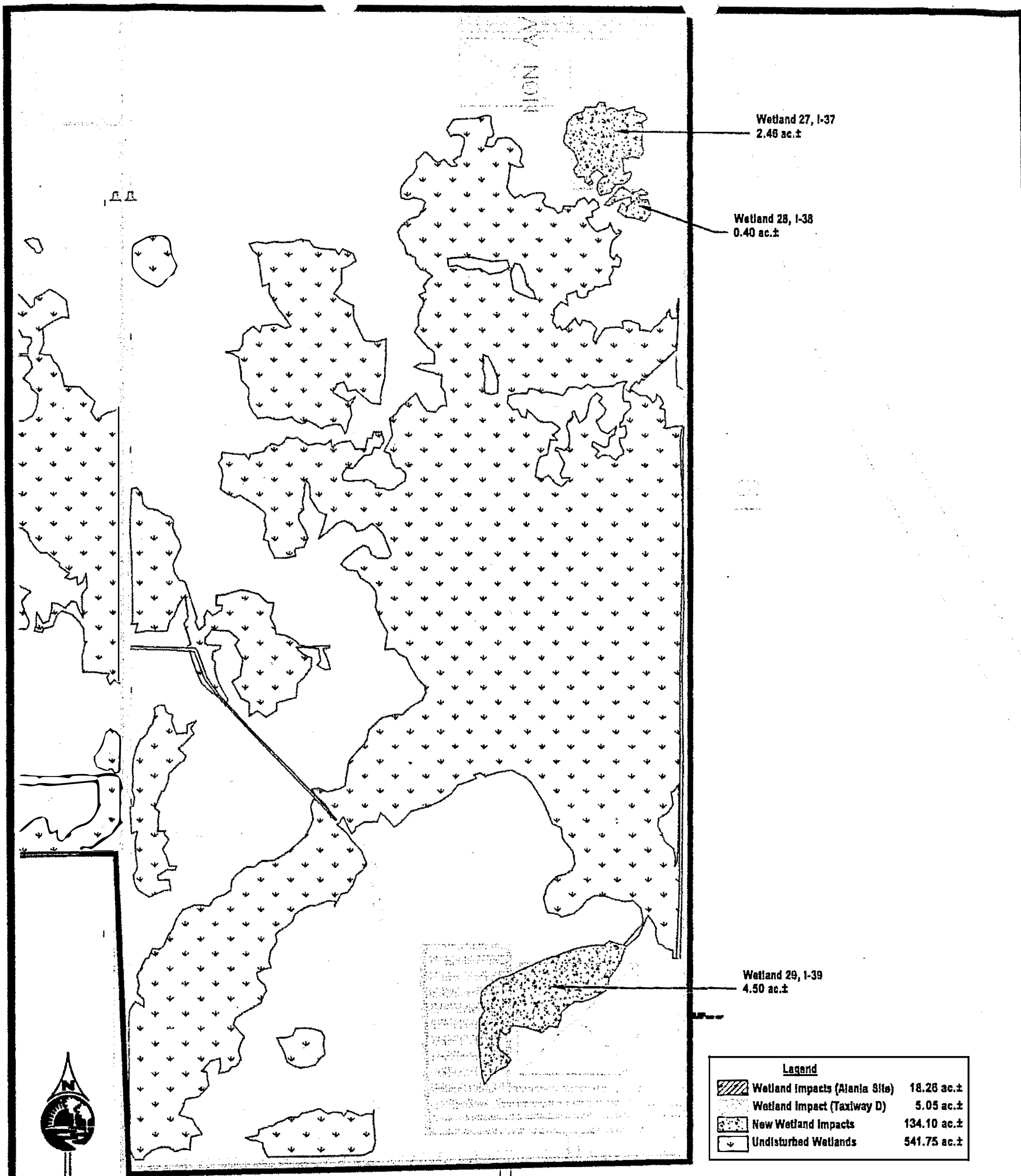
DATE: 26 JANUARY 2009
DRAWING PAGE: 6 OF 30

Environmental Resource Solutions Inc. 1597 The Greens Way Suite 200 Jacksonville Beach, FL 32250	Cecil Commerce Center Wetland Impact Map (Sheet D)	Project No.: 08012	
		Date: 1-22-09	Rev.:
	Source:	File: 08012_Impact_1-22-09	By: JK	Exhibit No.: 4D



Scale: 1"=600'

Environmental Resource Solutions Inc.
1597 The Greens Way
Suite 300
Jacksonville Beach, FL 32250

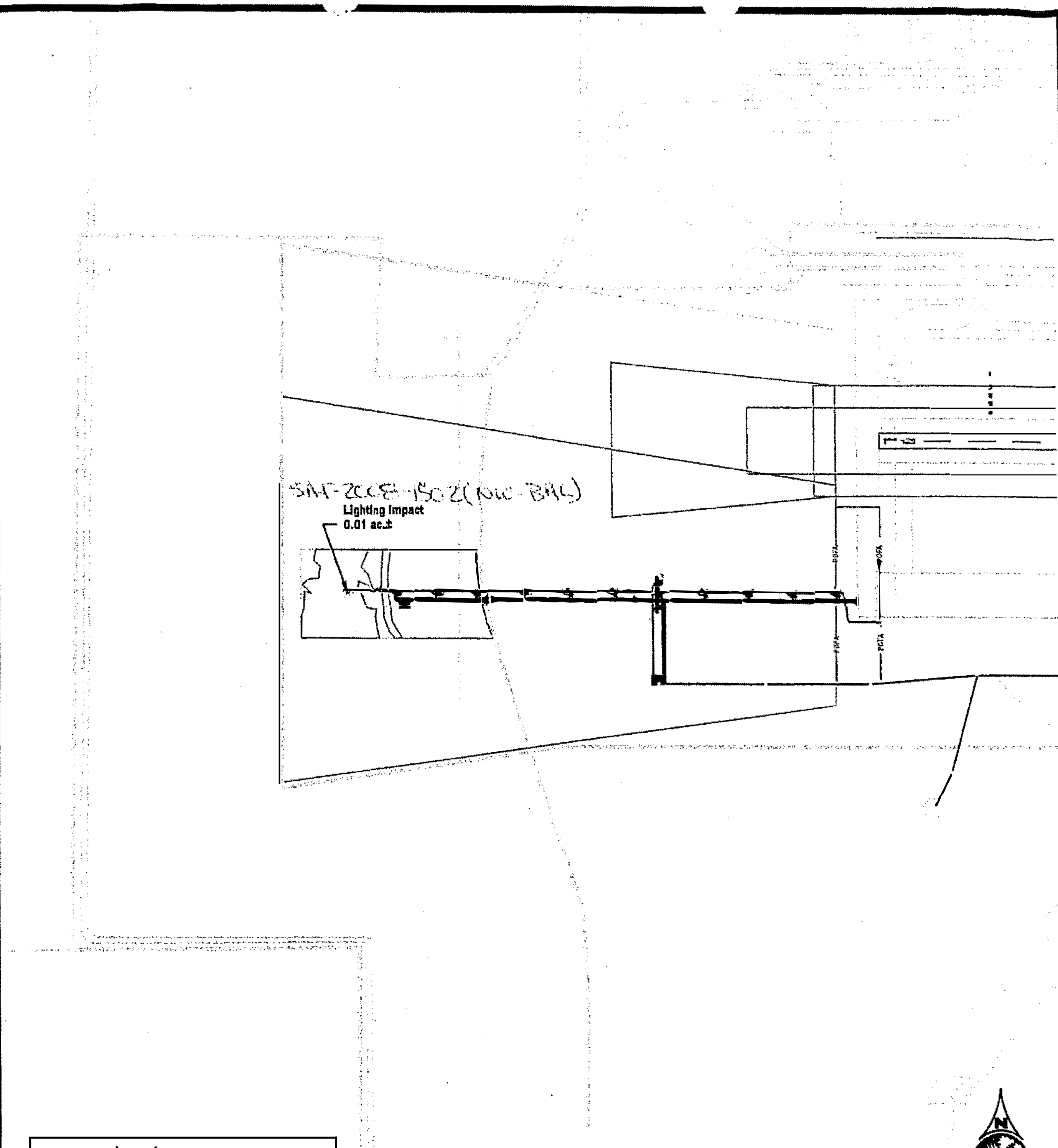
Cecil Commerce Cent...
Wetland Impact Map (Sh...

Project No.: 08012

Source:

File: 08012

U.S. ARMY CORPS OF ENGINEERS
SAJ-2008-1502(SP-BAL) MOD -1
DATE: 26 JANUARY 2009
DRAWING PAGE: 7 OF 80



Legend

	Wetland Impacts (Alenia Site)	18.28 ac.±
	Wetland Impact (Taxiway D)	5.05 ac.±
	New Wetland Impacts	134.10 ac.±
	Undisturbed Wetlands	541.75 ac.±

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DATE: 26 JANUARY 2009
DRAWING PAGE: 8 OF 80

Scale: 1"=600'

Environmental Resource Solutions Inc.
1597 The Greens Way
Suite 200
Jacksonville Beach, FL 32250

Cecil Commerce Center
Wetland Impact Map (Sheet F)

Project No.: 08012			
Date: 1-22-09	Rev.:		
Source:	File: 08012_Impact_1-22-09	By: JK	Exhibit No.: 4F

Draft EA Mailing List
Jacksonville Aviation Authority Cecil Airport
Environmental Assessment

Federal

FAA (electronic)
Ms. Amy Reed
FAA, Orlando Airports District Office
8427 Southpark Circle, STE 524
Orlando, FL 32819
407-487-7297
Amy.M. Reed@faa.gov

U.S. Fish and Wildlife Service (electronic)
Ms. Annie Dziergowski
Fish and Wildlife Biologist
Jacksonville Ecological Services Field Office
U.S. Fish and Wildlife Service
7915 Baymeadows Way, Suite 200
Jacksonville, FL 32256-7517
(904)-731-3089
annie_dziergowski@fws.gov

U.S. Environmental Protection Agency (electronic)
Mr. Christopher Militscher, Chief
NEPA Program Office
U.S. Environmental Protection Agency Region 4
61 Forsyth Street, SW
Atlanta, GA 30303
(404) 562-9512
militscher.chris@epa.gov

U.S. Army Corps of Engineers (electronic)
Mr. Brad Carey
Jacksonville District Office
U.S. Army Corps of Engineers
701 San Marco Blvd
Jacksonville, FL 32207
(904)-232-2405
brad.j.carey@usace.army.mil

State

Environmental Review Clearinghouse (electronic)
Mr. Chris Stahl
Florida Department of Environmental Protection
Environmental Review Clearinghouse
3900 Commonwealth Blvd., MS 47
Tallahassee, FL 32399
(850)-717-9045
State.Clearinghouse@FloridaDEP.gov

St. Johns River Water Management District (electronic)
Mr. Douglas Conkey
Intergovernmental Coordinator
SJRWMD Jacksonville Service Center
7775 Baymeadows Way, Suite 102
Jacksonville, Fl 32256
904-730-6287
dconkey@sjrwmd.com

State Historic Preservation Office (SHPO)
FAA will conduct all correspondence with SHPO.

Local

City of Jacksonville (COJ) Planning and Development (electronic)
Ms. Kristen D. Reed, Chief
Community Planning Division
Ed Ball Building
214 N. Hogan Street, Suite 300
Jacksonville, FL 32202
(904)-255-7837
KReed@coj.net

COJ Development Services Division-Floodplains, site plan review, etc. (electronic)
Ms. Ellyn Cavin, P.E., Chief
Edward Ball Building
214 N. Hogan St., Room 2100 (2nd Floor)
Jacksonville, FL 32202
Phone: (904) 255-8310
Fax: (904) 255-8311
ECavin@coj.net

Draft EA Mailing List

Jacksonville Aviation Authority Cecil Airport
Environmental Assessment

COJ Development Services Division (electronic)
Mr. William Joyce, P.E., Operations Director
214 N. Hogan Street 10th floor
Jacksonville, Florida 32202
904-255-8786
joyce@coj.net

Cecil Commerce Center (electronic)
Mr. Ed Randolph
Office of Economic Development
(904)-255-5450
edr@coj.net

Jacksonville Public Library (hardcopy)
Argyle Branch
Attn: Kimberly Kirkland, Branch Manager
7972 Old Middleburg Road South
Jacksonville, FL 32222
904-255-2665

RS&H

10748 Deerwood Park Boulevard S
Jacksonville, Florida 32256
O 904-256-2500
F 904-256-2501
rsandh.com

[DATE]

[NAME]
[ADDRESS]
[ADDRESS LINE 2]

RE: Review and Comment of the Cecil Airport Draft Environmental Assessment for On-Airport Access Road and Utilities Corridor Extension Development

Dear [Mr./Ms.],

In compliance with Federal Aviation Administration (FAA) policy and procedures (FAA Orders 1050.1F and 5050.4B) for implementing the National Environmental Policy Act (NEPA), as amended (42 United States Code 4321 et seq.), the Jacksonville Aviation Authority (Authority), is announcing the availability of, and requesting comments on, the *Draft Environmental Assessment (EA) for On-Airport Access Road and Utilities Corridor Extension Development at Cecil Airport*. The Draft EA was prepared to analyze the potential environmental impacts of the Authority's proposal to extend Approach Road and utilities on the east side of Cecil Airport (Proposed Project). The purpose of the Proposed Project is to ensure continued safe airport operations by providing reliable vehicular access, connecting a water supply utility line to the spaceport hangar, and allowing commercial space operators to use the spaceport hangar safely.

A Draft EA under the NEPA has been prepared to disclose the potential economic, social, and environmental impacts of the Proposed Project. The Proposed Project can potentially impact Biological and Coastal Resources, Hazardous Materials, Solid Waste, and Pollution Prevention, Natural Resources and Energy Supply, and Water Resources – Surface Water. Pursuant to FAA Order 1050.1F and Executive Order (EO) 11990, notice is given that the Proposed Project would affect wetlands. A portion of the Proposed Project is within a 100-year floodplain. According to FAA Order 1050.1F and EO 11988, Floodplain Management, notice is given that the Proposed Project constitutes an encroachment into the 100-year floodplain. The potential wetland and floodplain impacts and mitigation measures are described in the Draft EA.

All interested parties are invited to provide comments concerning the content of the Draft EA by June 24, 2023. Comments should be as specific as possible and address the analysis of potential environmental impacts, the adequacy of the Proposed Project, or the merits of alternatives being considered. Reviewers should organize their comments to be meaningful and inform the Authority of their interests and concerns by quoting or providing specific references to the text of the Draft EA. This commenting procedure is intended to ensure that substantive comments and concerns are made available to the Authority in a timely manner so that the Authority has an opportunity to address them. After comments from the public, federal, state, and local agencies are considered and responded to in the Final EA, the Final EA will be submitted to the FAA for environmental determination.

Written comments may be submitted to the Jacksonville Aviation Authority, Attn. Ms. Lauren Scott, Senior Manager of Aviation Planning, 14201 Pecan Park Road, Jacksonville, FL, 32218, or mailed to RS&H, Inc. Attn. Mr. David Alberts, 10748 Deerwood Park Boulevard South, Jacksonville, FL 32256. Comments may also be submitted by email to david.alberts@rsandh.com.

Sincerely,

D. D. Alberts

David Alberts
Project Manager

Electronic Enclosure (PDF)
Cecil Airport Draft Environmental Assessment for On-Airport Access Road and Utilities Corridor Extension Development

NOTICE OF AVAILABILITY OF DRAFT ENVIRONMENTAL ASSESSMENT (EA)
ON-AIRPORT ACCESS ROAD AND UTILITIES CORRIDOR EXTENSION
CECIL AIRPORT, DUVAL COUNTY, FLORIDA

Pursuant to Title 49, United States Code, § 47106(c)(1)(A), notice is hereby given that the Jacksonville Aviation Authority (JAA), in coordination with the Federal Aviation Administration (FAA), intends to develop an extension to Approach Road and utilities on the east side of the Cecil Airport (Proposed Project). The purpose of the Proposed Project is to ensure continued safe airport operations by providing reliable vehicular access and connecting a water supply utility line to the spaceport hangar and providing commercial space operators the ability to use the spaceport hangar safely.

A Draft Environmental Assessment (EA) under the National Environmental Policy Act (NEPA) has been prepared to disclose the potential economic, social, and environmental impacts of the Proposed Project. The Proposed Project can potentially impact Biological and Coastal Resources, Hazardous Materials, Solid Waste, and Pollution Prevention, Natural Resources and Energy Supply, and Water Resources – Surface Water. Pursuant to FAA Order 1050.1F and Executive Order (EO) 11990, notice is given that the Proposed Project would affect wetlands. A portion of the Proposed Project is within a 100-year floodplain. According to FAA Order 1050.1F and EO 11988, Floodplain Management, notice is given that the Proposed Project constitutes an encroachment into the 100-year floodplain. The potential wetland and floodplain impacts and mitigation measures are described in the Draft EA.

The Draft EA is available for public examination for 30 days beginning with the publication date of this notice, on the JAA website https://www.flyjacksonville.com/cecil/content.aspx?id=543, and at the following locations: JAA Administrative Office, 14201 Pecan Park Road, Jacksonville, FL 32218; Cecil Airport 13365 Simpson Way, Jacksonville, FL 32221; and the Jacksonville Public Library Argyle Branch, 7972 Old Middleburg Road South, Jacksonville, FL 32222.

This notice provides the opportunity for a public workshop on the Proposed Project. A request for a public workshop must be received within 15 days of the original notice. The FAA will consider whether a public workshop is warranted. After comments from the public, federal, state, and local agencies are considered and responded to in the Final EA, the Final EA will be submitted to the FAA for environmental determination.

Written comments on the Draft EA should focus on the Proposed Project's economic, social and environmental effects and may be sent to David.Alberts@rsandh.com or addressed to: Mr. David Alberts, RS&H, 10748 Deerwood Park Boulevard South, Jacksonville, FL 32256 or JAA, Attn. Ms. Lauren Scott, Senior Manager of Aviation Planning, 14201 Pecan Park Road, Jacksonville, FL, 32218. Electronic and hand-delivered comments must be received no later than 5:00 pm Eastern Time 30 days from the publication date of this notice. Mailed comments must be postmarked no later than 30 days from the publication date of this notice. Be advised that all comments received, including personal identifying information, may be made publicly available at any time. While you can ask us in your comment to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so.

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FLORIDA

PO Box 631244 Cincinnati, OH 45263-1244

PROOF OF PUBLICATION

Monica Hamblin
Rs&H
10748 DEERWOOD PARK BLVD S
Jacksonville FL 32256

STATE OF WISCONSIN, COUNTY OF BROWN

Before the undersigned authority personally appeared, who on oath says that he or she is the Legal Coordinator of The Florida Times-Union, published in Duval and Clay Counties, Florida; that the attached copy of advertisement, being a Public Notices, was published on the publicly accessible website of Duval and Clay Counties, Florida, or in a newspaper by print in the issues of, on:

05/24/2023

Affiant further says that the website or newspaper complies with all legal requirements for publication in chapter 50, Florida Statutes.

Subscribed and sworn to before me, by the legal clerk, who is personally known to me, on 05/24/2023

Legal Clerk

Mariah Verhagen

Notary, State of WI, County of Brown

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Pursuant to Title 49, United States Code, § 47106(c)(1)(A), notice is hereby given that the Jacksonville Aviation Authority (JAA), in coordination with the Federal Aviation Administration (FAA), intends to develop an extension to Approach Road and utilities on the east side of the Cecil Airport (Proposed Project). The purpose of the Proposed Project is to ensure continued safe airport operations by providing reliable vehicular access and connecting a water supply utility line to the spaceport hangar and providing commercial space operators the ability to use the spaceport hangar safely.

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May 24, 2023

SECOND NOTICE OF AVAILABILITY OF DRAFT ENVIRONMENTAL ASSESSMENT (EA)
ON-AIRPORT ACCESS ROAD AND UTILITIES CORRIDOR EXTENSION
CECIL AIRPORT, DUVAL COUNTY, FLORIDA

Pursuant to Title 49, United States Code, § 47106(c)(1)(A), notice is hereby given that the Jacksonville Aviation Authority (JAA), in coordination with the Federal Aviation Administration (FAA), intends to develop an extension to Approach Road and utilities on the east side of the Cecil Airport (Proposed Project). The purpose of the Proposed Project is to ensure continued safe airport operations by providing reliable vehicular access and connecting a water supply utility line to the spaceport hangar and providing commercial space operators the ability to use the spaceport hangar safely.

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PROOF OF PUBLICATION

Monica Hamblin
Rs&H
10748 DEERWOOD PARK BLVD S
Jacksonville FL 32256

STATE OF WISCONSIN, COUNTY OF BROWN

Before the undersigned authority personally appeared, who on oath says that he or she is the Legal Coordinator of The Florida Times-Union, published in Duval and Clay Counties, Florida; that the attached copy of advertisement, being a Public Notices, was published on the publicly accessible website of Duval and Clay Counties, Florida, or in a newspaper by print in the issues of, on:

06/07/2023

Affiant further says that the website or newspaper complies with all legal requirements for publication in chapter 50, Florida Statutes.
Subscribed and sworn to before me, by the legal clerk, who is personally known to me, on 06/07/2023

Legal Clerk

Notary, State of WI, County of Brown

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SECOND NOTICE OF AVAILABILITY OF DRAFT ENVIRONMENTAL ASSESSMENT (EA)
ON-AIRPORT ACCESS ROAD AND UTILITIES CORRIDOR EXTENSION
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6/7/2023

APPENDIX B – BIOLOGICAL RESOURCES

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SES Environmental Resource Solutions LLC

Technical Memorandum	
RE: VQQ Approach Road and Utility Corridor Extension Duval County, Florida	ERS Job No.: 22114
To: Ms. Monica Hamblin, RS&H	
From: Gabby Allerton, SES Environmental Resource Solutions LLC	Date: May 16, 2023

INTRODUCTION

This Technical Memorandum presents the results of a wildlife and habitat assessment of the 43.76-acre± Approach Road corridor on Cecil Airport (VQQ) property, Duval County, Florida (**Exhibit 1**, **Appendix A**). The purpose of the assessment was to conduct a protected species survey and habitat assessment of the referenced project area in support of a National Environmental Policy Act (NEPA; 42 U.S.C. §§ 4321 et seq.) documentation prepared by RS&H.

EXISTING ENVIRONMENTAL CONDITIONS

Soils

According to the *Soil Survey of City of Jacksonville, Duval County, Florida* [U.S. Department of Agriculture Natural Resource Conservation Service (NRCS)], the following soil types are mapped within the project area: Boulogne fine sand (Soil Identification No. 14), Evergreen-Wesconnett complex, depressional (22), Rutlege mucky fine sand, frequently flooded (62), Sapelo fine sand (63), Yulee clay, frequently flooded (79), and Stockade fine sandy loam, depressional (81). Mapped soil types are depicted on **Exhibit 2** (**Appendix A**).

Land Use/Cover

All habitats and land uses within the project area were inspected and classified utilizing the Florida Department of Transportation (FDOT) *Florida Land Use, Cover and Forms Classification System* (FLUCFCS, 1999). Habitat classifications utilized are consistent with the valid Formal Wetland Determination issued 27 September 2019 (Permit No. 70452.108) issued by the St. Johns River Water Management District (SJRWMD). Land uses mapped within the project area are described below, and their classification and approximate extents are depicted on **Exhibit 3** (**Appendix A**).

Uplands

Shrub and Brushland (FLUCFCS Code 320) – 5.72 acres± Naturally revegetating shrub and brushland uplands consisting of previously forested uplands that have been cleared. This habitat type lacks a mature canopy element. Regenerating species observed include slash pine (*Pinus elliottii*), bitter gallberry (*Ilex glabra*), laurel oak (*Quercus laurifolia*), water oak (*Q. nigra*), sweetgum (*Liquidambar styraciflua*), wax myrtle (*Morella cerifera),* saw palmetto (*Serenoa repens*), shiny blueberry (*Vaccinium myrsinites),* bracken fern (*Pteridium aquilinum*), blackberry (*Rubus* spp.), and muscadine (*Vitis rotundifolia*).

Pine Flatwoods (FLUCFCS Code 411) – 0.41 acres± This coniferous upland habitat was never bedded or planted for silviculture purposes. The canopy strata is dominated by slash pine, with minor inclusions of laurel oak and sweetgum. Observed subcanopy and groundcover species include wax myrtle, saw palmetto, bracken fern, blackberry, and muscadine.

Coniferous Plantation (FLUCFCS Code 441) - 9.36 acres± Coniferous plantation uplands are dominated by a canopy of planted slash pine. Other canopy species observed included laurel oak, water oak, sweetgum, and southern magnolia (*Magnolia grandiflora*). Subcanopy species include wax myrtle, bitter gallberry, beautyberry (*Callicarpa americana*), highbush blueberry (*Vaccinium corymbosum*), and saplings of canopy species. Groundcover is primarily comprised of bracken fern, wire grass (*Aristida stricta*), shiny blueberry, saw palmetto, blackberry, and muscadine.

Photo 1. Forested upland area

Photo 2. Forested upland edge, maintained roadside, and access road

Airports (FLUCFCS Code 811) - 0.16 acres± A small inclusion of habitat associated with aircraft hangar space is located in the southern terminus of the proposed project limits. This habitat is mowed and maintained turf dominated by bahia grass (*Paspalum notatum*), St. Augustine grass (*Stenotaphrum secundatum*), and other pasture grasses and weeds.

Roads and Highways (FLUCFCS Code 814) – 9.51 acres± This habitat classification consists of paved roads and associated road shoulder. Species observed within the mowed and maintained road shoulder include bahia grass, shiny blueberry, St. Augustine grass, thistle (*Cirsium* spp.), blackroot (*Pterocaulon pycnostachyum*), and panicgrass (*Dichanthelium* spp.).

Wetlands and Surface Waters

Wetlands within the project area were identified and classified using definitions and guidelines contained in the FDOT's FLUCFCS Handbook (1999). The Corps of Engineers Wetlands Delineation Manual (1987) and its regional supplements, the Florida Wetlands Delineation Manual (Gilbert, et al., 1995), and several field guides aided in the identification of project wetlands. All on-site wetlands are part of a valid Formal Wetland Determination issued 27 September 2019 (Permit No. 70452.108) issued by the St Johns River Water Management District (SJRWMD), however, this does not serve as a permit for impact. Wetland lines will be verified by Florida Department of Environmental Protection (FDEP) during the permitting process.

Wetland Forested Mixed (FLUCFCS Code 630) 18.25 acres± Wetland forested mixed wetlands represent the majority of wetland habitat present within the proposed project area. Observed canopy species included laurel oak, water oak, tuliptree (*Liriodendron tulipifera),* swamp tupelo (*Nyssa biflora),* American hornbeam (*Carpinus caroliniana),* red maple (*Acer rubrum*), sweet gum, bald cypress (*Taxodium distichum),* slash pine, and sweetbay magnolia (*Magnolia virginiana*). Subcanopy species include cabbage palm (*Sabal palmetto*), swamp bay (*Persea palustris*), myrtle leaf holly (*Ilex myrtifolia*), Virginia willow (*Itea virginica*), highbush blueberry, wax myrtle, and fetterbush (*Lyonia lucida).* Groundcover primarily consists of cinnamon fern (*Osmundastrum cinnamomeum*), royal fern (*Osmunda regalis*), netted chain fern (*Woodwardia areolata*), Virginia chain fern (*Woodwardia virginica*), beaked sedges *(Rhynchospora* spp.) and Caric sedges (*Carex* spp.). These wetland systems are mature, relatively undisturbed, and moderate to high in quality.

Photo 3. On-site forested wetland

Photo 4. FEMA Regulatory Floodway

Vegetated Non-forested Wetlands (FLUCFCS Code 640) – 0.04 acres± A very small inclusion of vegetated non-forested wetland habitat is located in the southeast corner of the proposed project. Observed species include redroot (*Lachnanthes caroliniana),* shore rush (*Juncus marginatus),* bunched beaksedge (*Rhynchospora cephalantha),* and maidencane (*Panicum hemitomon).*

Upland Cut Ditch (FLUCFCS 511) 0.35 acres± Several stormwater conveyance features were observed throughout the project area. Multiple wetland-cut and one upland-cut stormwater features extend throughout the project area. Swales were observed along either side of access roads that run throughout the project area. All ditches and swales are utilized to convey stormwater away from the airfield and associated roads.

Federal Emergency Management Agency (FEMA) Flood Zones

FEMA maps and defines certain natural features by flood hazard, which are geographic areas that are given special designations according to varying levels of flood risk. Typically, restrictions to land use and development occur in Regulatory Floodways, which are defined by FEMA as “the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.” Flood hazards identified within the project area are depicted on **Exhibit 7, Appendix A**. In general, sites mapped as containing Regulatory Floodways and 1% annual chance flood hazard represent high risk flood areas.

WILDLIFE RESOURCES

The project area was evaluated to identify wildlife and habitat resources, including federally and state protected species, in accordance with Section 7 of the Endangered Species Act (ESA, 1973) and Chapter 68A-27 Florida Administrative Code (F.A.C.), as amended. This report contains information pertaining to all federally-listed species, candidates for federal listing, and state-listed species that may occur within the project area. Unless otherwise noted, all are collectively referred to as "listed species" in this report.

Methods

Literature reviews, agency database searches, and field surveys of potential habitat areas were conducted to identify listed species potentially found within the project area. The *Soil Survey of The City of Jacksonville, Duval County, Florida*, recent aerial photographs, Geographic Information System (GIS) Land Cover and Land Use data, and field reconnaissance were utilized to determine habitat types within and adjacent to the project area.

The assessment of listed species began with the identification of suitable habitat. A field investigation was conducted on 8 June 2022. The survey was conducted by a qualified biologist using visual and aural methods. Listed wildlife species were identified by burrows, scat, shed skins, tracks, sightings, and/or their distinctive calls. The probability of occurrence of each species is discussed below.

Survey Results

Literature Search

This report addresses federally-listed species, candidates for federal listing, and state-listed species. Of these three categories, only federally-listed species are afforded protection under the ESA at this time. Other species may be protected by state or local regulations.

Information regarding federally-listed species was derived from the following online sources:

- http://www.fws.gov/endangered/?ref=topbar
- http://www.florida.plantatlas.usf.edu/
- https://www.flrules.org/gateway/ChapterHome.asp?Chapter=5B-40
- https://ecos.fws.gov/ecp/
- https://ecos.fws.gov/ipac/location/index
- https://www.fnai.org/species-communities/tracking-main

Information regarding state-listed species was derived from the following online sources:

- https://www.fnai.org/species-communities/tracking-main
- https://myfwc.com/media/1945/threatend-endangered-species.pdf
- http://www.florida.plantatlas.usf.edu/
- https://www.flrules.org/gateway/ChapterHome.asp?Chapter=5B-40

Information from all above listed sources was compiled to generate an inventory of all listed species that may occur in Duval County.

A total of 85 listed species are known to occur in Duval County (**Appendix B**). In general, listed species possess specific habitat requirements that must be met to fulfill biologic needs of the species. Lacking appropriate habitat required for each species, potential occurrence of listed species is negligible. Therefore, the potential for occurrence of a number of listed species was eliminated based on the lack of suitable habitat. Of the 85 state and federally listed species documented to occur within Duval County, 10 were determined to have some probability of occurrence within the project area based on the presence of suitable habitat and observations. These 10 species are included in the table below and were assigned a probability of occurrence (low, moderate, high, or observed), defined as follows:

> **Low** – Species that are known to occur in the county, but for which preferred habitat is limited in the project area.
> **Moderate** – Species that are known to occur in the county, and whose suitable habitat is well represented within or adjacent to the project area, but no observations or positive indicators exist to verify their presence.
> **High** – Species that are known to occur in the county and are suspected to occur based on known ranges and existence of sufficient preferred habitat within or immediately adjacent to the project area, or species which have been previously observed or documented within the project area.
> **Observed** – Species or their sign were seen within the project area.

Table 1 summarizes the potential habitat availability and probability of occurrence within the project area for those listed species that may utilize the site. No federally-listed species were directly encountered during the field inspection. Documented occurrences of wood storks, nesting locations, Core Foraging Areas (CFAs), and wading bird rookeries are depicted on **Exhibit 4**, **Appendix A .** Documented occurrences of additional protected fauna near/within the project area are depicted on **Exhibit 5, Appendix A**.

Table 1: Federally-, State-, and Candidate Listed Species That May Occur Within the Project Area

Scientific Name	Common Name	Federal Status	State Status	Preferred Habitat	Habitat Present Within Project Area	Probability of Occurrence
Plants and Lichens						
Asclepias viridula	Southern Milkweed	N	ST	Wet flatwoods and prairies, seepage slopes, pitcher plant bogs.	The side slopes of on-site stormwater conveyance features and on-site wetland may provide suitable habitat for this species.	Low
Balduina atropurpurea	Purple Honeycomb-head	N	SE	Wet pine flatwoods and savannahs, seepage slopes, bogs, and wet ditches.	The side slopes of on-site stormwater conveyance features and on-site wetland may provide suitable habitat for this species.	Low
Amphibians						

Scientific Name	Common Name	Federal Status	State Status	Preferred Habitat	Habitat Present Within Project Area	Probability of Occurrence
Ambystoma cingulatum	Frosted Flatwoods Salamander	T	FT	Flatwoods with wiregrass and interspersed wetlands; breeds in small ponds and seasonally flooded wetlands. The lack of fire and implementation of silviculture practices lessens the probability of occurrence.	Upland and wetland habitat may provide suitable habitat for this species	Low
Reptiles						
*Drymarchon corais couperi**	Eastern Indigo Snake	T	FT	Linked to xeric habitats and gopher tortoise burrows, but also uses other natural habitats such as mesic uplands, swamps, and freshwater marshes as foraging habitat	This species is a commensal to the gopher tortoise, and may periodically utilize on-site burrows	Low
*Gopherus polyphemus**	Gopher Tortoise	N	ST	Sandhills, scrub, dry flatwoods, dry ruderal areas	The burrows indicative of this species was directly observed in upland areas	High
*Pituophis melanoleucus mugitus***	Florida Pine Snake	N	ST	Sandhill, sand pine scrub and scrubby flatwoods.	This species is a commensal to the gopher tortoise, and if present, may periodically utilize on-site burrows.	Low
Birds						
*Egretta caerulea***	Little Blue Heron	N	ST	Forages in a wide variety of freshwater, brackish, and saline wetlands and waterways, including ponds and ditches; Prefers freshwater habitats; Nests in mixed colonies in flooded trees or shrubs or on islands	On-site surface waters provide suitable foraging habitat for this species.	Moderate
*Egretta tricolor***	Tricolored Heron	N	ST	Forages in a wide variety of freshwater, brackish, and saline wetlands and	On-site surface waters provide suitable	Moderate

Scientific Name	Common Name	Federal Status	State Status	Preferred Habitat	Habitat Present Within Project Area	Probability of Occurrence
				waterways, including ponds and ditches; Prefers coastal habitats, Nests in mixed colonies in flooded trees or shrubs or on islands	foraging habitat for this species.	
*Falco sparverius paulus***	Southeastern American Kestrel	N	ST	Upland pinelands (flatwoods, sandhills, pastures, and old fields). Requires open areas for foraging, and nest cavities (dead trees, nest boxes, etc.) for breeding.	On-site forested areas adjacent to mowed and maintained airfield may provide suitable foraging habitat for this species.	Moderate
*Mycteria americana**	Wood Stork	T	FT	Forages in a wide variety of freshwater and brackish wetlands and waterways, including ponds and ditches; Prefers waterbodies that have shallow or variable water levels to concentrate fish prey; Nests in colonies in flooded trees or on islands	On-site wetlands and surface waters provide suitable foraging habitat for this species.	Moderate

Legal Status and Notes
Federally-listed Species (FWS)
C = Candidate species for which federal listing agencies have sufficient information on biological vulnerability and threats to support proposing to list the species as endangered or threatened.
CH = Critical Habitat has been designated in the county in which the project is located.
E = Endangered: species in danger of extinction throughout all or a significant portion of its range.
T = Threatened: species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
PT = Proposed threatened.
N = Not federally-listed.
* = This species is included in a FWS Recovery Plan.
Recovery plans can be found at: https://www.fws.gov/endangered/species/recovery-plans.html
State-listed Species
SAT = Listed as threatened for similarity of appearance.
SSC = Species of Special Concern.
SE = State endangered.
ST = State threatened: species listed by the state that are likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
FE = Federally endangered: species federally listed as being in danger of extinction throughout all or a significant portion of its range.
FT = Federally threatened: species federally listed as likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
** = FWC has developed a draft or final Permitting Guidelines document for this species. Permitting guidelines can be found at:
https://myfwc.com/wildlifehabitats/wildlife/species-guidelines/

Listed Species That May Occur in the Project Area

The following listed species have some probability of occurrence in the project area or have been documented as occurring within the project area from previous permitting or surveying efforts. Only federally-listed species are afforded protection under the ESA at this time. The ESA is administered by the United States Fish and Wildlife Service (FWS) and the National Oceanic Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) to provide protection of imperiled species and their habitat. Section 7 of the ESA requires federal agencies to consult with FWS and/or NMFS when a project under their review has the potential to impact a federally-listed species. Other species may be protected by state or local regulations.

<u>Listed Plant Species That May Occur in the Project Area</u>

Based upon the preliminary data analysis and the June 2022 field investigation, a total of two state-listed plant species were determined to have some probability of occurrence in the project area. The southern milkweed (*Asclepias viridula*) and the purple honeycomb-head (*Balduina atropurpurea*) are given a low probability of occurrence, as potential habitat within the proposed project area is very limited. Plant species are best located when flowers are present, and not all species may not have been flowering at the time of the inspection. None of these state-listed plants were observed in the project area during the site inspections, and none have been observed during previous work done in and around the project area. The proposed project is not likely to affect listed vegetative species.

<u>Listed Wildlife Species That May Occur in the Project Area</u>

AMPHIBIANS

Frosted Flatwoods Salamander (*Ambystoma cingulatum*) – The frosted flatwoods salamander is federally listed as a threatened species. They have a black body with white spots and can reach a length of five inches. This species typically resides in fire-maintained slash and longleaf pine flatwoods with wiregrass groundcover and little to no subcanopy that typically include scattered depressional wetlands. This species breeds between October to January in shallow ponds free of predatory fish (Palis,1997). The larva will live in the ponds until they metamorphose into their adult life stage (Palis,1997). The primary threat to this species is loss of habitat due to agriculture and silviculture. These species are highly sensitive to disturbance and habitat quality, and therefore have been given a low probability of occurrence in the project area due to the surrounding development, past and/or present silviculture activities, and infrequent fire maintenance. This project will have no effect on the frosted flatwoods salamander.

REPTILES

Gopher Tortoise (*Gopherus polyphemus*) – The gopher tortoise is state listed as a threatened and is a candidate for federal listing. Gopher tortoises inhabit xeric and mesic forests, fields, and disturbed areas. The project area was inspected for the presence of gopher tortoises. One potentially occupied gopher tortoise burrow was observed within 25 feet of the proposed limits of construction

Photo 5. Potentially occupied gopher tortoise burrow

(**Exhibit 3; Appendix A**). Per FWC guidelines, all potentially occupied burrows within 25 feet of construction should be permitted for relocation. While only one burrow was identified during the field survey, it is important to note that a 100% burrow survey was not completed. A 100% survey of all affected potential gopher tortoise habitat will be required within 90 days of construction, and all affected gopher tortoises will be relocated in accordance with Fish and Wildlife Conservation Commission (FWC) regulations.

Eastern Indigo Snake (*Drymarchon corais couperi*) – The eastern indigo snake is a federally-threatened species that is linked to xeric habitats and gopher tortoise burrows. While indigo snakes utilize gopher tortoise burrows for refuge, particularly in winter months, they forage within a variety of upland and wetland habitat (Moler,1992). No xeric habitat was identified in the project area; however, one potentially occupied gopher tortoise burrow was observed during the June 2022 field survey. Because of the presence of potentially-occupied gopher tortoise burrows, the eastern indigo snake has been given a low probability of occurrence. The project's potential effect on this species was determined by using the FWS' *Eastern Indigo Snake Programmatic Effect Determination Key* (updated August 2017) as follows:

A. Project is not located in open water or salt marsh……………………………..………….go to B
B. Permit will be conditioned for use of the Service's *Standard Protection Measures For The Eastern Indigo Snake* during site preparation and project construction……………..…….go to C
C. The project will impact less than 25 acres of eastern indigo snake habitat (e.g. sandhill, scrub, pine flatwoods, pine rocklands, scrubby flatwoods, high pine, dry prairie, coastal prairie, mangrove swamps, tropical hardwood hammocks, hydric hammocks, edges of freshwater marshes, agricultural fields [including sugar cane fields and active, inactive, or abandon citrus groves], and coastal dunes)……………………………………..………………………..go to D
D. The project has known holes, cavities, active or inactive gopher tortoise burrows, or other underground refugia where a snake could be buried, trapped, and/or injured during project activities……………………………………….……………………………………………go to E
E. Any permit will be conditioned such that all gopher tortoise burrows, active or inactive, will be excavated prior to site manipulation in the vicinity of the burrow. If an eastern indigo snake is encountered, the snake must be allowed to vacate the area prior to additional site manipulation in the vicinity. Any permit will also be conditioned such that holes, cavities, and snake refugia other than gopher tortoise burrows will be inspected each morning before planned site manipulation of a particular area, and, if occupied by an eastern indigo snake, no work will commence until the snake has vacated the vicinity of the proposed work………………….*NLAA*

The implementation of FWS *Standard Protection Measures for the Eastern Indigo Snake* during project construction and the excavation of any affected active or inactive gopher tortoise burrows, in accordance with FWC and FWS requirements, leads to a **may affect, not likely to adversely affect** determination for this species.

Florida Pine Snake (*Pituophis melanoleucus mugitus*) – Similar to the indigo snake, the state-threatened pine snake is associated with xeric habitats and the presence of gopher tortoise burrows. This species is found throughout Florida, with preferred habitat including longleaf pine woodlands, xerophytic oak woodlands, sand pine scrub, pine flatwoods on well-drained soils, and old fields on former sandhill sites. The pine snake avoids hammocks and forests that have a thick canopy. It is a fossorial species, living primarily underground, utilizing paths left by pocket gophers (*Geomys* spp.) and gopher tortoises. Females have a home range of 70 to 75 acres, while males have a home range 2-8 times larger than that of females. On-site habitat is marginal, but due to the presence of a potentially occupied gopher tortoise burrow and well drained habitat, this species has been given a low probability of occurrence. The proposed project is not likely to affect the Florida pine snake.

BIRDS

State-listed Wading Birds – The **little blue heron** (*Egretta caerulea*) and **tricolored heron** (*Egretta tricolor*), are state-listed as threatened species. The little blue heron and tricolored heron have a moderate probability of occurrence, as on-site wetlands provide potential foraging habitat during periods of inundation. These species are unlikely to utilize these areas for nesting due to adjacent development and lack of suitable nesting trees over water. Typically, these species nest in colonies, which are tracked and documented by FWS. The nearest documented wading bird rookery is approximately 7.3 miles southeast of the project area and was last documented as active in the 1980s FWC survey (**Exhibit 4; Appendix A**). No listed wading birds were observed during the site inspection. The proposed project is not likely to affect state listed wading bird species.

Southeastern American Kestrel (*Falco sparverius paulus*) – This state-listed species is the smallest species of falcon in the United States and is known for its unique coloration. The kestrel's habitat includes open woodlands, sandhill, prairie, and pasture, typically nesting along tree lines. This species was not observed during this field investigation. The kestrel is a highly mobile species, and individuals present within the project area can easily leave the area if disturbed. The proposed project is not likely to affect the Southeastern American kestrel.

Wood Stork (*Mycteria americana*) – The wood stork, federally listed as threatened, is a wetland-dependent wading bird. It frequently utilizes areas containing woody vegetation over standing water, preferably in cypress trees or mangroves (Rodgers et al., 1988; FWS, 1996). The wood stork ranges across the state except for the western half of the panhandle (FWS, 1996). It routinely travels 6-25 miles to foraging sites and is known to fly between 60-80 miles to find food (Ogden et al., 1978; Browder, 1984; Ogden, 1996). It feeds in areas of calm and clear water that is between 2-16 inches deep (Kahl, 1964; Ogden, 1996). The wood stork requires areas that have long hydroperiods that allow for its prey to reproduce, and droughts that concentrate its prey into small pools making it easier to catch. FWS designates Core Foraging Areas (CFAs) for each documented wood stork colony by region. Duval County is within the North Florida region, which defines each CFA as a 13-mile radius surrounding the colony location. All wetlands and waterways within the 13-mile radius may be considered Suitable Foraging Habitat (SFH) for wood storks.

As noted on **Exhibit 4**, the project area is not located in the CFA of an active wood stork colony. No wood storks were observed during field investigation; however, this species has been given a low probability of occurrence. The wetlands and surface waters in the project area, while not located within a CFA, still represent suitable habitat for this species and therefore may be classified as SFH. The project's potential effect on wood storks was evaluated using the USACE/FWS *Effect Determination Key for the Wood Stork in Central and North Peninsular Florida* (2008).

A. Project more than 2,500 feet from a colony site ……………………………………………………………go to B
B. Project impacts SFH …………………………………………………………………………………….…….go to C

C. Project impacts to SFH are greater than or equal to 0.5 ac…………………………...………..go to D
D. Project impacts to SFH are within the CFA of a colony site, or wood storks have been documented foraging on a project site outside the CFA …………………………………….…….….……..go to E
E. Project provides SFH compensation within the Service Area of a Service-approved wetland mitigation bank or wood stork conservation bank preferably within the CFA, or consists of SFH compensation within the CFA consisting of enhancement, restoration or creation in a project phased approach that provides an amount of habitat and foraging function equivalent to that of impacted SFH (see Wood Stork Foraging Habitat Assessment Procedure for guidance), is not contrary to the Service's Habitat Management Guidelines For The Wood Stork In The Southeast Region and in accordance with the CWA section 404(b)(1) guidelines…………………….............….…..…………"*NLAA*"

Should the project impact more than 0.5 acre of on-site wetlands and surface waters, wetland mitigation would be provided, and the project **may affect, but is not likely to adversely affect**, the wood stork. Any mitigation provided for unavoidable wetland impacts will very likely satisfy mitigation requirements for the loss of and potential SFH. Specific potential wetland and surface water mitigation requirements are discussed in detail below.

Non-listed Protected Species and Additional Species That May be of Regulatory Significance

Bald Eagle (*Haliaeetus leucocephalus*) - While no longer considered a listed species under the ESA, the bald eagle is afforded protection under the Bald and Golden Eagle Protection Act (BGEPA) of 1940 and the Migratory Bird Treaty Act of 1918 (MBTA), as amended. Bald eagles are large raptors that average 14 pounds with a wingspan of approximately 8 feet as adults. They are brown with white head and tail feathers and range across North America utilizing a variety of habitats including coastal areas, rivers, lakes, and other territories in proximity to their preferred food, fish. In Florida, there are over 1,000 documented nesting pairs of bald eagles.

Exhibit 5 depicts the locations of the documented bald eagle nests. Although the bald eagle has been delisted, restrictions regarding work around their nests are still in place. These restrictions vary based on the time of year and distance from the nest. The FWS Florida Ecological Services Field Offices (FO's) in Jacksonville define two buffer zones from the central location of a nest that regulates activity restrictions based on their distance, the primary and secondary zones. The primary activity zone is 330 feet, and the secondary activity zone is 660 feet from the central location of the nest. Generally, if work is proposed within 660 feet of the nest, restrictions may be applicable. No documented eagle nests occur within 660 feet of the project area. The nearest bald eagle nest is located approximately 7.0-miles southwest of the project area.

Other non-listed faunal species observed on site can be found on **Table 2** below. Avian species listed below are afforded protection by the MBTA.

Table 2. Other Non-listed Faunal Species Observed Within the Project Area

Scientific Name	Common Name
Birds	
Cardinalis cardinalis	Northern cardinal
Coragyps atratus	Black vulture

Scientific Name	Common Name
Mimus polyglottos	Mockingbird
Dryocopus pileatus	Pileated woodpecker

Non-listed avian and mammalian species are frequently harassed by Airport staff due to the danger they present to aircraft operations and are undesirable for this land use type. Avian species are highly mobile species, so if any individuals are present during construction, they can easily leave the area if disturbed.

PERMITTING HISTORY

Cecil Field Naval Air Station was closed under the federal Defense Base Realignment and Closure Act of 1993. Projects are permitted by SJRWMD and the U.S. Army Corps of Engineers (USACE) to address redevelopment of the approximately 17,000 acres within the Cecil Field boundary.

The proposed project boundary is located within the boundary of the SJRWMD Conceptual Permit # 4-031-70452-1, issued on 1 November, 2001. The issued conceptual permit authorized the impact of approximately 497.06 acres of wetland habitat. The City of Jacksonville and the Jacksonville Port Authority were co-applicants for the issued conceptual. Subsequently, permit responsibility was transferred to the Jacksonville Economic Development Commission (JEDC) and the JAA. The originally issued conceptual permit also identified a mitigation plan to offset conceptual impacts in the form of a large mitigation corridor. Mitigation ratios were approved as part of the mitigation plan. Through a subsequent memorandum of agreement, the JEDC and JAA were each allocated portions of the mitigation area to be utilized to offset future wetland impacts. Permit modification #4-031-70452-55 consisted of the conceptual approval to impact approximately 105.86 acres of wetlands located in areas controlled by JAA. To mitigate for the impact of the 105.86 acres± of wetland impact, JAA proposed the preservation of approximately 1,363.38 acres of upland and wetland habitat, and the creation of approximately 26.68 acres of wetland habitat. To date, JAA has utilized approximately 117.78 acres of wetland preservation and 220.24 acres of upland preservation. Therefore, JAA possesses approximately 1,054.04 acres of upland and wetland preservation and 28.68 acres± of wetland creation available to offset impacts associated with the proposed VQQ Approach Road and Utility Corridor Extension project. While the proposed project boundary is included in the overall conceptual boundary, on-site wetlands were not approved for impact. Therefore, it is anticipated that the mitigation area may be utilized to offset incurred impact, but conceptually approved mitigation ratios within the mitigation area may need to be revisited. Permit # 4-031-70452-55 expires 27 April 2032.

USACE permit SAJ-2008-1502 (SP-BAL) authorized 152.32 acres of wetland impacts for the construction of aircraft hangars, taxiway extensions, maintenance facilities, and aviation-related support facilities. Proposed impact areas associated with the proposed VQQ Approach Road project are located on wetland impact maps sheet B and C of the attached USACE permit. According to ERS records, sufficient mitigation remains within the mitigation area permitted by SAJ-2003-1935 (IP-BAL) to offset wetland impacts incurred by the proposed project. Permit #SAJ-2003-1935 (IP-BAL) expires 15 September 2023, while permit SAJ-2008-1502 (SP-BAL) expires 22 September 2023. USACE staff Terri Mashour stated on 19 January 2023, that USACE will consider these project impacts covered under exiting active permits and requests a minor modification for authorization of mitigation associated with the project impacts. Documentation needed includes plan sets, a SJRWMD permit, UMAM sheets and the associated mitigation ledger (**Appendix C**). No state 404 authorization will be required as a valid USACE permit will be utilized for this project at the time of this report.

PERMITTING IMPLICATIONS

Development of the property will require site planning to ensure adjacent properties are not adversely affected by on-site run-off following construction. All on-site wetlands are part of a valid Formal Wetland Determination issued 27 September 2019 (Permit No. 70452.108; expirers 27 September 2024) issued by the SJRWMD. A valid USACE permit (Permit # SAJ-2008-1502 (SP-BAL) depicts subject site impacts, and USACE permit SAJ-2003-1935 (IP-BAL) (**Appendix C**) authorizes the use of the Cecil Mitigation Area to offset wetland impacts at Cecil Field.

The regulatory agencies exerting jurisdiction over potentially affected wetlands (i.e., SJRWMD and USACE) will require permits for unavoidable impacts. This project will require an Individual Environmental Resource Permit from SJRWMD and a minor modification to an active Federal Section 404 permit. Compliance with these permits includes verification that all impacts have been avoided to the greatest extent practicable, that unavoidable impacts have been minimized, and that a compensatory mitigation plan has been provided for unavoidable wetland impacts. Utilizing the provided limits of construction and wetland lines approved by the valid Formal Wetland Determination, the proposed project will incur approximately 18.25 acres of direct wetland impact, and 0.35 acres± acres of upland cut ditch impact. Proposed impacts are depicted on **Exhibit 6, Appendix A.** At the time of this report, this project is currently in USACE and SJRWMD permitting utilizing the mitigation techniques outlined below.

The project will incur 18.25 acres of direct wetland impact and approximately 20.84 acres of secondary impacts. Mitigation is proposed to be accomplished through the preservation of uplands and wetlands within the JAA owned portion of Cecil Commerce Center Conservation Corridor. This mitigation has been previously deemed regionally significant. Per the conceptual permit, ratios are utilized to determine the amount of preservation required for any project proposing to utilize the conservation corridor as mitigation. Conceptually approved mitigation ratios are 30:1 for wetland preservation and 10:1 for upland preservation. Secondary impacts are assessed on a project-by-project basis. Proposed mitigation will be provided through the recording of a conservation easement over approximately 264.01 acres of upland habitat and 58.71 acres of wetland habitat. A management plan will be a component of the conservation easement, ensuring the mitigation area provides appropriate functions in perpetuity. The proposed conservation easement is adjacent to previously recorded easements and will serve to amplify the value of the overall conservation corridor. The configuration of the habitat to be placed under conservation easement will be finalized through the permitting process.

If the applicant is unable to utilize the approved mitigation area to offset incurred impacts, credits from an in-basin mitigation bank will be required.

A Conditional Letter of Map Revision (CLOMR) and a determination that the development will not result in any increase in flood levels during the base flood will be required should the project impact a FEMA flood hazard area. Compliance with this documentation includes verification that all impacts have been avoided to the greatest extent practicable, that unavoidable impacts have been minimized, and that a compensatory mitigation plan has been provided for unavoidable impacts. According to **Exhibit 7** a regulatory floodway is located on the northeastern portion of the proposed project area. The impact of this floodway will require additional permitting efforts from FEMA.

Per the USACE/FWS Effect Determination Key for the Wood Stork in Central and North Peninsular Florida (2008), mitigation may be provided through the purchase of mitigation bank credits "within the service area of a service-approved wetland mitigation bank or wood stork conservation bank, preferably within the CFA, or consists of SFH compensation within the CFA consisting of enhancement, restoration or creation in a project phased approach that provides an amount of habitat and foraging function equivalent to that of impacted SFH." Any mitigation provided for unavoidable wetland impacts will very likely satisfy mitigation requirements for the loss of and potential SFH. No additional FWS consultation is anticipated.

One potentially occupied burrow was located within 25 feet of the proposed project limits. FWC requires a 100% survey of all potential gopher tortoise habitat within 90 days of construction. Any potentially impacted burrows will be required to be excavated and relocated per FWC rules and regulations. If fewer than 10 burrows are identified during the 100% survey, a *10 or Fewer Burrows Permit* from FWC will most likely be required. If more than 10 burrows are identified, then, most likely, a *Conservation Permit* will be required from FWC. All excavated tortoises will have to be relocated to an FWC-approved Long Term Protected Recipient Site. JAA owns and operates the Cecil Field Gopher Tortoise Recipient Site. As of the date of this report, there is currently capacity available within this site to accommodate up to 80 gopher tortoises.

Per the FWS' *Eastern Indigo Snake Programmatic Effect Determination Key* (updated August 2017), because the project is expected to impact fewer than 25 acres of xeric habitat and/or gopher tortoise burrows, no further mitigation requirements and/or consultation for this species is expected to be necessary. Any permit will be conditioned such that all identified gopher tortoise burrows and other refugia will be excavated prior to the start of construction within the project area, ensuring the protection of the eastern indigo snake per FWS guidance. Therefore, it is unlikely that further consultation will be required. Should a live eastern indigo snake be found on-site, the snake must be allowed to vacate the area where work is being conducted without interference before work can resume[1]

All avian species observed are afforded protection by the MBTA, which prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species, or their nests, without prior authorization by FWS via depredation permit.

Pursuant to 40 CFR parts 122 and 124, any project that results in the clearing of one or more acres of land will require a National Pollutant Discharge Elimination System (NPDES) permit from the FDEP. In association with this permit, a Stormwater Pollution Prevention Plan (SWPPP), implemented during the construction of the project will also be required. The primary functions of the NPDES requirements are to ensure that sediment and erosion are controlled during construction of the project. These permits require adherence to BMPs to ensure compliance.

[1] Standard Protection Measures for the eastern indigo snake can be found at: https://www.fws.gov/media/eis-protection-measures

Please feel free to contact me at gallerton@bbch-llc.com or 904-285-1397 if you have any questions regarding this report.

Sincerely,

SES ENVIRONMENTAL RESOURCE SOLUTIONS LLC

Gabrielle Allerton
Environmental Scientist/NEPA Specialist

Appendix A: Environmental Exhibits
Appendix B: Listed Species Known to Occur in Duval County, Florida
Appendix C: USACE Correspondence and Permits

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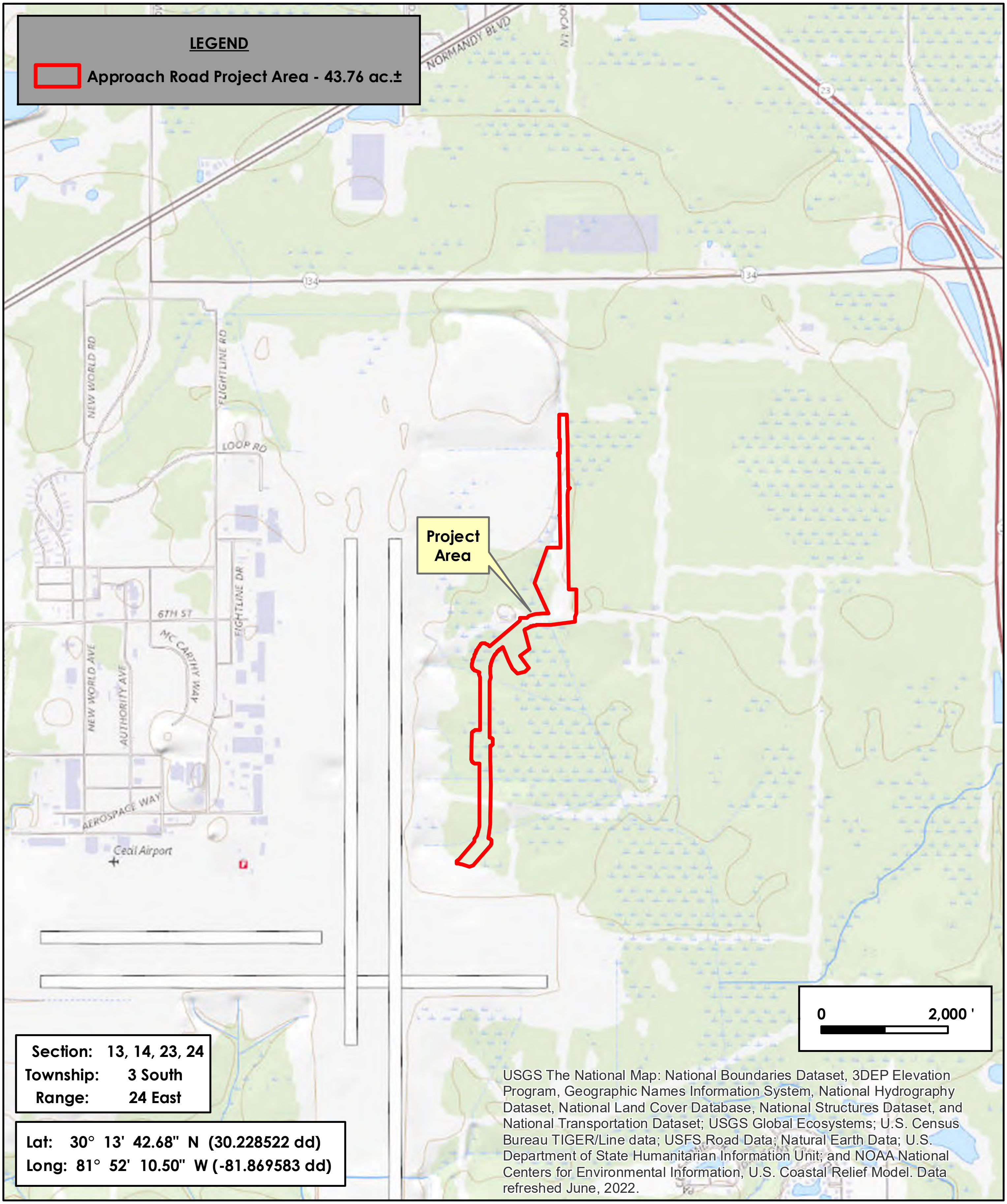
Appendix A

Environmental Exhibits



LEGEND

Approach Road Project Area - 43.76 ac.±

0 2,000 '

Section:	13, 14, 23, 24
Township:	3 South
Range:	24 East

Lat: 30° 13' 42.68" N (30.228522 dd)
Long: 81° 52' 10.50" W (-81.869583 dd)

USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road Data; Natural Earth Data; U.S. Department of State Humanitarian Information Unit; and NOAA National Centers for Environmental Information, U.S. Coastal Relief Model. Data refreshed June, 2022.

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VQQ Approach Road
USGS Topographic Map

Duval County, Florida

By: NEE

Project No.:	22114
Exhibit No.:	1
Date:	3-1-23
Rev. Date:	

N W E S

Source: ESRI; USGS National Map; Jacksonville Heights, FL Quadrangle

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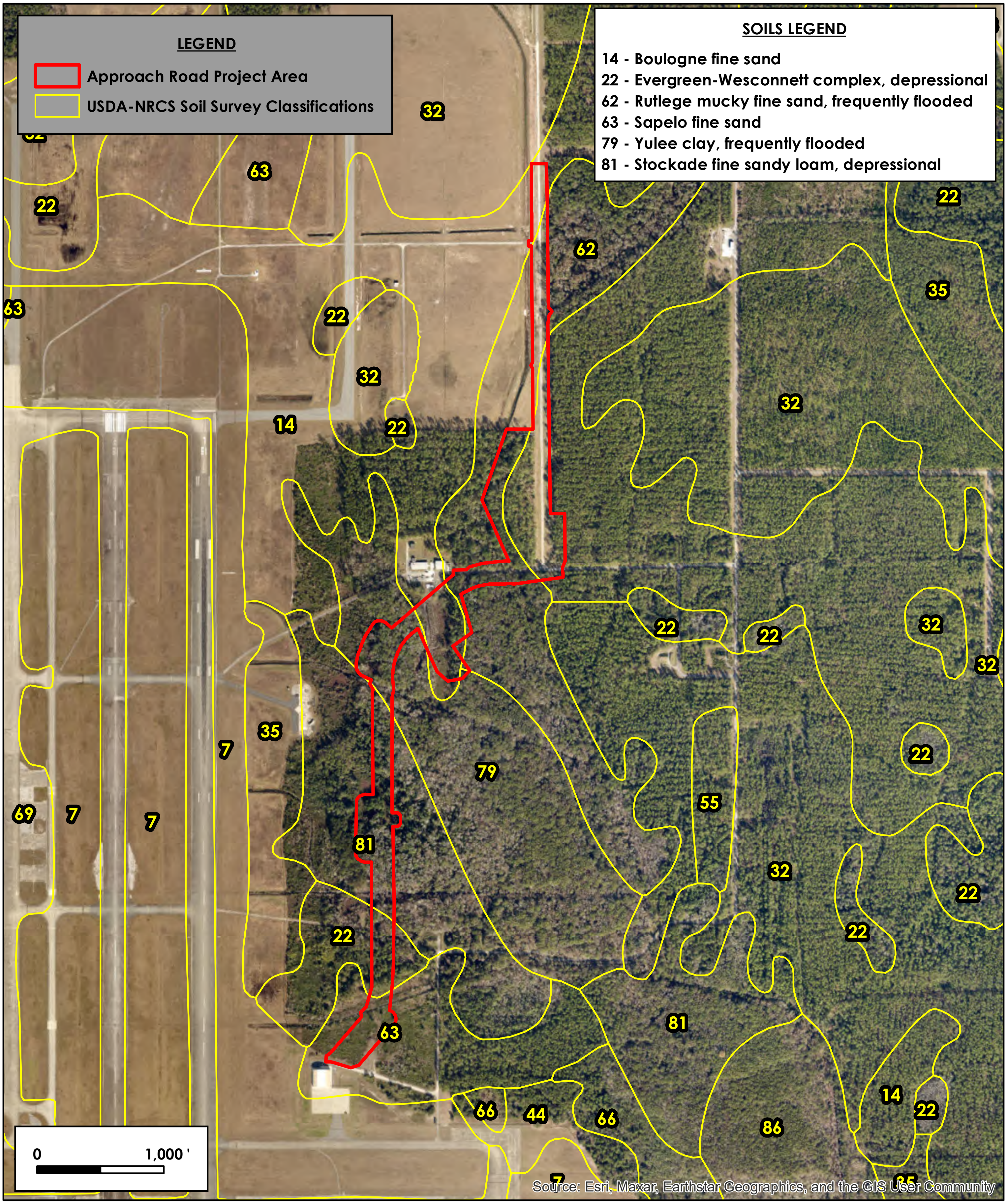

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VQQ Approach Road
Soils Map

Project No.:	22114
Exhibit No.:	2
Date:	10-7-22
Rev. Date:	

Duval County, Florida

By: NEE

N
W E
S

Source: ESRI; USDA-NRCS soil survey classifications (data obtained from NRCS)

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LEGEND

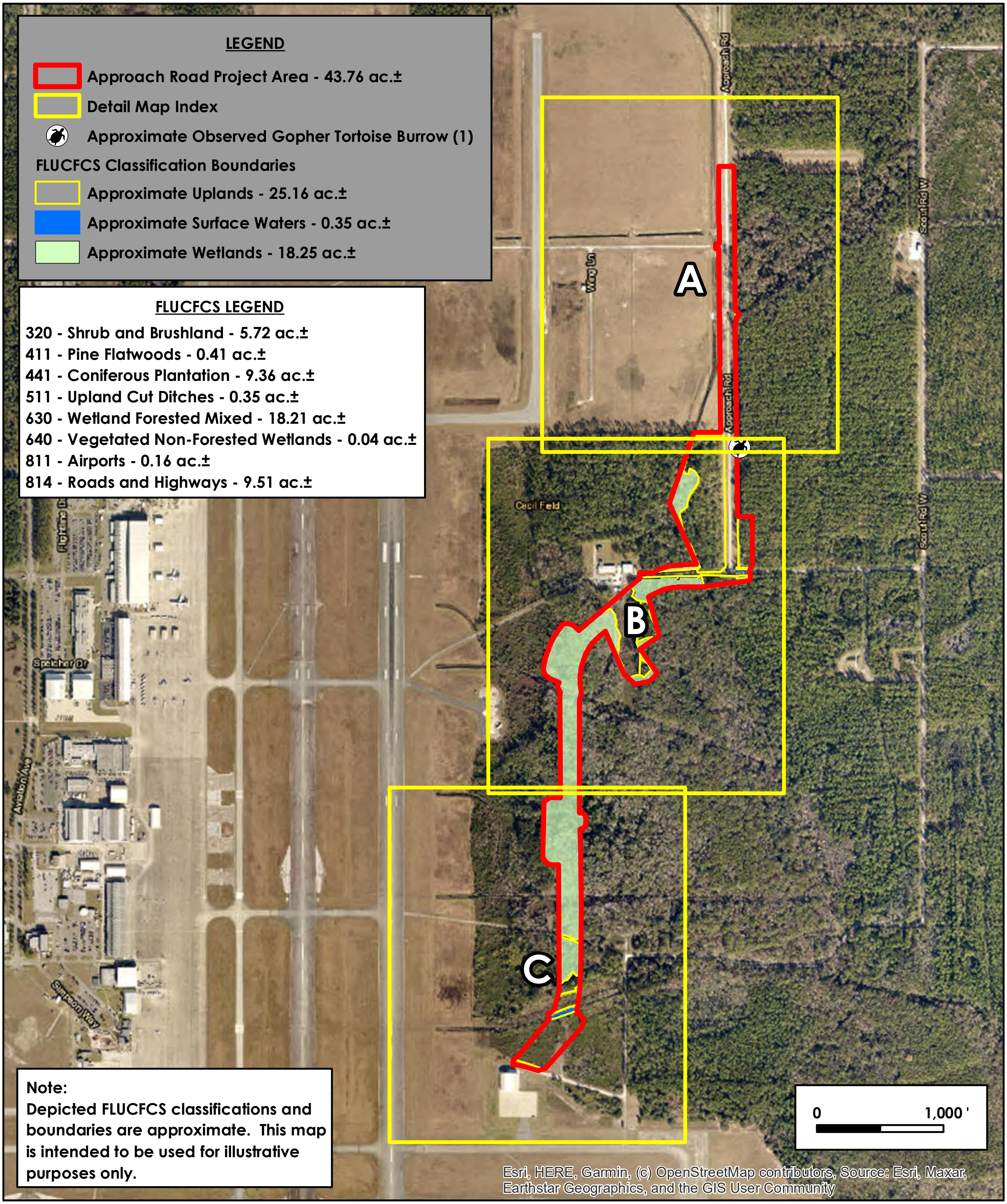
- Approach Road Project Area - 43.76 ac.±
- Detail Map Index
- Approximate Observed Gopher Tortoise Burrow (1)

FLUCFCS Classification Boundaries

- Approximate Uplands - 25.16 ac.±
- Approximate Surface Waters - 0.35 ac.±
- Approximate Wetlands - 18.25 ac.±

FLUCFCS LEGEND

320 - Shrub and Brushland - 5.72 ac.±
411 - Pine Flatwoods - 0.41 ac.±
441 - Coniferous Plantation - 9.36 ac.±
511 - Upland Cut Ditches - 0.35 ac.±
630 - Wetland Forested Mixed - 18.21 ac.±
640 - Vegetated Non-Forested Wetlands - 0.04 ac.±
811 - Airports - 0.16 ac.±
814 - Roads and Highways - 9.51 ac.±



Note:
Depicted FLUCFCS classifications and boundaries are approximate. This map is intended to be used for illustrative purposes only.

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VQQ Approach Road
FLUCFCS Map Key

Project No.:	22114
Exhibit No.:	3-Key
Date:	3-1-23
Rev. Date:	

By: DF

N E S W

Source: ArcGIS Online Imagery

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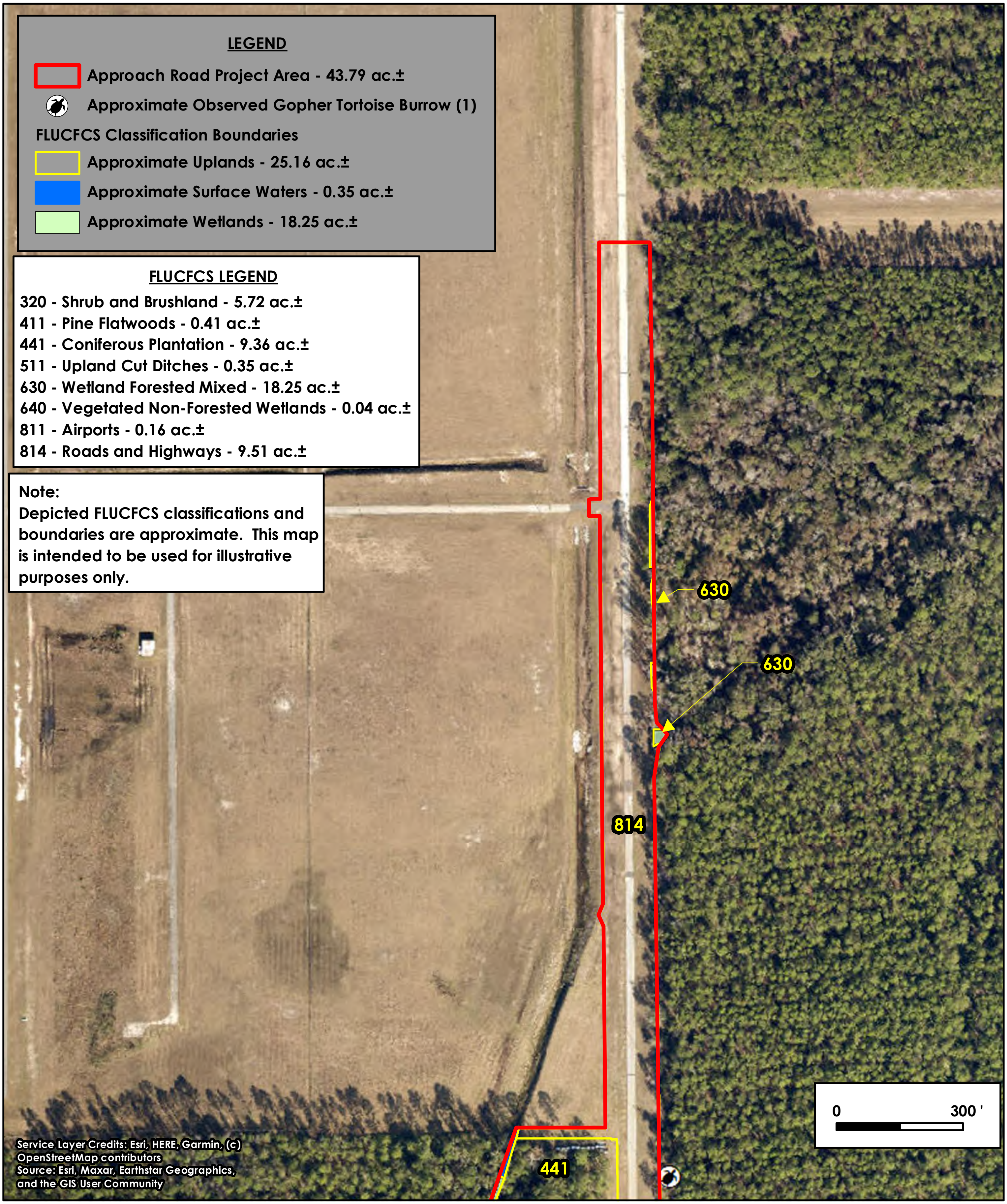

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VQQ Approach Road
FLUCFCS Map A

Project No.:	22114
Exhibit No.:	3-A
Date:	3-1-23
Rev. Date:	

By: DF

N
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S

Source: ArcGIS Online Imagery

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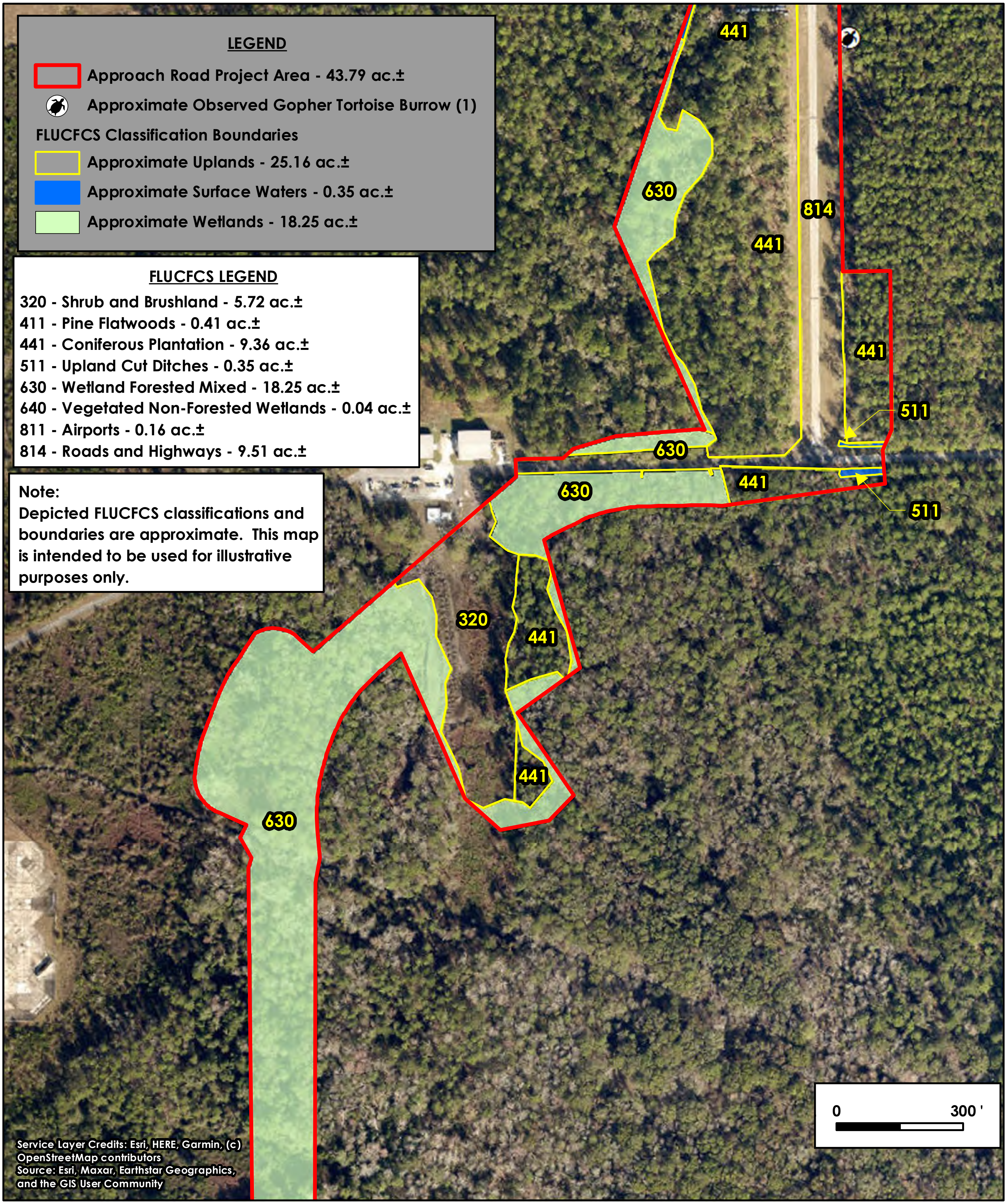

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VQQ Approach Road
FLUCFCS Map B

Project No.:	22114
Exhibit No.:	3-B
Date:	3-1-23
Rev. Date:	

By: DF

N W E S

Source: ArcGIS Online Imagery

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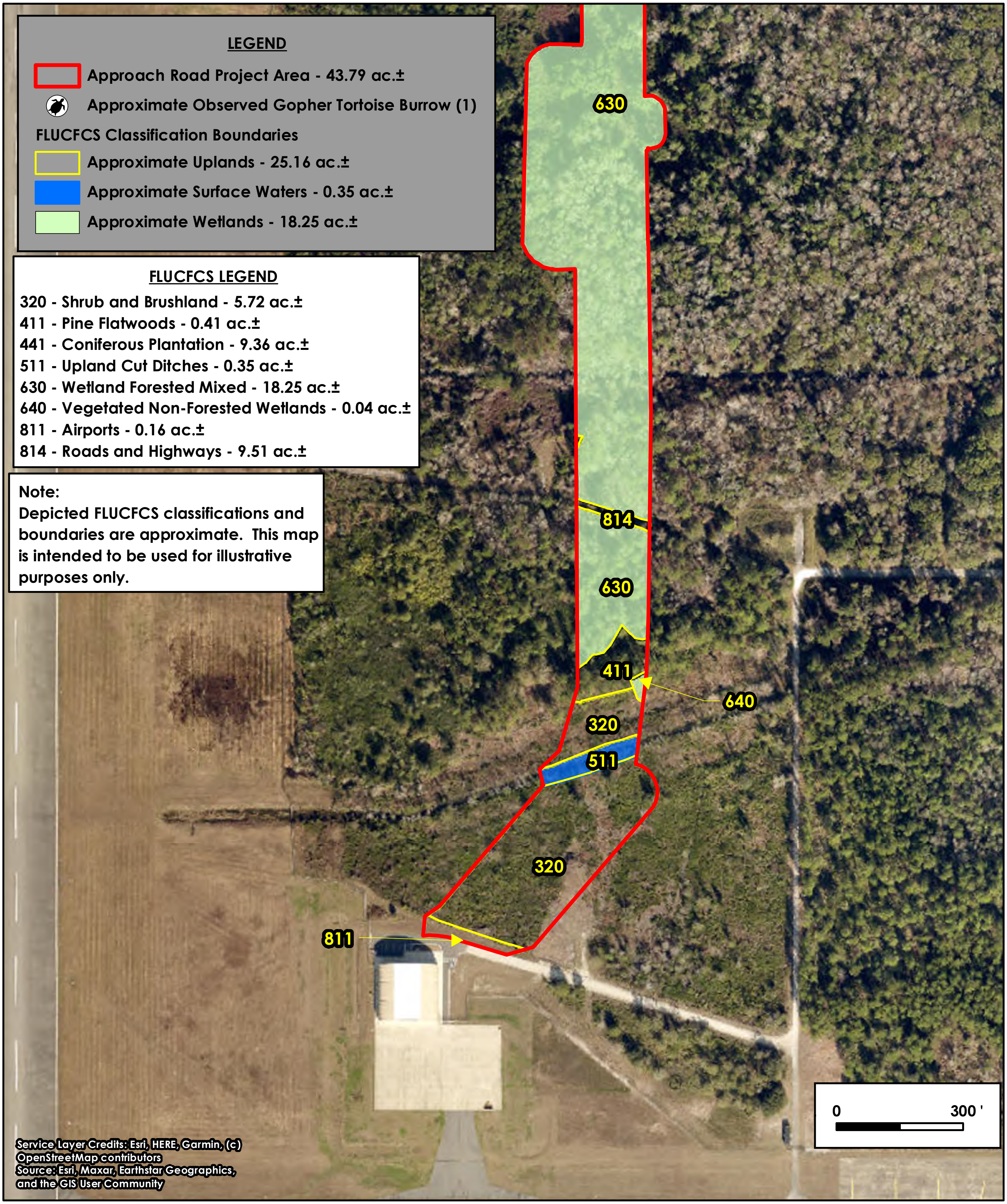

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VQQ Approach Road
FLUCFCS Map C

Project No.:	22114
Exhibit No.:	3-C
Date:	3-1-23
Rev. Date:	

By: DF

N W E S

Source: ArcGIS Online Imagery

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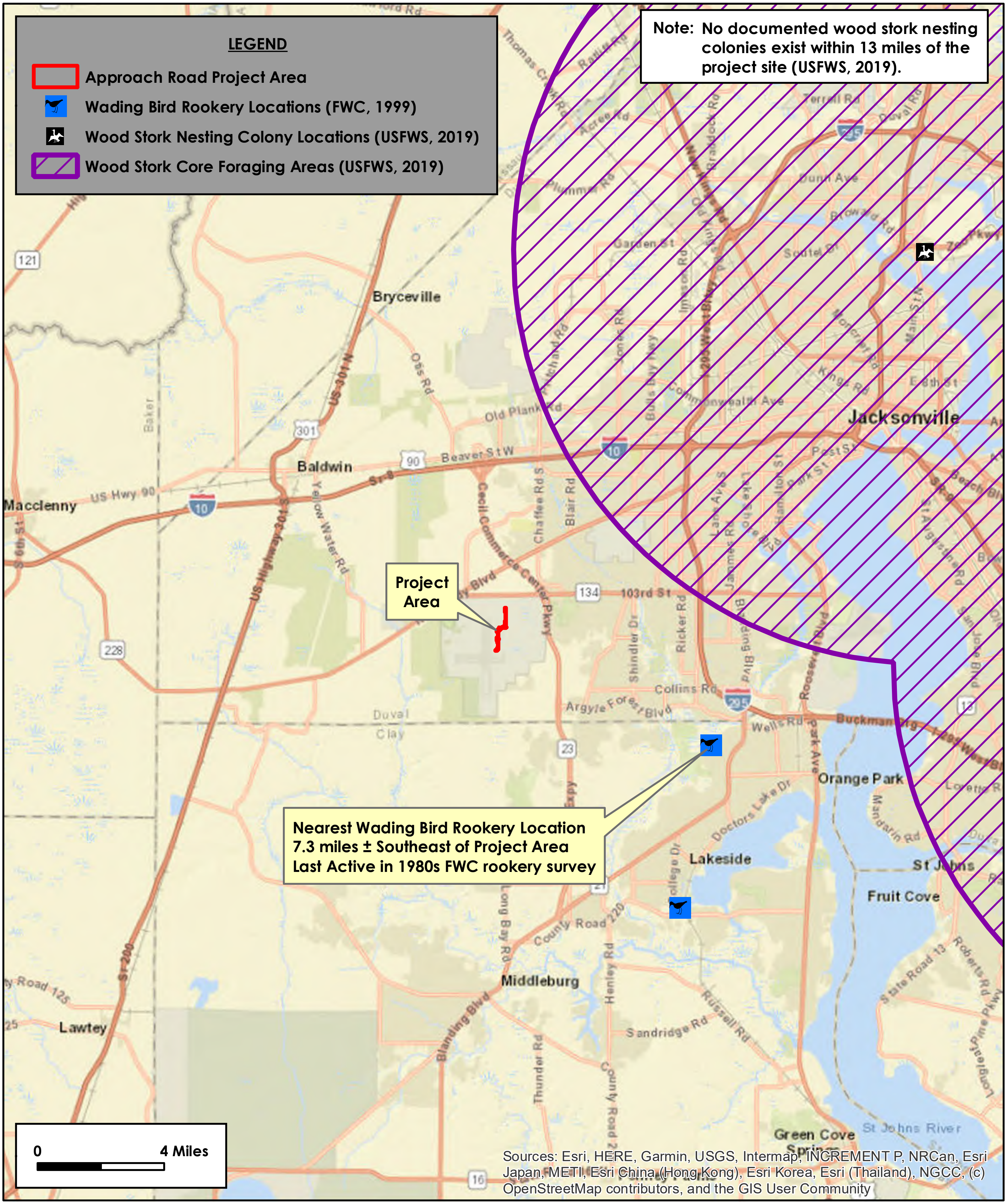

Environmental Resource Solutions A Division of SES Energy Services LLC 3550 St. Johns Bluff Rd S • Jacksonville, FL 32224 (904) 285-1397 • www.ersenvironmental.com	VQQ Approach Road Documented Occurrences of Wading Bird Rookeries and Wood Stork Nesting Colonies/CFA's	Project No.: 22114	N E S W
		Exhibit No.: 4	
		Date: 8-9-22	
	By: DF	Rev. Date:	

Source: USFWS, FDEP, FWC, FNAI, USGS, ArcGIS Online Data (World Street Map)

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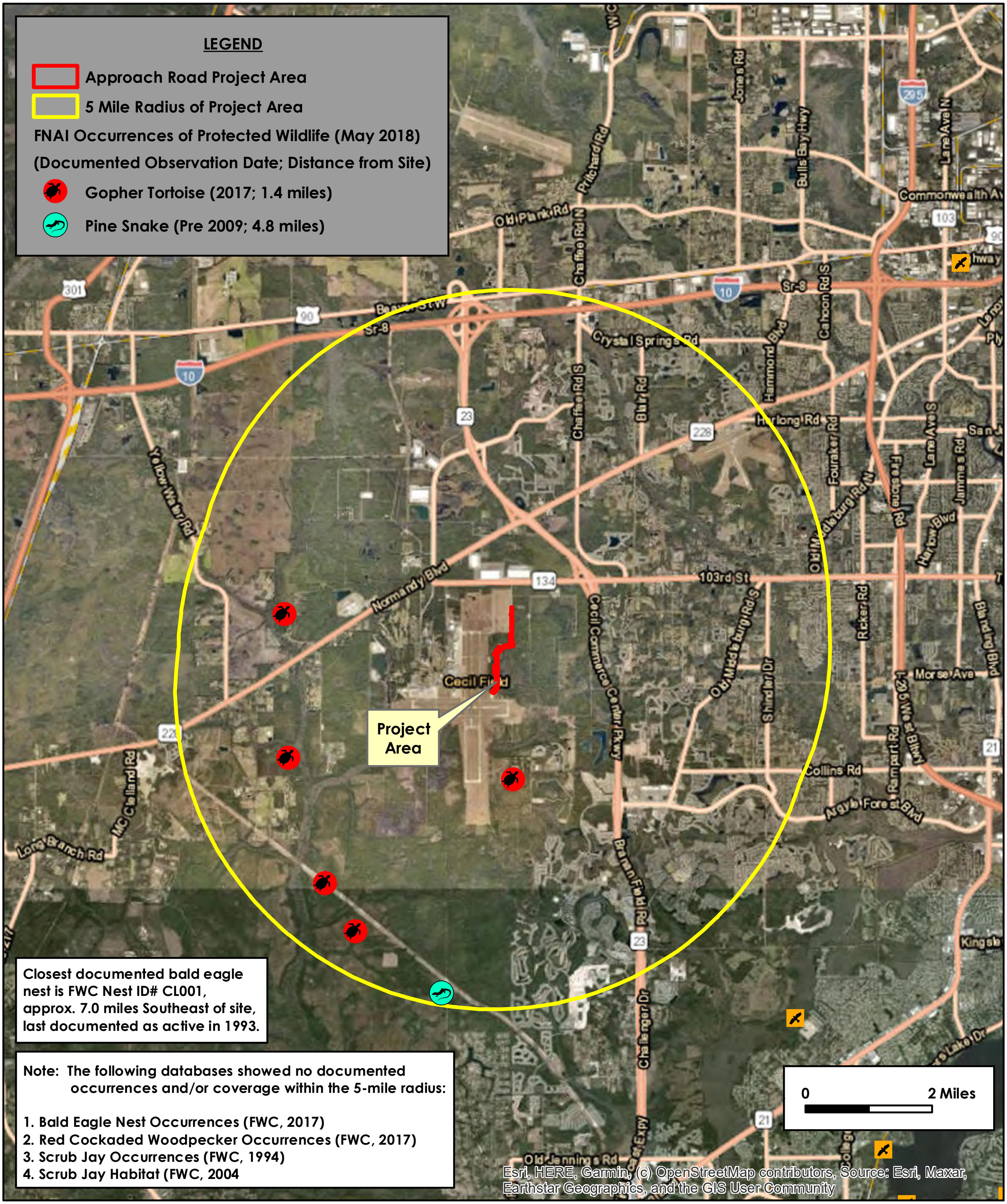

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VQQ Approach Road
Documented Occurrences of Protected Wildlife Within 5 Miles

Project No.:	22114
Exhibit No.:	5
Date:	8-9-22
Rev. Date:	

By: DF

N W E S

Source: USFWS, FDEP, FWC, FNAI, USGS, ArcGIS Online Imagery

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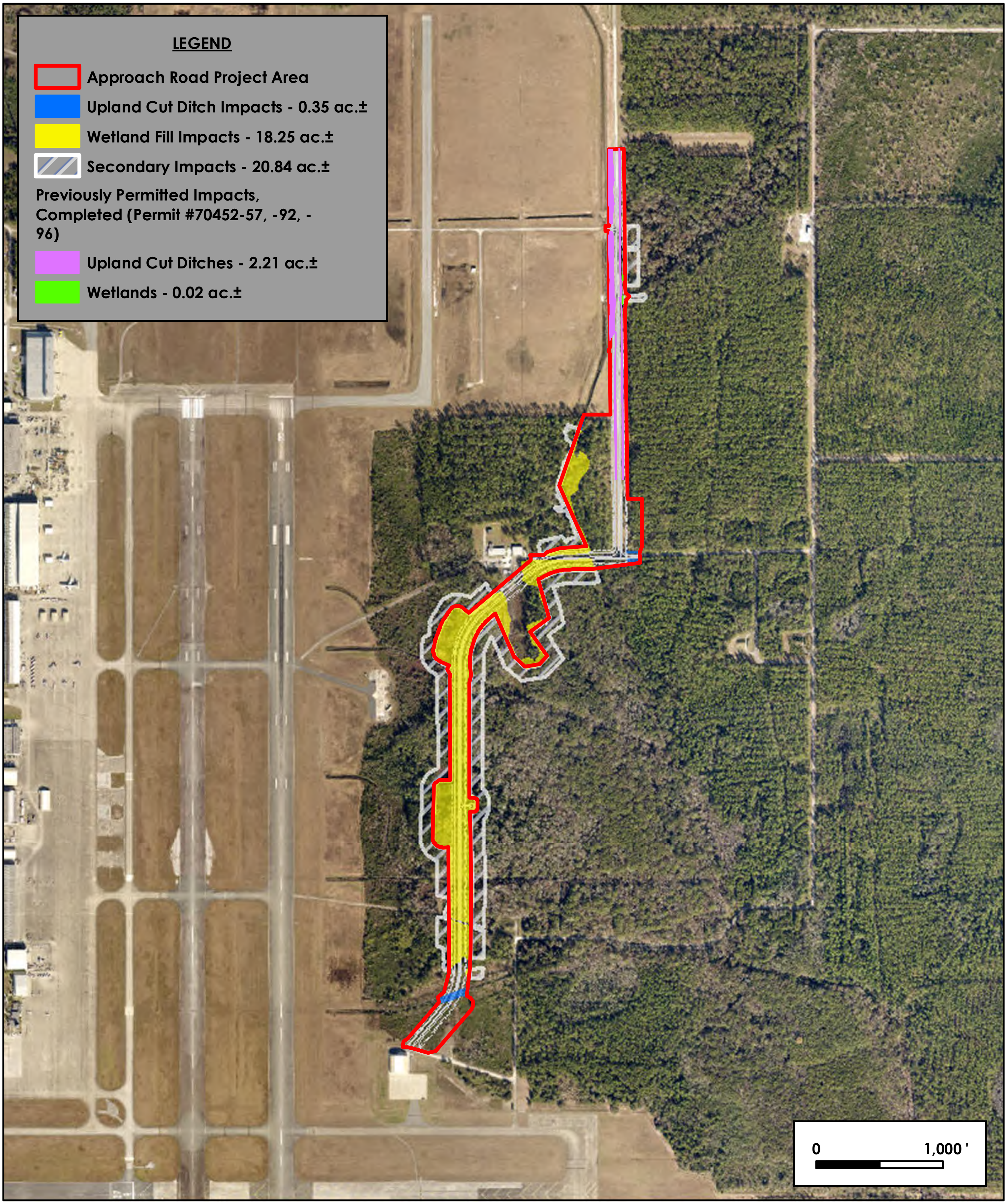

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VQQ Approach Road Impact Map Key

Project No.:	22114
Exhibit No.:	6-Key
Date:	3-1-23
By: DF	Rev. Date:

Source: ArcGIS Online Imagery

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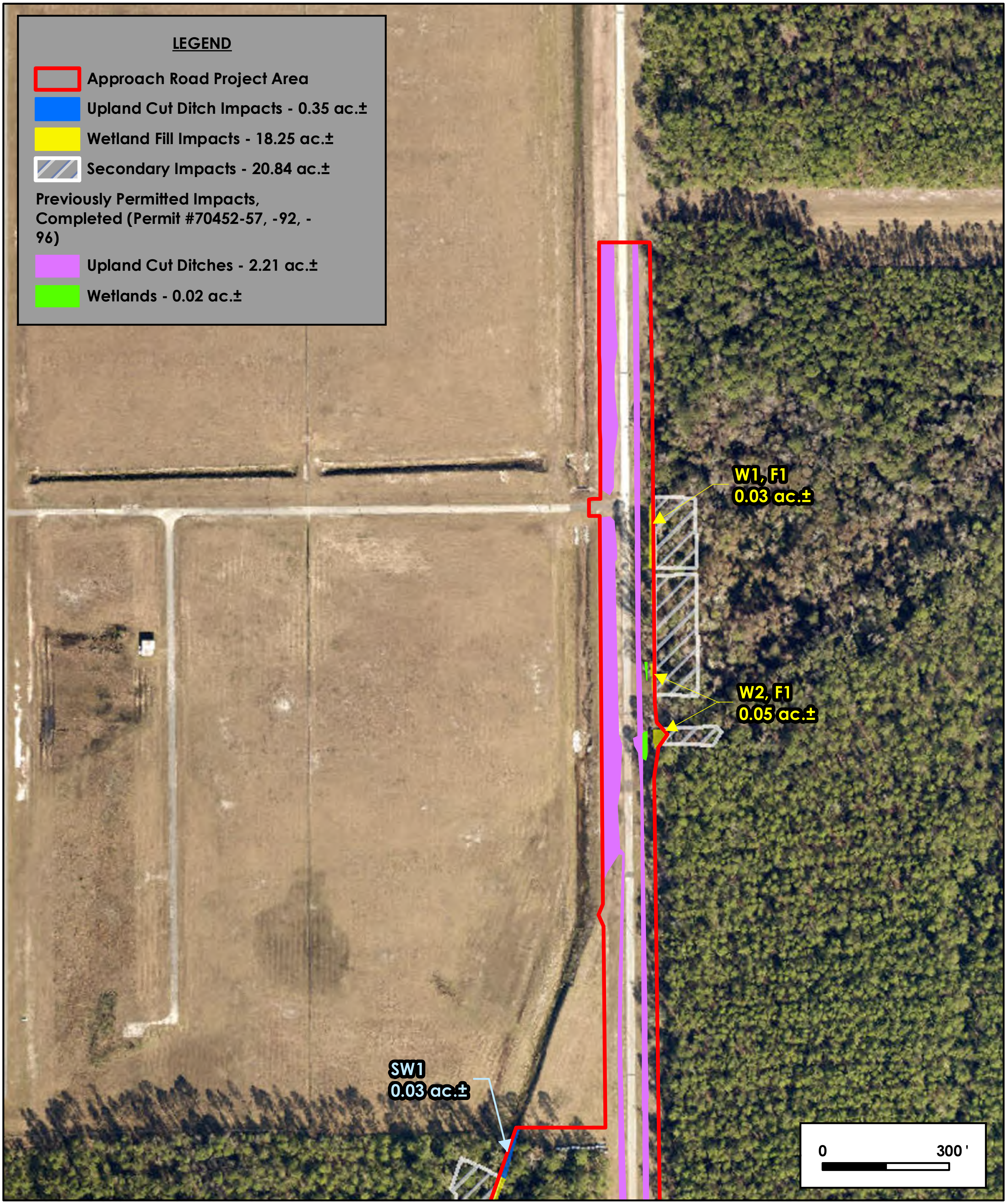

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VQQ Approach Road Impact Map A

Project No.:	22114
Exhibit No.:	6-A
Date:	3-1-23
Rev. Date:	

By: DF

N W E S

Source: ArcGIS Online Imagery

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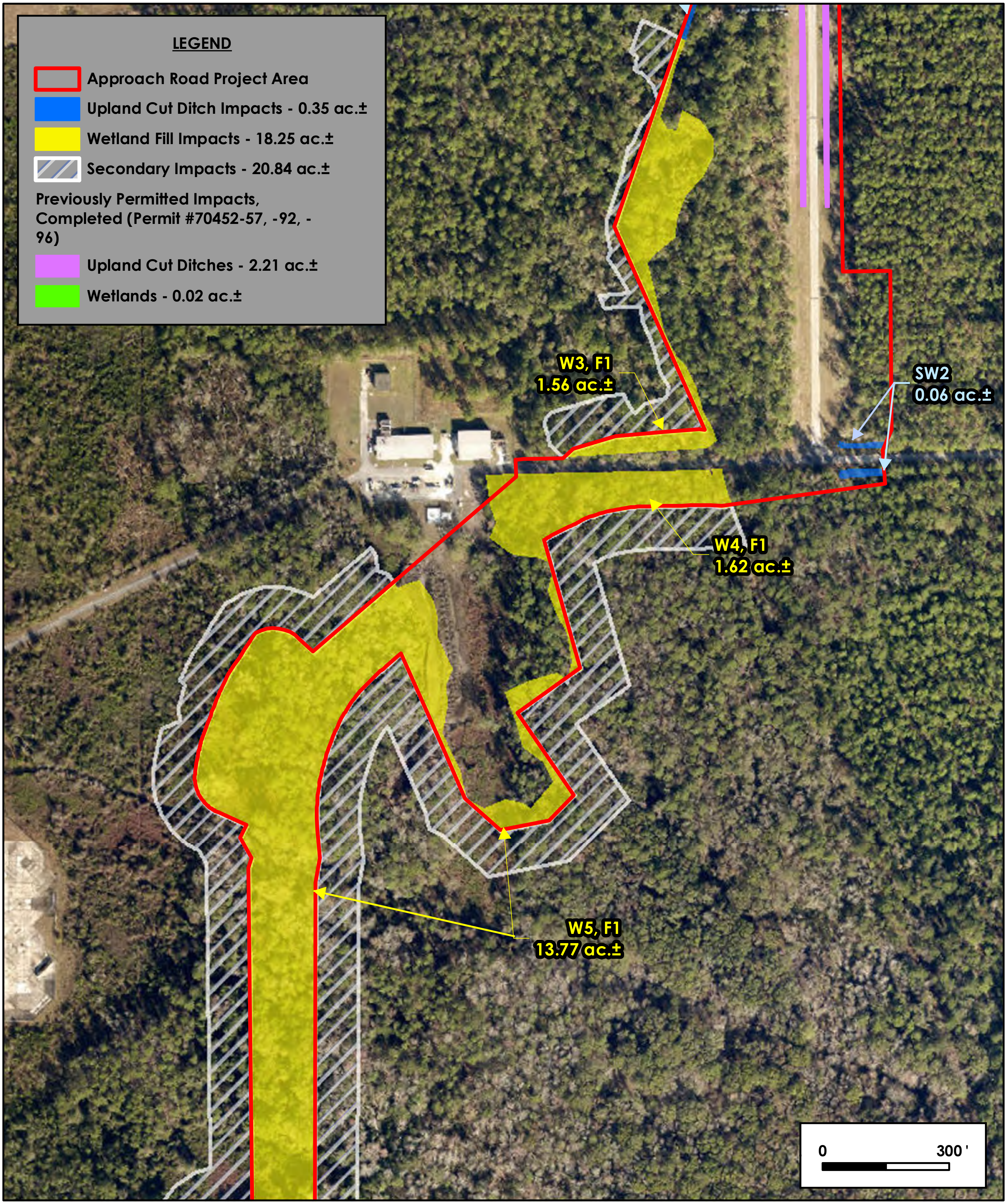

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VQQ Approach Road
Impact Map B

Project No.:	22114
Exhibit No.:	6-B
Date:	3-1-23
Rev. Date:	

By: DF

Source: ArcGIS Online Imagery

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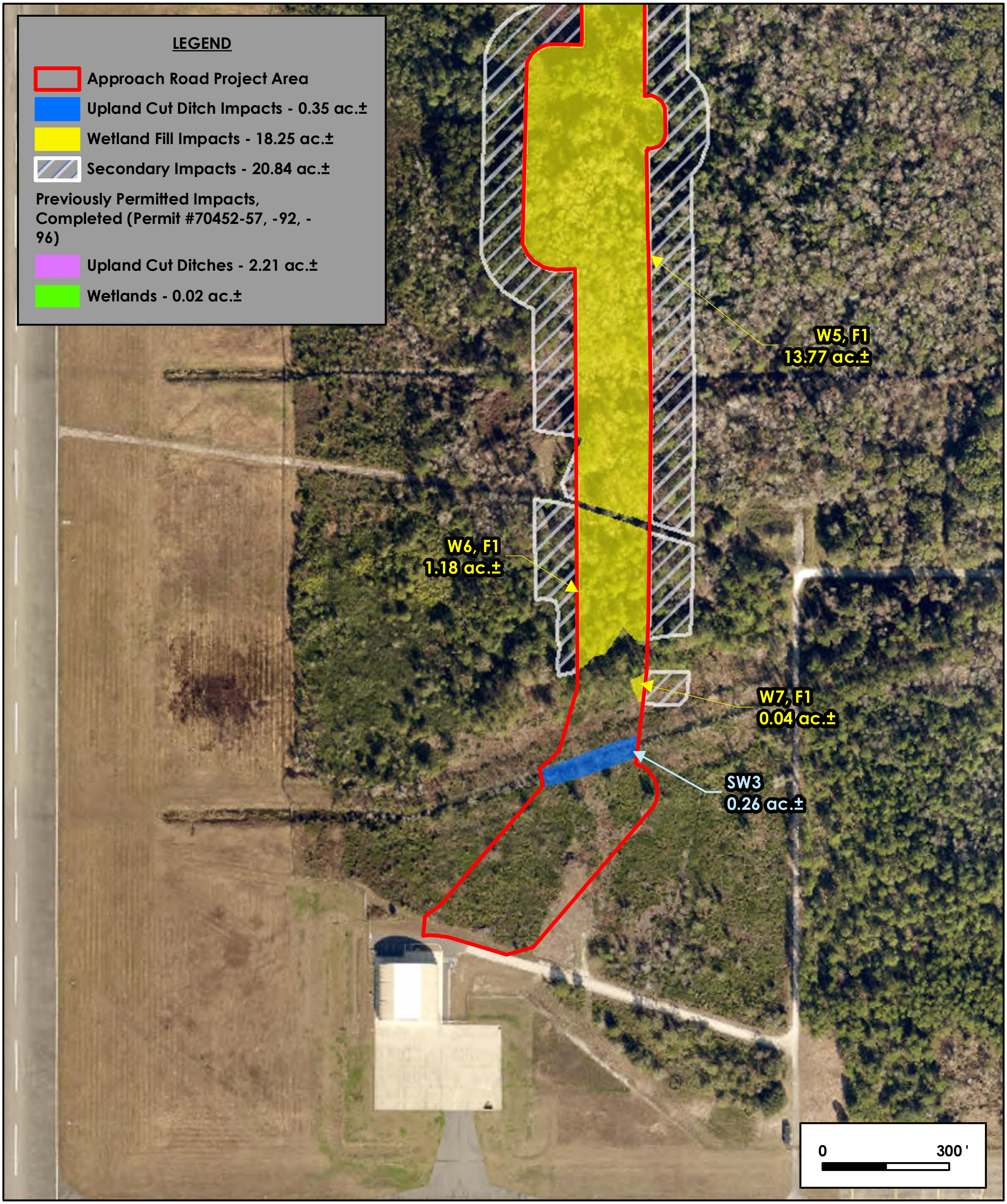

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VQQ Approach Road
Impact Map C

By: DF

Project No.:	22114
Exhibit No.:	6-C
Date:	3-1-23
Rev. Date:	

N W E S

Source: ArcGIS Online Imagery

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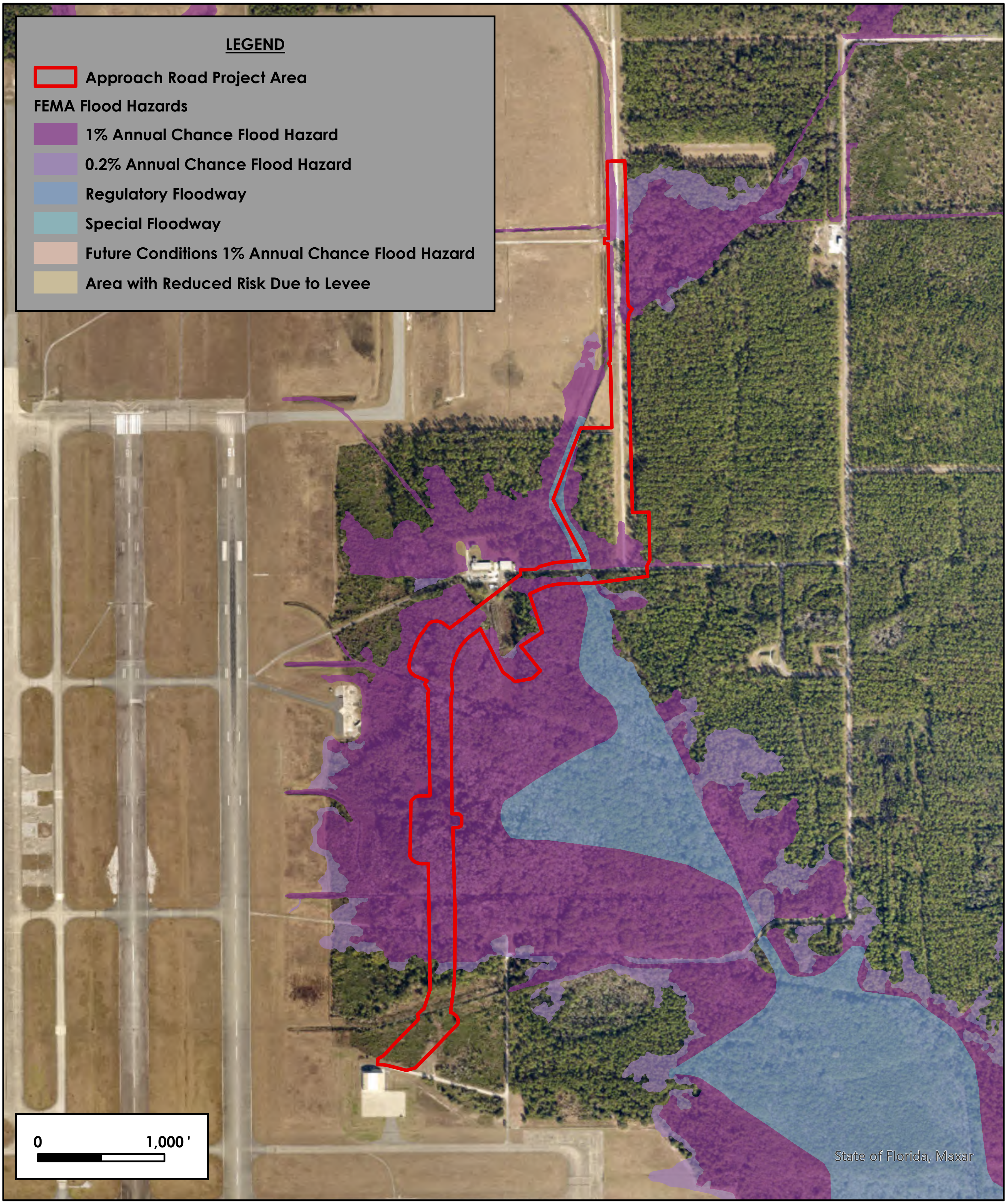

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VQQ Approach Road FEMA Map

Project No.:	22114
Exhibit No.:	7
Date:	10-6-22
Rev. Date:	

By: DF

Source: ESRI; FEMA

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Appendix B

Listed Species Known to Occur in Duval County

Note that this table includes all federally-listed and candidate species and state-listed species that may occur in the county. For a list of all such species that may occur on the subject site, see the text of the report.

Federally-listed and candidate species and state-listed species – Duval County.				
Scientific Name	**Common Name**	**Federal Status**	**State Status**	**Preferred Habitat**
Plants				
Agrimonia incisa	Incised Groove-bur	N	ST	Sandhills.
Asarum arifolium (= Hexastylis arifolia)	Little Brown Jug	N	ST	Shady hammocks, slopes, and wetland edges.
Asclepias viridula	Southern Milkweed	N	ST	Wet flatwoods and prairies, seepage slopes, pitcherplant bogs.
Balduina atropurpurea	Purple Honeycomb-head	N	SE	Wet pine flatwoods and savannahs, seepage slopes, bogs, and wet ditches.
Calopogon multiflorus	Many-flowered Grass-pink	N	ST	Longleaf pine savannahs and flatwoods.
Calycanthus floridus	Eastern Sweetshrub	N	SE	Mesic hammocks and stream banks.
Calydorea caelestina	Bartram's Ixia	N	SE	Wet to mesic flatwoods.
Carex chapmannii	Chapman's Sedge	N	ST	Swamps, hydric hammocks, seepage slopes, and mesic hammocks.
Centrosema arenicola	Pineland Butterfly Pea	N	SE	Sandhills, scrub, and scrubby flatwoods.
Cleistesiopsis divaricata	Rosebud Orchid	N	SE	Wet flatwoods and bogs.
Cleistesiopsis oricamporum (= *Cleistes bifaria*)	Fragrant Pogonia	N	SE	Wet flatwoods.
Coelorachis tuberculosa	Piedmont Jointgrass	N	ST	Margins or shallows of lakes and ponds.
Ctenium floridanum	Florida Toothache Grass	N	SE	Sandhills and other dry pinelands.
Drosera intermedia	Water Sundew	N	ST	Pond margins, bogs, and marshes.
Forestiera godfreyi	Godfrey's Swampprivet	N	SE	Upland hardwood forests with limestone near surface, often on slopes above lakes and rivers.
Gonolobus suberosus (= Matelea gonocarpus)	Anglepod Milkvine	N	ST	Hammocks.
Hartwrightia floridana	Hartwrightia	N	ST	Seepage slopes and burned wet pine flatwoods.
Helianthus carnosus	Lakeside Sunflower	N	SE	Wet flatwoods and prairies.
Hexalectris spicata	Spiked Crested Coralroot	N	SE	Calcareous hammocks and shell middens.
Isoetes appalachiana	Appalachian Quillwort	N	SE	Ephemeral woodland pools and swampy streams.
Lantana depressa var. *floridana*	Atlantic Coast Florida Lantana	N	SE	Stabilized dunes of Atlantic coast barrier islands
Lilium catesbaei	Pine Lily	N	ST	Pine savannahs, marshes, flatwoods, and bogs.

Federally-listed and candidate species and state-listed species – Duval County.				
Scientific Name	**Common Name**	**Federal Status**	**State Status**	**Preferred Habitat**
Litsea aestivalis	Pondspice	N	SE	Pond margins, cypress dome and swamp edges.
Lobelia cardinalis	Cardinalflower	N	ST	Swamps, riverbanks, and cypress domes.
Matelea flavidula	Yellow Carolina Milkvine	N	SE	Wooded slopes and bluff forests.
Matelea floridana	Florida Milkvine	N	SE	Hammocks.
Mesadenus lucayanus (=Sprianthes polyantha)	Florida Keys Ladies'-tresses	N	SE	Rock outcrops in mesic hammock, rockland hammock, maritime hammock.
Myriopteris microphylla	Southern Lip Fern	N	SE	Rock outcrops and shell mounds.
Neottia bifolia	Southern twayblade	N	ST	Seasonally flooded deciduous woodlands, often associated with *Sphagnum*.
Opuntia stricta	Erect Pricklypear	N	ST	Dunes, coastal scrub, maritime hammock edges, and coastal ruderal areas.
Orbexilum virgatum	Pineland Leatherroot	N	SE	Pine flatwoods and savannahs, usually in moist soils.
Orthochilus ecristatus (= Pteroglossaspis ecristata)	Giant Orchid	N	ST	Sandhill, scrub, pine flatwoods, and pine rocklands.
Pecluma plumula	Plume Polypody	N	SE	Epiphytic on tree branches or on limestone in hammocks and swamps.
Pecluma ptilota var. *bourgeauana*	Comb Polypody	N	SE	Rockland hammocks and wet woods, often on tree bases and fallen logs.
Peperomia humilis	Terrestrial Peperomia	N	SE	Shell mounds and outcrops in mesic hammocks, coastal berms, and cypress swamps
Pinguicula caerulea	Blueflower Butterwort	N	ST	Marshes, swamp edges, and wet flatwoods.
Pinguicula lutea	Yellow Butterwort	N	ST	Sandy bogs and open wet flatwoods.
Platanthera blephariglottis var. *conspicua*	White Fringed Orchid	N	ST	Bogs, swamps, and marshes.
Platanhera chapmanii	Chapman's Fringed Orchid	N	SE	Bogs, swamps, and marshes.
Platanthera ciliaris	Yellow Fringed Orchid	N	ST	Bogs, swamps, and marshes.
Platanthera cristata	Crested Yellow Orchid	N	ST	Wet flatwoods and bogs.
Platanthera flava	Gypsy-spikes	N	ST	Prairies, marshes, and wet flatwoods.
Platanthera integra	Orange Reinorchid	N	SE	Wet flatwoods and bogs.
Platanthera nivea	Snowy Orchid	N	ST	Bogs, swamps, and marshes.
Pogonia ophioglossoides	Rose Pogonia	N	ST	Wet pine savannahs and flatwoods.
Pycnanthemum floridanum	Florida Mountainmint	N	ST	Sandhills, mesic forest and disturbed areas.
Ruellia noctiflora	Nightflowering Wild Petunia	N	SE	Wet flatwoods, seepage slopes, hydric hammock.
Sarracenia minor	Hooded Pitcherplant	N	ST	Wet flatwoods, swamps, marshes, and bogs.

Federally-listed and candidate species and state-listed species – Duval County.				
Scientific Name	**Common Name**	**Federal Status**	**State Status**	**Preferred Habitat**
Schoenolirion croceum	Yellow Sunnybell	N	SE	Wet pine flatwoods and bogs.
Schwalbea americana	Chaff-seed	E	FE	Fire-maintained longleaf pine savannas, sandhills, flatwoods, and ecotones between sandhills and ponds. Semi-parasitic on roots of *Ilex glabra*, *Gaylussacia*, *Hypericum*, etc.
Spiranthes brevilabris	Texas Ladies-Tresses	N	SE	Wet prairies and flatwoods.
Spiranthes longilabris	Longlip Ladies-tresses	N	ST	Wet prairies and flatwoods.
Verbesina heterophylla	Variable-leaf Crownbeard	N	SE	Mesic flatwoods and dry woods.
Zephyranthes atamasca var. *atamasca*	Rainlily	N	ST	Swamps, floodplains, wet prairies, and wet roadsides.
Zephyranthes atamasca var. *treatiae*	Treat's Rainlily	N	ST	Swamps, floodplains, wet prairies and wet roadsides.
Insects				
Danaus plexippus	Monarch Butterfly	C	N	Breeding females lay eggs on *Asclepias* spp. (milkweeds) where the larvae develop. Non-breeding and breeding adults feed on many species of wildflowers, and so may occur in areas with high densities of wildflowers.
Crustaceans				
*Procambarus pictus***	Black Creek Crayfish	N	ST	Small high quality tannic streams.
Fish				
*Acipenser brevirostrum***	Shortnose Sturgeon	E	FE	Large rivers and coastal waterways; Formerly bred in the Ocklawaha River before the Rodman Dam was constructed.
*Acipenser oxyrinchus oxyrinchus**	Atlantic Sturgeon	E	FE	Atlantic Ocean and portions of large river systems.
Pristis pectinata	Smalltooth Sawfish	E	FE	Open sea, estuaries, bays, and river mouths.
Amphibians				
Ambystoma cingulatum	Frosted Flatwoods Salamander	T	FT	Flatwoods with wiregrass and interspersed wetlands; breeds in small ponds and seasonally flooded wetlands.
Reptiles				
Caretta caretta	Loggerhead Sea Turtle	T	FT	Open sea, bays, lagoons, creeks; beaches for nesting.
Chelonia mydas	Green Sea Turtle	T	FT	Open sea, inshore bays, tidal creeks; beaches for nesting.
*Dermochelys coriacea**	Leatherback Sea Turtle	E	FE	Open sea; beaches for nesting.
*Drymarchon corais couperi**	Eastern Indigo Snake	T	FT	Linked to xeric habitats and gopher tortoise burrows, but also uses other natural habitats such as mesic uplands, swamps, and freshwater marshes as foraging habitat.

Federally-listed and candidate species and state-listed species – Duval County.				
Scientific Name	**Common Name**	**Federal Status**	**State Status**	**Preferred Habitat**
*Eretmochelys imbricata**	Hawksbill Sea Turtle	E	FE	Typically inhabits inshore reefs and hardbottom areas where they forage primarily on encrusted sponges. Utilizes beaches for nesting.
*Gopherus polyphemus**	Gopher Tortoise	C	ST	Sandhills, scrub, dry flatwoods, dry ruderal areas.
*Lepidochelys kempii**	Kemp's Ridley Sea Turtle	E	FE	Open sea, bays, lagoons, inlets; beaches for nesting.
*Pituophis melanoleucus***	Pine Snake	N	ST	Sandhill, sand pine scrub and scrubby flatwoods.
Birds				
*Aphelocoma coerulescens**	Florida scrub-jay	T	FT	Fire-maintained scrub with scrub oaks and open areas.
*Athene cunicularia floridana***	Florida Burrowing Owl	N	ST	Open prairies with little vegetation.
Calidris canutus rufa	Red Knot	T	FT	Migratory in large flocks; requires beaches and shallow coastal waters for stopover feeding.
*Charadrius melodus**	Piping Plover	T/CH	FT	Beaches, sandflats, and mudflats.
*Cistothorus palustris griseus***	Worthington's Marsh Wren	N	ST	Tidal marshes dominated by cordgrass.
*Egretta caerulea***	Little Blue Heron	N	ST	Forages in a wide variety of freshwater, brackish, and saline wetlands and waterways, including ponds and ditches. Prefers freshwater habitats. Nests in mixed colonies in flooded trees or shrubs or on islands.
*Egretta tricolor***	Tricolored Heron	N	ST	Forages in a wide variety of freshwater, brackish, and saline wetlands and waterways, including ponds and ditches. Prefers coastal habitats. Nests in mixed colonies in flooded trees or shrubs or on islands.
*Falco sparverius paulus***	Southeastern American Kestrel	N	ST	Upland pinelands (flatwoods, sandhills, pastures, and old fields). Requires open areas for foraging, and nest cavities (dead trees, nest boxes, etc.) for breeding.
Haematopus palliatus	American Oystercatcher	N	ST	Occurs in beaches, sandbars, spoil islands, shall rakes, salt march, and oyster reefs.
Laterallus jamaicensis jamaicensis	Eastern Black Rail	T	FT	Primarily occurs in tidal saltmarsh, but can also occur in freshwater wetlands, coastal prairies, and grassy fields.
Leuconotopicus borealis (= Dryobates borealis and *Picoides borealis)***	Red-cockaded Woodpecker	E	FE	High quality fire-maintained upland pine forest with mature pines with heart rot for nesting.
Mycteria americana	Wood Stork	T	FT	Forages in a wide variety of freshwater and brackish wetlands and waterways, including ponds and ditches. Prefers waterbodies that have shallow or variable water levels to concentrate fish prey. Nests in colonies in flooded trees or on islands.
*Platalea ajaja***	Roseate Spoonbill	N	ST	Forages in a wide variety of freshwater, brackish, and saline wetlands and waterways, including ponds and ditches. Prefers coastal habitats. Nests in mixed colonies in mangroves, willow heads, or spoil islands.
*Rynchops niger***	Black Skimmer	N	ST	Estuaries, beaches, and sandbars.
*Sternula antillarum***	Least Tern	N	ST	Coastal areas, including estuaries and bays.

Federally-listed and candidate species and state-listed species – Duval County.				
Scientific Name	**Common Name**	**Federal Status**	**State Status**	**Preferred Habitat**
Mammals				
Eubalaena glacialis	North Atlantic Right Whale	E	FE	Open ocean. Gives birth near the Atlantic shoreline between December and March.
*Trichechus manatus***	West Indian Manatee	T/CH	FT	Estuaries, tidal rivers, springs, and spring runs.

Legal Status and Notes

Federally-listed Species (FWS)

C = Candidate species for which federal listing agencies have sufficient information on biological vulnerability and threats to support proposing to list the species as endangered or threatened.
CH = Critical Habitat has been designated in the county in which the project is located.
E = Endangered: species in danger of extinction throughout all or a significant portion of its range.
T = Threatened: species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
PT = Proposed threatened.
N = Not federally-listed.
***** = This species is included in a FWS Recovery Plan.
Recovery plans can be found at: https://www.fws.gov/endangered/species/recovery-plans.html

State-listed Species

SAT = Listed as threatened for similarity of appearance.
SSC = Species of Special Concern.
SE = State endangered.
ST = State threatened: species listed by the state that are likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
FE = Federally endangered: species federally listed as being in danger of extinction throughout all or a significant portion of its range.
FT = Federally threatened: species federally listed as likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
****** = FWC has developed a draft or final Permitting Guidelines document for this species. Permitting guidelines can be found at: https://myfwc.com/wildlifehabitats/wildlife/species-guidelines/

Appendix C

USACE Permits

Gabby Allerton

Sent:
To:
Subject:

From: Mashour, Terri M CIV USARMY CESAJ (USA) <Terri.M.Mashour@usace.army.mil>
Sent: Thursday, January 19, 2023 2:43 PM
To: Walt Esser <wesser@ses-grp.com>
Subject: RE: [Non-DoD Source] RE: Cecil Airport Approach Road

[EXTERNAL]

Walt,

We would consider this process each time a minor mod because the impacts are already permitted and the permit is active. Please submit the plans and SJRWMD permit when you have that, along with be UMAM and ledger. We can then process.

Thank you,
Terri Mashour

Sent with BlackBerry Work
(www.blackberry.com)

From: Walt Esser <wesser@ses-grp.com>
Date: Thursday, Jan 19, 2023 at 2:14 PM
To: Mashour, Terri M CIV USARMY CESAJ (USA) <Terri.M.Mashour@usace.army.mil>
Subject: [Non-DoD Source] RE: Cecil Airport Approach Road

Terri, any word on this?

Thanks,
Walt

From: Mashour, Terri M CIV USARMY CESAJ (USA) <Terri.M.Mashour@usace.army.mil>
Sent: Wednesday, January 18, 2023 9:02 AM
To: Walt Esser <wesser@ses-grp.com>
Subject: RE: Cecil Airport Approach Road

Walt,

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

08012
Alenia

REPLY TO
ATTENTION OF

March 12, 2009

Regulatory Division
North Permits Branch
Jacksonville Permits Section
SAJ-2008-1502(SP-BAL)
Modification-1

Mr. J. Derek Powder, P.E.
Jacksonville Aviation Authority
14201 Pecan Park Boulevard
Jacksonville, Florida 32218

Dear Mr. Powder:

The U.S. Army Corps of Engineers has completed the review and evaluation of your permit request that was received on December 22, 2008. You asked for additional impacts at the aviation facility at Cecil Commerce Center which was previously authorized by Department of the Army permit number SAJ-2008-1502(SP-BAL). The project site surrounds the boundary of the existing Cecil Field runway facilities that is located at Cecil Commerce Center, in Sections 23, 24, 25, 35 & 36, Township 3 South, Range 24 East, Jacksonville, Duval County, Florida. Specifically,

You requested to eliminate 152.32 acres of wetland impacts for the construction of aircraft hangers, taxiway extensions, maintenance facilities and aviation-related support facilities including business offices, and warehouses. In addition, the modification request needs to match the expiration date of other permits issued for Cecil Commerce Center.

The following special conditions have been added as a result of the modification:

1. **St. Johns River Water Management District(SJRWMD) Permits:** The permittee shall submit to the Corps a copy of any and all future State of Florida Environmental Resource Permits and/or St. Johns River Water Management District(SJRWMD) permits **for each work component** associated with the project, or any portion of the overall work associated with this project, within 30 days of the issuance of such permits.

2. **Mitigation:** Within 30 days from the date of receiving the SJRWMD permit, the Permittee shall submit to the Corps a site plan and the Wetland Rapid Assessment Procedures (WRAP) scores for the work component for review and approval. The permittee cannot begin work until they receive verification from the Corps that the credits are available at the Mitigation Area or appropriate compensatory wetland mitigation has been reviewed and accepted by the Corps.

3. **Disconnecting Aquatic Resources**: The permittee acknowledges that no work authorized by this permit instrument shall in any way serve to hydrologically disconnect aquatic resources considered jurisdictional waters of the United States from other waters of the United States thereby rendering those resources non-jurisdictional. Also, compensatory wetland mitigation may be required if the aquatic resource has been altered by construction and no longer functioning at the assessed value.

4. **Regulatory Agency Changes**: Should any other regulatory agency require changes to the work authorized or obligated by this permit, the Permittee is advised that a modification to this permit instrument is required prior to initiation of those changes. It is the Permittee's responsibility to request a modification of this permit from the Jacksonville Regulatory Office.

The impact of your proposal on navigation and the environment have been reviewed and found to be insignificant. The permit is hereby modified in accordance with your request. The modification must be completed in accordance with the enclosed impact drawings dated January 26, 2009, which are incorporated in, and made a part of the permit. Also, the timeframe for the existing permit has been extended until **22 September 2023.** You should attach this letter to the permit. All other conditions of the permit remain in full force and effect.

If you have any questions concerning the permit modification, please contact the project manager Bev Lawrence at (904) 232-2517 or at the above letterhead address or by electronic mail at beverlee.a.lawrence@usace.army.mil.

Thank you for your cooperation with our permit program. The Corps Jacksonville District Regulatory Division is committed to improving service to our customers. We strive to perform our duty in a friendly and timely manner while working to preserve our environment. We invite you to take a few minutes to visit the following link and complete our automated Customer Service Survey:
http://www.saj.usace.army.mil/permit/forms/customer_service.htm.
Your input is appreciated - favorable or otherwise.

BY AUTHORITY OF THE SECRETARY OF THE ARMY:

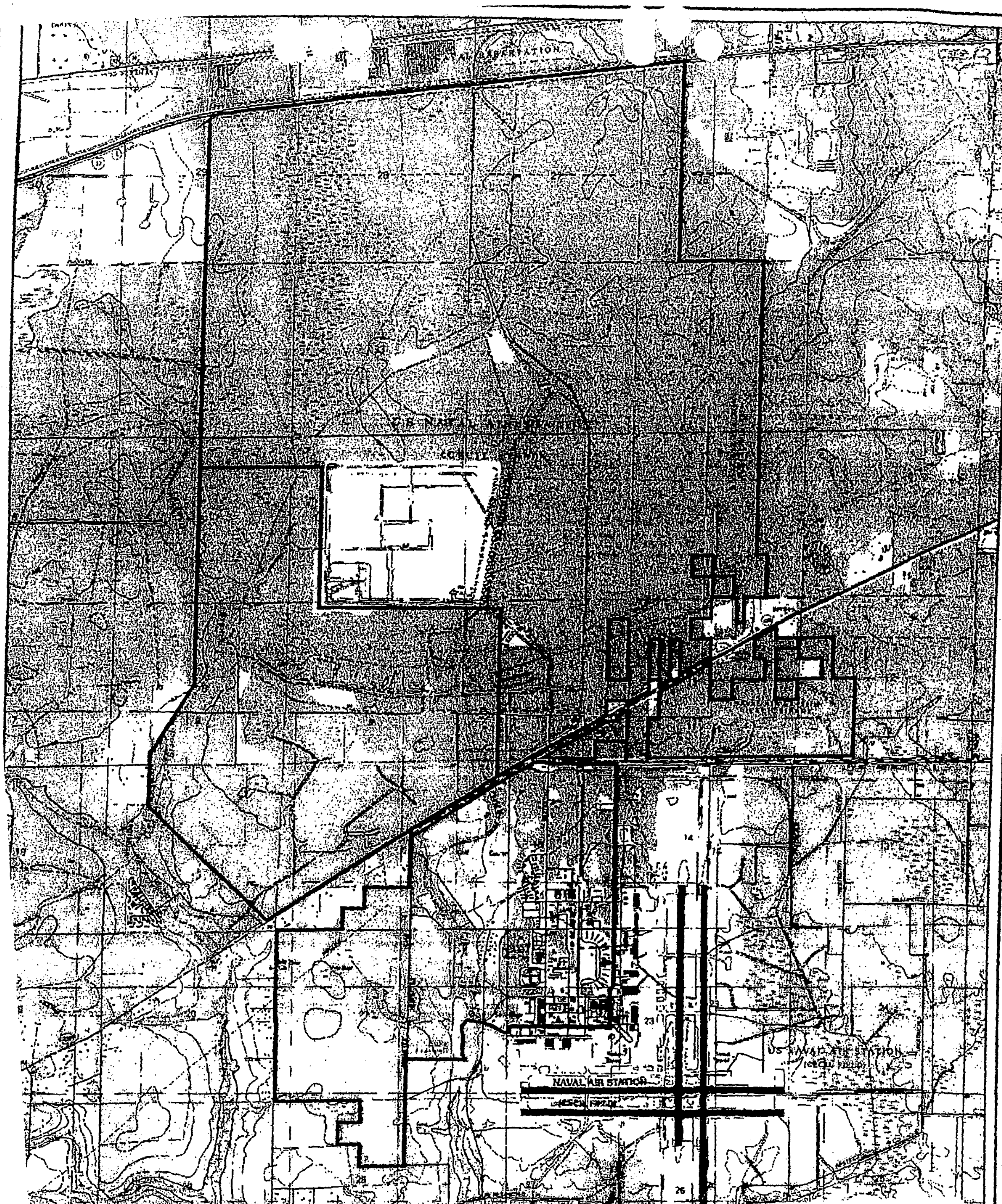
for Paul L. Grosskruger
Colonel, U.S. Army
District Commander

Enclosure

Copies Furnished:

Ms. Amy Wester, Environmental Resource Solutions, Inc., 1597 The Greens Way, Suite 200, Jacksonville Beach, FL 32250

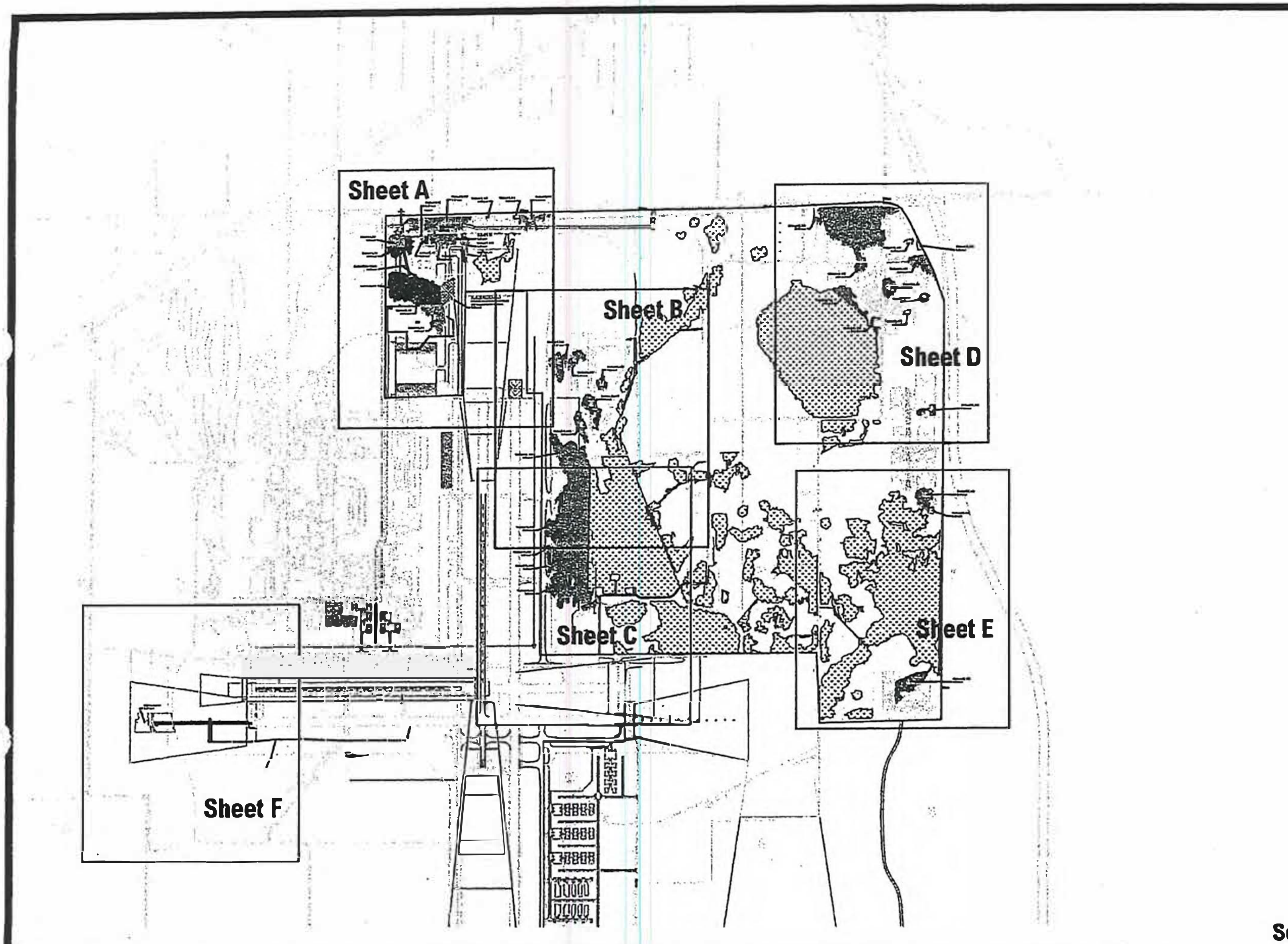
CESAJ-RD-PE



Environmental Resource Solutions Inc.
1597 The Greens Way, Suite 200
Jacksonville Beach, FL 32250

USGS 7.5' Topographic Quadrangles:
Baldwin, Marietta, Jacksonville Heights, Fiftone, Florida.

U.S. ARMY CORPS OF ENGINEERS
SAJ-2008-1502(SP-BAL) MOD -1
DATE: 26 JANUARY 2009
DRAWING PAGE: 1 OF 80

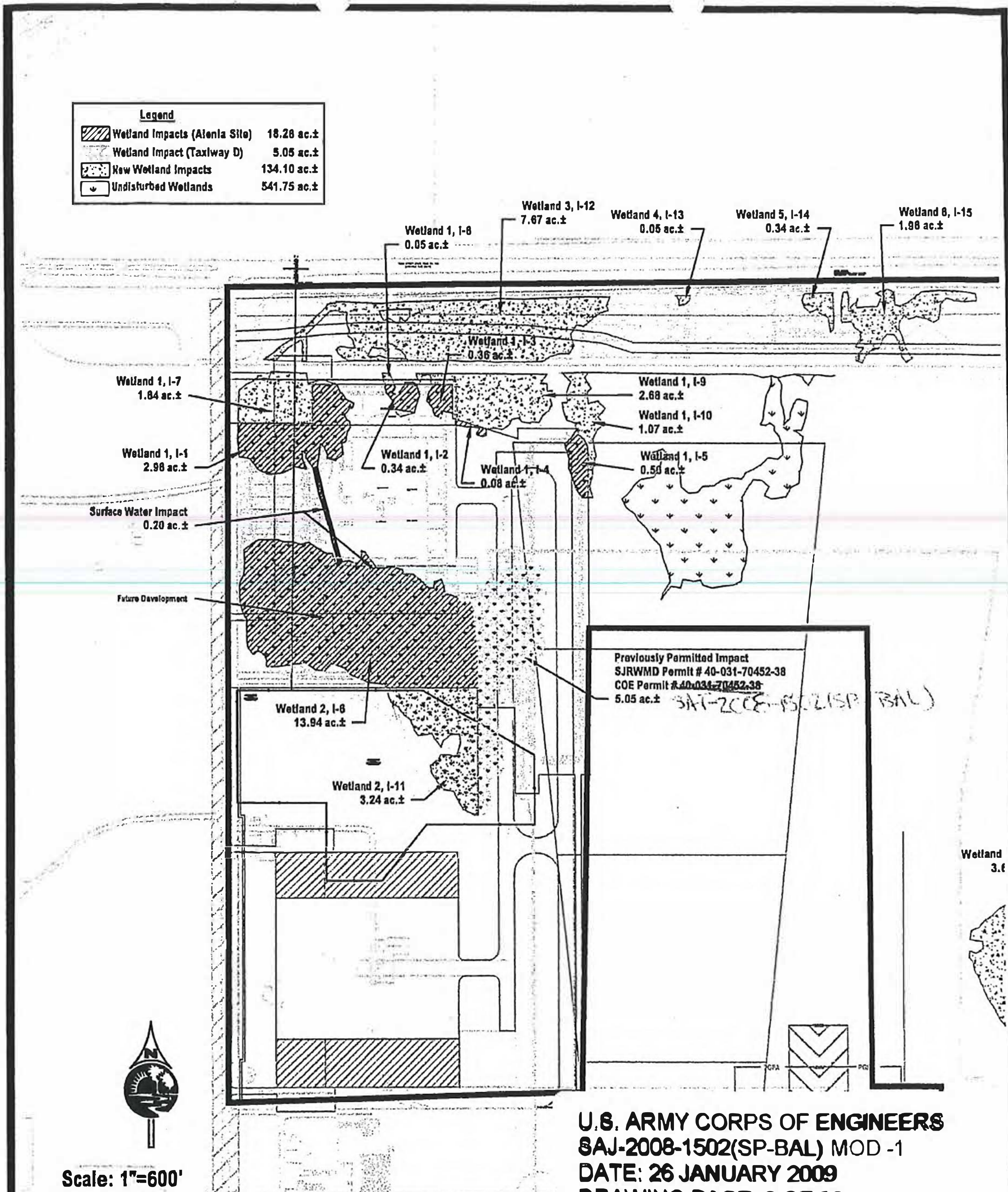


U.S. ARMY CORPS OF ENGINEERS
SAJ-2008-1502(SP-BAL) MOD -1
DATE: 26 JANUARY 2009
DRAWING PAGE: 2 OF 80

Environmental Resource Solutions Inc.

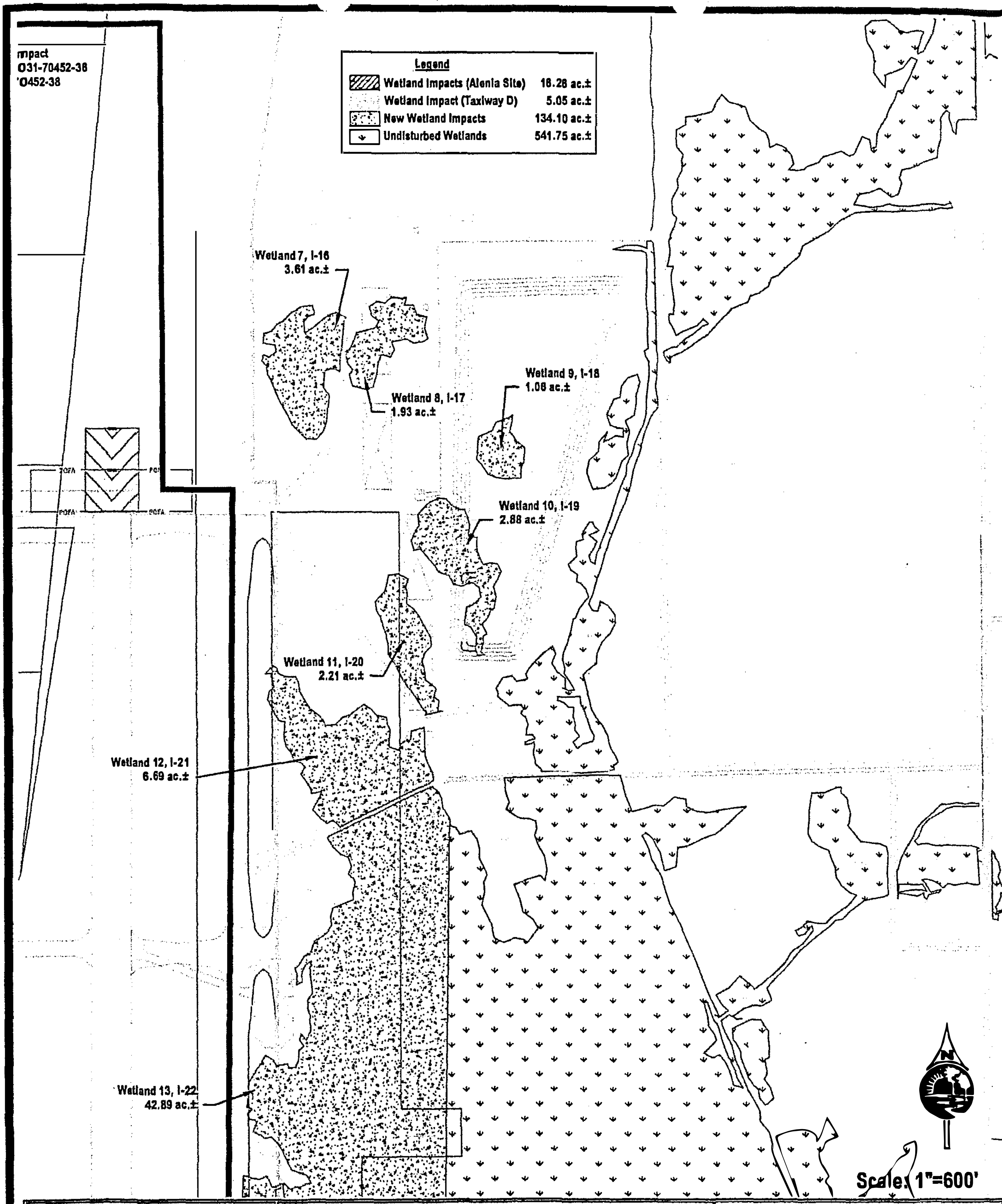
Cecil Commerce Center
Wetland Impact Key Map

Source:	Project No.: 08012		
	Date: 1-22-09	Rev.	
File: 08012_Impact_1-22-09	By: JK	Exhibit No: 4Key	



U.S. ARMY CORPS OF ENGINEERS
SAJ-2008-1502(SP-BAL) MOD -1
DATE: 26 JANUARY 2009
DRAWING PAGE: 3 OF 80

Environmental Resource Solutions Inc. 1597 The Greens Way Suite 200 Jacksonville Beach, FL 32250	Cecil Commerce Wetland Impact Map (Sheet A)	Date: 1-22-09	Rev.:
	Source:	File: 08012_Impact_1-22-09	By: JK / Exhibit No.: 4A



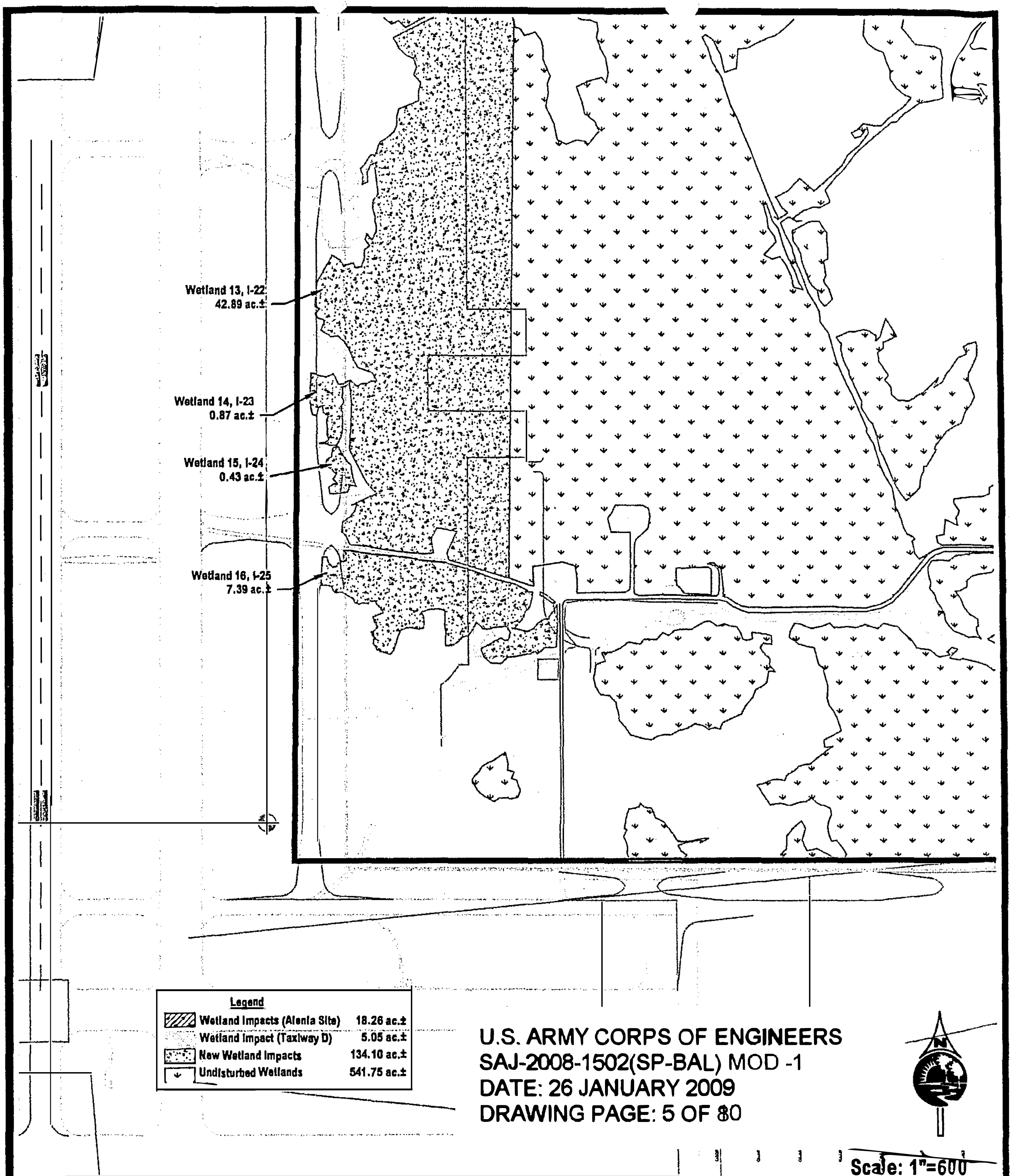
Environmental Resource Solutions Inc.
1597 The Greens Way
Suite 200
Jacksonville Beach, FL 32250

Cecil Commerce Cen
Wetland Impact Map (SI

Source:

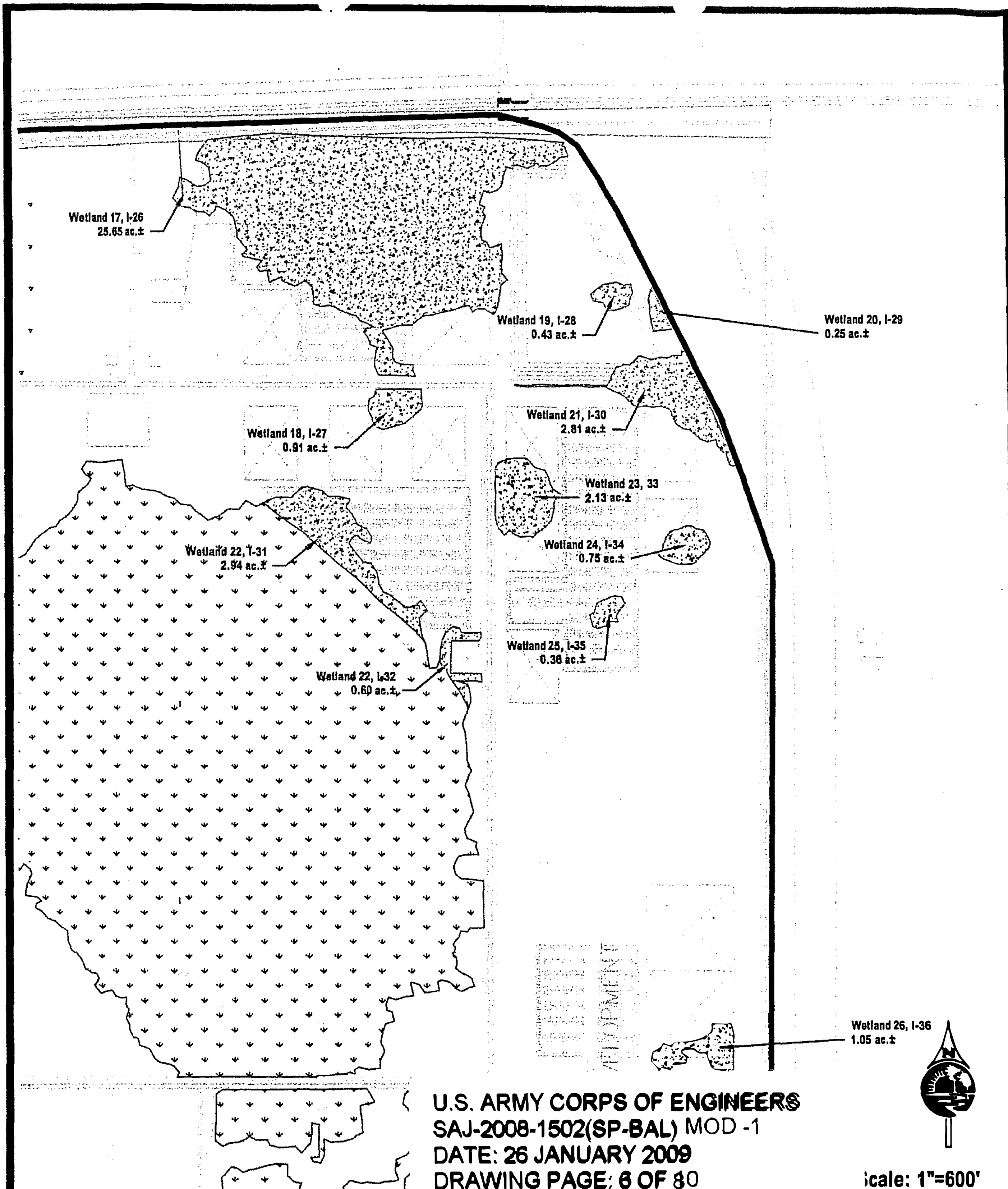
File: 0801.

U.S. ARMY CORPS OF ENGINEERS
SAJ-2008-1502(SP-BAL) MOD -1
DATE: 26 JANUARY 2009
DRAWING PAGE: 4 OF 80



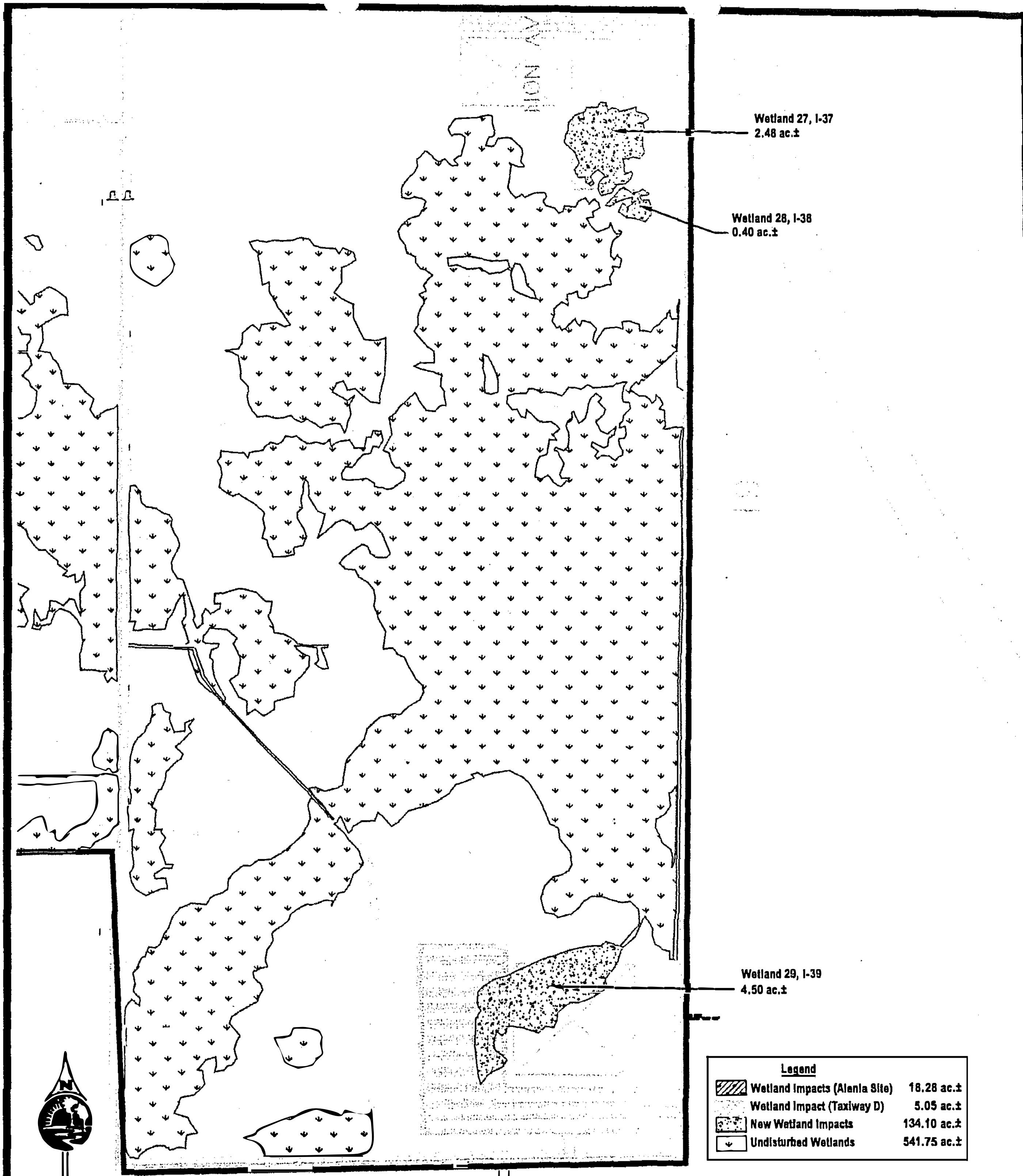
U.S. ARMY CORPS OF ENGINEERS
SAJ-2008-1502(SP-BAL) MOD -1
DATE: 26 JANUARY 2009
DRAWING PAGE: 5 OF 80

Environmental Resource Solutions Inc. 1597 The Greens Way Suite 200 Jacksonville Beach, FL 32250	**Cecil Commerce Center** **Wetland Impact Map (Sheet C)**	Project No.: **08012**	
		Date: **1-22-09**	Rev.:
	Source: / File: 08012_Impact_1-22-09	By: **JK**	Exhibit No.: **4C**



U.S. ARMY CORPS OF ENGINEERS
SAJ-2008-1502(SP-BAL) MOD -1
DATE: 26 JANUARY 2009
DRAWING PAGE: 6 OF 80

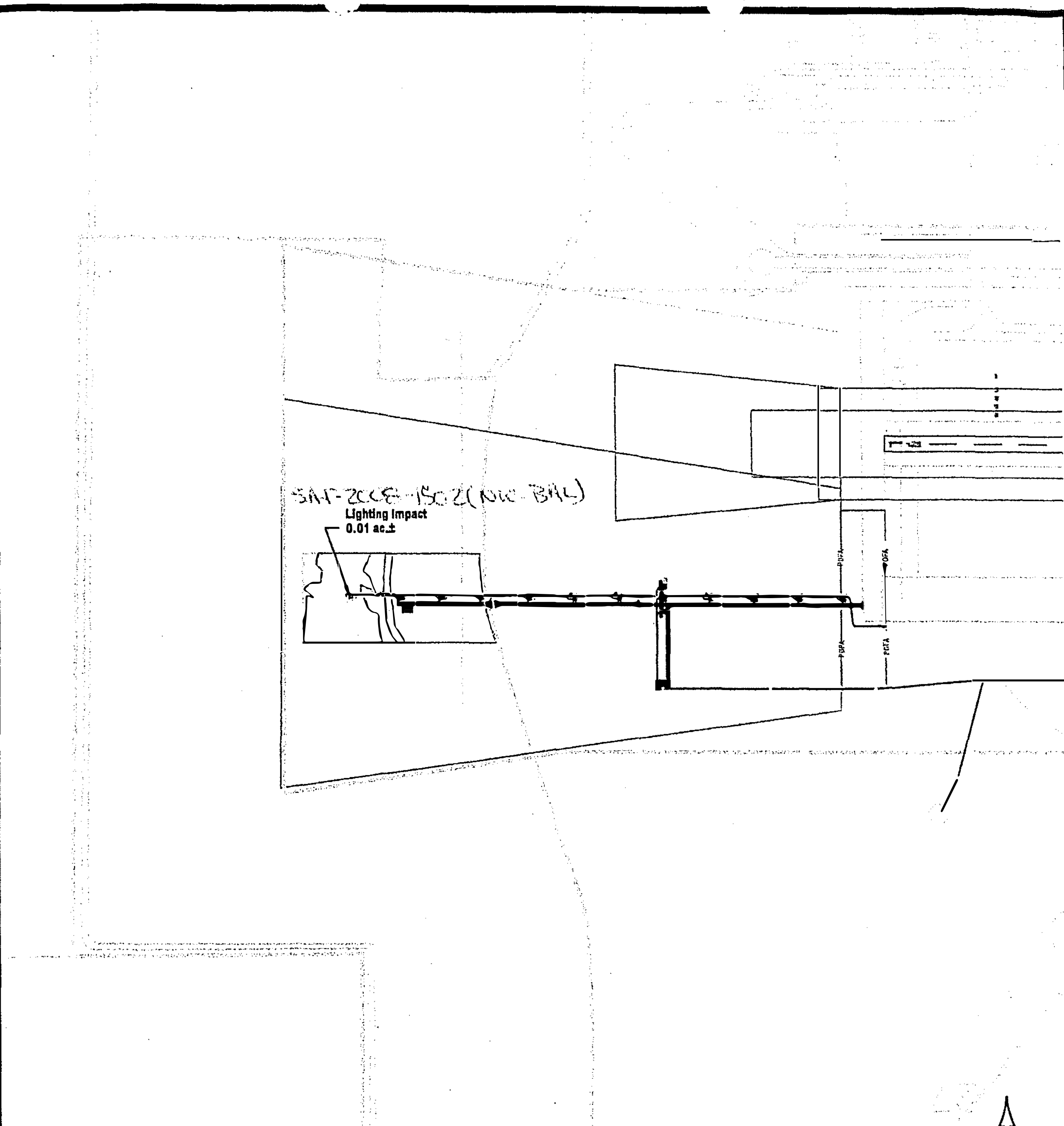
Environmental Resource Solutions Inc. 1597 The Greens Way Suite 200 Jacksonville Beach, FL 32250	Cecil Commerce Center Wetland Impact Map (Sheet D)	Project No.: 08012	
		Date: 1-22-09	Rev.:
	Source:	File: 08012_Impact_1-22-09	By: JK	Exhibit No.: 4D



Scale: 1"=600'

Environmental Resource Solutions Inc. 1597 The Greens Way Suite 200 Jacksonville Beach, FL 32250	**Cecil Commerce Cent** **Wetland Impact Map (Sh**	Project No.: 08012
	Source:	File: 0801

U.S. ARMY CORPS OF ENGINEERS
SAJ-2008-1502(SP-BAL) MOD -1
DATE: 26 JANUARY 2009
DRAWING PAGE: 7 OF 80



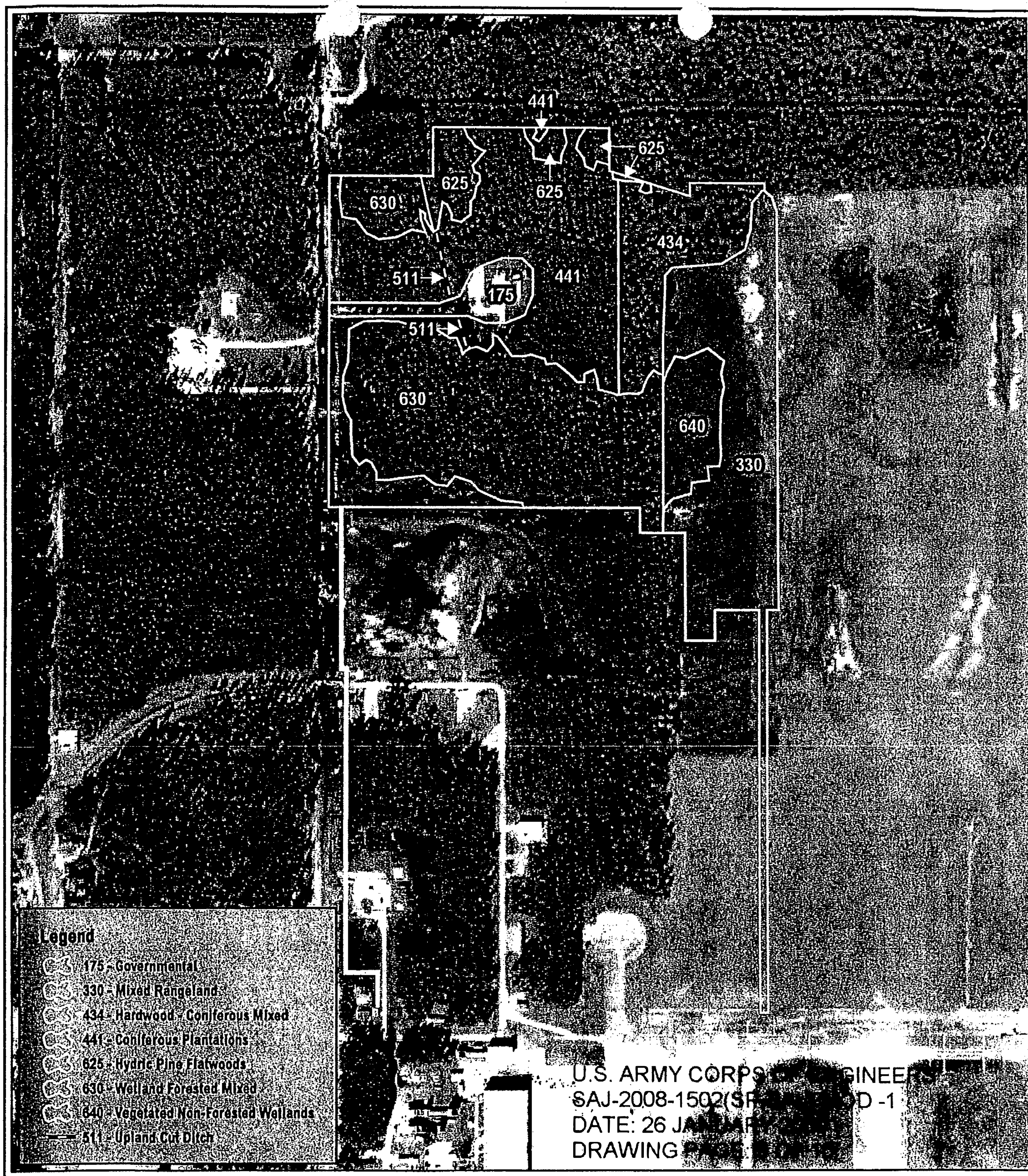
Legend

	Wetland Impacts (Alenia Site)	18.26 ac.±
	Wetland Impact (Taxiway D)	5.05 ac.±
	New Wetland Impacts	134.10 ac.±
	Undisturbed Wetlands	541.75 ac.±

U.S. ARMY CORPS OF ENGINEERS
SAJ-2008-1502(SP-BAL) MOD -1
DATE: 26 JANUARY 2009
DRAWING PAGE: 8 OF 80

Scale: 1"=600'

Environmental Resource Solutions Inc. 1597 The Greens Way Suite 200 Jacksonville Beach, FL 32250	**Cecil Commerce Center** **Wetland Impact Map (Sheet F)**	Project No.: **08012**	
		Date: **1-22-09**	Rev.:
	Source:	File: 08012_Impact_1-22-09	By: **JK** | Exhibit No.: **4F**



FLUCFCS lines and boundaries are approximate and are intended for planning purposes only.

0 500 '

Environmental Resource Solutions Inc.
1597 The Greens Way, Suite 200
Jacksonville Beach, FL 32250

Alenia Site
FLUCFCS Map

Source: SJRWMD (2004)

By: KC

Project No.:	08012
Exhibit No.:	3
Date:	5-27-08
Rev. Date:	12-10-08

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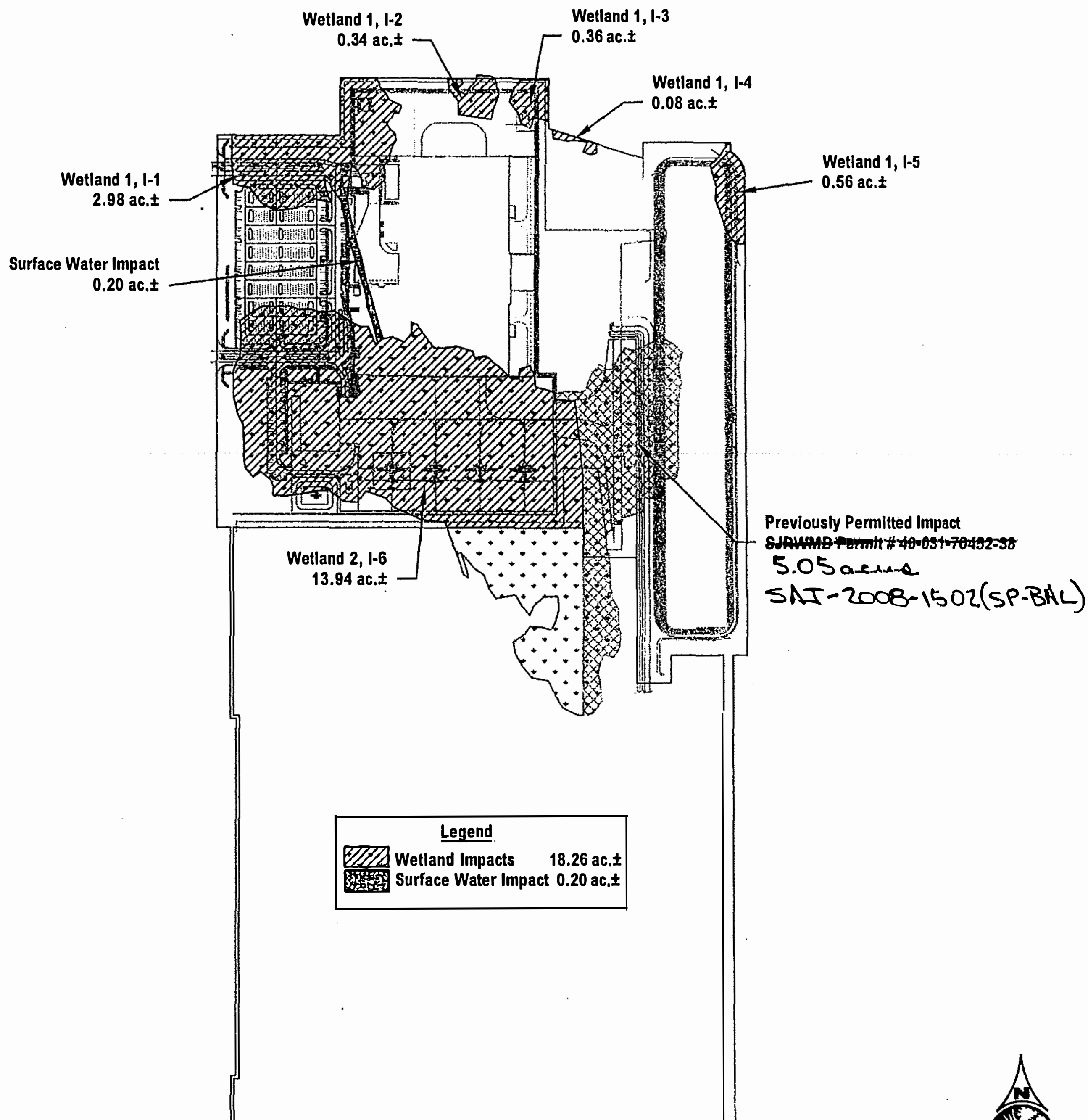
W
E
S



U.S. ARMY CORPS OF ENGINEERS
SAJ-2008-1502(SP-BAL) MOD -1
DATE: 26 JANUARY 2009
DRAWING PAGE: 10 OF 10

Scale: 1"=400'

Environmental Resource Solutions Inc. 1597 The Greens Way Suite 200 Jacksonville Beach, FL 32250	**Alenia Site Wetland Impact Map**	Project No.: **08012**	
		Date: **12-4-08**	Rev.:
	Source: **RS&H** / File: **08012_Impact_12-4-08**	By: **KC**	Exhibit No.: **4**

WETLAND RAPID ASSESSMENT PROCEDURE WRAP
APPLICATION NO. SAJ-2008-1502 (SP-BAL)
Alenia Site
Overall Wetland Assessment

IMPACT AREAS

Polygon No.	Wetland Type	Description	WL	OS	GC	Buffer	HYD	WQ	Calculations	WRAP SCORE	Acreage	Mitigation Debit
1	617	Mixed Wetland Hardwoods (Exterior)	1.50	2.50	2.50	2.00	2.50	2.00	13/18	**0.72**	**1.17**	**0.84**
2	625	Hydric Pine	2.00	2.00	2.00	2.00	2.00	2.00	12/18	**0.67**	**16.64**	**11.15**
4	640	Veg Non-Forested-(Runway) Wetland	1.50	N/A	1.50	1.25	2.00	1.50	7.75/15	**0.52**	**0.45**	**0.23**
										TOTAL	**18.26**	**12.23**

WL - Wildlife Utilization
OS - Overstory (Canopy)
GC - Ground Cover
HYD - Hydrology
WO - Water Quality & Treatment

mitigation

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

MAR 2 3 2004

Regulatory Division
North Permits Branch
Atlantic Permits Section
SAJ-2003-1935(IP-BAL)

Mr. Andy Eckert
Chief, Cecil Commerce Center
220 East Bay Street, Suite 1400
Jacksonville, FL 32202

Dear Mr. Eckert:

Enclosed is a Department of the Army permit for Corps of Engineers tracking number SAJ-2003-1935(IP-BAL). The proposal includes the development of the Cecil Commerce Mitigation Area in the Cecil Commerce Center, Jacksonville, Duval County, Florida.

You may begin work in accordance with the terms and conditions of the issued permit. The Enforcement Section of the Regulatory Division must be notified of:

a. The date of commencement of work,

b. The dates of work suspension and resumption if work is suspended over a week, and

c. The date of final completion.

The Enforcement Branch is responsible for inspections to determine that permit conditions are strictly adhered to. A copy of the permit and drawings must be available at the site of work.

<u>IT IS NOT LAWFUL TO DEVIATE FROM</u>
<u>THE APPROVED PLANS ENCLOSED.</u>

Sincerely,

John R. Hall
Chief, Regulatory Division

Enclosures

Copy Furnished (permit w/plans): Ms. Kim Allerton,
Environmental Resource Solutions, Inc., 1597 The Greens Way,
Suite 200, Jacksonville
Beach, Florida 32250

bcc:(permit w/plans & sof)
CESAJ-RD-E

mitigation

DEPARTMENT OF THE ARMY PERMIT
(COPY)

Permittees: CITY OF JACKSONVILLE (COJ) & JACKSONVILLE AIRPORT AUTHORITY (JAA)

Permit Number: SAJ-2003-1935(IP-BAL)

U.S. Army Engineer District, Jacksonville

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Location: The project is located within the Cecil Commerce Center, more specifically in waters of the United States, including wetlands, associated with Caldwell Branch in all or parts of Sections 26-29 and 32-35, Township 2 South, Range 24 East, and Sections 2-5, 8-11, 16-18, Township 3 South, Range 24 East in western Jacksonville, Duval County, Florida.

Project Description: To perform work for mitigation credit purposes. The work includes the creation of an additional 100 acres of waters of the United States, including wetlands, associated with Caldwell Branch and the discharge of fill material in portions of 1,922-acres of wetlands in the enhancement area at the Cecil Commerce Center Mitigation Area (CCC Mitigation Area). The project will also provide a framework for the establishment and use of the credits that resulted from the increase functions and values of the mitigation area. All work is to be completed in accordance with the attached plans numbered SAJ-2003-1935(IP-BAL) in 7 sheets dated 20 January 2004.

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on **15 SEPTEMBER 2023**. If you find that you need more time to complete the authorized activity, submit your request for a time

extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

SPECIAL CONDITIONS:

1. All reports and submittals that are a requirement of this authorization shall be sent to the U.S. Army Corps of Engineers, Regulatory Division, Enforcement Section, P.O. Box 4970, Jacksonville, Florida 32232-0019 and **shall reference the permit number SAJ-2003-1935(IP-BAL).**

2. Within 60 days of the date of this permit, the JAA permittee shall submit an attorneys' opinion of title that the JAA permittee has the requisite ownership rights to the Cecil Mitigation Management Area (within the JAA portion of the southern section of the Cecil property), shown on page 1 of the attached drawings to ensure that the mitigation easement deeds will be primary to any other interests over the property. The opinion of title shall be submitted to the address in Special Condition 1 above and shall reference the permit number SAJ-2000-1935(IP-BAL).

3. The permittees acknowledges that the mitigation easement will be a formal recorded encumbrance on the land. There will be two types of easements: a mitigation easement for the JAA section which will consist of 1,398.56-acres of land and a conservation easement for COJ section which will consist of 4,483.96 acres. Within 6 months of the start of work for that portion of the proposal, the permittee will record the mitigation/conservation easement for that project. The entire site, approximately 5,882.52 acres, shall be preserved through the establishment of conservation/mitigation easements. The conservation/mitigation easement shall include provisions for the perpetual maintenance and management of the site and the installation of boundary markers and/or structures. Also, it includes activities associated with in the Cecil Field Natural and Recreation Corridor Management Plan (Management Plan). The Management Plan is attached and the activities outlined in this plan will be allowed within the easements. The permittee will prepare each proposed mitigation easement, including a description, and scaled drawings, of the area(s) in question and furnish the same to the Jacksonville District Office of Counsel, C/O the Regulatory Division, Enforcement Section for legal review and approval. Within 30 days of the Corps approval of the proposed easement, the permittee will record the easement in the public records of Duval County, Florida, and a certified copy of the recorded document, will be forwarded to the Regulatory Division of Jacksonville District Office at the address in Special Condition 1 above within 30 days of recordation.

4. The permittees acknowledges that there is the potential for 413.54 available credits once certain activities are completed and determined successful. There are four main components in the release schedule: recording the conservation easement for COJ portion, recording the mitigation easement for JAA portion, enhancing 1,922-acres of wetlands and creating 100 acres of

wetlands. Mitigation credits will be made available based on the following schedule of mitigative steps:

Activity	Mitigation credits released
Record conservation easements for the 4,483.96-acre tract for the City of Jax	185.8
Opinion of Title letter submitted and approved on the 1,398.56-acre tract for JAA	27.95
Record mitigation easement for the 1,398.56-acre tract for JAA	27.95
Successful implementation of the 1,922-acre enhancement area	80.5
Complete tree plantings in the 100-acre creation area	22.82
1 year of monitoring indicating successful establishment in the creation area	13.69
2 years of monitoring indicating successful establishment in the creation area	13.69
3 years of monitoring indicating successful establishment in the creation area	13.69
4 years of monitoring indicating successful establishment in the creation area	13.69
Achievement of final success after 5 years of monitoring which indicates successful establishment in the creation area	13.69
Total	413.54*

* total off by a fraction due to rounding in the conservation easement

The permittees acknowledges that the conservation easement will be recorded in phases and credits released accordingly. Conservation/mitigation credits are based on an equivalent of 0.04 credits per acre. (6,032 acres in the ce w/ 322.27 credits from WRAP) For the COJ conservation easement credits, they will be released as the acres are recorded. The JAA credit release will have two phases; half of them will be released once the Corps approves the attorneys' opinion of title letter and the other half released as the mitigation easement is recorded.

Also, the credit release for the enhancement and creation areas will be recorded in phases as the activities are completed or determined successful.

5. The permittees concedes that they will not impact Corps jurisdictional wetlands until mitigation credits have been released to compensate for the impacts.

6. The permittee shall submit a "working" ledger and status report for review and approval every October. The information should reference permit number SAJ-2003-1935(IP-BAL) and be sent to the address referenced in Special Condition 1 above. The ledger shall include the "actual" number of credits released and debited with corresponding back-up information (if needed) and "proposed" impacts and credit release for the next year's projects. The project status report is a summary of the mitigation work which would include the number of acres recorded in the conservation/mitigation easement, enhancement and creation work that has been started during the past year and as-built drawings. The summary should describe the work and expected results (acres of enhanced and created wetlands).

7. The permittee will enhance the 5,882.52 acres of land of which 1,922 acres are wetlands by implementing the forestry management plan and overall natural recreation and corridor management plan. The permittee will submit an annual report on the forestry management plan. The report will provide a summary and a map of the enhancement areas that were completed during that reporting period.

8. Within 5 years from the authorization of this permit, the permittee shall commence the mitigation work for 100 acres of contiguous wetland creation, which is depicted on the attached drawings dated 20 January 2004. The wetland creation will consist of coniferous hardwood wetlands, per the following:

a. The wetland creation area will be randomly planted, not in rows, to mimic the historic natural conditions of the existing, adjacent wetlands. The trees will be 3-gallon size and will be installed on equivalent 10-foot centers to allow a density of approximately 436 trees per acre. The transitional area or side slopes of the wetland creation areas will be planted with wetland species including (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), sweetbay (*Magnolia Virginiana*), wax myrtle (*Myrica cerifera*) and fetterbush (Lyonia lucida). The floor or the main portion of the creation area will be planted, based on availability, with inundation-tolerant cypress

(*Taxodium distichum*), blackgum (*Nyssa sylvatica var. biflora*), buttonbush (Cephalanyhus occidentalis), and Virginia willow (Itea virginica).

b. The transitional species will be evenly distributed and planted on the creation area side slopes and will include, based on availability, a total of 10,900 trees (25%) as follows: 3,924 red maple (9%), 3,488 sweet bay (8%) and 3,488 sweetgum (8%). The remaining 32,700 trees (75%) will be out of the inundation-tolerant variety and will be planted in clusters on the floor of the wetland creation areas. These trees will include, based on availability, 16,132 blackgum (37%) and 16,568 cypress (38%). In addition to the trees, 43,600 1-gallon shrubs will be installed on 10-foot centers within the creation mitigation areas (436 shrubs/acre). As with the trees, 10,900 (25%) of the shrubs will consisit of transitional species planted on the creation area slopes. These will include 5,450 wax myrtle (12.4%) and 5,450 fetterbush (12.5%)). The remaining 32,700 (75%) shrubs will be installed at the bottom of the mitigation areas and will include 16,350 buttonbush (37.5%) and 16,350 Virginia willow (37.5%). Desirable herbaceous wetland species are expected to proliferate in the wetland creation areas, as the top soil material to be transferred from the impacted wetlands will contain a suitable seed source for these species.

9. The field sampling will be conducted between the months of August to October of each year for 5 years after the initial planting to determine the success of the created wetland. The field sampling shall be conducted as follows:

a. A pedestrian survey will be conducted on 100% of the creation area. The field sampling reports will include the following information:

(1) a count of live stems of survived planted vegetation by species within the enhancement area,

(2) assessment of growth (height) of planted tree species within the enhancement area,

(3) relative health of plantings observed within the enhancement area, indicating any problems such as fungal infection, insect damage, etc.

(4) percentage (aerial coverage) of exotic, undesirable or nuisance species present within each transect,

(5) wildlife utilization (qualitative) observed during a survey of each transect,

(6) recruitment of hydrophytic vegetation observed in each belt transect,

(7) a recordation of additional plant species observed in each of the belt transects that were not present in the previous sample, and

(8) an observation of hydric soil indicators within the upper 6 inches of the substrate, including measurements of any organic detritus accumulation on the soil surface.

b. These reports shall be submitted within 60 days of the completion of the monitoring event. The report shall include the quantitative or qualitative data, narrative description, and one page summary. The one page summary shall highlight any potential problems. Some examples of potential problems are concerns with the hydrological conditions, a decline in wetland species (less than 80% obligate wetland and/or facultative species in each area), an increase in nuisance, undesirable, or invasive species (more than 10% in any transect, poor average growth of woody tree plantings), and any other potential problems that may cause the creation area to fail.

c. Credits will be available for release upon planting of the area, as well as when success criteria are met during annual monitoring, according to the credit-release schedule. The success criteria will be as follows: >80% survivorship of installed tree species, <5% nuisance/exotic species, and a demonstrated mean growth rate of 1 foot per year. The mitigation will be considered successful if at the end of the 5-year monitoring period, the created wetlands have achieved the following results:

(1) Sustained a minimum 80% obligate wetland and/or facultative wetland species as defined by the "1988 List of Vascular Plants occurring in the Southeast Region."

(2) Does not contain more than 10% nuisance, undesirable, or invasive species. Updated lists of invasive species in the state of Florida can be found at the following Internet site: *www.fleppc.org*. Additionally, at a minimum the following will be considered nuisance species: *Sapium sebiferum* (Chinese tallow), *Salix* sp. (Willows) and *Typha* sp. (Cattails),

and *Pinus elliottii* (slash pine) are considered an undesirable species.

(3) Plantings have achieved an 80% survivability rate.

(4) Woody tree plantings have achieved a mean growth rate of approximately 1 foot per year (Denton 1990 reports average growth rate for Cypress in mitigation sites as 1.7 feet per year).

10. If the mitigation efforts within the second year of the creation areas fail to indicate a reasonable degree of success at any time after the initial planting, the permittee shall submit a contingency plan that details corrective actions to be taken within 30 days of notification by the Corps. The restoration success criteria are the same as the forested creation criteria. The Corps reserves the right to fully evaluate, amend, and approve the contingency plan. Within 30 days of Corps approval, the permittee will execute the contingency plan in full.

11. The Corps permit does not authorize you to take an endangered species, in particular the eastern indigo snake. In order to legally take a listed species, you must have separate authorization in the Biological Opinion (BO) under the Endangered Species Act (ESA), section 7, with "incidental take" provisions with which you must comply. The enclosed BO from the U.S. Fish and Wildlife Service (FWS) contains mandatory terms and conditions to implement the reasonable and prudent measures that are associated with "incidental take" that is also specified in the BO. Your authorization under this Corps permit is conditional upon your compliance with all of the mandatory terms and conditions associated with incidental take of the attached BO, which terms and conditions are incorporated by reference in this permit. Failure to comply with the terms and conditions associated with incidental take of the BO, where a take of the listed species occurs, would constitute an unauthorized take, and it would also constitute noncompliance with your Corps permit. However, the FWS is the appropriate authority to determine compliance with the terms and conditions of its BO, and with the ESA. For further clarification on this point, you should contact the FWS. Should the FWS determine that the conditions of the BO have been violated, normally the FWS will enforce the violation of the ESA, or refer the matter to the Department of Justice.

12. The permittee shall conduct a Phase 1 Cultural Resource Survey in accordance with Section 106 of the *National Historic Preservation Act of 1966*, as amended and *36 CFR part 800: Protection of Historic Properties* prior to the start of any construction at the site in Areas 1, 2, 4(8DU14671), 5-7, 9-13, 15, and 16. See the attached letter dated April 30, 2003, and map for details on the locations. A copy of the survey shall be submitted to the Corps in the address referenced in Special Condition 1 of the permit and to the State Historic Preservation Officer, Division of Historic Resources, State Historic Preservation Officer, 500 South Bronough Street, Tallahassee, Florida 32399-0250 for review and approval. The letter transmitting the survey shall reference the Corps permit number, 200301935(IP-BAL) and the SHPO number, 2003-2721. Upon receipt of this survey, the Corps will review and determine any other appropriate action.

13. The permittee shall provide as-built drawings of the mitigation creation work, and a completed As-Built Certification Form. The drawings and Certification Form are to be submitted within 60 days of completion of the authorized work, or at the expiration of the construction authorization of the permit, whichever comes first. The drawings and As-Built Certification Form must be signed and sealed by a professional engineer registered in the State of Florida. The submitted As-Built Certification Form and drawing shall include the following:

a. The Department of the Army permit number on each sheet.

b. A plan view of the overall footprint of the project showing all "earth disturbance", including wetland creation.

c. Clear indication of any deviations, which have been described on the As-Built Certification Form. In the event that the completed work deviates from the approved permit drawings and special conditions, the permittee shall describe, on the Certification Form, the deviations between the work authorized by the permit and the work as constructed. <u>Please note that the depiction and description of the deviations on the drawings and Certification Form does not necessarily mean that the Corps will approve of them.</u>

Further Information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

( ) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).

(X) Section 404 of the Clean Water Act (33 U.S.C. 1344).

( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization:

a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.

b. This permit does not grant any property rights or exclusive privileges.

c. This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal projects.

3. Limits of Federal Liability: In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision: This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (see 4 above).

c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions: General condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittees, indicates that you accept and agree to comply with the terms and conditions of this permit.

_______________________________ 2/24/04
(PERMITTEE - City of Jacksonville)
JOHN PAPPAS
(DATE)

_______________________________ 3/10/04
(PERMITTEE - Jacksonville Airport Authority) JOHN CLARKE
(DATE)

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

_______________________________ 22 March 2004
(DISTRICT ENGINEER)
(DATE)
Robert M. Carpenter
Colonel, U.S. Army

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

_______________________________ _______________________
(TRANSFEREE) (DATE)

____
(NAME-PRINTED)

____
(ADDRESS)

____
(CITY, STATE, AND ZIP CODE)

ATTACHMENTS

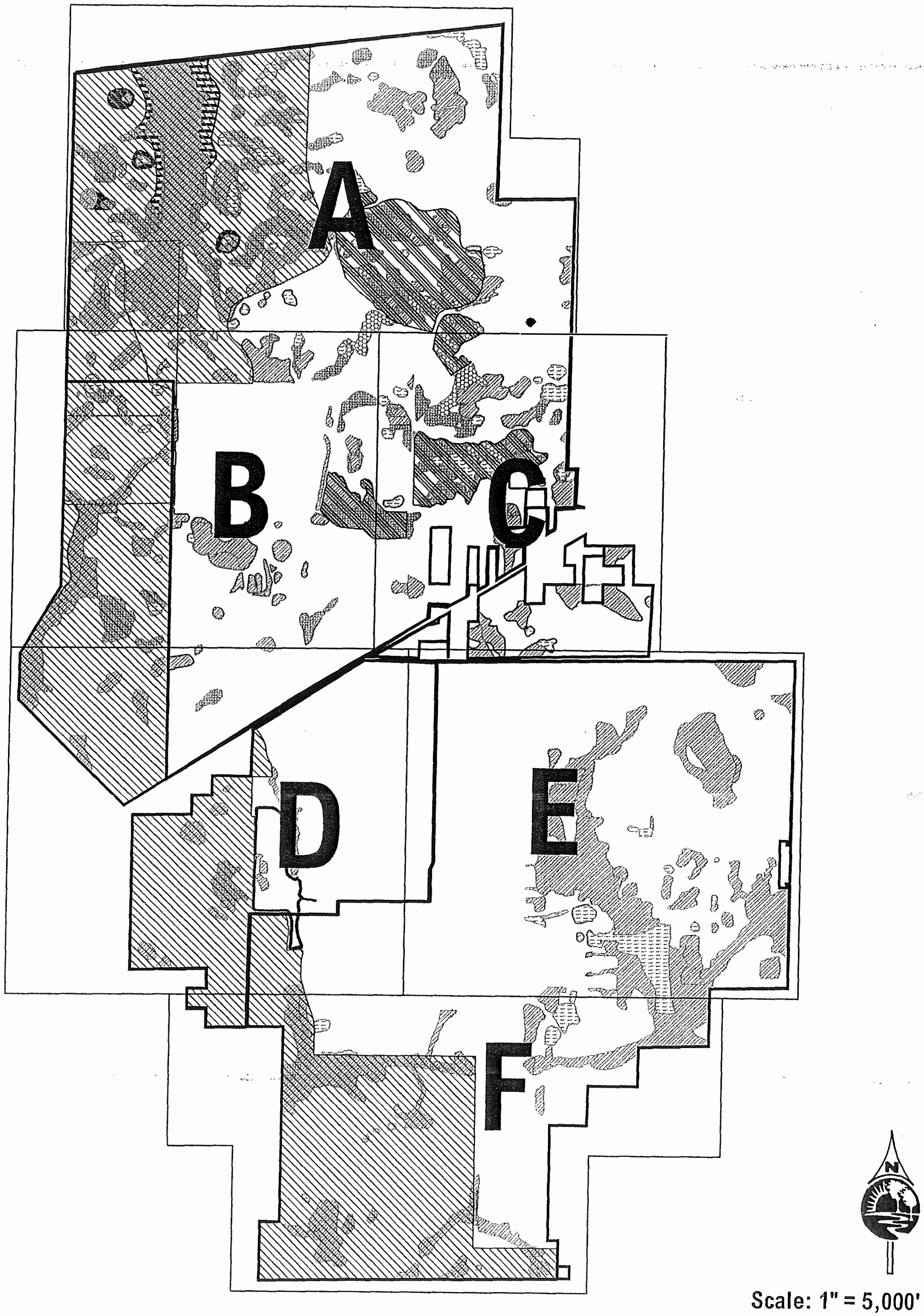
Eleven pages of drawings

Cecil Field Natural and Recreation Corridor Management Plan

Cecil Commerce Center Five-Year Management Goals for the Division of Forestry

U.S. Fish & Wildlife's Biological Opinion for the eastern indigo snake dated May 29, 2002

State Historic Preservation Office's letter dated April 30, 2003, that contains areas of high sensitivity



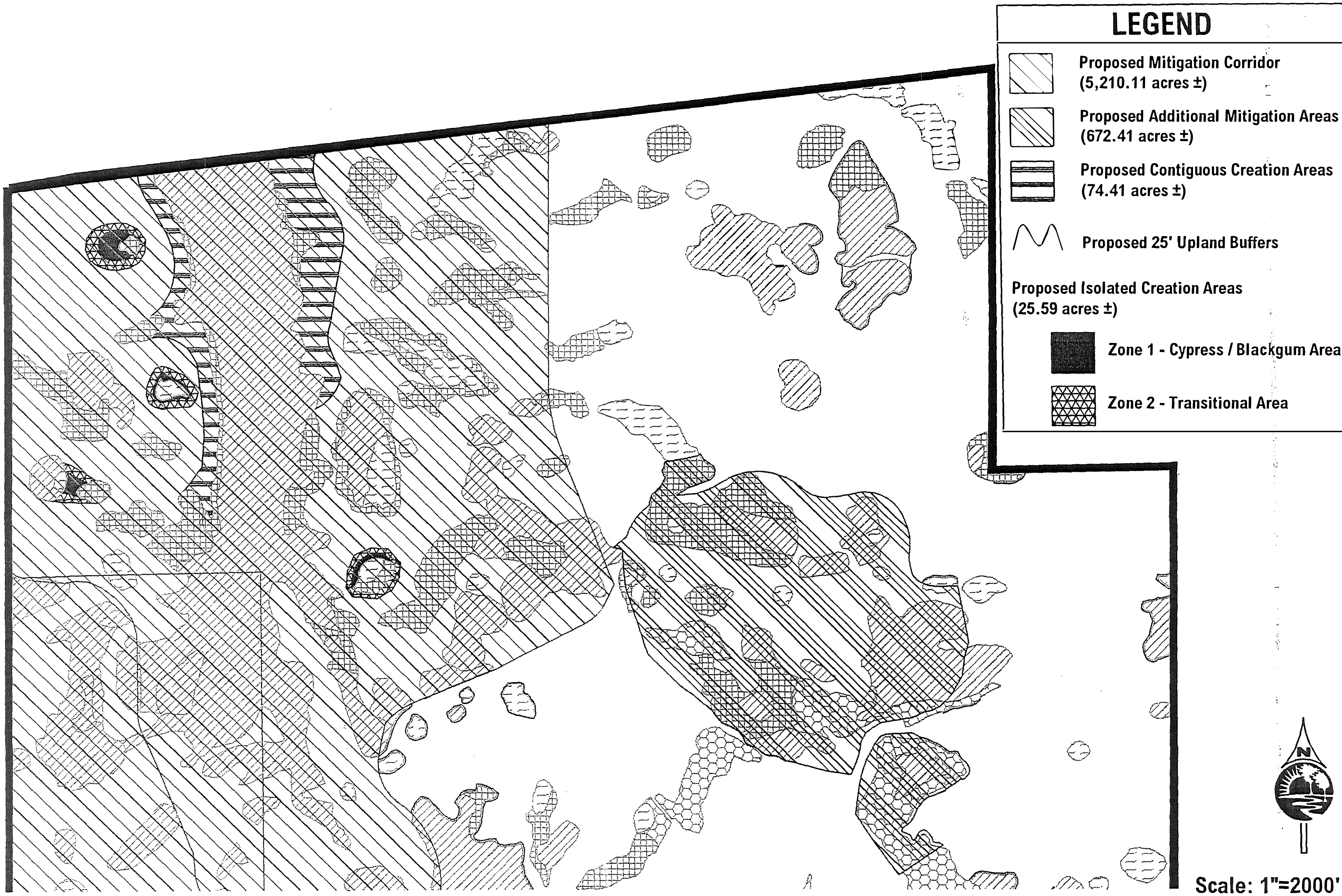
Environmental Resource Solutions Inc.
1597 The Greens Way
Suite 200
Jacksonville Beach, FL 32250

Cecil Commerce Center
Wetland Mitigation Map

Source:

File: 99011 COEMit

U.S ARMY CORPS OF ENGINEERS
PERMIT SAJ-2003-1935(IP-BAL)
DATE... 21 January 2004
DRAWING PAGE 1 OF 11



Environmental Resource Solutions Inc.
1597 The Greens Way
Suite 200
Jacksonville Beach, FL 32250

Cecil Commerce Center
Wetland Mitigation Map

Source:

File: 99011 CO

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PERMIT SAJ-2003-1935(IP-BAL) 4
DATE... 21 January 2004
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PERMIT SAJ-2003-1935(IP-BAL)
DATE... 21 January 2004
DRAWING PAGE 3 OF 11

Environmental Resource Solutions Inc. 1597 The Greens Way Suite 200 Jacksonville Beach, FL 32250	**Cecil Commerce Center Wetland Mitigation Map**	Source:	Project No.: **99011**
			Date: **2-05-02** Rev: **1-20-04**
		File: **99011 COEMitMapR2**	By: **JEM** Exhibit No: **3b**

Environmental Resource Solutions Inc.
1597 The Greens Way
Suite 200
Jacksonville Beach, FL 32250

Cecil Commerce Center
Wetland Mitigation Map

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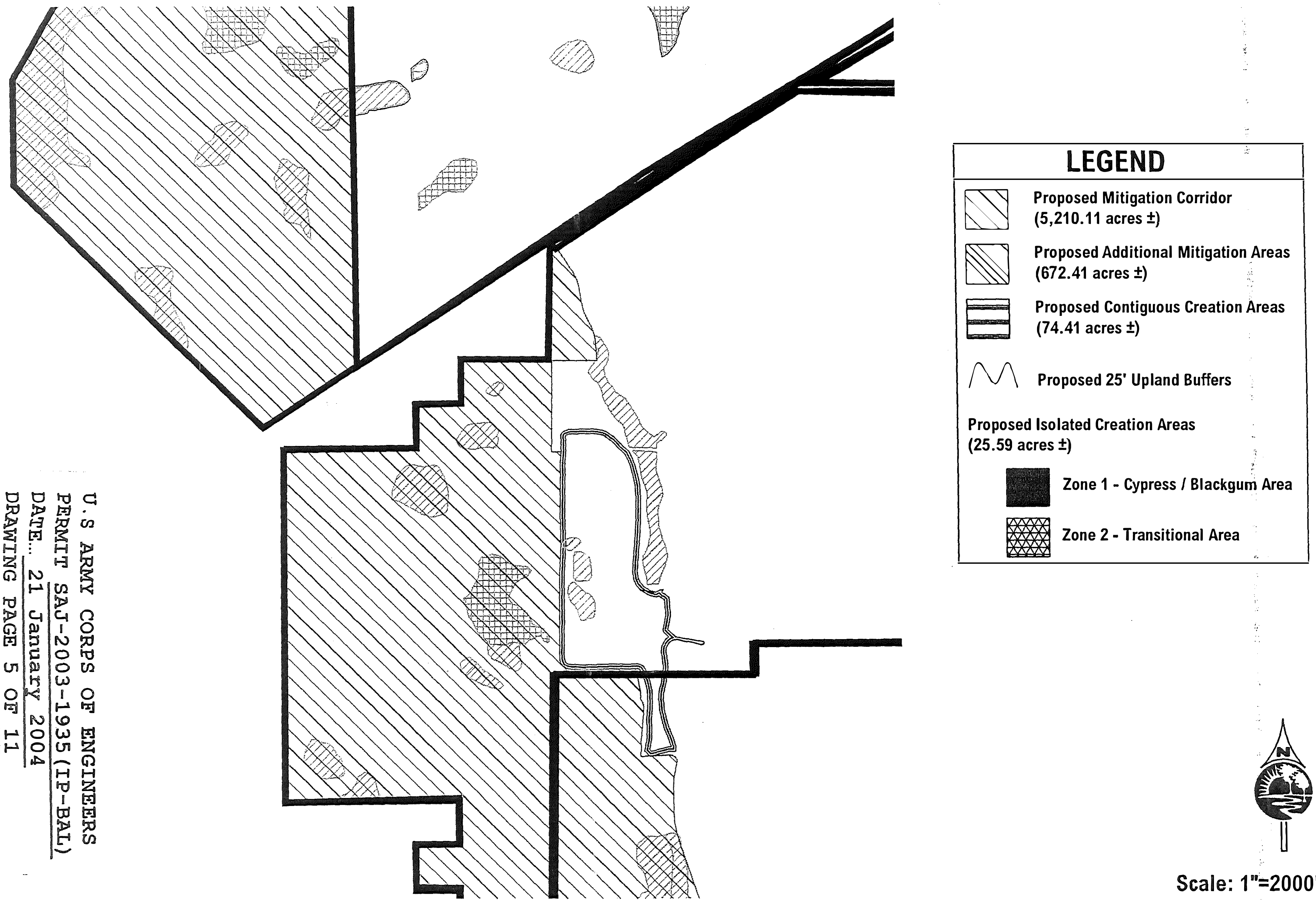
PERMIT SAJ-2003-1935(IP-BAL)
DATE... 21 January 2004
DRAWING PAGE 4 OF 11

99011
Rev: 1-20-04
it No: 3c



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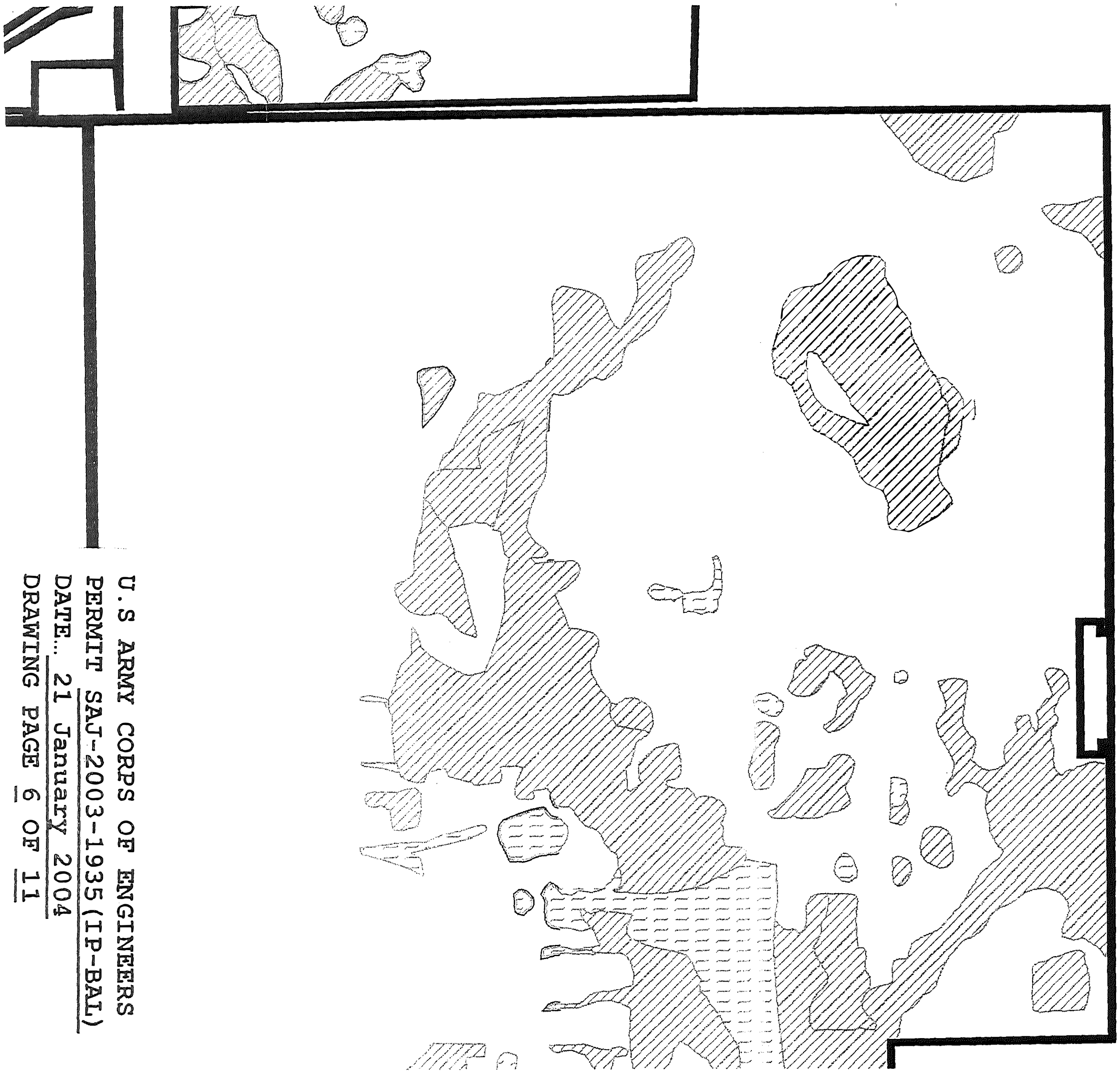
PERMIT SAJ-2003-1935(IP-BAL)
DATE... 21 January 2004
DRAWING PAGE 5 OF 11

Environmental Resource Solutions Inc. 1597 The Greens Way Suite 200 Jacksonville Beach, FL 32250	**Cecil Commerce Center Wetland Mitigation Map**	Source:	Project No.: 99011
			Date: 2-05-02 / Rev: 1-20-04
		File: 99011 COEMitMapR2	By: JEM / Exhibit No: 3d



LEGEND

- Proposed Mitigation Corridor (5,210.11 acres ±)
- Proposed Additional Mitigation Areas (672.41 acres ±)
- Proposed Contiguous Creation Areas (74.41 acres ±)
- Proposed 25' Upland Buffers
- Proposed Isolated Creation Areas (25.59 acres ±)
  - Zone 1 - Cypress / Blackgum Area
  - Zone 2 - Transitional Area

Scale: 1"=2000'

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PERMIT SAJ-2003-1935(IP-BAL)
DATE... 21 January 2004
DRAWING PAGE 6 OF 11

Environmental Resource Solutions Inc.
1597 The Greens Way
Suite 200
Jacksonville Beach, FL 32250

Cecil Commerce Center
Wetland Mitigation Map

Source:	Project No.: 99011
	Date: 2-05-02 — Rev: 1-20-04
File: 99011 COEMitMapR2	By: JEM — Exhibit No: 3e

U.S ARMY CORPS OF ENGINEERS
PERMIT SAJ-2003-1935(IP-BAL)
DATE... 21 January 2004
DRAWING PAGE 7 OF 11

Environmental Resource Solutions Inc. 1597 The Greens Way Suite 200 Jacksonville Beach, FL 32250	**Cecil Commerce Center Wetland Mitigation Map**	Source:	Project No.: 99011	
			Date: 2-05-02	Rev: 1-20-04
		File: 99011 COEMitMapR2	By: JEM	Exhibit No: 3f

Table 3. Cecil Commerce Center. Comparison table, previous and Aug. 2002 values.

Area (Ac)		Polygon	WU					VO					VG					AB					HY					WQ					Sum
		Number	With	W/out	D	TLF	Adj-D	With	W/out	D	TLF	Adj-D	With	W/out	D	TLF	Adj-D	With	W/out	D	TLF	Adj-D	With	W/out	D	TLF	Adj-D	With	W/out	D	TLF	Adj-D	D
	Wet Coniferous (620)																																
238.21	Enhanced/Managed	1a	2.50	2.00	0.17	1.00	0.17	2.50	2.50	0.00	1.00	0.00	3.00	2.50	0.17	1.00	0.17	3.00	2.00	0.33	1.00	0.33	2.50	2.00	0.17	1.00	0.17						39.70
		Before	2.00	2.00	0.00	1.00	0.00	2.50	2.50	0.00	1.00	0.00	3.00	2.50	0.17	1.00	0.17	3.00	2.00	0.33	1.00	0.33	2.00	2.00	0.00	1.00	0.00						
[illegible]	[illegible]	Difference	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Wet Coniferous Logged (620A)																																
234.11	Enhanced/Managed	2a	3.00	1.00	0.67	1.00	0.67	2.50	0.00	0.83	1.00	0.83	3.00	0.00	1.00	1.00	1.00	3.00	1.75	0.42	1.00	0.42	2.50	2.00	0.17	1.00	0.17						144.37
		Before	2.50	1.00	0.50	1.00	0.50	2.50	0.00	0.83	1.00	0.83	3.00	0.00	1.00	1.00	1.00	3.00	1.75	0.42	1.00	0.42	2.50	2.00	0.17	1.00	0.17						
[illegible]	[illegible]	Difference	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Wetland Forested Mixed (630)																																
1198.05	Enhanced/Managed	4a	3.00	3.00	0.00	1.00	0.00	3.00	3.00	0.00	1.00	0.00	3.00	3.00	0.00	1.00	0.00	3.00	2.50	0.17	1.00	0.17	2.50	2.00	0.17	1.00	0.17	2.50	2.25	0.08	1.00	0.08	83.20
		Before	3.00	3.00	0.00	1.00	0.00	3.00	3.00	0.00	1.00	0.00	3.00	3.00	0.00	1.00	0.00	3.00	2.50	0.17	1.00	0.17	2.00	2.00	0.00	1.00	0.00	2.50	2.25	0.08	1.00	0.08	
[illegible]	[illegible]	Difference	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Wetland Forested Mixed Logged (630A)																																
62.10	Enhanced/Managed	5a	3.00	2.50	0.17	1.00	0.17	3.00	2.50	0.17	1.00	0.17	3.00	1.50	0.50	1.00	0.50	3.00	1.50	0.50	1.00	0.50	2.50	2.00	0.17	1.00	0.17	2.50	2.50	0.00	1.00	0.00	15.53
		Before	3.00	2.50	0.17	1.00	0.17	3.00	2.50	0.17	1.00	0.17	3.00	1.50	0.50	1.00	0.50	3.00	1.50	0.50	1.00	0.50	2.00	2.00	0.00	1.00	0.00	2.50	2.50	0.00	1.00	0.00	
[illegible]	[illegible]	Difference	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Wetland Forested Mixed Burned (630B)																																
75.58	Enhanced/Managed	6a	3.00	2.50	0.17	1.00	0.17	3.00	1.00	0.67	1.00	0.67	3.00	1.50	0.50	1.00	0.50	3.00	1.50	0.50	1.00	0.50	2.50	2.50	0.00	1.00	0.00	2.50	2.50	0.00	1.00	0.00	23.09
		Before	2.50	2.50	0.00	1.00	0.00	3.00	1.00	0.67	1.00	0.67	3.00	1.50	0.50	1.00	0.50	1.50	1.50	0.00	1.00	0.00	2.50	2.50	0.00	1.00	0.00	2.00	2.50	-0.17	1.00	-0.17	
[illegible]	[illegible]	Difference	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Wetland Forested Mixed Disturbed (630C)																																
3.12	Enhanced/Managed	7a	3.00	2.00	0.33	1.00	0.33	2.50	2.00	0.17	1.00	0.17	3.00	1.50	0.50	1.00	0.50	3.00	2.00	0.33	1.00	0.33	2.50	1.00	0.50	1.00	0.50	2.50	1.75	0.25	1.00	0.25	1.08
		Before	2.00	2.00	0.00	1.00	0.00	2.50	2.00	0.17	1.00	0.17	2.50	1.50	0.33	1.00	0.33	2.00	2.00	0.00	1.00	0.00	2.00	1.00	0.33	1.00	0.33	2.00	1.75	0.08	1.00	0.08	
[illegible]	[illegible]	Difference	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Wet Scrub Shrub (640)																																
108.08	Enhanced/Managed	8a	3.00	2.50	0.17	1.00	0.17						3.00	3.00	0.00	1.00	0.00	3.00	3.00	0.00	1.00	0.00	2.50	2.00	0.17	1.00	0.17	2.50	1.40	0.37	1.00	0.37	15.13
		Before	2.50	2.50	0.00	1.00	0.00						3.00	3.00	0.00	1.00	0.00	3.00	3.00	0.00	1.00	0.00	2.00	2.00	0.00	1.00	0.00	2.00	1.40	0.20	1.00	0.20	
[illegible]	[illegible]	Difference	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Shrub Marsh (641)																																
2.58	Enhanced/Managed	9a	3.00	2.50	0.17	1.00	0.17						3.00	2.50	0.17	1.00	0.17	3.00	3.00	0.00	1.00	0.00	2.50	2.50	0.00	1.00	0.00	2.50	2.50	0.00	1.00	0.00	0.17
		Before	2.50	2.50	0.00	1.00	0.00						2.50	2.50	0.00	1.00	0.00	3.00	3.00	0.00	1.00	0.00	2.50	2.50	0.00	1.00	0.00	2.50	2.50	0.00	1.00	0.00	
[illegible]	[illegible]	Difference	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Wetland Creation (630/617)																																
100.00	Creation	10	3.00	0.00	1.00	0.7655	0.77	3.00	0.00	1.00	0.7105	0.71	3.00	0.00	1.00	1.00	1.00	3.00	0.00	1.00	1.00	1.00	3.00	0.00	1.00	1.00	1.00	3.00	0.00	1.00	1.00	1.00	91.27
1921.84		Before	3.00	0.00	1.00	0.7655	0.77	3.00	0.00	1.00	0.7105	0.71	3.00	0.00	1.00	1.00	1.00	3.00	0.00	1.00	1.00	1.00	3.00	0.00	1.00	1.00	1.00	3.00	0.00	0.50	1.00	0.50	
[illegible]	[illegible]	Difference	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
																														Total Credits			413.54

NOTES:

With = "with project" raw WRAP score
W/out = "without project" raw WRAP score
d = Delta. Difference in averaged WRAP score (raw with project score/3)-(raw without project score/3)
Adj-D = Adjusted Delta. Appropriate W-Factor and/or T-Factor applied to difference in averaged WRAP score
Sum Adj-D = sum of Adj-D variables for each polygon * acreage of polygon
TLF for Creation: WU (T3-4, YF21), VO (T5-4, YF-28)

Note: These values were revised per a meeting with Ross Hellman and Kim Allerton of ERS, and Bev Lawrence of COE, on Aug. 28, 2002.
Only wetlands were to be included. It was also discussed that WQ might possibly increase with the Plan.
So, some WQ values were increased from 2.0 to 2.5's.
For Wetland Creation, Bev thought that 3's were too high for WU and VO, but I asserted that the TLF already discounted their values.

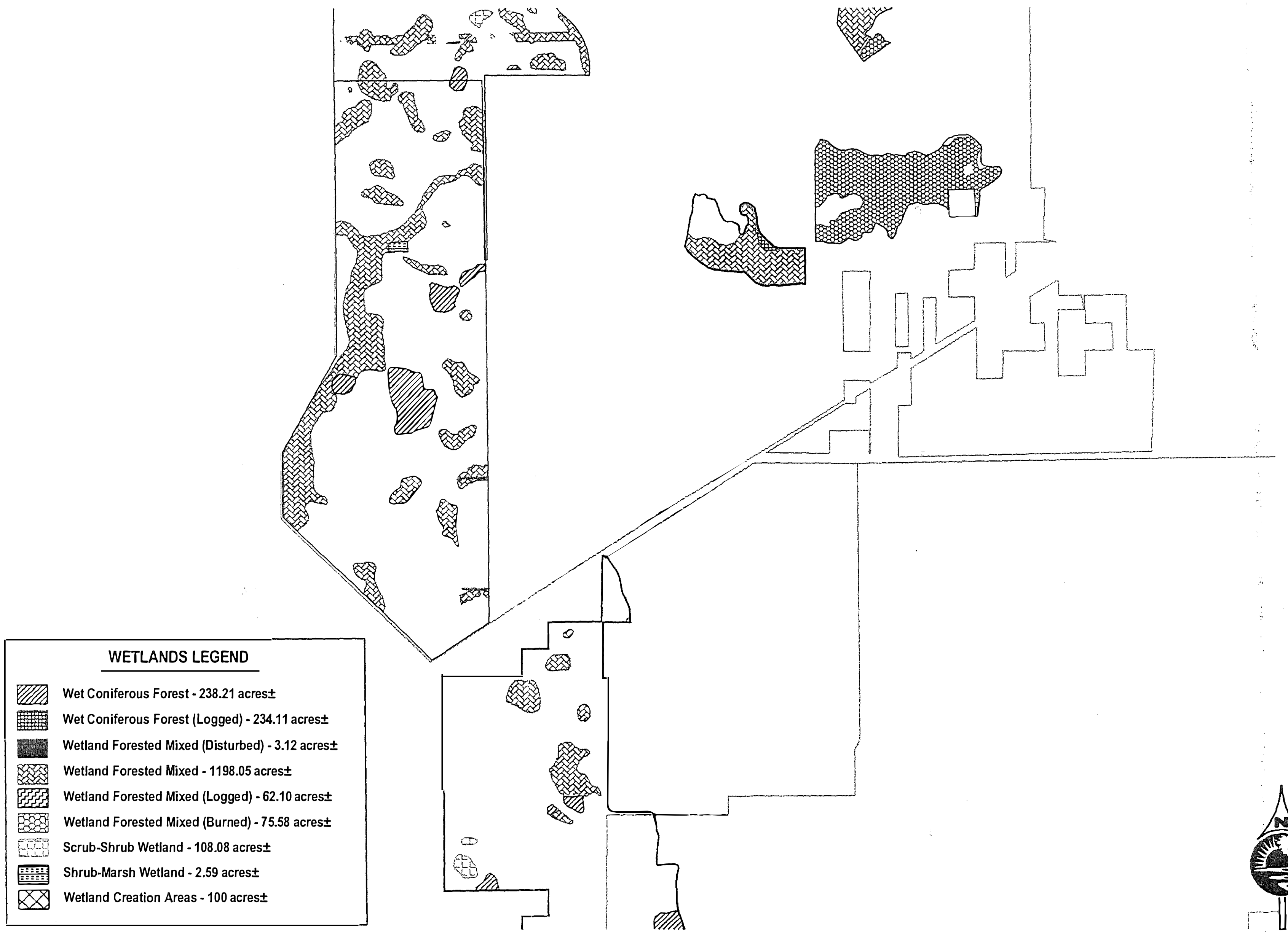
U.S ARMY CORPS OF ENGINEERS
PERMIT SAJ-2003-1935(IP-BAL)
DATE... 21 January 2004
DRAWING PAGE 8 OF 11

U.S ARMY CORPS OF ENGINEERS
PERMIT SAJ-2003-1935 (IP-BAL)
DATE... 21 January 2004
DRAWING PAGE 9 OF 11

Environmental Resource Solutions Inc.
1597 The Greens Way
Suite 200
Jacksonville Beach, FL 32250

Cecil Commerce Center
COE WRAP Map

Source:	Project No.: 02302	
	Date: 1-6-03	Rev: 9-25-03
File: 02302 WRAP-mitonly2	By: JK	Exhibit No: 3a



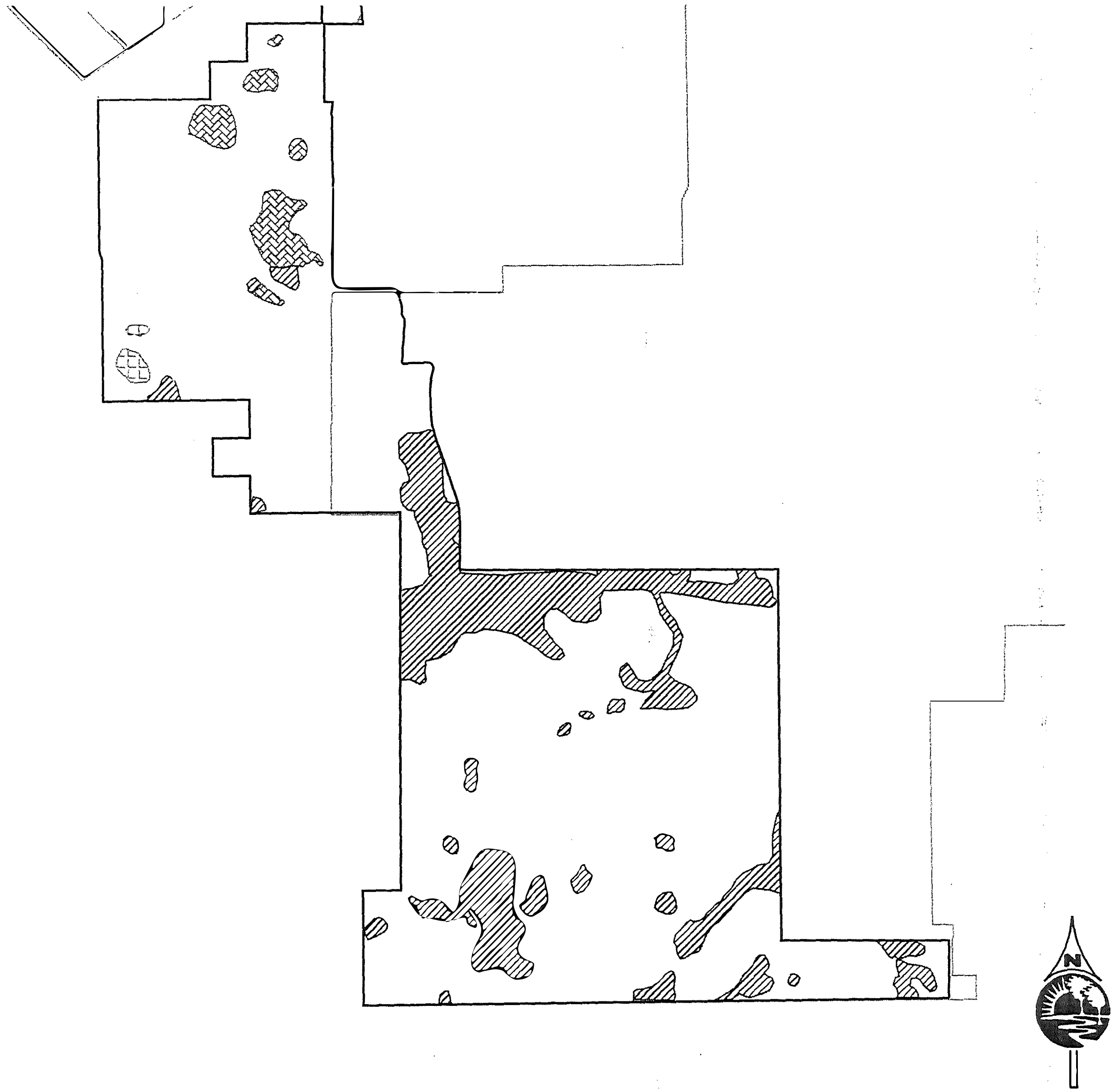
U.S ARMY CORPS OF ENGINEERS
PERMIT SAJ-2003-1935(IP-BAL)
DATE... 21 January 2004
DRAWING PAGE 10 OF 11

Scale: 1"=3000'

Environmental Resource Solutions Inc. 1597 The Greens Way Suite 200 Jacksonville Beach, FL 32250	**Cecil Commerce Center** **COE WRAP Map**	Source:	Project No.: **02302**	
			Date: **1-6-03**	Rev: **9-25-03**
		File: **02302 WRAP-mitonly2**	By: **JK**	Exhibit No: **3b**

WETLANDS LEGEND

- Wet Coniferous Forest - 238.21 acres±
- Wet Coniferous Forest (Logged) - 234.11 acres±
- Wetland Forested Mixed (Disturbed) - 3.12 acres±
- Wetland Forested Mixed - 1198.05 acres±
- Wetland Forested Mixed (Logged) - 62.10 acres±
- Wetland Forested Mixed (Burned) - 75.58 acres±
- Scrub-Shrub Wetland - 108.08 acres±
- Shrub-Marsh Wetland - 2.59 acres±
- Wetland Creation Areas - 100 acres±



U.S ARMY CORPS OF ENGINEERS
PERMIT SAJ-2003-1935(IP-BAL)
DATE... 21 January 2004
DRAWING PAGE 11 OF 11

Scale: 1"=3000'

Environmental Resource Solutions Inc.
1597 The Greens Way
Suite 200
Jacksonville Beach, FL 32250

Cecil Commerce Center
COE WRAP Map

Source:	Project No.: 02302
	Date: 1-6-03 / Rev: 9-25-03
File: 02302 WRAPmitonly2	By: JK / Exhibit No: 3c

Appendix C:

Cecil Field
Natural and Recreation Corridor
Management Plan

For:
Jacksonville Economic Development Commission
And
The Jacksonville Airport Authority

Prepared by:
Environmental Resource Solutions, Inc.

28 March 2000
(revised June 2000, March 2001, July 2001, September 2001, December 2002)

TABLE OF CONTENTS

1.0 INTRODUCTION

The Cecil Field Natural and Recreation Corridor (Corridor) encompasses approximately 5,261.86 acres of land 14 miles west of downtown Jacksonville in Duval County, Florida. It is located along the western boundary of the Naval Air Station (NAS) Cecil Field, a former United States Navy base which was formally established in 1952. The area within the Corridor historically contained active and passive recreation facilities, including hunting areas and fishing/swimming ponds, and large areas of undeveloped land. Prior to the establishment of the U.S. Navy base, this area was largely undeveloped or used (in parts) for agriculture and silviculture.

In 1993, the Defense Base Closure and Realignment Commission (in conjunction with the Congress and President of the United States of America) chose to close NAS Cecil Field to military operations. The base was formally closed in 1993. In response to the base closure, the Mayor of Jacksonville, by Executive Order, established the Cecil Field Development Commission, which over time became the Jacksonville Economic Development Commission. The Commission is charged with coordinating the conversion of Cecil Field from military use to commercial use and developing options for the development and reuse of Cecil Field. It is the decision of the Commission, in coordination with the Jacksonville Airport Authority (JAA), the United States Fish and Wildlife Service (FWS), the Florida Fish and Wildlife Conservation Commission (FWC) and the Florida Department of Agriculture and Consumer Services, Division of Forestry (DOF), that the Corridor be preserved in perpetuity with a recorded conservation easement.

The corridor includes lands suitable for long-term conservation, such as streams, wetlands, floodplains, and upland habitat for species considered threatened, endangered and of special concern. Upland vegetative communities within the Corridor include pine flatwoods, longleaf pine-xeric oak, shrub and brushlands, transitional hardwoods and disturbed/developed areas. Wetland vegetative communities include wetland pine forests, cypress swamps, bottomland swamps, bay swamps, pine-hardwood mixed forests, vegetated wetlands, freshwater marshes and disturbed wetland areas.

The U.S. Navy currently owns approximately 167 acres of land within the Corridor. Approximately 80 of the 167 acres are currently undergoing remediation activities due to contamination from military activities. The 167 acres will be incorporated in the Corridor after the remediation activities are completed and the U.S. Navy releases them to the City of Jacksonville (COJ). This is estimated to occur in the fall of 2001. It is expected that contamination will be remediated to a level conducive for the expected future passive recreational land use of this area. The Navy's contamination remediation activities must coordinate with this management plan. The management practices identified in this plan will be adjusted when necessary to accommodate changes in the remediation plan. The adjustments will be consistent with the plans goals to the greatest extent possible.

2.0 PURPOSE

The purposes of the Corridor, as managed through a coordinated effort by Federal, State and City agencies, are as follows:

- To properly take advantage of the unique opportunity presented by the preservation of a large parcel of land in a rapidly developing area of Florida through careful stewardship;
- To protect, restore, enhance and conserve the significant natural resources on-site including abundant wetlands and extensive, relatively undisturbed upland forest;
- To establish a natural wildlife area which will be part of the large-scale (35-mile-long) wildlife corridor extending from Interstate-10 (through the Corridor) to Jennings State Forest and Camp Blanding;
- To establish a passive resource-based public recreation area with uses including hiking and horseback riding trails, camping, limited hunting, fishing and environmental education (managed in part by the COJ Department of Parks, Recreation and Entertainment);
- To provide limited revenues through sound forestry management by the DOF integrated with the nearby Cary and adjacent Jennings State Forests; and
- To serve as environmental mitigation for proposed new- and mid-term impacts to jurisdictional wetland areas at NAS Cecil Field.

The location of the Corridor, coupled with the demand for recreation and preservation of land in Duval County, make this an ideal project. This Corridor project combines and implements policies within both to the Conservation/Coastal Management element (CCM) and the Recreation and Open Space element (ROS) of the Duval County Comprehensive Plan.

This management plan for the Cecil Field Natural and Recreation Corridor is designed to address the following:

a. Preservation, restoration and enhancement of natural resources
b. Protection of native vegetation and wildlife habitat
c. Preservation of wetland and watershed areas
d. Creation of wetland areas
e. Provision of limited forestry revenues through sound forestry management and the application of Best Management Practices
f. Provision of passive recreational activities for the public
g. Provision of environmental education

Although the conceptual nature of this Management Plan prevents the enclosure of a detailed facility plan, physical facilities will be limited to an outdoor pavilion (to be used for educational programs), pervious entrance and access roads (which will be situated on existing logging roads), a primitive campground area with waterless restrooms, and informational kiosks/signage. Passive resource based recreational activities such as hiking and nature trails, interpretive displays, picnicking, and limited hunting and fishing will also be provided. Areas that are currently disturbed could be enhanced by installing new vegetation, or used as locations for nature trails, picnic areas and support facilities. Many wetland areas which have been impacted historically through natural means such as fire, or human intervention such as logging or road/trail creation, will be restored and/or enhanced via restoration of natural hydrologic regimes, installation of new vegetation, or a combination of both.

The property will be managed for the conservation, protection and enhancement of natural resources. Outdoor recreation will be managed to be compatible with the goals of the management plan. Printed literature, advertising and/or signs will identify the Corridor as being publicly owned and operated as a natural resource conservation area, and a public outdoor recreation site providing passive activities.

3.0 NATURAL RESOURCES

The Natural and Recreation Corridor will be protected and managed as part of a 35-mile long wildlife corridor from Interstate 10, Jennings State Forest, Brannan Field Mitigation Park and Camp Blanding. The primary purposes for preserving the Corridor are to protect, restore, enhance and conserve the significant on-site natural resources including abundant wetlands and extensive, relatively undisturbed upland forest. Secondarily, the Corridor will provide much needed additional passive recreational acreage and activities, and provide additional and enhanced public access to the undisturbed natural areas of Florida, which are rapidly disappearing. Proposed activities within the Corridor include passive resource-based public recreation such as hiking and horseback riding, camping, hunting, fishing and environmental education (managed in part by the COJ Department of Parks, Recreation and Entertainment).

The City of Jacksonville, in cooperation with DOF, FWC and JAA, will ensure that the Corridor is managed in a manner that will protect native wildlife species and their habitat. Resource protection is based on the development and maintenance of up-to-date information from which sound management goals and strategies are established. Listed species will be protected by virtue of 1) public ownership of the project site; 2) enhancement, where feasible, of natural habitat via restoration and enhancement of existing and historic vegetative communities; and 3) prohibiting private development within the Corridor. Historically, a majority of the Corridor was managed primarily for silvicultural operations. The creation of this Corridor and the consequent management and public ownership of the Corridor will be more conducive to management for natural resource protection.

Native vegetative communities that occur on the site will be preserved and appropriately managed to ensure long-term viability. Baseline information has been culled from a variety of sources including, but not limited to, available historical data from the area, the Environmental Impact Statement (EIS) written in 1998, current and historical forest surveys and transects, and infrared and true-color aerial photography. This information has already been used to create an overall picture and current estimate of the health and composition of the natural communities within the Corridor.

The vegetative communities within the Corridor have been classified using the Florida Land Use Cover and Forms Classification System (FLUCFCS). They include the following: pine flatwoods (411), coniferous plantation (441), pine flatwood logged/fire impacted (441LI), longleaf pine-xeric oak (412), shrub and brushland (320), wetland coniferous forest (620), wetland coniferous forest logged (620L), cypress swamp (621), bottomland swamp (615), bay swamp (611), wetland forested mixed (630), wetland forested mixed logged (630L), wetland forested mixed burned (630B), wetland forested mixed disturbed (630D), vegetated non-forested wetlands (640), and freshwater marsh (641). Appendix C1 describes in detail the species typically found in these communities within the Corridor.

4.0 WILDLIFE MANAGEMENT

The Corridor will be managed in a manner that will protect wildlife species and their habitat through coordination with FWC. Several areas of habitat that support federal and state-listed endangered and/or threatened species exist within the Corridor. The EIS prepared by the U.S. Navy in October 1998 identifies habitat for the gopher tortoise (*Gopherus polyphemus*), eastern indigo snake (*Drymarchon corais couperi*), Florida pine snake (*Pituophis melanoleucus mugitus*), Florida gopher frog (*Rana capito aesopus*), flatwoods salamander (*Ambystoma cingulatum*), wood stork (*Mycteria americana*), Bachman's sparrow (*Aimophila aestivalis*), southeastern American kestrel (*Falco sparverius paulus*), Sherman's fox squirrel (*Sciurus niger shermani*), water sundew (*Drosera intermedia*) and the variable-leaf crownbeard (*Verbesina heterophylla*). Although habitat exists for these species, the only animals visually identified during the EIS site surveys were the gopher tortoise and Sherman's fox squirrel. Listed species identification will be a continuous process as part of the overall management plan. All listed species information will be coordinated with FWC and subsequently forwarded to the Florida Natural Areas Inventory for their records.

Passive recreation design plans will be submitted to FWS and FWC for review and comment to ensure the preservation and viability of listed and non-listed native wildlife species and their habitats. Revisions suggested by these agencies will be integrated into facility and trail design where possible. Follow-up contact will be maintained to ensure up-to-date regulations and design guidance specifications are available throughout the project development.

Any current impacts to listed species or sensitive habitat areas will be identified and corrective actions including restoration work will be undertaken. Limiting direct public access to designated trails will contribute to the preservation of the existing habitats and species. Such limited access will also contribute to the restoration of impacted sites by allowing the areas to naturally revegetate. Listed species and their habitats will be avoided during design and installation of trails and facilities. The trail system will not create new impacts to wetlands or wading bird habitats. Further restoration work to listed species habitat could include, but may not be limited to, the following: prescribed burning, installing native vegetation, hand-clearing of underbrush areas, removal of exotic or nuisance species, and the use of adequate signage to reduce human impact to these areas.

The creation of the Corridor will provide a natural greenway connection between Jennings State Forest and Brannan Field Mitigation Park to the south and Cary State Forest to the north of the property. The large size of the Corridor, approximately 5,330 acres, will allow for large areas of suitable habitat for all wildlife in the area, including listed species habitat that will be preserved and/or restored. Implementation of a forestry management plan will maintain and enhance the presence of suitable habitat for the gopher tortoise, Florida pine snake, Florida gopher frog, eastern indigo snake, Sherman's fox squirrel and Bachman's sparrow through selective harvesting and prescribed burning. The use of prescribed burning around certain cypress wetlands could increase the potential breeding habitat for the flatwoods salamander by increasing the growth of wiregrass species.

The Corridor has the potential to be designated a Wildlife Management Area. If designated, FWC will have greater regulatory authority within the Corridor to control recreation, such as hunting only during certain seasons and certain times of the day, restrictions on size and numbers of wildlife taken, and restrictions on vehicular use.

5.0 RESOURCE RESTORATION, ENHANCEMENT, AND WETLAND CREATION

The transfer of the site into public ownership, with uses limited to passive recreation and recreation only in currently impacted and specifically designated areas, will ensure that additional impacts generally associated with development and unrestricted public use do not occur. This, in turn, will allow a natural regeneration of some areas and is expected to provide an increase in water quality.

Current resource restoration strategies include but are not limited to the following activities:

- Hydrologic enhancement of wetlands via stopping ditches where possible or redirection of treated runoff into wetland areas;
- Creation of 100± acres of diverse contiguous and isolated wetland areas;
- Removal of unused forest roads in wetlands and allowing these areas to naturally revegetate;
- Replanting negatively impacted areas with native vegetation;
- Retain, protect and enhance wildlife utilization;
- Reforesting clearcut areas by hand planting, machine planting and/or direct seeding;
- Removal of bedding rows in poor quality areas or allowing bedded areas to return to a natural state;
- Uneven-age stand development in potential forested areas;
- Prescribed burning where the potential exists to improve wildlife and vegetative habitat as described in the Division of Forestry Forest Management Plan; and
- Removal of nuisance or exotic species where possible and establish exotic species control plans where applicable.

Resource enhancement at this site will consist primarily of improvement of the native vegetative and wildlife communities. Native plant communities will be protected, preserved, and appropriately managed to ensure their long-term viability. Based on baseline information, limited habitat restoration may be undertaken. However, because the site is largely undeveloped, it is not expected that any large areas will require restorative efforts. Areas that have been previously cleared and/or disturbed, but are suitable for revegetation, will be identified. Management of these areas will include vegetative restoration, as well as prescribed burning, with the exception of the wetland creation areas. Future vegetation surveys will be conducted on the site on a regular basis to observe and estimate the results of the restoration efforts. Results from these surveys will allow the coordinating agencies to correct and modify plans accordingly.

Comparison of future vegetation surveys to baseline information will allow for the identification of any exotic plant species invasion. Where feasible, exotic or nuisance species found on the project site will be removed by appropriate means such as hand clearing or chemical treatment using a chemical herbicide that is deemed safe to use in such a location and approved by the Florida Department of Agriculture and Consumer Services. An ongoing monitoring and control program for invasive vegetation, including exotic and nuisance native plant species (referenced by the Exotic Pest Plant Council's List of Florida's Most Invasive Species), shall be developed and implemented. The goal of this program is the reduction of invasive exotic plant species and the maintenance of native vegetation diversity.

Duval County will monitor hydrology and stormwater quality at the project site on an annual basis as part of the County's existing stormwater management program. With little or no additional previous impervious surface area, there will be only minor stormwater improvements. Off-site runoff entering the Corridor will be treated in accordance with COE criteria to address water quality standards and thus protect the integrity of the receiving waters. Whenever possible, amenities will be constructed of natural materials.

6.0 FORESTRY MANAGEMENT

Forest resources within the Corridor will be managed in accordance with the Forestry Management Plan created and implemented by DOF. This plan is similar in nature to the existing management plans for Cary and Jennings State Forest, which are designed for sustainable management of the forest resources without significantly impacting non-forested areas. As the primary goal of the development of the Corridor is to provide natural restoration and enhancement, timber revenue will not be a primary consideration in managing the timber resources. The timber resources within the Corridor will be harvested as needed to improve and/or preserve the existing natural communities. All forestry management within the Corridor will follow Florida's Best Management Practices (BMPs). Periodic harvesting of pinelands and hardwoods will be done to create uneven-age stands where appropriate and to maximize wildlife habitat to every extent practicable. While harvesting results in the loss of habitat for certain forest-dwelling wildlife species, it also allows for the creation of open habitat for other species. A variety of forest stands of differing ages will benefit the vegetative and wildlife communities within the Corridor.

The forestry management plan provides for selective harvesting of some pine-dominated flatwood wetlands. Removal of these trees will only be done when necessary to meet the goals of improving, enhancing or restoring wetland habitats. No harvesting will be done in areas of standing or running water or within wetland creation areas.

Prescribed burning will be used as a management tool to open undergrowth areas for increased wildlife habitat, to prevent uncontrolled and dangerous wildfires during dry seasons, and to maintain natural, fire-dependent vegetative communities. Areas to undergo prescribed burning will be identified from DOF forest surveys and may include most of the pine flatwood areas. A Fire Management Plan for these areas will be developed and implemented in coordination with the Forest Management Plan. Prescribed burning will be conducted on an as-needed basis, and will be implemented during optimum burn times as prescribed by wind and weather conditions. Proper staffing will be used during the burns to ensure they are controlled and restricted to on-site areas. Annual monitoring will ensure the goals of the prescribed burning plan are met.

7.0 PASSIVE RECREATIONAL ACTIVITIES

Recreational activities will be compatible with the protection of natural resources. The Recreation Plan developed by the COJ Department of Parks, Recreation and Entertainment is attached. The plan, while conceptual in nature, outlines the recreational facilities that will be provided within the Corridor. The plan includes recreational activities that would negligibly affect vegetation and wildlife because of the activity's (typically) unobtrusive nature and the small amount of terrestrial resources affected relative to the total size of the Corridor.

Current logging roads will be utilized for hiking and horseback riding trails, and limited hunting and fishing access. Currently impacted areas will be utilized to provide for picnicking, bird watching, nature appreciation, primitive camping, fishing and environmental education. It is anticipated that the Corridor's recreational facilities will be promoted to adults and children through nature walks, environmental education programs, bird watches and other various managed activities where applicable. The magnitude of such activities will depend largely on funding of such efforts and secondarily on participation estimates. Educational activities will focus on local ecology and habitat preservation. If the Corridor is established as a Wildlife Management Area, coordination between the COJ, JAA, FWC and DOF will ensure that programming and interpretation is provided in such a way as to be conducive to the restorative goals of the Corridor Management Plan.

Environmental education will occur through passive interpretive exhibits along the trails and entrance areas and through educational programs conducted in an outdoor pavilion. COJ Department of Parks, Recreation and Entertainment will sponsor environmental educational programs in cooperation with local elementary and junior high schools. Ample opportunity exists for various local environmental groups to sponsor and deliver on-site educational programs, which will be further pursued by the County. A feasible goal would be to provide one program a month to the public through various local educational entities. Environmental education programs will be consistent with the management philosophy of the Corridor.

The goal of educational signage and interpretation is to enhance the awareness of the general public on the sensitive ecology of this region while addressing the specific needs and concerns of the site. Interpretive kiosks situated along the nature trails will focus on geographic localities and historical aspects of the property along with environmental issues. The project site also contains several very good examples of vegetative communities within marshes and cypress domes. These areas could serve as focal points where trails are widened and large educational displays could exhibit information highlighting environmental concerns and adverse effects of impacts caused by human development. Learning to identify adverse impacts will assist the public in making informed decisions about the protection and conservation of other sensitive environments. Environmental interpretive signage also will direct visitor interest towards enhancement of the site, such as trash removal. The participation of volunteer groups in maintenance activities such as trash removal is seen as an educational tool, introducing them to a natural environment. Such groups could also increase enhancement efforts through supervised, hands-on activities such as trail restoration and planting endeavors.

8.0 SITE DEVELOPMENT

Currently, the site predominately contains pine flatwood/coastal plantation habitats typically associated with the undeveloped areas of northeastern Florida. The majority of the site will remain in its natural state. The extent and appropriate placement of most physical improvements cannot be specified at this time. However, any recreational facilities will be placed to avoid impacts to natural resources, specifically wetlands. Special care will be taken to avoid listed plant or animal species or habitats during construction of physical facilities, and no large trees will be removed.

Access will be compatible with State and Federal construction standards, including the Americans with Disabilities Act (ADA). Visitors will be able to park in designated parking areas. Trails will be developed to allow the public reasonable access for observation and appreciation of natural resources without causing harm to those resources. These trails, located throughout the project site, will be positioned to avoid any listed plant and animal species during construction. Pedestrian access to the site will be promoted through the provision of pedestrian oriented walkways that link the site with adjacent residential development. The County will be required to obtain permits for the security facilities. All necessary permits will be obtained prior to initiation of construction on the site.

Physical improvements will include an outdoor pavilion (to be used for educational programs), pervious entrance and access roads (which will be situated on existing logging roads), a primitive campground area with waterless restrooms, and informational kiosks/signage. The Corridor will be fenced either partially or entirely to minimize pedestrian and vehicular impact.

A Florida Gas Company right-of-way traverses the northwest corner of the property adjacent to Normandy Boulevard. The right-of-way is approximately sixty feet wide and one mile long. All of the right-of way lies within the Corridor. Limited physical improvements or alterations to this area are expected to occur periodically. However, due to the relatively small size and remote location of the right-of-way, these activities are not expected to pose a negative impact on the existing wildlife or recreational facilities in this area.

The St. Johns River Water Management District (SJRWMD) will develop a potable water wellfield, with associated utility services, within the Corridor. This well field will be permitted by SJRWMD under Jacksonville Electric Authority's (JEA's) Consumptive Use Permit for major withdrawals from the Floridan Aquifer. The Floridan Aquifer in the Corridor has some of the best water quality in Duval County. The Corridor is located at a relatively higher elevation than most of Duval County, therefore the need for special pumping provisions is reduced through this location. Locating this source of water supply in the undeveloped Corridor also allows for high quality water to be provided to the western portion of Duval County at a reduced risk of contamination of the supply source. This well field is not expected to affect the surface hydrology of the wetlands within the Corridor. JEA anticipates the installation of approximately 9 wells (3.6 million gallons per day capacity each) through the year 2020. Each well will be spaced 1,000 feet apart, including a 750-foot radius buffer around each wellhead, per JEA Standards for Water Supply Wells. This buffer can include wetlands, which will be unimpacted by the wellhead installation and utilization. A 100-foot radius separation between each wellhead and wetlands or surface waters is required. Wellheads, piping supports, panels and instruments will be located on a concrete slab and enclosed with a 6-foot high chain link fence topped with three strands of barbed wire. The minimum size of each fenced well site is 200 square feet.

Cecil Commerce Center
Five-Year Management Goals

The following goals have been established by the Florida Department of Agriculture and Consumer Affairs, Division of Forestry (DOF) for management of Conservation areas at Cecil Commerce Center. The following goals have been established to ensure conservation enhancement goals are met and maintain compliance with St. Johns River Water Management (SJRWMD) and U.S. Army Corps of Engineers (COE) permitting requirements. The Conservation Easement language (agreed to by SJRWMD legal staff and under review by COE staff) specifies that a written report of the land management activities for the upcoming year and a written report of the land management activities for the previous year be submitted to the grantee. Furthermore, any changes to the five-year work plan must be reviewed and approved in writing by the Grantee.

Year One

- Development a Fire Management Plan that addresses prescribed burning, fire suppression strategies, identification and establishment of temporary and permanent firelines, and fireline rehabilitation strategies. The plan will also address potential conflicts with aviation operations on and around the property.

- Develop and implement a forest wide traffic plan that distinguishes which roads are open for public use, which are management use only, identifies maintenance responsibilities, and which are suitable for permanent closure.

- Develop a cooperative law enforcement program between the Jacksonville Sheriffs Office, the Florida Fish and Wildlife Conservation Commission, and the Florida Department of Agricultural Law Enforcement.

- Establish an inter-agency land management team for the purpose of reviewing forest management operations and accomplishments.

- Conduct one public meeting regarding management of Cecil Commerce Center forest management program, recreational opportunities, etc.

- Reforest 200 acres within the National and Recreational Corridor and 300 acres within the Intensive Management Unit that were destroyed by the 1998 Wildfires.

- Prescribe burn 2,000 acres using a combination of ground and aerial ignition firing techniques.

- Establish pre-suppression fire lines along the perimeter of the property.

- Complete all timber sales listed in the Forest Inventory Harvest Plan.

Year Two

- Development and implement a cooperative Wildlife Management Area program with the Florida Fish and Wildlife Conservation Commission that includes limited public hunting, urban fishing, and wildlife viewing opportunities for the non-hunting public.

- Develop and implement a forest exotic species control plan.

- Develop a coordinated interagency recreation plan between the Jacksonville Parks and Recreation Department and the Division of Forestry that addresses and resolves potential conflicts between passive recreational activities and forest management operations, especially timber management and prescribed burning operations.

- Reforest an additional 500 acres of the area burned by the 1998 wildfires.

- Prescribe burn 2,000 acres using a combination of ground and aerial ignition firing techniques.

- Complete all timber sales listed in the Forest Inventory Harvest Plan.

- Explore marketability of non-traditional forest products such as pine straw, stick wood, palmetto berries, apiary leases, etc.

Year Three

- Reforest an additional 500 acres of the area burned by the 1998 wildfires.

- Prescribe burn 2,000 acres for hazard removal using a combination of ground and aerial ignition firing techniques.

- Initiate growing season burning program on acreage burned in 2001.

- Complete all timber sales listed in the Forest Inventory Harvest Plan.

- Conduct a biological survey of flora and fauna within the Natural and Recreation Corridor.

Year Four

- Initiate update of 1999 Forest Inventory and Stand Description.
- Complete reforestation of the area burned by the 1998 wildfires.
- Prescribe burn 2,000 acres for hazard removal using a combination of ground and aerial ignition firing techniques.
- Continue growing season burning program.
- Complete all timber sales listed in the Forest Inventory Harvest Plan.

Year Five

- Complete all timber sales listed in the Forest Inventory Harvest Plan.
- Prescribe burn 2,000 acres for hazard removal using a combination of ground and aerial ignition firing techniques.
- Continue growing season burning program.

(KMA/02302/5 year goals)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
6620 Southpoint Drive South
Suite 310
Jacksonville, Florida 32216-0958

IN REPLY REFER TO:
FWS/R4/ES-JAFL

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MAY 30 2002

JACKSONVILLE DISTRICT
USACE

May 29, 2002

Colonel James G. May
District Engineer
Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232

FWS Log No: 02-934
Application No: 199801374 (IP-BL)
Dated: November 1, 2000
Applicant: Jacksonville Economic Development Commission and Jacksonville Port Authority
County: Duval

Dear Colonel May:

The U.S. Fish and Wildlife Service has reviewed the project plans for the above referenced Public Notice. Our comments are submitted in accordance with section 7 of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq.*).

The applicants are requesting a 20-year permit in order to revitalize and develop the recently closed Naval Air Station Cecil Field (NAS Cecil) as a Commerce Center. The installation is 17, 200 acres in size, of which the applicants propose to develop about 11,000 acres. The applicants are requesting authorization to fill about 570 acres of wetlands in order to accomplish this objective. Much of the installation is already developed as NAS Cecil was a fully operational military base until is was recently closed.

To mitigate for the wetland loss, the applicants will establish a 5,970-acre natural area along the western boundary of the installation. Approximately one-half of the total on-site wetlands lie within the natural area. A restoration and management plan has been developed for the mitigation site.

ENDANGERED SPECIES ACT

The Corps evaluated the impact this project would have on the eastern indigo snake, and determined that the proposed project may affect, not likely to adversely affect this species. We anticipate that the future development of NAS Cecil will result in the incidental take of this species; therefore, a biological opinion is required.

Status of the Species

The eastern indigo snake is the largest nonpoisonous snake in North America, attaining lengths of up to 104 inches (Ashton and Ashton 1981). The adult eastern indigo snake is glossy black in color with red, rust, or white under the chin; juveniles have a light, blotched pattern.

The indigo snake (*Drymarchon corais*) ranges from southeastern United States to Argentina. *Drymarchon corais* has eight recognized subspecies, two of which occur in the United States (Conant 1975, Moler 1985). At one time, the eastern indigo snake (*Drymarchon corais couperi*) occurred throughout the coastal plain of the southeastern United States, ranging from South Carolina to Florida and west to Louisiana. Georgia and Florida currently support the remaining populations of the eastern indigo snake (Lawler 1977).

Threats to this species are habitat destruction from development, gassing of gopher tortoise (*Gopherus polyphemus*) burrows, highway mortality, residual pesticides, and blatant killing (Diemer and Speake 1981, U.S. Fish and Wildlife Service 1982). Low density development is also a potential threat to indigo snakes, increasing the likelihood of snakes being killed by property owners and domestic pets. Lawler (1977) noted that habitat has been destroyed by real estate development and farming agriculture. He stated that the loss of natural sandhill habitat from agricultural production, construction, and forestry is increasing, with losses at the rate of five percent per year in Florida. Bioaccumulation of pesticides may pose a potential hazard to the snake as well (Speake unpublished data).

Over most of its range in Florida, the indigo snake frequents diverse habitats such as pine flatwoods, scrubby flatwoods, flood plain edges, sand ridges, dry glades, tropical hammocks, muckland fields, and xeric sandhill communities. On the central east coast, indigos can be found in orange groves and near ditches and canals. In south Florida, they are found in pine woods and tropical hammocks, or in most undeveloped areas (Kuntz 1977). The snake also utilizes agricultural lands and various types of wetlands, with higher population concentrations occurring in sandhill/pineland regions in northern and central Florida.

Adult male eastern indigo snakes have larger home ranges than adult females and juveniles, encompassing as much as 553 acres (224 hectares) in winter and 390 acres (158 hectares) in summer (Moler 1986). A gravid female may use from 3.4 acres (1.4 hectares) to 106 acres (42.9 hectares) (Smith 1987).

Environmental Baseline

Action Area

The action area for this biological opinion is defined as that portion of the property that will be developed by the applicants on NAS Cecil.

Status of the Species in the Action Area

There has not been a survey for this species on NAS Cecil, but the habitats are suitable for the snake, both within the proposed development and mitigation areas. While there is much development throughout the base, including runways and attendant facilities and a vast roadway network, it has been demonstrated that eastern indigo snakes can and do survive in urban settings, at least in the short term. Sites such as these are sinks for this species, however.

Effects of the Action on the Eastern Indigo Snake

The proposed action will result in the loss of eastern indigo snake habitat through destruction and fragmentation. The proposed development will likely result in "take," as defined by the Act. Snakes that are not taken directly as a result of construction, will more than likely be injured or killed as they move between buildings, cross roadways, and come into contact with people.

Cumulative effects

Cumulative effects include the effects of future State, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The Service has considered cumulative effects with respect to this project and determined they do not apply in this instance.

Conclusion

The eastern indigo snake is threatened by the loss of habitat. Although the proposed project will result in habitat loss, there is a significant amount of habitat that will be retained and managed on NAS Cecil for the benefit of all fish and wildlife resources, including the eastern indigo snake. The eastern indigo snake ranges from southeast Georgia through peninsular Florida. This species is not dependent on any particular habitat type.

After reviewing the current status of the eastern indigo snake, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the future development on NAS Cecil is not likely to jeopardize the continued existence of the eastern indigo snake. No critical habitat has been designated for this species, therefore, none will be affected.

INCIDENTAL TAKE

Sections 4(d) and 9 of the Act, as amended, prohibit taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect or to attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. "Harm" and "harass" are further defined in Service regulations (50 CFR 17.3). "Harm" is defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. "Harass" is defined as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns, which include, but are not limited to, breeding, feeding or sheltering.

Under the terms of sections 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be implemented by the agency so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply.

The Federal agency has a continuing responsibility to regulate the activity that is covered by this incidental take statement. If the agency (1) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Sections 7(b)(4) and 7(o)(2) of the Act do not apply to the incidental take of listed plant species. However, protection of listed plants is provided to the extent that the Act requires a Federal permit for removal or reduction to possession of endangered plants from areas under Federal jurisdiction, or for any act that would remove, cut, dig up, or damage or destroy any such species on any State or in the course of any violation of a State criminal trespass law.

Amount or Extent of Take

The Service has reviewed the biological information for this species, information presented by the applicant's consultants, and other available information relevant to this action, and based on our review, incidental take is anticipated for all eastern indigo snakes and their eggs within the construction areas on NAS Cecil.

Effect of the Take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

Reasonable and Prudent Measures

When providing an incidental take statement the Service is required to give reasonable and prudent measures it considers necessary or appropriate to minimize the take along with terms and conditions that must be complied with, to implement the reasonable and prudent measures. Furthermore, the Service must also specify procedures to be used to handle or dispose of any individuals taken. The Service believes the following reasonable and prudent measure is necessary and appropriate to reduce take:

Implement on-site procedures to avoid take of the eastern indigo snake.

Terms and Conditions

To implement the above reasonable and prudent measure, the Service has outlined the following terms and conditions for incidental take. In accordance with the Interagency Cooperation Regulation (50 CFR 402), these terms and conditions must be complied with to implement the reasonable and prudent measure for incidental take:

1. An eastern indigo snake protection/education plan shall be developed by the applicant or requestor for all construction personnel to follow. The plan shall be provided to the Service for review and approval at least 30 days prior to any clearing activities. The educational materials for the plan could consist of a combination of posters, videos, pamphlets, and lectures (*e.g.*, an observer trained to identify eastern indigo snakes could use the protection/education plan to instruct construction personnel before any clearing activities occur). Informational signs should be posted throughout the construction site and contain the following information:

   a. a description of the eastern indigo snake, its habits, and protection under Federal Law;
   b. instructions not to injure, harm, harass or kill this species;
   c. directions to cease clearing activities and allow the eastern indigo snake sufficient time to move away from the site on its own before resuming clearing; and,
   d. telephone numbers of pertinent agencies to be contacted if a dead eastern indigo snake is encountered. The dead specimen should be thoroughly soaked in water, then frozen.

2. Only an individual, who has been either authorized by a section 10(a)(1)(A) permit issued by the Service, or designated as an agent of the State of Florida by the Florida Fish and Wildlife

   Conservation Commission for such activities, is permitted to come in contact with or relocate an eastern indigo snake.

3. If necessary, eastern indigo snakes shall be held in captivity only long enough to transport them to a release site; at no time shall two snakes be kept in the same container during transportation.

4. An eastern indigo snake monitoring report must be submitted to the ~~South~~ North Florida Field Office within 60 days of the conclusion of clearing phases. The report should be submitted whether or not eastern indigo snakes are observed. The report should contain the following information:
   a. any sightings of eastern indigo snakes;

b. summaries of any relocated snakes if relocation was approved for the project (*e.g.*, locations of where and when they were found and relocated);
c. thorough description of the preserve area for eastern indigo snakes if a preserve area was approved (*e.g.*, types of habitats, percent cover of dominant species); and
d. summaries of maintenance activities and schedules for the preserve area.

REINITIATION OF SECTION 7 CONSULTATION

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR Section 402.16, reinitiation of formal consultation is required when discretionary Federal agency involvement or control over the action has been retained and if: (1) the amount or extent of incidental take is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this biological opinion, for example the results of ~~the red-cockaded woodpecker~~ indigo snake survey, (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this biological opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Sincerely,

Don Palmer

For Peter M. Benjamin
Assistant Field Supervisor

cc:

FWS-Atlanta ES

S: palmer\02-934\acm\05.29.02

LITERATURE CITED

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FLORIDA DEPARTMENT OF STATE
Glenda E. Hood
Secretary of State
DIVISION OF HISTORICAL RESOURCES

RECEIVED
MAY 12 2003
JACKSONVILLE DISTRICT
USACE

District Engineer
Regulatory Division, Atlantic Permits Branch
Jacksonville District, Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

April 30, 2003

RE: DHR Project File No. 2003-2721
Received by DHR March 28, 2003 fak 5/6/03
Permit Application No. 200301935 (IP-BAL), 200302533 (IP-BAL), 200302534 (IP-BAL), 200302535 (IP-BAL), 200302536 (IP-BAL), and 200302537 (IP-BAL)
Applicant: Jacksonville Economic Development Commission
Cecil Commerce Center
Duval County

Dear Sir or Madam:

Our office received and reviewed the above referenced project in accordance with Section 106 of the *National Historic Preservation Act of 1966*, as amended and *36 CFR Part 800: Protection of Historic Properties*. The State Historic Preservation Officer is to advise Federal agencies as they identify historic properties (listed or eligible for listing, in the *National Register of Historic Places*), assess effects upon them, and consider alternatives to avoid or minimize adverse effects.

A review of our files indicated that there are sixteen areas within the Cecil Commerce Center, which are areas of high archaeological sensitivity (see map). We note that archaeological sensitive areas 3, 4, 8, and 14 have previously been subjected to an archaeological reconnaissance survey. Results of the survey indicate one previously unrecorded archaeological site (8DU14671) was identified in Area 4, while no archaeological or historical properties were identified in Areas 3, 8, or 14. It is the opinion of Florida Archeological Services, Inc. that insufficient information has been obtained about site 8DU14671 to determine whether it should be considered eligible for listing in the *National Register of Historic Places*. Since no cultural resources were identified in Areas 3, 8, and 14, development of these parcels will have no effect on any historic properties eligible for listing in the *National Register*. Based on the information provided, this office concurs with these determinations.

We note that the City of Jacksonville plans to leave Area 4 undisturbed in accordance with the Cecil Commerce Center Master Development Plan. In the event ground-disturbing activities are planned for the subject parcel, additional investigation of site 8DU14671 will be necessary to determine whether it should be considered eligible for listing in the *National Register of Historic Places*.

500 S. Bronough Street • Tallahassee, FL 32399-0250 • http://www.flheritage.com

☐ Director's Office (850) 245-6300 • FAX: 245-6435
☐ Archaeological Research (850) 245-6444 • FAX: 245-6436
☑ Historic Preservation (850) 245-6333 • FAX: 245-6437
☐ Historical Museums (850) 245-6400 • FAX: 245-6433

☐ Palm Beach Regional Office (561) 279-1475 • FAX: 279-1476
☐ St. Augustine Regional Office (904) 825-5045 • FAX: 825-5044
☐ Tampa Regional Office (813) 272-3843 • FAX: 272-2340

Since potentially significant archaeological and historic sites may be present within the remaining archaeological sensitive areas, prior to initiating any project related land clearing or ground disturbing activities within the areas of high archaeological sensitivity, they should be subjected to a professional archaeological and historical survey. The purpose of this survey will be to locate and assess the significance of historic properties present. The resultant survey report shall conform to the specifications set forth in Chapter 1A-46, Florida Administrative Code, and will need to be forwarded to this agency in order to complete the process of reviewing the impact of this proposed project on historic properties. The results of the investigations will determine if significant historic properties would be disturbed by this project. In addition, if significant remains are located, the data described in the report and the consultant's conclusions will assist this office in determining measures that must be taken to avoid, minimize, or mitigate adverse impacts to historic properties listed, or eligible for listing in the *National Register of Historic Places*, or otherwise of historical or architectural significance.

Because this letter and its contents are a matter of public record, consultants who have knowledge of our recommendations may contact the project applicant. This should in no way be interpreted as an endorsement by this agency. The *Registry of Professional Archaeologists* (RPA) is the national certifying organization for archaeologists. A listing of archaeologists who are RPA members living or working in Florida can be accessed at *http://dhr.dos.state.fl.us/bhp/compliance*. In addition, the complete RPA Directory of Certified Professional Archaeologists is available at *www.rpanet.org*.

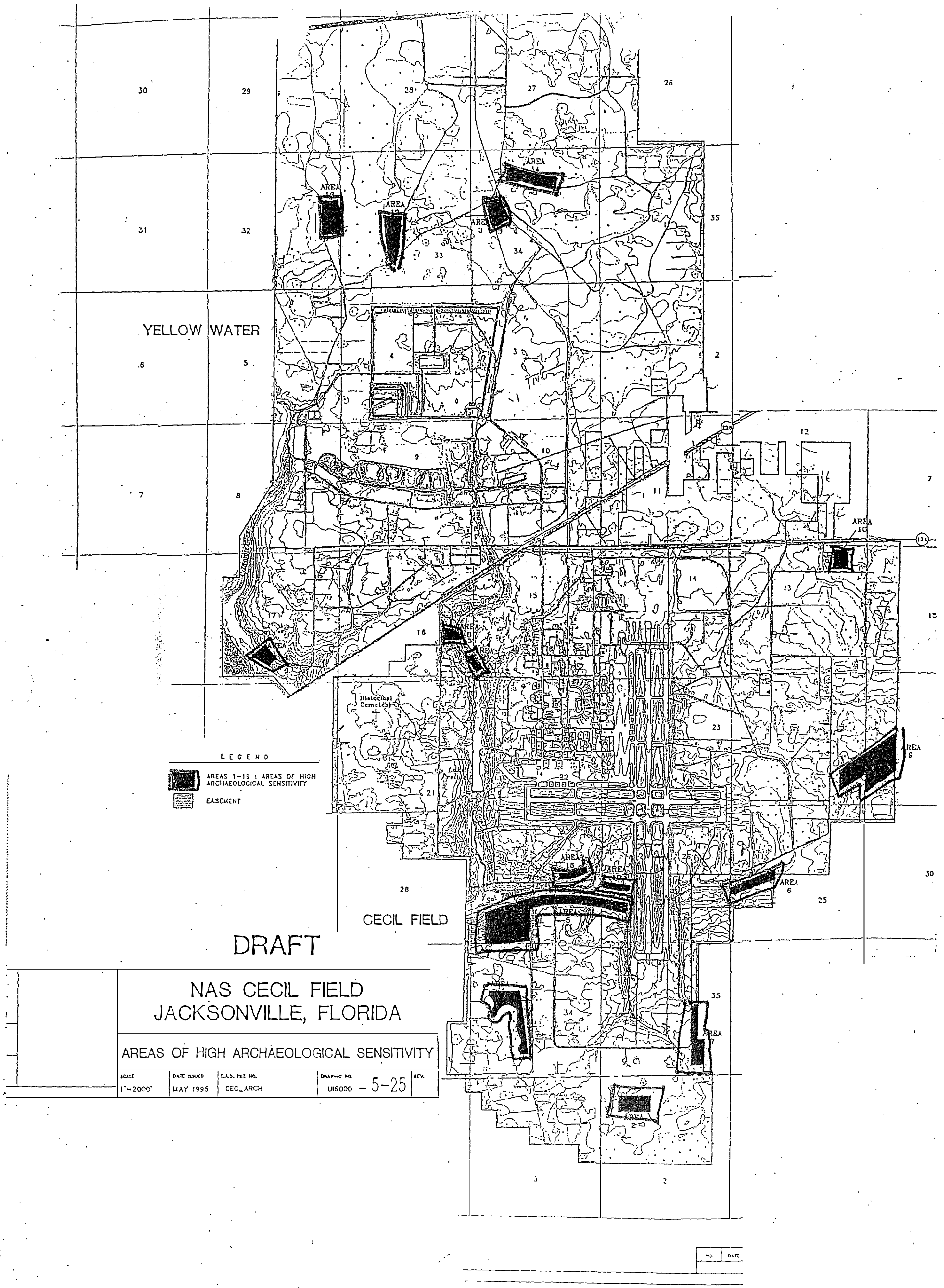
If you have any questions concerning our comments, please contact Scott Edwards, Historic Preservation Planner, by electronic mail *sedwards@mail.dos.state.fl.us*, or at 850-245-6333 or 800-847-7278.

Sincerely,

Jan Matthews

Janet Snyder Matthews, Ph.D., Director, and
State Historic Preservation Officer

Enclosure


YELLOW WATER
CECIL FIELD
Historical Cemetery
LEGEND
AREAS 1-19 : AREAS OF HIGH ARCHAEOLOGICAL SENSITIVITY
EASEMENT
DRAFT
NAS CECIL FIELD
JACKSONVILLE, FLORIDA
AREAS OF HIGH ARCHAEOLOGICAL SENSITIVITY
SCALE 1"=2000'
DATE ISSUED MAY 1995
C.A.D. FILE NO. CEC_ARCH
DRAWING NO. U16000 - 5-25
REV.
NO.
DATE

APPENDIX C - DESIGN DRAINAGE REPORT

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November 2022

100% Design Drainage Report For Cecil Airport Approach Road and Utility Corridor Extension

100% Design Drainage Report for Cecil Airport Approach Road and Utility Corridor Extension

November 2022

Jacksonville, Florida

JAA Project No: S2019-03

RS&H No.: 1001-0049-002

Prepared by RS&H, Inc. at the direction of the Jacksonville Aviation Authority

Table of Contents

List of Tables

List of Figures

List of Appendices

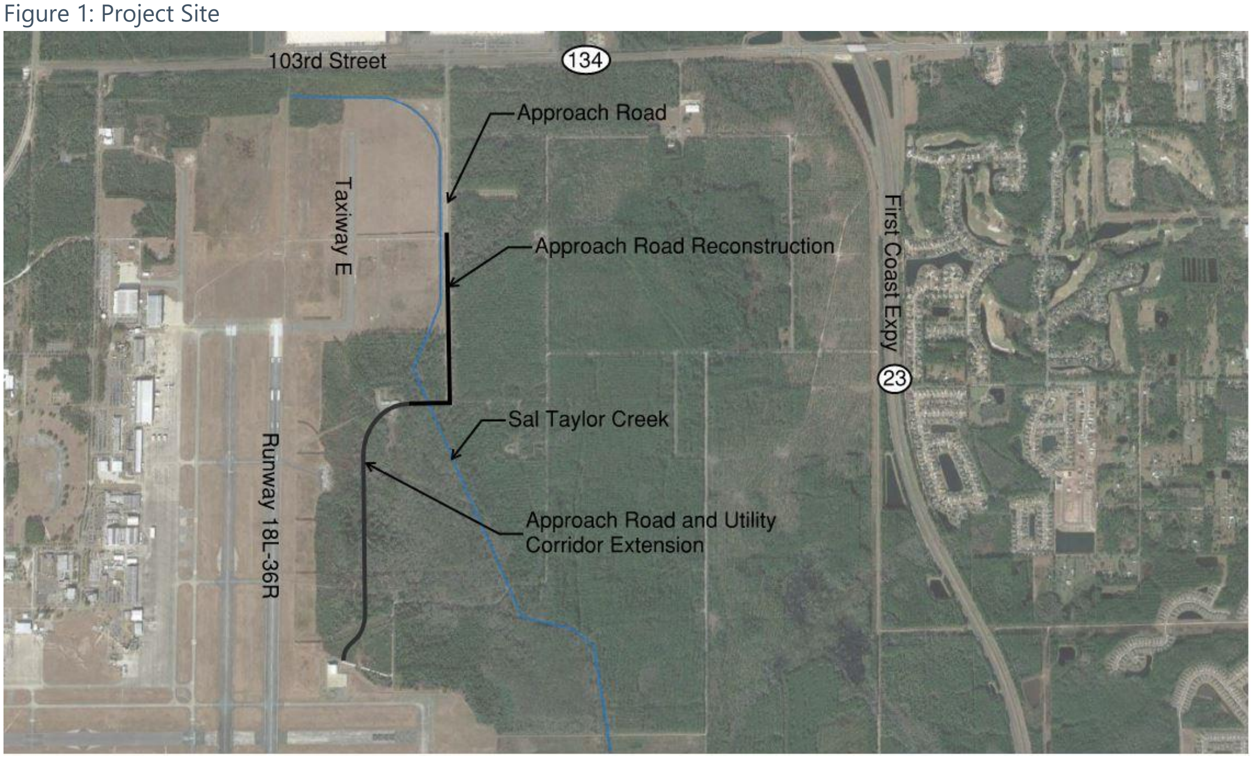
1 Introduction

In coordination with the Jacksonville Aviation Authority (JAA), RS&H, Inc. conducted a stormwater analysis for the Approach Road and Utility Corridor Extension located on the east side of Cecil Airport. The Roadway extension begins approximately 2,300 feet south of 103rd street connecting to previous roadway improvements constructed by the Airport. A portion of this project is in the 100-year floodplain and floodway as well as jurisdictional wetlands. The project includes the construction of four stormwater management facilities to meet the treatment, flood compensation, and attenuation requirements of the proposed roadway.

2 Existing Conditions

The site is comprised of existing Approach Road north and east of the airport maintenance building, and undeveloped forest and wetlands south of the facility. Existing drainage conditions for the project area consist of terrain sloping generally from north to south toward existing ditches and tributaries that connect to Sal Taylor Creek. The creek runs north to south along the existing Approach Road, passes under the east-west road segment via an existing 60-inch culvert, and continues around the east side of the airfield. Refer to *Figure 1* project site.

Figure 1: Project Site



2.1 Existing Land Use

In the existing (pre-development) condition, the site is 17.31 acres of mostly woodland and pervious area. There are approximately 2.92 acres of impervious area consisting of an existing utility corridor and existing Approach Road.

2.2 Existing Soils

Soils on the site are a mixture of hydrologic soil groups (HSG) A, C, and D. A large portion of the site is in the Hydrologic Soil group A/D. Hydrologic soil groups C and D a have very slow infiltration rate when thoroughly wet and have a high potential for stormwater runoff. Soil group A is relatively well draining with medium to high infiltration rates. For soil group A, curve number of 39 was used, and soil D the curve number used was 80. The USDA NRCS soil map for this project is included in **Appendix A.**

2.3 Floodplains

The project encroaches on the existing 100-year floodplains. The City of Jacksonville (COJ) has jurisdiction over the floodplain in the vicinity of the proposed development area. A Conditional Letter of Map Revision (CLOMR) for the project is currently being reviewed by The COJ and FEMA. Base flood elevations (BFEs) for the site, referenced to the North American Vertical Datum of 1988 (NAVD88), range from 73 feet at the northern limit to 62 feet at the southern limit. The annotated Flood Insurance Rate Map (FIRM) 12031C0505H is included in **Appendix B.**

2.4 Existing Stormwater

The northern part of the project site consisting of the existing roadway sheet flows to ditches and tributaries that connect to Sal Taylor Creek. The existing conditions drainage map is included in **Appendix C**. Sal Taylor Creek runs north to south along the existing road and crosses under the existing road at the east-west section via a 60-inch culvert. Set of 48-inch culverts crosses under the existing road south of Wing Lane to connect a tributary coming from the northeast to Sal Taylor Creek. The project is located south of the existing roadway and underdrain pond constructed under St. Johns River Water Management District (SJRWMD) Environmental Resource Permit (ERP) No. 40-031-70452-57 issued on November 10, 2011 and proposed Boeing Facility permitted under ERP No. 70452-117 issued on October 14, 2021. The southern part of the project site is comprised of mostly floodplain area with three major conveyance ditches discharging stormwater from the airfield pipes to Sal Taylor Creek.

3 Proposed Conditions

The storm drain system was designed to convey runoff from the future impervious areas of the site. The proposed conditions drainage map is included in **Appendix C**. The site will be equipped with drainage infrastructure and ditches to collect the runoff and convey it to the underdrain ponds.

3.1 Design Criteria

The design criteria come from the SJRWMD ERP Handbook Volume II, State of Florida Department of Transportation (FDOT) Drainage Manual, and COJ Land Development Procedures Manual. The following list contains the criteria used in the design.

- Ditches
  - Conveyance capacity designed for the 5-year 24-hour storm event
    (City of Jacksonville Land Development Procedures Manual, 2022)
  - Maximum side slope of 2:1 horizontal-to-vertical
    (City of Jacksonville Land Development Procedures Manual, 2022)
  - Maximum velocity of 2.5 feet per second
    (City of Jacksonville Land Development Procedures Manual, 2022)
- Pipes
  - Maximum length of 400 feet for 24- through 36-inch pipes without access structures
    (City of Jacksonville Land Development Procedures Manual, 2022)
  - Minimum and maximum pipe velocity of 2.5 and 15 feet per second, respectively.
    (City of Jacksonville Land Development Procedures Manual, 2022)
  - Design storm frequency is the 5-year event
    (City of Jacksonville Land Development Procedures Manual, 2022).
  - Minimum time of concentration of 10 minutes
    (City of Jacksonville Land Development Procedures Manual, 2022)
  - Minimum pipe cover of 12 inches
    (City of Jacksonville Land Development Procedures Manual, 2022)
- Culverts
  - Maximum 1-foot rise at the entrance of a culvert and 0.1-foot rise 500 feet upstream of the culvert entrance
    (City of Jacksonville Land Development Procedures Manual, 2022)

Additionally, the proposed project is exempt from SJRWMD floodplain criteria due the upstream contributing watershed being less than 5 square miles. RS&H determined the upstream contributing area from the COJ Master Stormwater Management Plan (MSMP) Stormwater Management Model (SWMM) subbasins for Sal Taylor Creek.

3.2 Ditch Design

Ditch calculations for the proposed roadside ditches were computed using a FDOT ditch hydraulic spread sheet. The spread sheet uses Manning’s equation to calculate the flow depth from the channel geometry, slope, area, runoff coefficient, rainfall intensity, and time of concentration. The ditch calculations were designed such that flow would not encroach on the road or cause erosive velocities.

The roadside ditches for the proposed conditions, runoff travels towards the proposed inlets within the ditches on both sides of the road. The ditches were broken into segments based on the profiles of the proposed Approach Road. The maximum flow depth calculated was approximately than 9 inches, well below the adjacent road grade. The proposed design calculations used the 10-year storm as the design event to match capacity of the previous roadway project. The resulting ditch velocities were less than 1.33 fps. Ditch calculations are included in **Appendix D.**

3.3 Pipe Capacity

Storm sewer pipes were designed using the Autodesk Storm and Sanitary extension for AutoCAD Civil 3D. Storm Sewer. The methodology used was the rational method analyzing the 10-year storm per City of Jacksonville Land Development Procedure Manual. The analysis uses the 10-year 10 minute storm intensity of 6.71 from NOAA atlas 14, the results were similar to the ditch calculations, and majority of the pipes have been sized to 24-inches. Calculations are provided in **Appendix E**.

3.4 Culvert Design

The proposed culverts were sized using the COJ MSMP SWMM model. A Conditional Letter of Map Revision (CLOMR) is currently being reviewed by FEMA for the aeronautical development of the east airfield at Cecil Airport. The proposed roadway extension was included in the CLOMR analysis and will not cause BFE increases greater than those documented in the CLOMR. The proposed model used the existing conditions from the CLOMR as the basis of analysis.

Due to the location within the 100-year floodplain and floodway, the culverts were sized to convey the 100-year flow. The culvert in the east-west section was sized to achieve a no-rise. In the floodway the culverts along the three airfield ditches were sized using COJ criteria for maximum rise. Elevation comparison tables for existing and proposed conditions from the SWMM model results are included in **Appendix F**.

3.5 Floodplain Compensation

The City of Jacksonville requires equivalent compensation for fill placed within the 100-year floodplain. The proposed project will place approximately 50,000 CY of fill in the floodplain. Due to the low elevation of the existing site and wetlands, the seasonal high groundwater table (SHGWT) is located at or above grade along much of the proposed roadway in the floodplain. Therefore, equivalent compensation was created above and below the SHGWT to existing conditions.

3.6 Stormwater Management

The SJRWMD requires stormwater management for proposed projects. Best Management Practices that include mechanisms such as infiltration and flow disconnection for water quality treatment are preferable on or near airports. BMPs with some types of vegetation or standing water can attract wildlife within the vicinity of aircraft operations. FAA AC 150/5200-33C, "Hazardous Wildlife Attractants On Or Near Airports", requires stormwater ponds to drain within 48 hours and remain dry between storm events. Wet and extended detention ponds cannot be used because they require permanent pools. Therefore, stormwater management will be achieved in ponds with liner and underdrains. Meeting minutes from the pre-application meeting with SJRWMD are included in **Appendix G**.

3.6.1 Stormwater Quantity

To satisfy the water quantity requirements of attenuating the 25-year, 24-hour event to match at or below the pre-development conditions, the existing and proposed site conditions were modeled in the Interconnected Channel and Pond Routing Model (ICPR4) software, version 4.05.02, a hydraulic and hydrologic modeling program, to calculate the peak flow rates for the 25-year, 24-hour storm. The site runoff was calculated using the SCS curve number method as described in the St. Johns River Water Management District Manual. This method considers the soil type, impervious and pervious areas, and time of concentration. The time of concentration for the pond basins were calculated using the TR-55 methodology. Due to the results from the time of concentration calculations, a time of concentration of 10 minutes for post development was used for the stormwater quantity design. Results from the time of concentration calculations for the pre-development are in **Appendix H**. The peak flow rate from the pre-development conditions was used to determine the required attenuation for the post-development condition. The post-development condition of the site was also modeled in ICPR using the same method and design storm as the pre-development.

To meet the peak flow rate of the pre-development condition, four underdrain ponds were designed and modeled in ICPR4. The control structures are sharp crested rectangular weirs with a maximum width of 3 feet. The ponds were sized to attenuate the 25-year, 24-hour storm event to the pre-development level. The results for the peak flows are summarized in *Table 1*, and the water quantity calculations are in **Appendix I.**

Table 1: Peak Flow Results

NAME	PRE-DEVELOPMENT PEAK FLOW (cfs)	POST-DEVELOPMENT PEAK FLOW (cfs)	TOP OF BANK ELEVATION (ft)	PEAK STAGE IN POND (ft)
BASIN 1	5.75	5.36	64.00	62.89
BASIN 2	12.02	11.70	65.00	63.77
BASIN 3	22.10	13.49	66.00	64.13
BASIN 4	36.02	31.65	69.00	67.85

3.6.1.1 Tailwater Justification

RS&H used the 25-year event node elevations from the COJ MSMP for the outfall tailwater in the ICPR4 model. *Table 2* provides the information for each proposed underdrain pond.

Table 2: ICPR4 Tailwater Elevations

NAME	COJ MSMP NODE	25-YEAR NODE ELEVATION (ft NAVD88)
POND 1	TC1111S	61.2
POND 2	TC1114	62.1
POND 3	TC1120	62.6
POND 4	TC1130	63.6

3.6.1.2 Groundwater

Estimated Seasonal High Water Level (ESHWL) for the site is from two separate geotechnical investigations performed for different phases of the Approach Road and utility corridor extension. One report provide depth from surface, so RS&H calculated the NAVD88 elevation from the existing ground surface. *Table 3* provides values ESHWL at each pond location. Excerpts from the geotechnical reports are included in **Appendix J**.

Table 3: ESHWL at Pond Locations

NAME	DEPTH (ft)	EXISTING ELEVATION (ft NAVD88)	ESHWL (ft NAVD88)	POND BOTTOM (ft NAVD88)
POND 1	--	66	62	61.0
POND 2	--	60	60	60.0
POND 3	--	62	61	60.5
POND 4	3	67	64	64.0

3.6.2 Stormwater Quality

The St. Johns River Water Management District requires new development to improve runoff conditions from a project site. Stormwater Best Management Practices (BMPs) are required to meet the St. Johns River Water Management District water quality requirements. BMPs are structural or non-structural practices incorporated into a site design to effectively reduce pollutant loads and runoff.

Stormwater quality design criteria is from the SJRWMD ERP Applicants Handbook Volume II. For underdrain ponds, the treatment volume (TV) is dictated by the greater value of 0.5 inch over the entire drainage area or 1.25 inches over the impervious area plus an additional 0.5 inch of runoff from the entire drainage area for on-line systems.

The treatment elevation for the rectangular weir control structure was set to an elevation allowing the entire treatment volume in each pond to infiltrate through the sand bottom into the underdrains. The underdrain was designed per the methodology of the SJRWMD applicant's handbook to recover the TV within 24 hours (uses Factor of Safety=2) following a rainfall event to meet requirements of FAA AC 150/5200-33C. Water Quality calculations are provided in **Appendix K**. *Table 4* presents the characteristics of each underdrain pond.

Table 4: Water Quality Data

NAME	REQUIRED VOLUME (AC-FT)	PROVIDED VOLUME (AC-FT)	WEIR ELEVATION (FT NAVD88)
POND 1	0.25	0.37	62.0
POND 2	0.46	0.63	62.1
POND 3	0.40	0.54	62.6
POND 4	0.67	0.69	65.9

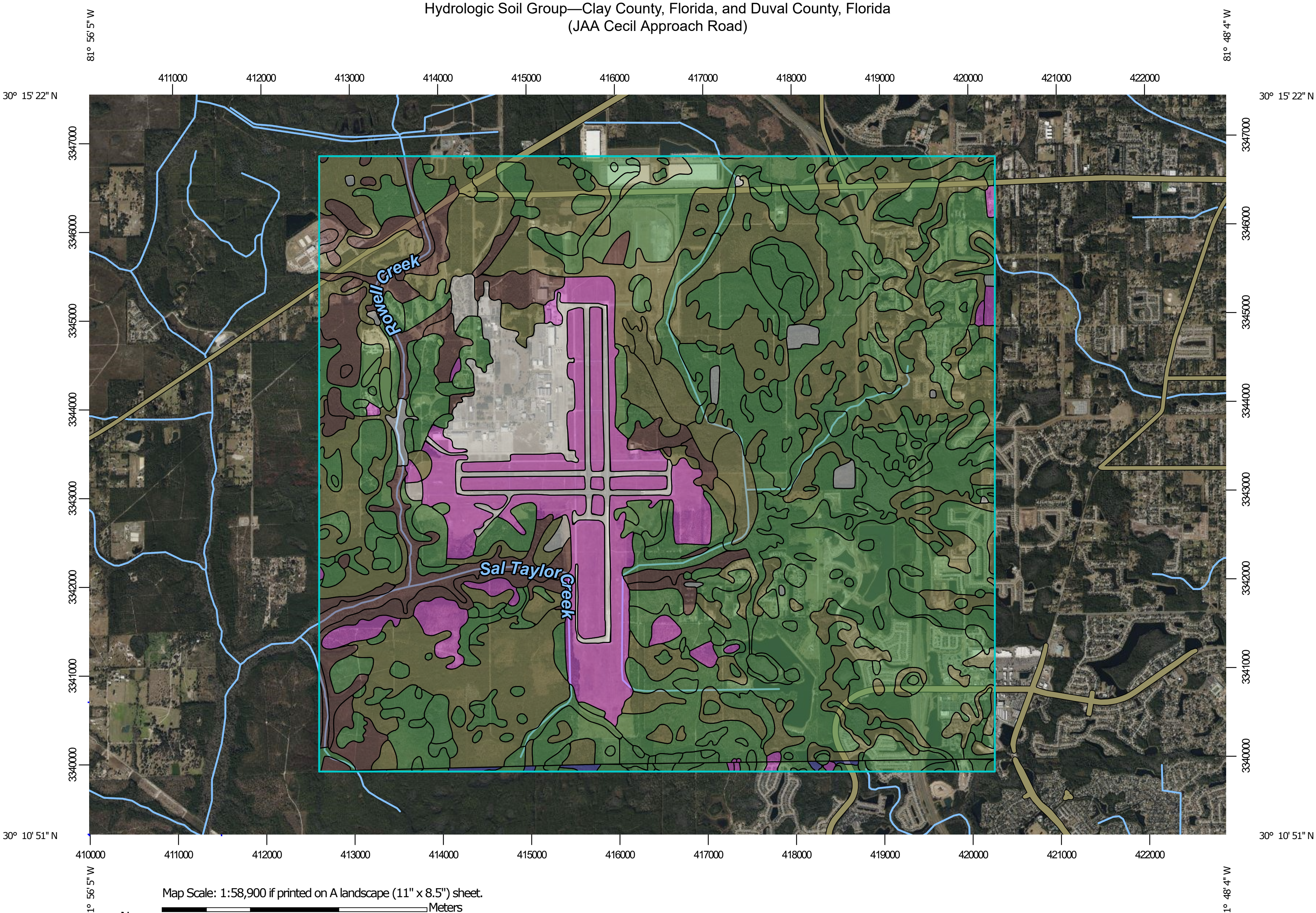
4 Erosion and Sediment Control

The proposed project incorporates Best Management Practices (BMPs) to help reduce post-construction runoff and pollutant transport. Silt fence and inlet filters will help reduce sediment transport to the surrounding wetlands and floodplain as well as keep the area untouched. To ensure the inlet filters perform as intended, any sediment accumulated during construction should be removed as necessary to ensure proper capacity.

APPENDIX A

SOIL REPORT

Hydrologic Soil Group—Clay County, Florida, and Duval County, Florida
(JAA Cecil Approach Road)



Map Scale: 1:58,900 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 500, 1000, 2000, 3000

Feet: 0, 2500, 5000, 10000, 15000

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 Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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 1:24,000.

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: Clay County, Florida
Survey Area Data: Version 18, Aug 31, 2021

Soil Survey Area: Duval County, Florida
Survey Area Data: Version 16, Sep 1, 2021

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: Jan 7, 2022—Feb 14, 2022

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
3	Hurricane fine sand, 0 to 5 percent slopes	A	2.8	0.0%
6	Mandarin fine sand, 0 to 2 percent slopes	A	1.7	0.0%
8	Sapelo fine sand	B/D	0.6	0.0%
9	Leon fine sand, 0 to 2 percent slopes	A/D	75.4	0.6%
10	Ortega fine sand, 0 to 5 percent slopes	A	5.7	0.0%
11	Allanton and Rutlege mucky fine sands, depressional	A/D	2.0	0.0%
27	Pamlico muck	A/D	12.5	0.1%
29	Rutlege-Osier complex, frequently flooded	A/D	5.0	0.0%
31	Pottsburg fine sand	A/D	7.5	0.1%
43	Pamlico muck, frequently flooded	A/D	6.4	0.0%
59	Lynn Haven fine sand	A/D	9.1	0.1%
60	Ridgeland fine sand	B	20.5	0.2%
61	Wesconnett fine sand, frequently flooded	A/D	8.7	0.1%
Subtotals for Soil Survey Area			**158.1**	**1.2%**
Totals for Area of Interest			**13,164.8**	**100.0%**

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
2	Albany fine sand, 0 to 5 percent slopes	A/D	275.7	2.1%
7	Arents, nearly level	A	1,061.6	8.1%
9	Arents, sanitary landfill	A	13.1	0.1%
12	Blanton fine sand, 0 to 6 percent slopes	A	68.5	0.5%
14	Boulogne fine sand, 0 to 2 percent slopes	C/D	3,242.8	24.6%
22	Evergreen-Wesconnett complex, depressional, 0 to 2 percent slopes	A/D	999.1	7.6%
24	Hurricane and Ridgewood soils, 0 to 5 percent slopes	A	39.0	0.3%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
32	Leon fine sand, 0 to 2 percent slopes	A/D	3,379.4	25.7%
35	Lynn Haven fine sand, 0 to 2 percent slopes	A/D	505.0	3.8%
36	Mandarin fine sand, 0 to 2 percent slopes	A	0.5	0.0%
38	Mascotte fine sand, 0 to 2 percent slopes	C/D	34.0	0.3%
44	Mascotte-Pelham complex, 0 to 2 percent slopes	C/D	276.0	2.1%
46	Ortega fine sand, 0 to 5 percent slopes	A	72.0	0.5%
49	Pamlico muck, depressional, 0 to 1 percent slopes	A/D	160.5	1.2%
50	Pamlico muck, 0 to 2 percent slopes, frequently flooded	A/D	9.9	0.1%
51	Pelham fine sand, 0 to 2 percent slopes	B/D	45.8	0.3%
55	Pits		75.2	0.6%
56	Pottsburg fine sand, 0 to 2 percent slopes	A/D	120.4	0.9%
58	Pottsburg fine sand, high, 0 to 3 percent slopes	A/D	313.6	2.4%
62	Rutlege mucky fine sand, 0 to 2 percent slopes, frequently flooded	A/D	184.6	1.4%
63	Sapelo fine sand, 0 to 2 percent slopes	B/D	457.7	3.5%
66	Surrency loamy fine sand, depressional, 0 to 2 percent slopes	B/D	83.5	0.6%
67	Surrency loamy fine sand, 0 to 2 percent slopes, frequently flooded	B/D	332.3	2.5%
69	Urban land		653.6	5.0%
71	Urban land-Leon-Boulogne complex, 0 to 2 percent slopes	A/D	49.9	0.4%
73	Urban land-Mascotte-Sapelo complex, 0 to 2 percent slopes		35.0	0.3%
79	Yulee clay, 0 to 2 percent slopes, frequently flooded	C/D	79.1	0.6%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
80	Goldhead, Wet, and Lynn Haven soils, 2 to 5 percent slopes	B/D	188.8	1.4%
81	Stockade fine sandy loam, depressional, 0 to 2 percent slopes	C/D	97.3	0.7%
82	Pelham fine sand, ponded, 0 to 2 percent slopes	B/D	27.9	0.2%
86	Yulee clay, depressional, 0 to 2 percent slopes	C/D	85.2	0.6%
99	Water		38.7	0.3%
Subtotals for Soil Survey Area			**13,005.8**	**98.8%**
Totals for Area of Interest			**13,164.8**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

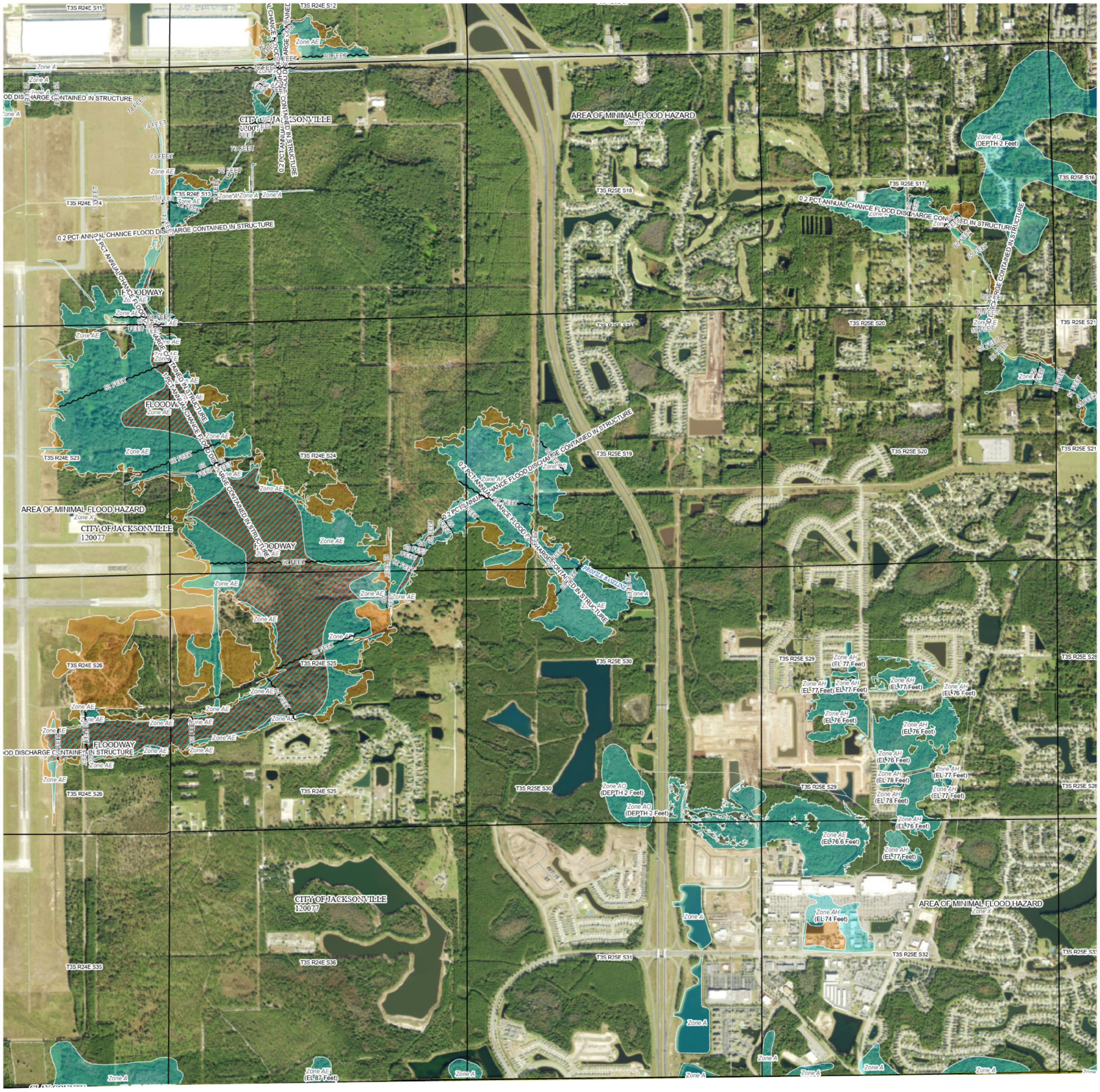
Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX B

FEMA FIRM

81°52'30.87"W 30°15'14.06"N



81°48'44.16"W 30°11'2.71"N

FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP
FOR DRAFT 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	B 20.2 / 17.5	Cross Sections with 1% Annual Chance Water Surface Elevation
	8	Coastal Transect
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
	513	Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates, refer to the Flood Insurance Study Report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Basemap information shown on this FIRM was provided in digital format by the United States Geological Survey (USGS). The basemap shown is the USGS National Map: Orthoimagery. Last refreshed October, 2020.

This map was exported from FEMA's National Flood Hazard Layer (NFHL) on 5/3/2022 2:19 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. For additional information, please see the Flood Hazard Mapping Updates Overview Fact Sheet at https://www.fema.gov/media-library/assets/documents/118418

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. 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.

SCALE

Map Projection:
GCS, Geodetic Reference System 1980;
Vertical Datum: NAVD88
For information about the specific vertical datum for elevation features, datum conversions, or vertical monuments used to create this map, please see the Flood Insurance Study (FIS) Report for your community at https://msc.fema.gov

N

1 inch = 1,000 feet 1:12,000

0 500 1,000 2,000 3,000 4,000 Feet

0 105 210 420 630 840 Meters

FEMA
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

PANEL 505 OF 675

Panel Contains:

COMMUNITY	NUMBER	PANEL
CLAY COUNTY	120064	0505
CITY OF JACKSONVILLE	120077	0505

MAP NUMBER
12031C0505H
EFFECTIVE DATE
June 03, 2013

APPENDIX C

DRAINAGE MAPS

LEGEND

(yellow line)	DRAINAGE BASIN BOUNDARY
(blue line)	IMPERVIOUS AREA BOUNDARY

NORTH

GRAPHIC SCALE

300 150 0 300

WARNING - THERE ARE EXISTING UNDERGROUND UTILITIES IN THE PROJECT WORK AREAS. THE ENGINEER HAS MADE EVERY EFFORT TO SHOW THEIR APPROXIMATE LOCATIONS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE EVERY CABLE LOCATED, FLAGGED, AND IDENTIFIED PRIOR TO CONSTRUCTION. ANY DAMAGE DONE TO FLAGGED OR OTHERWISE LOCATED CABLES SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.

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FL Cert. Nos. AAC001886 * IB26000956 * 5620 * LCC000210 * GB238

JAA Jacksonville Aviation Authority

JAA A/E PROJECT
S2019-03
C-871

CECIL AIRPORT

APPROACH ROAD AND UTILITY CORRIDOR EXTENSION

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 08/26/22
REVIEWED BY:
DRAWN BY: EEJC
DESIGNED BY: EEJC

AEP PROJECT NUMBER
1001-0049-002

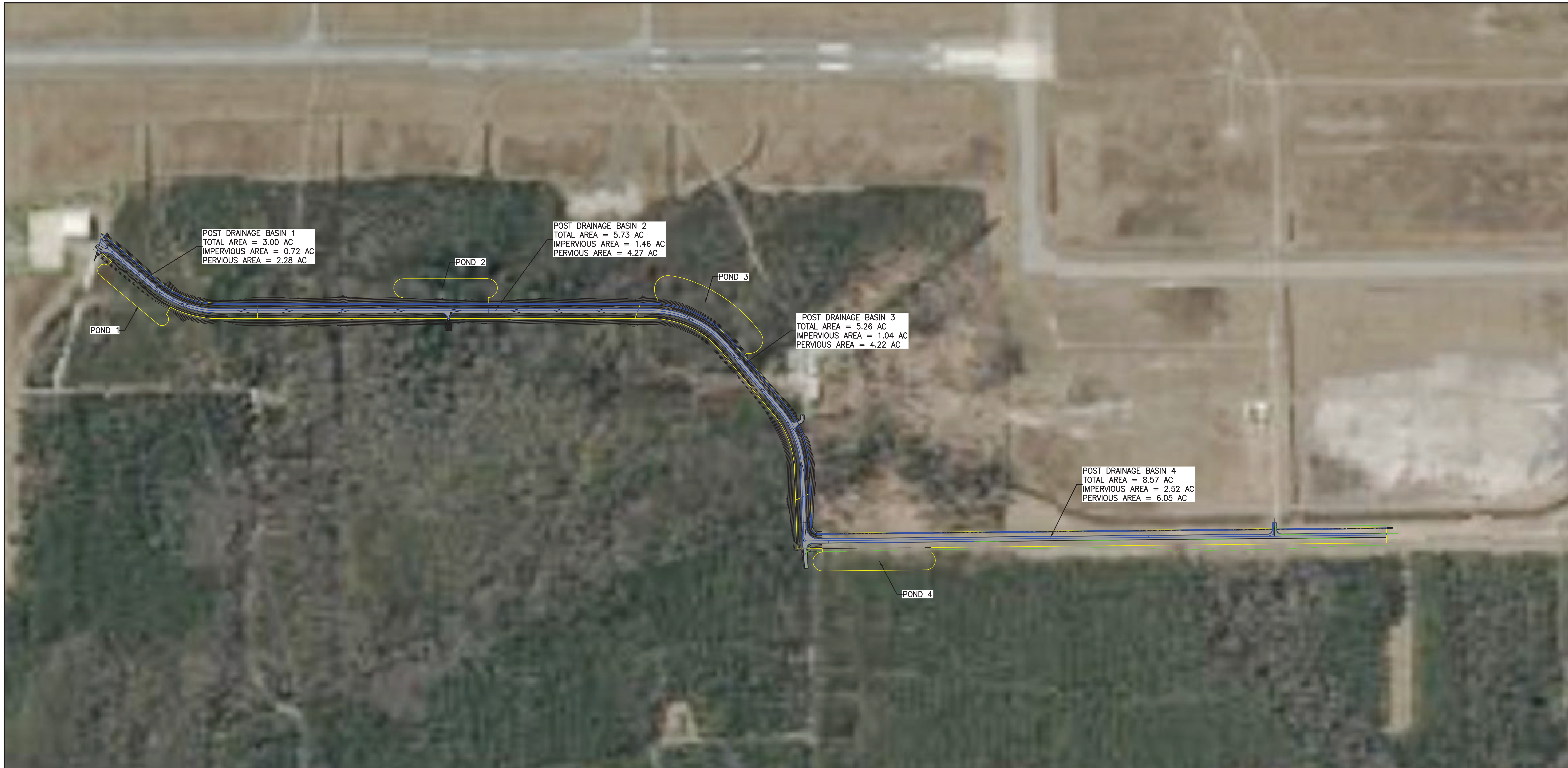
SHEET TITLE

EXISTING DRAINAGE MAP

SHEET NUMBER

EXHIBIT 1

PERMIT DOCUMENTS



LEGEND

- DRAINAGE BASIN BOUNDARY
- IMPERVIOUS AREA BOUNDARY

NORTH

GRAPHIC SCALE

300 150 0 300

WARNING - THERE ARE EXISTING UNDERGROUND UTILITIES IN THE PROJECT WORK AREAS. THE ENGINEER HAS MADE EVERY EFFORT TO SHOW THEIR APPROXIMATE LOCATIONS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE EVERY CABLE LOCATED, FLAGGED, AND IDENTIFIED PRIOR TO CONSTRUCTION. ANY DAMAGE DONE TO FLAGGED OR OTHERWISE LOCATED CABLES SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.

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www.rsandh.com
FL Cert. Nos. AAC001886 * IB26000956 *
5620 * LCC000210 * GB238

JAA
Jacksonville
Aviation
Authority

JAA A/E PROJECT
S2019-03
C-871

CECIL AIRPORT

APPROACH ROAD AND UTILITY CORRIDOR EXTENSION

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: 08/26/22
REVIEWED BY:
DRAWN BY: EEJC
DESIGNED BY: EEJC

AEP PROJECT NUMBER
1001-0049-002

SHEET TITLE

PROPOSED DRAINAGE MAP

SHEET NUMBER

EXHIBIT 2

PERMIT DOCUMENTS

APPENDIX D

DITCH CALCULATIONS

DITCH HYDRAULICS

System: **1**

PROJECT	
Number:	**2010049.002**
Description:	**JAA Approach Road and Utility Corridor Extension**
County:	**Duval**

Organization:	**RS&H**
Designed by:	**EEJC**
Checked by:	**0**

CONDITIONS				
Storm Event - IDF Curve		Runoff Coeff. (default)		
Zone	Frequency	Area 1	Area 2	Area 3
4	**25**	**0.95**	**0.20**	**0.35**

Location: From Sta. / Baseline / From Elev.	To Sta. / Side / To Elev.	Length (ft) / Slope (%)	Drainage Areas: Area (A)	Runoff Coeff. (C)	C*A (CA)	Lcl A UpStrm Tot A	Lcl CA UpStrm Tot CA	Tc (min): Local	Tc (min): Total	Inten. (in/hr)	Hyd. Rad.: A (ft^2) / P (ft) / R (ft)	Depth	Flow (cfs): Basin / Local / Total	Intercept. Inlet	Velocity (fps)	Ditch XS Geometry: Front Slope (1:_) / Bottom Width (ft) / Back Slope (1:_)	Height (ft)	Freeboard: State	Allow. Depth (ft)	DEPTH (ft)	Man'g 'N'	Remarks
22+85.81	**13+50.00**	935.81	**0.39**	0.95	0.37	0.91	0.47				3.42		3.02			**3**						
Approach Rd	**LT**		**0.53**	0.20	0.11	0.00	0.00	**10.0**	17.7	6.38	7.29	3.02		**S-120**	0.88	**3**	**2.00**	**Fill**	1.00	0.68	**0.042**	
	60.85	**0.17**		0.35	0.00	0.91	0.47				0.47		3.02			**3**						
12+33.84	**13+50.00**	116.16	**0.05**	0.95	0.05	0.11	0.06				1.78		0.46			**3**						
Approach Rd	**LT**		**0.07**	0.20	0.01	0.00	0.00	**10.0**	10.0	7.83	5.65	0.46		**S-120**	0.26	**3**	**2.00**	**Fill**	1.00	0.42	**0.060**	
	60.85	**0.05**		0.35	0.00	0.11	0.06				0.32		0.46			**3**						
22+85.81	**13+50.00**	935.81	**0.26**	0.95	0.24	0.91	0.38				3.36		2.06			**3**						
Approach Rd	**RT**		**0.66**	0.20	0.13	0.00	0.00	**10.0**	25.4	5.48	7.24	2.06		**S-121**	0.61	**3**	**2.00**	**Fill**	1.00	0.67	**0.060**	
	60.85	**0.17**		0.35	0.00	0.91	0.38				0.46		2.06			**3**						
12+33.84	**13+50.00**	116.16	**0.03**	0.95	0.03	0.11	0.05				2.84		0.37			**3**						
Approach Rd	**RT**		**0.08**	0.20	0.02	0.00	0.00	**10.0**	10.0	7.83	6.76	1.63		**S-121**	0.57	**3**	**2.00**	**Fill**	1.00	0.59	**0.060**	
	60.85	**0.17**		0.35	0.00	0.11	0.05				0.42		0.37			**3**						

DITCH HYDRAULICS

System: **2**

Worksheet: **2 of 6**

PROJECT			
Number:	**2010049.002**	Organization:	**RS&H**
Description:	**JAA Approach Road and Utility Corridor Extensio**	Designed by:	**EEJC**
County:	**Duval**	Checked by:	**0**

CONDITIONS				
Storm Event - IDF Curve		Runoff Coeff. (default)		
Zone	Frequency	Area 1	Area 2	Area 3
4	**25**	**0.95**	**0.20**	**0.35**

Location: From Sta. / Baseline / From Elev.	Location: To Sta. / Side / To Elev.	Length (ft) / Slope (%)	Drainage Areas: Area (A)	Runoff Coeff. (C)	C*A (CA)	Lcl A / UpStrm / Tot A	Lcl CA / UpStrm / Tot CA	Tc (min): Local	Tc (min): Total	Inten. (in/hr)	Hyd. Rad.: A (ft^2) / P (ft) / R (ft)	Depth	Flow (cfs): Basin / Local / Total	Intercept. Inlet	Velocity (fps)	Ditch XS Geometry: Front Slope (1:_) / Bottom Width (ft) / Back Slope (1:_)	Height (ft)	Freeboard: State	Allow. Depth (ft)	DEPTH (ft)	Man'g 'N'	Remarks
22+85.81	**23+83.37**	97.56	**0.04**	0.95	0.04	0.10	0.05				0.83		0.39			**3**						
Approach Rd	**LT**		**0.05**	0.20	0.01	0.00	0.00	**10.0**	10.0	7.83	4.43	0.39	0.39	**-**	0.46	**3**	**2.00**	**Fill**	1.00	0.23	**0.060**	
	60.55	**0.32**		0.35	0.00	0.10	0.05				0.19					**3**						
23+83.37	**34+74.98**	1091.61	**0.45**	0.95	0.43	1.07	0.55				3.53		2.73			**3**						
Approach Rd	**LT**		**0.61**	0.20	0.12	0.10	0.05	**10.0**	31.6	4.95	7.40	2.97	2.97	**-**	0.84	**3**	**2.00**	**Fill**	1.00	0.70	**0.060**	
	59.29	**0.31**		0.35	0.00	1.16	0.60				0.48					**3**						
34+74.98	**35+25.65**	50.67	**0.02**	0.95	0.02	0.05	0.03				5.35		0.12			**3**						
Approach Rd	**LT**		**0.03**	0.20	0.01	1.16	0.60	**10.0**	33.1	4.84	8.85	3.03	3.03	**S-134**	0.57	**3**	**2.00**	**Fill**	1.00	0.93	**0.042**	
	59.22	**0.05**		0.35	0.00	1.21	0.63				0.60					**3**						
43+57.01	**42+92.99**	64.02	**0.39**	0.95	0.37	0.42	0.37				3.11		2.93			**3**						
Approach Rd	**LT**		**0.04**	0.20	0.01	0.00	0.00	**10.0**	10.0	7.83	7.01	2.93	2.93	**-**	0.94	**3**	**2.00**	**Fill**	1.00	0.63	**0.060**	
	62.37	**0.43**		0.35	0.00	0.42	0.37				0.44					**3**						
42+92.99	**35+86.40**	706.59	**0.29**	0.95	0.28	0.69	0.36				3.32		2.24			**3**						
Approach Rd	**LT**		**0.40**	0.20	0.08	0.42	0.37	**10.0**	18.5	6.26	7.20	4.58	4.58	**-**	1.38	**3**	**2.00**	**Fill**	1.00	0.66	**0.042**	
	59.36	**0.43**		0.35	0.00	1.11	0.73				0.46					**3**						
35+86.40	**35+25.65**	60.75	**0.03**	0.95	0.02	0.06	0.03				7.28		0.19			**3**						
Approach Rd	**LT**		**0.03**	0.20	0.01	1.11	0.73	**10.0**	20.1	6.06	10.18	4.62	4.62	**S-134**	0.63	**3**	**2.00**	**Fill**	1.00	1.14	**0.042**	
	59.22	**0.05**		0.35	0.00	1.17	0.76				0.71					**3**						
22+85.81	**23+83.37**	97.56	**0.03**	0.95	0.03	0.10	0.04				0.71		0.31			**3**						
Approach Rd	**RT**		**0.07**	0.20	0.01	0.00	0.00	**10.0**	10.0	7.83	4.26	0.31	0.31	**-**	0.43	**3**	**2.00**	**Fill**	1.00	0.20	**0.060**	
	60.55	**0.32**		0.35	0.00	0.10	0.04				0.17					**3**						
23+83.37	**34+74.98**	1091.61	**0.30**	0.95	0.29	1.07	0.44				2.95		2.12			**3**						
Approach Rd	**RT**		**0.76**	0.20	0.15	0.10	0.04	**10.0**	33.2	4.83	6.86	2.31	2.31	**-**	0.78	**3**	**2.00**	**Fill**	1.00	0.61	**0.060**	
	59.29	**0.31**		0.35	0.00	1.16	0.48				0.43					**3**						
34+74.98	**35+25.65**	50.67	**0.01**	0.95	0.01	0.05	0.02				4.44		0.10			**3**						
Approach Rd	**RT**		**0.04**	0.20	0.01	1.16	0.48	**10.0**	34.8	4.72	8.16	2.35	2.35	**S-133**	0.53	**3**	**2.00**	**Fill**	1.00	0.82	**0.042**	
	59.22	**0.05**		0.35	0.00	1.21	0.50				0.54					**3**						
43+57.01	**42+92.99**	64.02	**0.02**	0.95	0.02	0.06	0.03				0.49		0.20			**3**						
Approach Rd	**RT**		**0.04**	0.20	0.01	0.00	0.00	**10.0**	10.0	7.83	3.91	0.20	0.20	**-**	0.41	**3**	**2.00**	**Fill**	1.00	0.14	**0.060**	
	62.37	**0.43**		0.35	0.00	0.06	0.03				0.13					**3**						
42+92.99	**35+86.40**	706.59	**0.19**	0.95	0.18	0.69	0.28				2.13		1.58			**3**						
Approach Rd	**RT**		**0.49**	0.20	0.10	0.06	0.03	**10.0**	24.5	5.56	6.03	1.72	1.72	**-**	0.81	**3**	**2.00**	**Fill**	1.00	0.48	**0.060**	
	59.36	**0.43**		0.35	0.00	0.75	0.31				0.35					**3**						
35+85.02	**35+25.65**	59.37	**0.02**	0.95	0.02	0.06	0.02				3.65		0.13			**3**						
Approach Rd	**RT**		**0.04**	0.20	0.01	0.75	0.31	**10.0**	26.6	5.37	7.50	1.79	1.79	**S-133**	0.49	**3**	**2.00**	**Fill**	1.00	0.71	**0.042**	
	59.22	**0.05**		0.35	0.00	0.81	0.33				0.49					**3**						

DITCH HYDRAULICS

System: **3**

PROJECT			
Number:	**2010049.002**	Organization:	**RS&H**
Description:	**JAA Approach Road and Utility Corridor Extensio**	Designed by:	**EEJC**
County:	**Duval**	Checked by:	**0**

CONDITIONS				
Storm Event - IDF Curve		Runoff Coeff. (default)		
Zone	Frequency	Area 1	Area 2	Area 3
4	**25**	**0.95**	**0.20**	**0.35**

Location: From Sta. / Baseline / From Elev.	To Sta. / Side / To Elev.	Length (ft) / Slope (%)	Drainage Areas: Area (A)	Runoff Coeff. (C)	C*A (CA)	Lcl A / UpStrm / Tot A	Lcl CA / UpStrm / Tot CA	Tc (min): Local	Total	Inten. (in/hr)	Hyd. Rad.: A (ft^2) / P (ft) / R (ft)	Depth	Flow (cfs): Basin / Local / Total	Intercept. Inlet	Velocity (fps)	Ditch XS Geometry: Front Slope (1:_) / Bottom Width (ft) / Back Slope (1:_)	Height (ft)	Freeboard: State	Allow. Depth (ft)	DEPTH (ft)	Man'g 'N'	Remarks
43+57.01	**44+07.01**	50.00	**0.02**	0.95	0.02	0.05	0.03				0.53		0.20			**3**						
Approach Rd	**LT**		**0.03**	0.20	0.01	0.00	0.00	**10.0**	10.0	7.83	3.97	0.20	0.20	**-**	0.37	**3**	**2.00**	**Fill**	1.00	0.15	**0.060**	
	62.43	**0.33**		0.35	0.00	0.05	0.03				0.13					**3**						
44+07.01	**47+44.29**	337.28	**0.14**	0.95	0.13	0.33	0.17				1.83		1.07			**3**						
Approach Rd	**LT**		**0.19**	0.20	0.04	0.05	0.03	**10.0**	18.4	6.29	5.70	1.23	1.23	**-**	0.67	**3**	**2.00**	**Fill**	1.00	0.43	**0.060**	
	61.30	**0.33**		0.35	0.00	0.38	0.20				0.32					**3**						
47+44.29	**48+00.00**	55.71	**0.02**	0.95	0.02	0.05	0.03				3.57		0.17			**3**						
Approach Rd	**LT**		**0.03**	0.20	0.01	0.38	0.20	**10.0**	20.3	6.04	7.43	1.74	1.35	**S-131**	0.49	**3**	**2.00**	**Fill**	1.00	0.70	**0.042**	
	61.22	**0.05**		0.35	0.00	0.43	0.22				0.48					**3**						
58+58.21	**57+96.79**	61.42	**0.03**	0.95	0.02	0.06	0.03				0.57		0.24			**3**						
Approach Rd	**LT**		**0.03**	0.20	0.01	0.00	0.00	**10.0**	10.0	7.83	4.03	0.24	0.24	**-**	0.43	**3**	**2.00**	**Fill**	1.00	0.16	**0.060**	
	65.20	**0.41**		0.35	0.00	0.06	0.03				0.14					**3**						
57+96.79	**48+55.71**	941.08	**0.39**	0.95	0.37	0.92	0.48				2.96		2.52			**3**						
Approach Rd	**LT**		**0.53**	0.20	0.11	0.06	0.03	**10.0**	27.3	5.30	6.87	2.69	2.69	**-**	0.91	**3**	**2.00**	**Fill**	1.00	0.61	**0.060**	
	61.35	**0.41**		0.35	0.00	0.98	0.51				0.43					**3**						
48+55.71	**48+00.00**	55.71	**0.02**	0.95	0.02	0.05	0.03				4.99		0.15			**3**						
Approach Rd	**LT**		**0.03**	0.20	0.01	0.98	0.51	**10.0**	29.0	5.16	8.59	2.76	2.76	**S-131**	0.55	**3**	**2.00**	**Fill**	1.00	0.88	**0.042**	
	61.22	**0.05**		0.35	0.00	1.03	0.53				0.58					**3**						
43+57.01	**44+07.01**	50.00	**0.01**	0.95	0.01	0.05	0.02				0.45		0.16			**3**						
Approach Rd	**RT**		**0.04**	0.20	0.01	0.00	0.00	**10.0**	10.0	7.83	3.85	0.16	0.16	**-**	0.35	**3**	**2.00**	**Fill**	1.00	0.13	**0.060**	
	62.43	**0.33**		0.35	0.00	0.05	0.02				0.12					**3**						
44+07.01	**47+44.29**	337.28	**0.09**	0.95	0.09	0.33	0.14				1.54		0.84			**3**						
Approach Rd	**RT**		**0.24**	0.20	0.05	0.05	0.02	**10.0**	19.0	6.20	5.37	0.96	0.96	**-**	0.62	**3**	**2.00**	**Fill**	1.00	0.37	**0.060**	
	61.30	**0.33**		0.35	0.00	0.38	0.16				0.29					**3**						
47+44.29	**48+00.00**	55.71	**0.02**	0.95	0.01	0.05	0.02				3.19		0.13			**3**						
Approach Rd	**RT**		**0.04**	0.20	0.01	0.38	0.16	**10.0**	21.8	5.85	7.09	1.04	1.04	**S-132**	0.33	**3**	**2.00**	**Fill**	1.00	0.65	**0.060**	
	61.22	**0.05**		0.35	0.00	0.43	0.18				0.45					**3**						
58+58.21	**57+96.79**	61.42	**0.02**	0.95	0.02	0.06	0.02				0.49		0.19			**3**						
Approach Rd	**RT**		**0.04**	0.20	0.01	0.00	0.00	**10.0**	10.0	7.83	3.90	0.19	0.19	**-**	0.40	**3**	**2.00**	**Fill**	1.00	0.14	**0.060**	
	65.20	**0.41**		0.35	0.00	0.06	0.02				0.12					**3**						
57+96.79	**48+55.71**	941.08	**0.26**	0.95	0.25	0.92	0.38				2.48		1.96			**3**						
Approach Rd	**RT**		**0.66**	0.20	0.13	0.06	0.02	**10.0**	28.6	5.19	6.40	2.09	2.09	**-**	0.84	**3**	**2.00**	**Fill**	1.00	0.54	**0.060**	
	61.35	**0.41**		0.35	0.00	0.98	0.40				0.39					**3**						
48+55.71	**48+00.00**	55.71	**0.02**	0.95	0.01	0.05	0.02				4.16		0.11			**3**						
Approach Rd	**RT**		**0.04**	0.20	0.01	0.98	0.40	**10.0**	30.4	5.05	7.93	2.15	2.15	**S-132**	0.52	**3**	**2.00**	**Fill**	1.00	0.78	**0.042**	
	61.22	**0.05**		0.35	0.00	1.03	0.43				0.52					**3**						

DITCH HYDRAULICS

System: **4**

PROJECT		Organization:	RS&H
Number:	**2010049.002**	Organization:	**RS&H**
Description:	**JAA Approach Road and Utility Corridor Extensio**	Designed by:	**EEJC**
County:	**Duval**	Checked by:	**0**

CONDITIONS				
Storm Event - IDF Curve		Runoff Coeff. (default)		
Zone	Frequency	Area 1	Area 2	Area 3
4	**25**	**0.95**	**0.20**	**0.35**

Location: From Sta. / Baseline / From Elev.	To Sta. / Side / To Elev.	Length (ft) / Slope (%)	Area (A)	Runoff Coeff. (C)	C*A (CA)	Lcl A / UpStrm / Tot A	Lcl CA / UpStrm / Tot CA	Tc (min) Local	Tc (min) Total	Inten. (in/hr)	Hyd. Rad. A (ft^2) / P (ft) / R (ft)	Depth	Flow (cfs) Basin / Local / Total	Intercept. Inlet	Velocity (fps)	Ditch XS Geometry: Front Slope (1:_) / Bottom Width (ft) / Back Slope (1:_)	Height (ft)	Freeboard State	Allow. Depth (ft)	DEPTH (ft)	Man'g 'N'	Remarks
58+58.21	**59+03.21**	45.00	**0.02**	0.95	0.02	0.04	0.02				0.51		0.18			**3**						
Approach Rd	**LT**		**0.03**	0.20	0.01	0.00	0.00	**10.0**	10.0	7.83	3.94	0.18	0.18	**-**	0.35	**3**	**2.00**	**Fill**	1.00	0.15	**0.060**	
	65.26	**0.30**		0.35	0.00	0.04	0.02				0.13					**3**						
59+03.21	**61+95.54**	292.33	**0.12**	0.95	0.11	0.29	0.15				1.74		0.94			**3**						
Approach Rd	**LT**		**0.16**	0.20	0.03	0.04	0.02	**10.0**	17.8	6.36	5.60	1.08	1.08	**-**	0.62	**3**	**2.00**	**Fill**	1.00	0.41	**0.060**	
	64.38	**0.30**		0.35	0.00	0.33	0.17				0.31					**3**						
61+95.54	**62+35.83**	40.29	**0.02**	0.95	0.02	0.04	0.02				3.46		0.12			**3**						
Approach Rd	**LT**		**0.02**	0.20	0.00	0.33	0.17	**10.0**	19.8	6.10	7.33	1.16	1.16	**S-118**	0.34	**3**	**2.00**	**Fill**	1.00	0.68	**0.060**	
	64.31	**0.05**		0.35	0.00	0.37	0.19				0.47					**3**						
93+06.56	**80+46.84**	1259.72	**0.52**	0.95	0.49	1.23	0.64				3.57		4.23			**3**						
Approach Rd	**LT**		**0.71**	0.20	0.14	0.00	0.00	**10.0**	15.9	6.64	7.43	4.70	4.23	**-**	1.32	**3**	**2.00**	**Fill**	1.00	0.70	**0.042**	
	67.51	**0.37**		0.35	0.00	1.23	0.64				0.48					**3**						
80+46.84	**80+00.00**	46.84	**0.02**	0.95	0.02	0.05	0.02				6.69		0.15			**3**						
Approach Rd	**LT**		**0.03**	0.20	0.01	1.23	0.64	**10.0**	17.2	6.45	9.80	4.26	4.26	**S-153**	0.64	**3**	**2.00**	**Fill**	1.00	1.07	**0.042**	
	67.41	**0.05**		0.35	0.00	1.27	0.66				0.68					**3**						
58+58.21	**59+03.21**	45.00	**0.01**	0.95	0.01	0.04	0.02				0.44		0.14			**3**						
Approach Rd	**RT**		**0.03**	0.20	0.01	0.00	0.00	**10.0**	10.0	7.83	3.82	0.14	0.14	**-**	0.32	**3**	**2.00**	**Fill**	1.00	0.13	**0.060**	
	65.26	**0.30**		0.35	0.00	0.04	0.02				0.12					**3**						
59+03.21	**61+95.54**	292.33	**0.08**	0.95	0.08	0.29	0.12				1.47		0.74			**3**						
Approach Rd	**RT**		**0.20**	0.20	0.04	0.04	0.02	**10.0**	18.4	6.28	5.28	0.85	0.85	**S-147**	0.58	**3**	**2.00**	**Fill**	1.00	0.36	**0.060**	
	64.38	**0.30**		0.35	0.00	0.33	0.14				0.28					**3**						
61+95.54	**62+35.83**	40.29	**0.01**	0.95	0.01	0.04	0.02				0.74		0.13			**3**						
Approach Rd	**RT**		**0.03**	0.20	0.01	0.00	0.00	**10.0**	10.0	7.83	4.29	0.13	0.13	**S-117**	0.17	**3**	**2.00**	**Fill**	1.00	0.20	**0.060**	
	64.31	**0.05**		0.35	0.00	0.04	0.02				0.17					**3**						
93+06.56	**80+46.84**	1259.72	**0.35**	0.95	0.33	1.23	0.51				3.23		2.86			**3**						
Approach Rd	**RT**		**0.88**	0.20	0.18	0.00	0.00	**10.0**	23.7	5.65	7.12	2.86	2.86	**-**	0.89	**3**	**2.00**	**Fill**	1.00	0.65	**0.060**	
	67.51	**0.37**		0.35	0.00	1.23	0.51				0.45					**3**						
80+46.84	**80+00.00**	46.84	**0.01**	0.95	0.01	0.05	0.02				5.04		0.10			**3**						
Approach Rd	**RT**		**0.03**	0.20	0.01	1.23	0.51	**10.0**	25.0	5.51	8.63	2.89	2.89	**S-152**	0.57	**3**	**2.00**	**Fill**	1.00	0.89	**0.042**	
	67.41	**0.05**		0.35	0.00	1.27	0.52				0.58					**3**						
74+09.46	**74+54.46**	45.00	**0.01**	0.95	0.01	0.04	0.02				0.44		0.14			**3**						
Approach Rd	**RT**		**0.03**	0.20	0.01	0.00	0.00	**10.0**	10.0	7.83	3.82	0.14	0.14	**-**	0.32	**3**	**2.00**	**Fill**	1.00	0.13	**0.060**	
	68.95	**0.30**		0.35	0.00	0.04	0.02				0.12					**3**						
74+54.46	**79+53.16**	498.70	**0.14**	0.95	0.13	0.49	0.20				2.01		1.14			**3**						
Approach Rd	**RT**		**0.35**	0.20	0.07	0.04	0.02	**10.0**	23.5	5.67	5.91	1.24	1.24	**-**	0.62	**3**	**2.00**	**Fill**	1.00	0.46	**0.060**	
	67.46	**0.26**		0.35	0.00	0.53	0.22				0.34					**3**						
79+53.16	**80+00.00**	46.84	**0.01**	0.95	0.01	0.05	0.02				3.57		0.10			**3**						
Approach Rd	**RT**		**0.03**	0.20	0.01	0.53	0.22	**10.0**	25.0	5.51	7.43	1.80	1.31	**S-152**	0.50	**3**	**2.00**	**Fill**	1.00	0.70	**0.042**	
	67.41	**0.05**		0.35	0.00	0.58	0.24				0.48					**3**						

DITCH HYDRAULICS

System: **4**

PROJECT			
Number:	**2010049.002**	Organization:	**RS&H**
Description:	**JAA Approach Road and Utility Corridor Extensio**	Designed by:	**EEJC**
County:	**Duval**	Checked by:	**0**

CONDITIONS				
Storm Event - IDF Curve		Runoff Coeff. (default)		
Zone	Frequency	Area 1	Area 2	Area 3
4	**25**	**0.95**	**0.20**	**0.35**

Location: From Sta. / Baseline / From Elev.	Location: To Sta. / Side / To Elev.	Length (ft) / Slope (%)	Drainage Areas: Area (A)	Runoff Coeff. (C)	C*A (CA)	Lcl A / UpStrm / Tot A	Lcl CA / UpStrm / Tot CA	Tc (min): Local	Tc (min): Total	Inten. (in/hr)	Hyd. Rad.: A (ft²) / P (ft) / R (ft)	Flow (cfs): Depth	Flow (cfs): Basin / Local / Total	Intercept. Inlet	Velocity (fps)	Ditch XS Geometry: Front Slope (1:_) / Bottom Width (ft) / Back Slope (1:_)	Height (ft)	Freeboard: State	Freeboard: Allow. Depth (ft)	DEPTH (ft)	Man'g 'N'	Remarks
74+09.46	**73+54.54**	54.92	**0.02**	0.95	0.01	0.05	0.02				0.47		0.17			**3**						
Approach Rd	**RT**		**0.04**	0.20	0.01	0.00	0.00	**10.0**	10.0	7.83	3.87	0.17	0.17	-	0.37	**3**	**2.00**	**Fill**	1.00	0.14	**0.060**	
	68.92	**0.37**		0.35	0.00	0.05	0.02				0.12					**3**						
73+54.54	**63+04.46**	1050.08	**0.29**	0.95	0.27	1.02	0.42				2.58		2.14			**3**						
Approach Rd	**RT**		**0.74**	0.20	0.15	0.05	0.02	**10.0**	30.0	5.08	6.50	2.25	2.25	-	0.87	**3**	**2.00**	**Fill**	1.00	0.55	**0.060**	
	64.45	**0.43**		0.35	0.00	1.08	0.44				0.40					**3**						
63+04.46	**62+35.83**	68.63	**0.02**	0.95	0.02	0.07	0.03				4.39		0.14			**3**						
Approach Rd	**RT**		**0.05**	0.20	0.01	1.08	0.44	**10.0**	32.2	4.91	8.12	2.31	2.31	**S-117**	0.53	**3**	**2.00**	**Fill**	1.00	0.81	**0.042**	
	64.31	**0.05**		0.35	0.00	1.15	0.47				0.54					**3**						

APPENDIX E

STORM SEWER CALCULATIONS

Project Description

File Name .... SSA.SPF

Project Options

Flow Units .... CFS
Elevation Type .... Elevation
Hydrology Method .... Rational
Time of Concentration (TOC) Method .... User-Defined
Link Routing Method .... Hydrodynamic
Enable Overflow Ponding at Nodes .... YES
Skip Steady State Analysis Time Periods .... NO

Analysis Options

Start Analysis On	Aug 22, 2022	00:00:00
End Analysis On	Aug 23, 2022	00:00:00
Start Reporting On	Aug 22, 2022	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	0
Subbasins	19
Nodes	27
Junctions	22
Outfalls	5
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links	22
Channels	3
Pipes	19
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

Rainfall Intensity.. 6.71 in/hr

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Runoff Coefficient	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Sub-03	0.67	0.5800	1.12	0.65	0.43	2.61	0 00:10:00
2	Sub-05	1.28	0.4700	1.12	0.53	0.67	4.04	0 00:10:00
3	Sub-06	0.39	0.4700	1.12	0.53	0.20	1.23	0 00:10:00
4	Sub-07	0.39	0.4700	1.12	0.53	0.21	1.24	0 00:10:00
5	Sub-08	0.39	0.4000	1.12	0.45	0.17	1.04	0 00:10:00
6	Sub-09	1.17	0.5700	1.12	0.64	0.74	4.46	0 00:10:00
7	Sub-10	0.26	0.4500	1.12	0.50	0.13	0.78	0 00:10:00
8	Sub-11	0.89	0.5800	1.12	0.65	0.58	3.48	0 00:10:00
9	Sub-12	0.61	0.5800	1.12	0.65	0.40	2.37	0 00:10:00
10	Sub-13	0.69	0.4900	1.12	0.55	0.38	2.26	0 00:10:00
11	Sub-14	0.42	0.6100	1.12	0.68	0.29	1.72	0 00:10:00
12	Sub-15	1.39	0.4400	1.12	0.49	0.69	4.12	0 00:10:00
13	Sub-16	1.13	0.5800	1.12	0.65	0.73	4.38	0 00:10:00
14	Sub-17	1.05	0.4800	0.00	0.00	0.00	3.37	0 00:00:00
15	Sub-18	1.03	0.4800	0.00	0.00	0.00	3.31	0 00:00:00
16	Sub-19	2.02	0.5600	0.00	0.00	0.00	7.58	0 00:00:00
17	Sub-20	0.98	0.5800	0.00	0.00	0.00	3.83	0 00:00:00
18	Sub-21	0.95	0.4800	0.00	0.00	0.00	3.05	0 00:00:00
19	Sub-22	0.28	0.4700	1.12	0.53	0.15	0.87	0 00:10:00

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	STRUCT -133	Junction	58.69	61.98	0.00	0.00	0.00	0.00	58.69	0.00	5.29	0 00:00	0.00	0.00
2	STRUCT-10	Junction	66.88	68.67	0.00	0.00	0.00	1.72	67.91	0.00	0.76	0 00:00	0.00	0.00
3	STRUCT-11	Junction	74.22	72.43	0.00	0.00	0.00	2.37	74.55	0.00	1.67	0 00:00	0.00	0.00
4	STRUCT-117	Junction	63.90	66.87	0.00	6.00	0.00	3.48	65.49	0.00	1.38	0 00:00	0.00	0.00
5	STRUCT-118	Junction	63.90	66.87	0.00	0.00	0.00	6.23	65.44	0.00	1.43	0 00:00	0.00	0.00
6	STRUCT-12	Junction	72.59	74.38	0.00	0.00	0.00	2.37	75.88	0.00	0.00	0 00:04	0.00	0.00
7	STRUCT-120	Junction	61.30	64.51	0.00	0.00	0.00	0.00	61.30	0.00	3.21	0 00:00	0.00	0.00
8	STRUCT-121	Junction	61.19	64.09	0.00	0.00	0.00	0.00	61.19	0.00	2.90	0 00:00	0.00	0.00
9	STRUCT-125	Junction	63.50	69.09	0.00	0.00	0.00	11.30	66.68	0.00	2.41	0 00:00	0.00	0.00
10	STRUCT-126	Junction	66.50	69.51	0.00	0.00	0.00	4.46	66.96	0.00	2.55	0 00:00	0.00	0.00
11	STRUCT-130	Junction	60.67	64.84	0.00	0.00	0.00	4.11	62.37	0.00	2.47	0 00:00	0.00	0.00
12	STRUCT-131	Junction	60.56	64.37	0.00	0.00	0.00	8.70	62.33	0.00	4.04	0 00:00	0.00	0.00
13	STRUCT-134	Junction	58.58	62.40	0.00	0.00	0.00	0.00	58.58	0.00	3.82	0 00:00	0.00	0.00
14	STRUCT-147	Junction	64.30	66.80	0.00	0.00	0.00	0.78	65.47	0.00	1.33	0 00:00	0.00	0.00
15	STRUCT-152	Junction	65.90	69.94	0.00	0.00	0.00	7.14	68.43	0.00	1.51	0 00:00	0.00	0.00
16	STRUCT-153	Junction	67.30	70.36	0.00	0.00	0.00	3.22	68.48	0.00	3.88	0 00:00	0.00	0.00
17	STRUCT-154	Junction	65.10	71.05	0.00	0.00	0.00	7.96	67.71	0.00	3.34	0 00:00	0.00	0.00
18	STRUCT-155	Junction	64.30	70.79	0.00	0.00	0.00	8.38	67.12	0.00	3.67	0 00:00	0.00	0.00
19	STRUCT-156	Junction	62.45	64.78	0.00	0.00	0.00	0.00	62.45	0.00	2.33	0 00:00	0.00	0.00
20	STRUCT-157	Junction	62.34	64.67	0.00	0.00	0.00	0.00	62.34	0.00	2.33	0 00:00	0.00	0.00
21	STRUCT-9	Junction	66.61	68.40	0.00	0.00	0.00	1.72	66.91	0.00	1.70	0 00:00	0.00	0.00
22	STRUCTURE45	Junction	63.10	68.34	0.00	0.00	0.00	11.56	65.94	0.00	2.40	0 00:00	0.00	0.00
23	POND -1	Outfall	61.00					0.00	61.00					
24	POND-2	Outfall	58.40					0.00	58.40					
25	POND-3	Outfall	60.40					8.54	62.02					
26	POND-4	Outfall	64.00					11.53	64.00					
27	POND4.2	Outfall	64.00					6.03	65.19					

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
1	Link-04	Pipe	STRUCT-153	STRUCT-152	57.00	67.30	67.19	0.1900	24.000	0.0130	3.16	9.94	0.32	1.88	1.21	0.60	0.00	Calculated
2	Link-05	Pipe	STRUCT-125	STRUCT-126	57.00	64.90	64.79	0.1900	24.000	0.0130	4.45	37.90	0.12	5.50	1.08	0.54	0.00	Calculated
3	Link-08	Pipe	STRUCT-155	STRUCT-125	400.00	65.59	64.79	0.2000	24.000	0.0120	7.63	10.96	0.70	2.78	1.71	0.86	0.00	Calculated
4	Link-09	Pipe	STRUCT-152	STRUCT-154	400.00	67.19	66.39	0.2000	24.000	0.0120	6.85	10.96	0.63	3.31	1.26	0.63	0.00	Calculated
5	Link-10	Pipe	STRUCT-154	STRUCT-155	400.00	66.39	65.59	0.2000	24.000	0.0120	7.58	10.96	0.69	3.42	1.40	0.70	0.00	Calculated
6	Link-11	Pipe	STRUCTURE45	POND-4	69.00	64.21	64.07	0.2000	24.000	0.0120	11.53	11.04	1.04	4.65	1.47	0.74	0.00	> CAPACITY
7	Link-12	Pipe	STRUCT-147	STRUCT-118	165.00	64.30	64.38	-0.0500	18.000	0.0130	0.79	2.31	0.34	0.80	1.11	0.74	0.00	Calculated
8	Link-13	Pipe	STRUCT-117	STRUCT-118	57.00	64.20	64.10	0.1800	24.000	0.0130	3.39	9.48	0.36	1.57	1.31	0.66	0.00	Calculated
9	Link-14	Pipe	STRUCT-118	POND4.2	62.00	64.10	64.00	0.1600	24.000	0.0130	6.03	9.09	0.66	2.88	1.26	0.63	0.00	Calculated
10	Link-15	Pipe	STRUCT-131	POND-3	82.00	60.56	60.40	0.2000	24.000	0.0150	8.54	8.66	0.99	3.02	1.69	0.85	0.00	Calculated
11	Link-16	Pipe	STRUCT-130	STRUCT-131	52.00	60.67	60.56	0.2100	24.000	0.0130	3.99	10.40	0.38	1.39	1.73	0.87	0.00	Calculated
12	Link-17	Pipe	STRUCT-10	STRUCT-9	57.00	66.88	66.61	0.4700	18.000	0.0130	1.72	7.23	0.24	4.79	0.53	0.35	0.00	Calculated
13	Link-24	Pipe	STRUCT-156	STRUCT-157	32.00	62.45	62.34	0.3400	18.000	0.0130	0.00	6.16	0.00	0.00	0.00	0.00	0.00	Calculated
14	Link-26	Pipe	STRUCT -133	STRUCT-134	57.00	58.69	58.58	0.1900	24.000	0.0130	0.00	9.94	0.00	0.00	0.00	0.00	0.00	Calculated
15	Link-27	Pipe	STRUCT-134	POND-2	89.00	58.58	58.40	0.2000	24.000	0.0130	0.00	10.17	0.00	0.00	0.00	0.00	0.00	Calculated
16	Link-28	Pipe	STRUCT-120	STRUCT-121	57.00	61.30	61.19	0.1900	24.000	0.0150	0.00	8.61	0.00	0.00	0.00	0.00	0.00	Calculated
17	Link-29	Pipe	STRUCT-121	POND -1	64.00	61.19	61.00	0.3000	24.000	0.0150	0.00	10.68	0.00	0.00	0.00	0.00	0.00	Calculated
18	Link-30	Pipe	STRUCT-125	STRUCTURE45	285.00	64.79	64.21	0.2000	24.000	0.0120	11.03	11.06	1.00	3.69	1.81	0.91	0.00	Calculated
19	PIPE-1	Pipe	STRUCT-12	STRUCT-11	50.00	74.38	72.59	3.5800	18.000	0.0130	2.37	5.94	0.40	5.07	0.76	0.51	0.00	Calculated
20	DITCH-153	Channel	STRUCT-11	STRUCT-153	654.32	72.43	70.36	0.3200	24.000	0.0320	1.11	70.48	0.02	1.23	0.24	0.12	0.00	
21	Link-18	Channel	STRUCT-9	STRUCT-131	588.10	66.61	64.37	0.3800	24.000	0.0320	0.70	56.63	0.01	0.92	0.21	0.10	0.00	
22	Link-25	Channel	STRUCT-157	STRUCT -133	200.00	62.34	61.98	0.1800	24.000	0.0320	0.00	38.93	0.00	0.00	0.00	0.00	0.00	

Subbasin Hydrology

Subbasin : Sub-03

Input Data

Area (ac) 0.67
Weighted Runoff Coefficient 0.5800

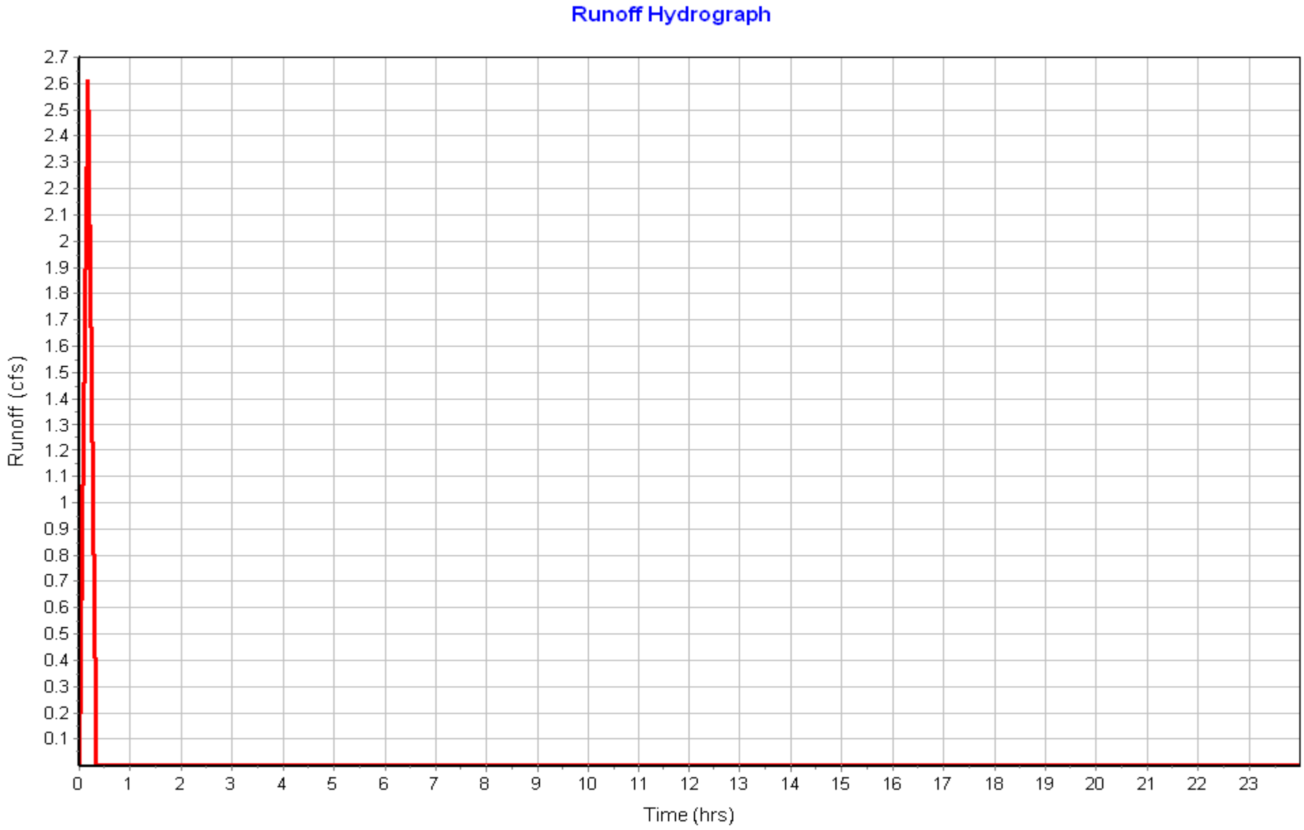
Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.31	-	0.90
-	0.36	-	0.30
Composite Area & Weighted Runoff Coeff.	0.67		0.58

Subbasin Runoff Results

Total Rainfall (in) 1.12
Total Runoff (in) 0.65
Peak Runoff (cfs) 2.61
Rainfall Intensity 6.710
Weighted Runoff Coefficient 0.5800
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : Sub-03



Subbasin : Sub-05

Input Data

Area (ac) 1.28
Weighted Runoff Coefficient 0.4700

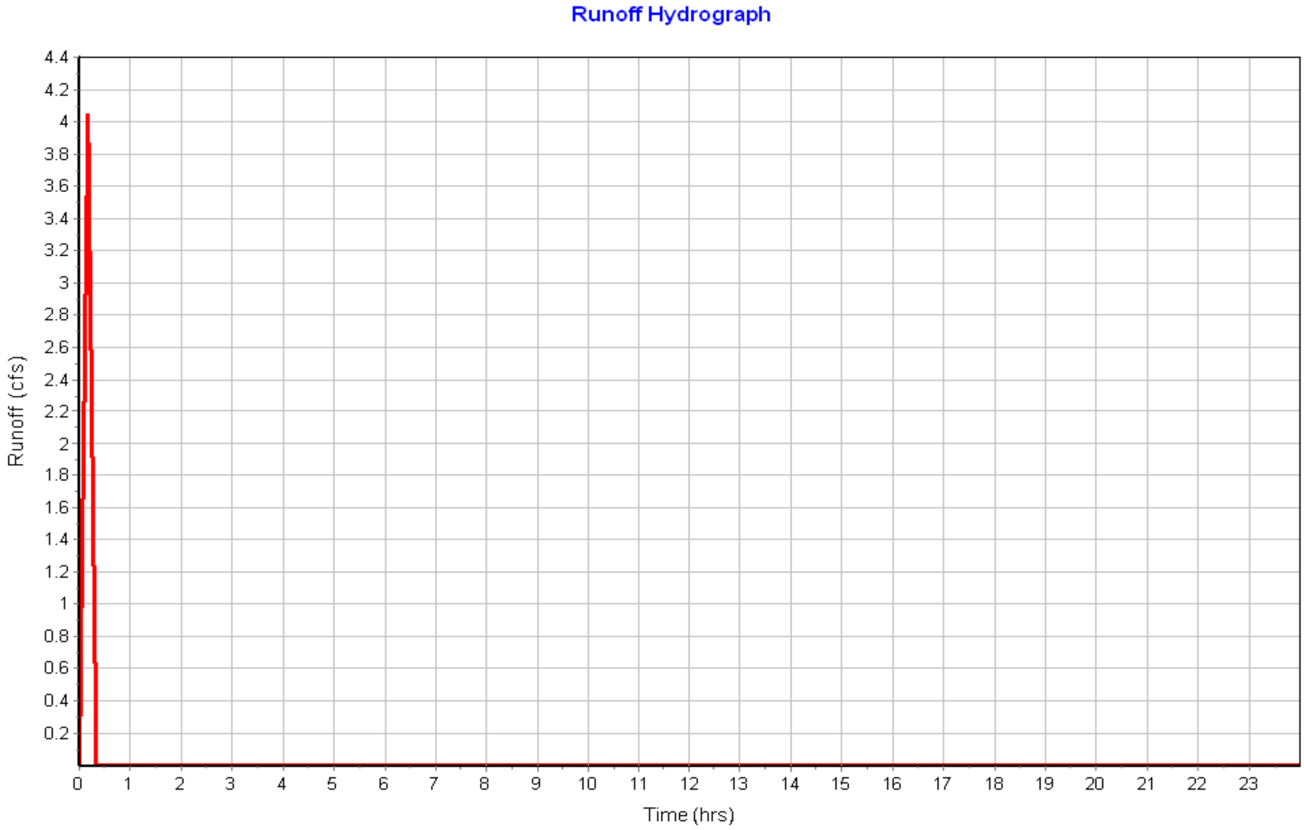
Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.36	-	0.90
-	0.92	-	0.30
Composite Area & Weighted Runoff Coeff.	1.28		0.47

Subbasin Runoff Results

Total Rainfall (in) 1.12
Total Runoff (in) 0.53
Peak Runoff (cfs) 4.04
Rainfall Intensity 6.710
Weighted Runoff Coefficient 0.4700
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : Sub-05



Subbasin : Sub-06

Input Data

Area (ac) 0.39
Weighted Runoff Coefficient 0.4700

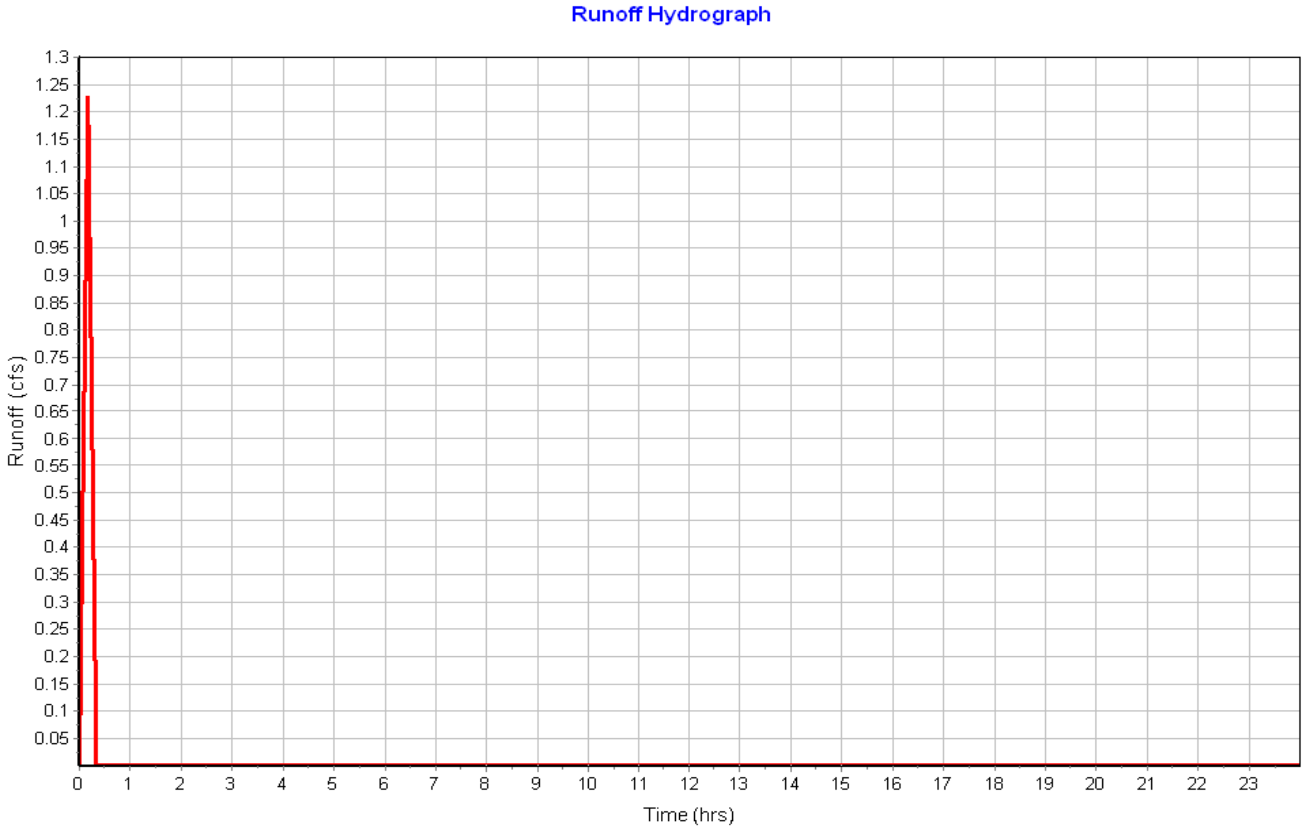
Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.11	-	0.90
-	0.28	-	0.30
Composite Area & Weighted Runoff Coeff.	0.39		0.47

Subbasin Runoff Results

Total Rainfall (in) 1.12
Total Runoff (in) 0.53
Peak Runoff (cfs) 1.23
Rainfall Intensity 6.710
Weighted Runoff Coefficient 0.4700
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : Sub-06



Subbasin : Sub-07

Input Data

Area (ac) 0.39
Weighted Runoff Coefficient 0.4700

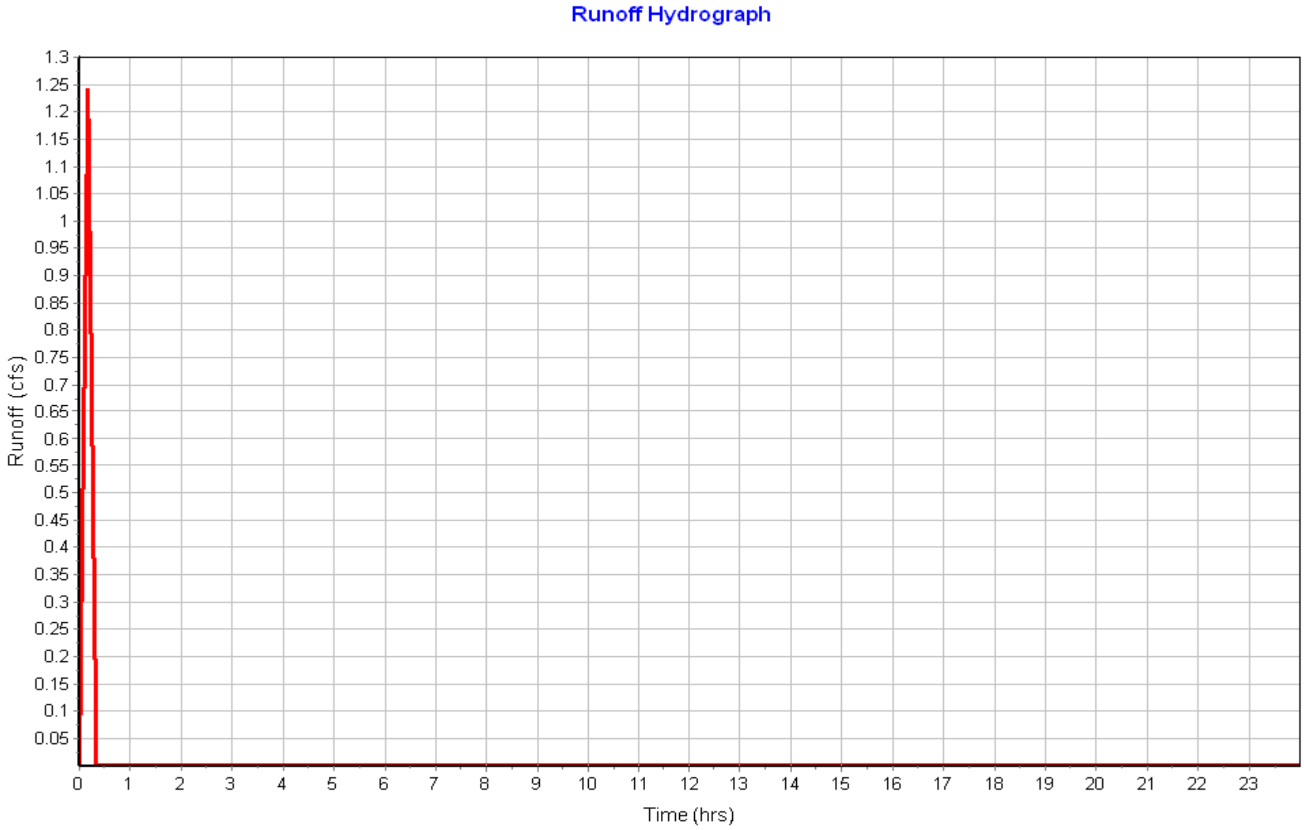
Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.11	-	0.90
-	0.28	-	0.30
Composite Area & Weighted Runoff Coeff.	0.39		0.47

Subbasin Runoff Results

Total Rainfall (in) 1.12
Total Runoff (in) 0.53
Peak Runoff (cfs) 1.24
Rainfall Intensity 6.710
Weighted Runoff Coefficient 0.4700
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : Sub-07



Subbasin : Sub-08

Input Data

Area (ac) 0.39
Weighted Runoff Coefficient 0.4000

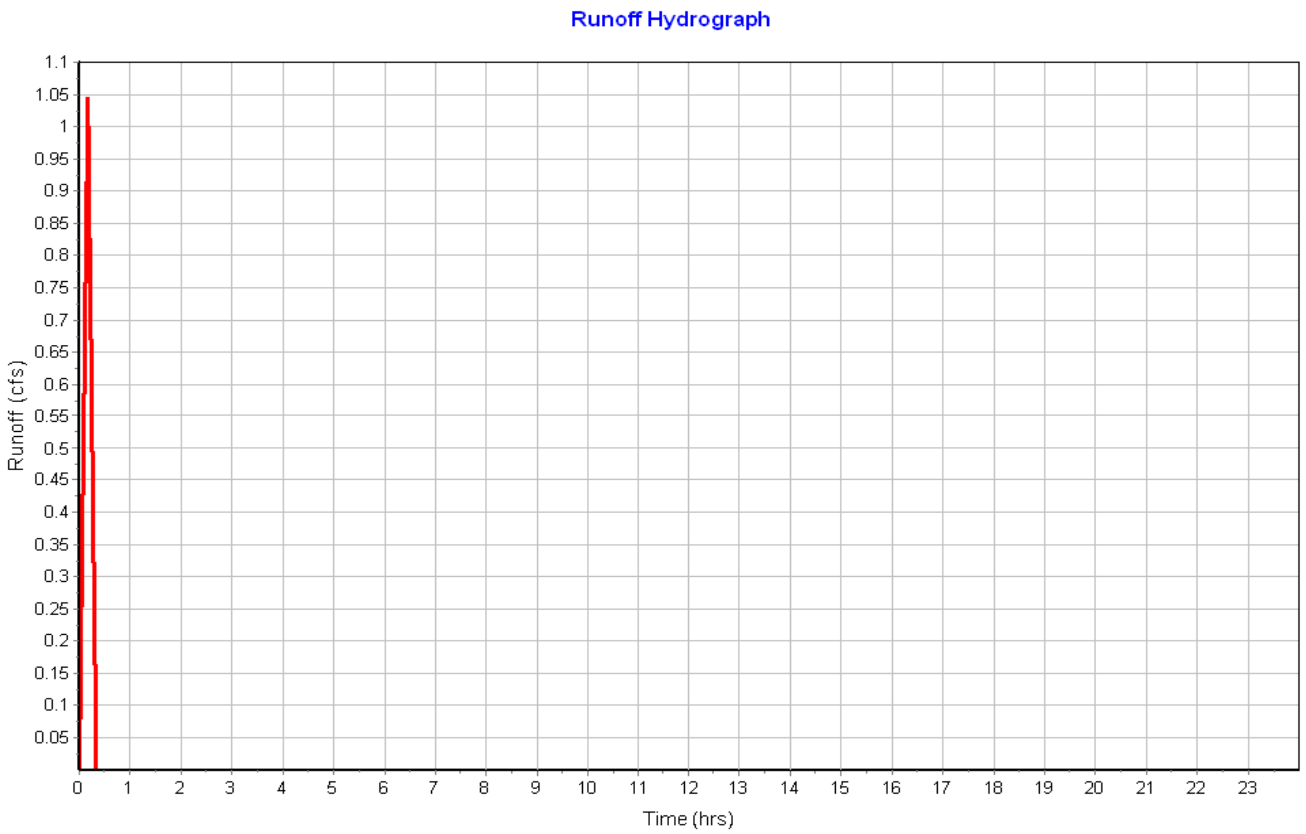
Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.11	-	0.90
-	0.28	-	0.20
Composite Area & Weighted Runoff Coeff.	0.39		0.40

Subbasin Runoff Results

Total Rainfall (in) 1.12
Total Runoff (in) 0.45
Peak Runoff (cfs) 1.04
Rainfall Intensity 6.710
Weighted Runoff Coefficient 0.4000
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : Sub-08



Subbasin : Sub-09

Input Data

Area (ac) 1.17
Weighted Runoff Coefficient 0.5700

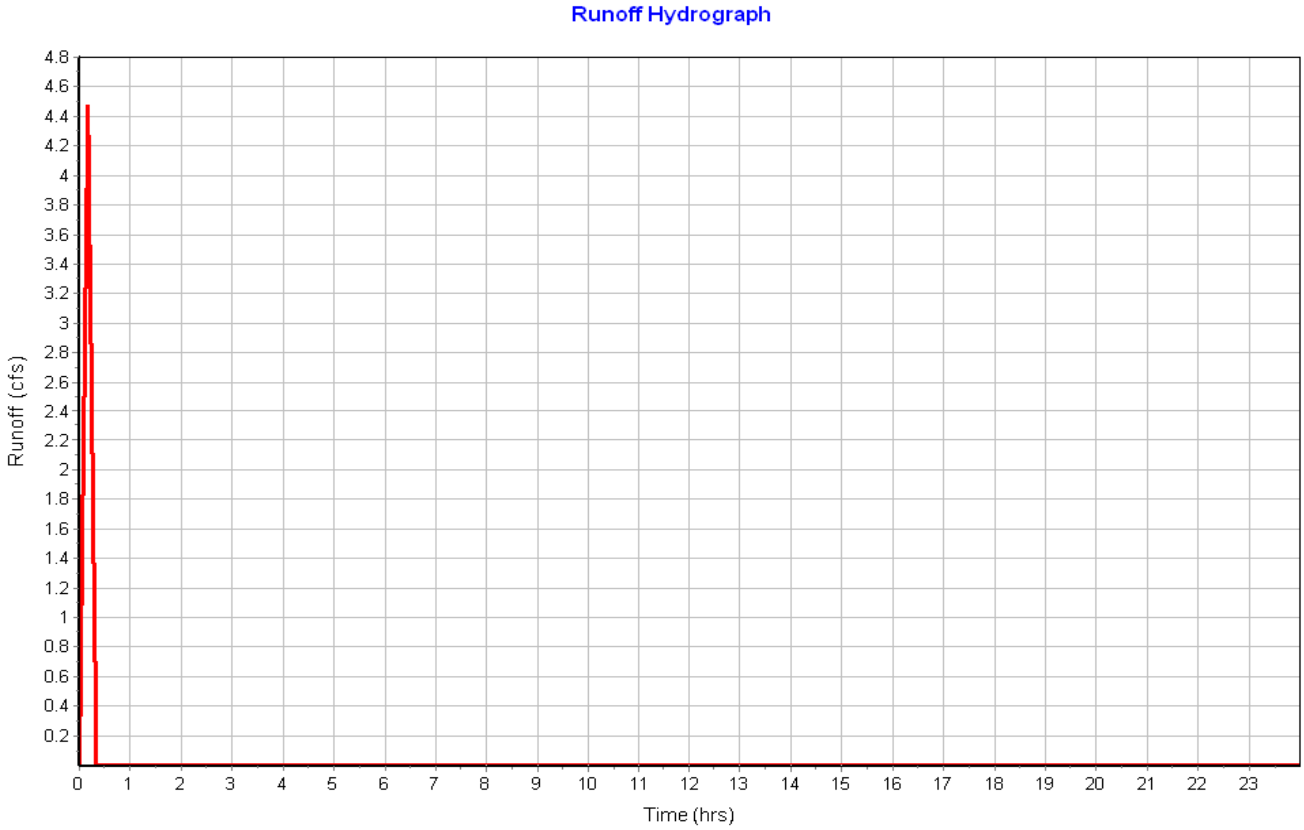
Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.52	-	0.90
-	0.65	-	0.30
Composite Area & Weighted Runoff Coeff.	1.17		0.57

Subbasin Runoff Results

Total Rainfall (in) 1.12
Total Runoff (in) 0.64
Peak Runoff (cfs) 4.46
Rainfall Intensity 6.710
Weighted Runoff Coefficient 0.5700
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : Sub-09



Subbasin : Sub-10

Input Data

Area (ac) 0.26
Weighted Runoff Coefficient 0.4500

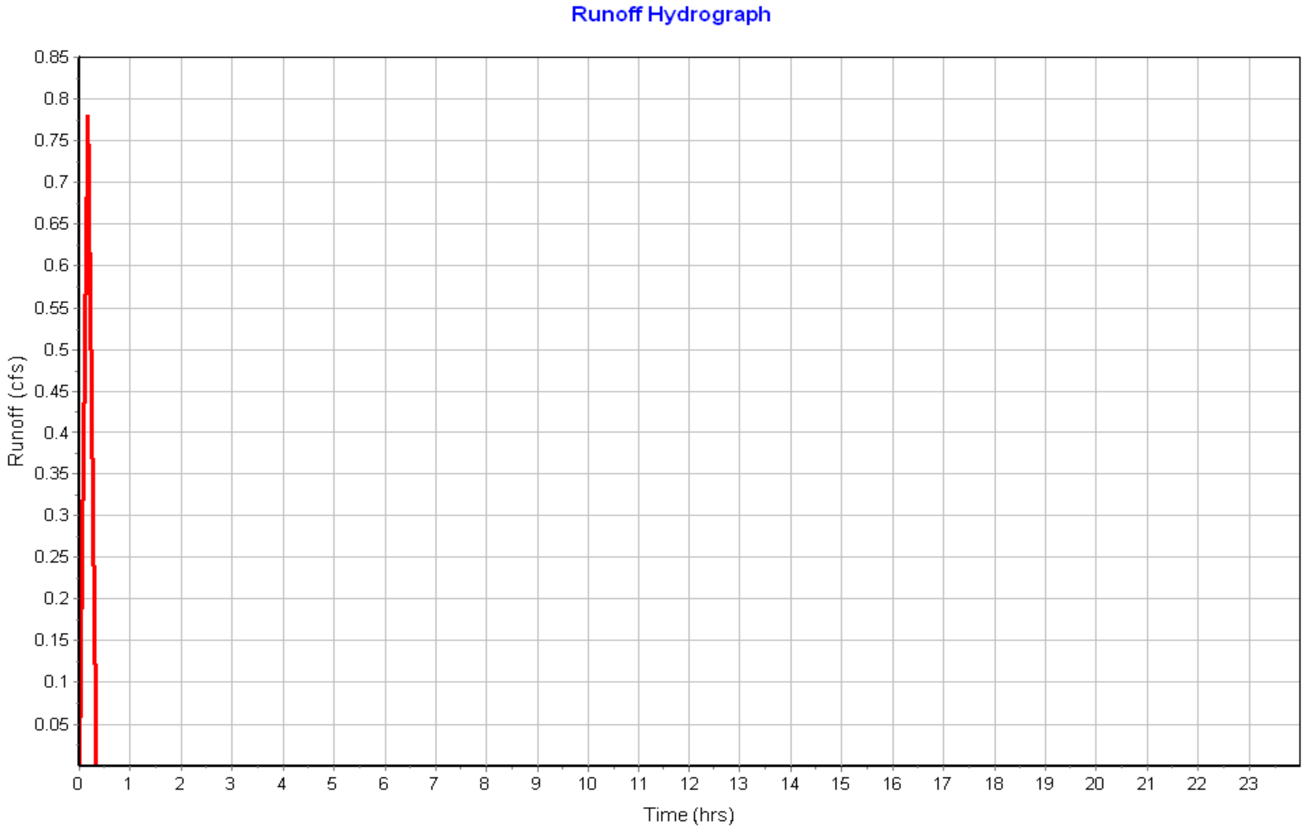
Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.19	-	0.30
-	0.06	-	0.90
Composite Area & Weighted Runoff Coeff.	0.25		0.45

Subbasin Runoff Results

Total Rainfall (in) 1.12
Total Runoff (in) 0.50
Peak Runoff (cfs) 0.78
Rainfall Intensity 6.710
Weighted Runoff Coefficient 0.4500
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : Sub-10



Subbasin : Sub-11

Input Data

Area (ac) 0.89
Weighted Runoff Coefficient 0.5800

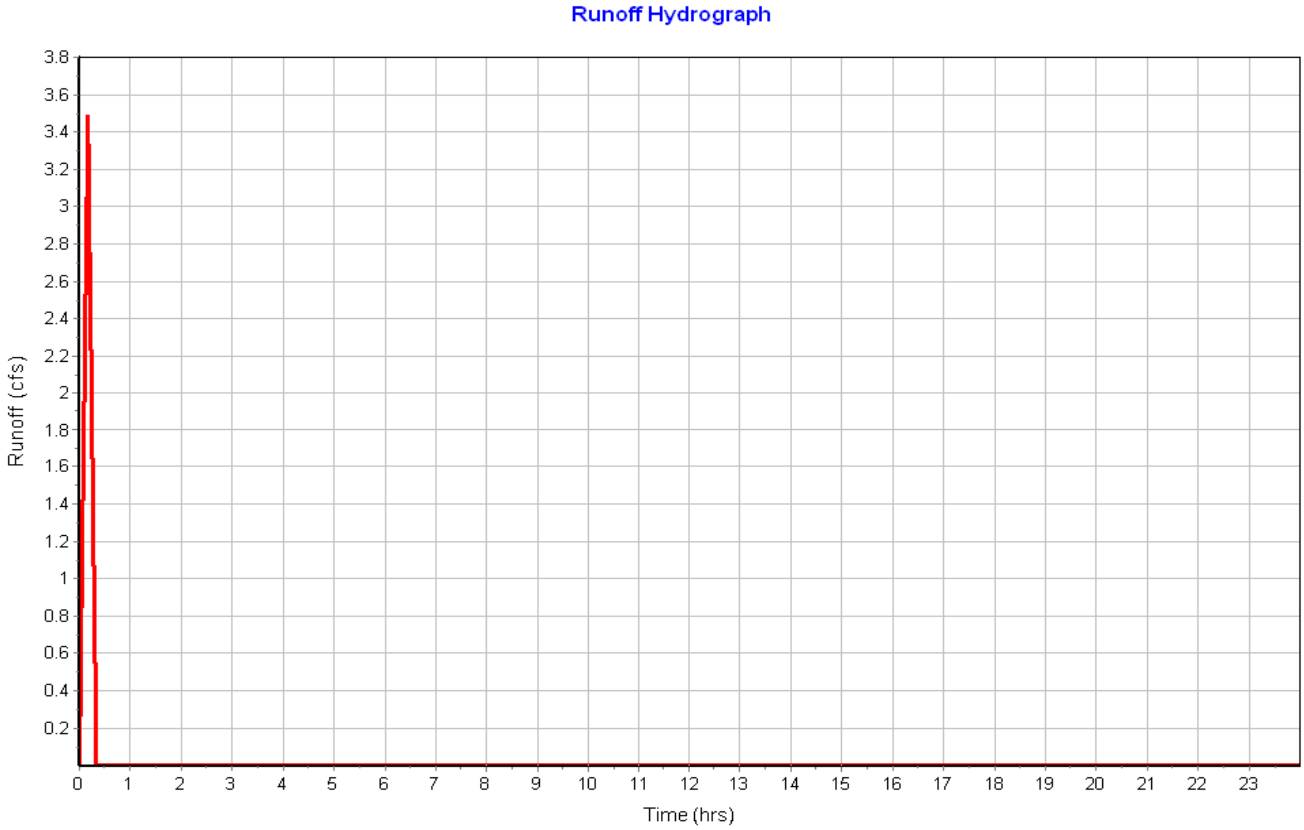
Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.42	-	0.90
-	0.48	-	0.30
Composite Area & Weighted Runoff Coeff.	0.90		0.58

Subbasin Runoff Results

Total Rainfall (in) 1.12
Total Runoff (in) 0.65
Peak Runoff (cfs) 3.48
Rainfall Intensity 6.710
Weighted Runoff Coefficient 0.5800
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : Sub-11



Subbasin : Sub-12

Input Data

Area (ac) 0.61
Weighted Runoff Coefficient 0.5800

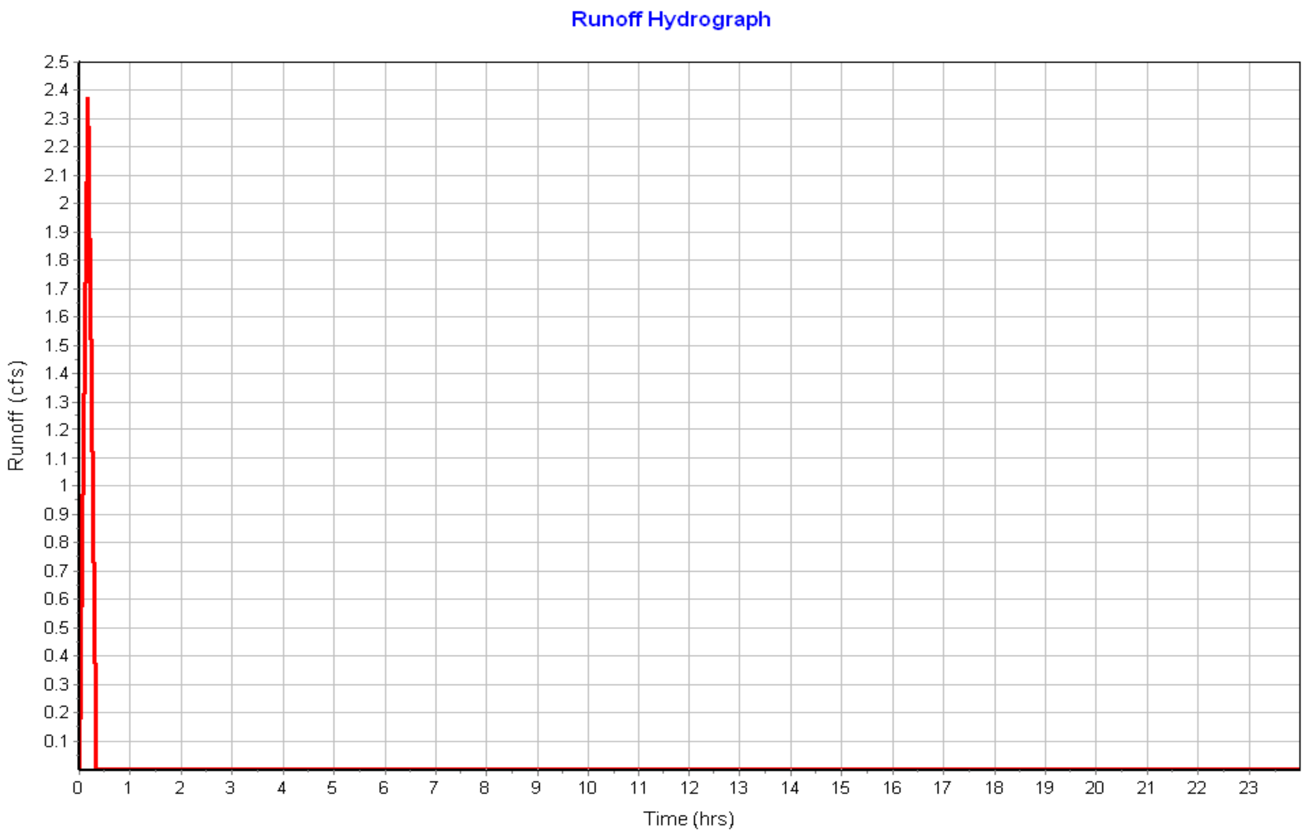
Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.29	-	0.90
-	0.32	-	0.30
Composite Area & Weighted Runoff Coeff.	0.61		0.58

Subbasin Runoff Results

Total Rainfall (in) 1.12
Total Runoff (in) 0.65
Peak Runoff (cfs) 2.37
Rainfall Intensity 6.710
Weighted Runoff Coefficient 0.5800
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : Sub-12



Subbasin : Sub-13

Input Data

Area (ac) 0.69
Weighted Runoff Coefficient 0.4900

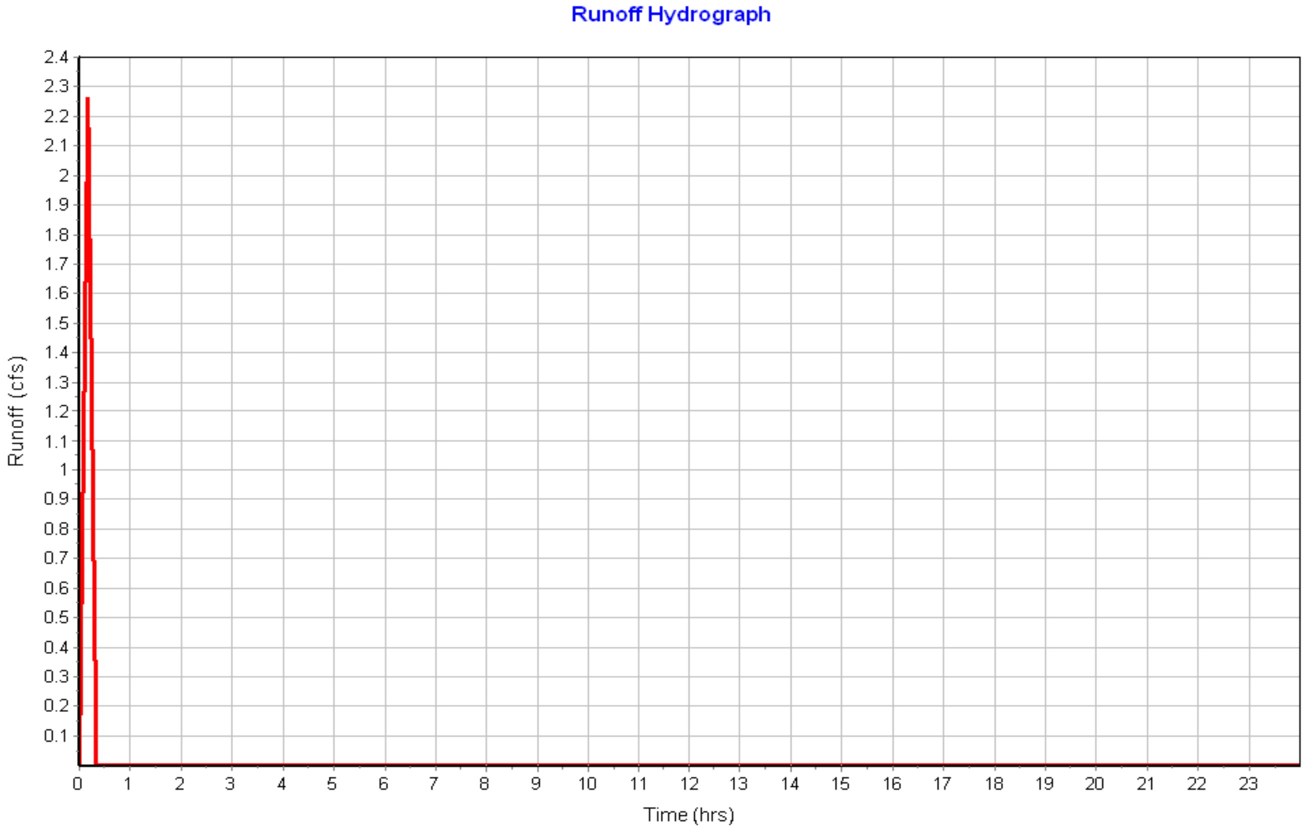
Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.21	-	0.90
-	0.47	-	0.30
Composite Area & Weighted Runoff Coeff.	0.68		0.49

Subbasin Runoff Results

Total Rainfall (in) 1.12
Total Runoff (in) 0.55
Peak Runoff (cfs) 2.26
Rainfall Intensity 6.710
Weighted Runoff Coefficient 0.4900
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : Sub-13



Subbasin : Sub-14

Input Data

Area (ac) 0.42
Weighted Runoff Coefficient 0.6100

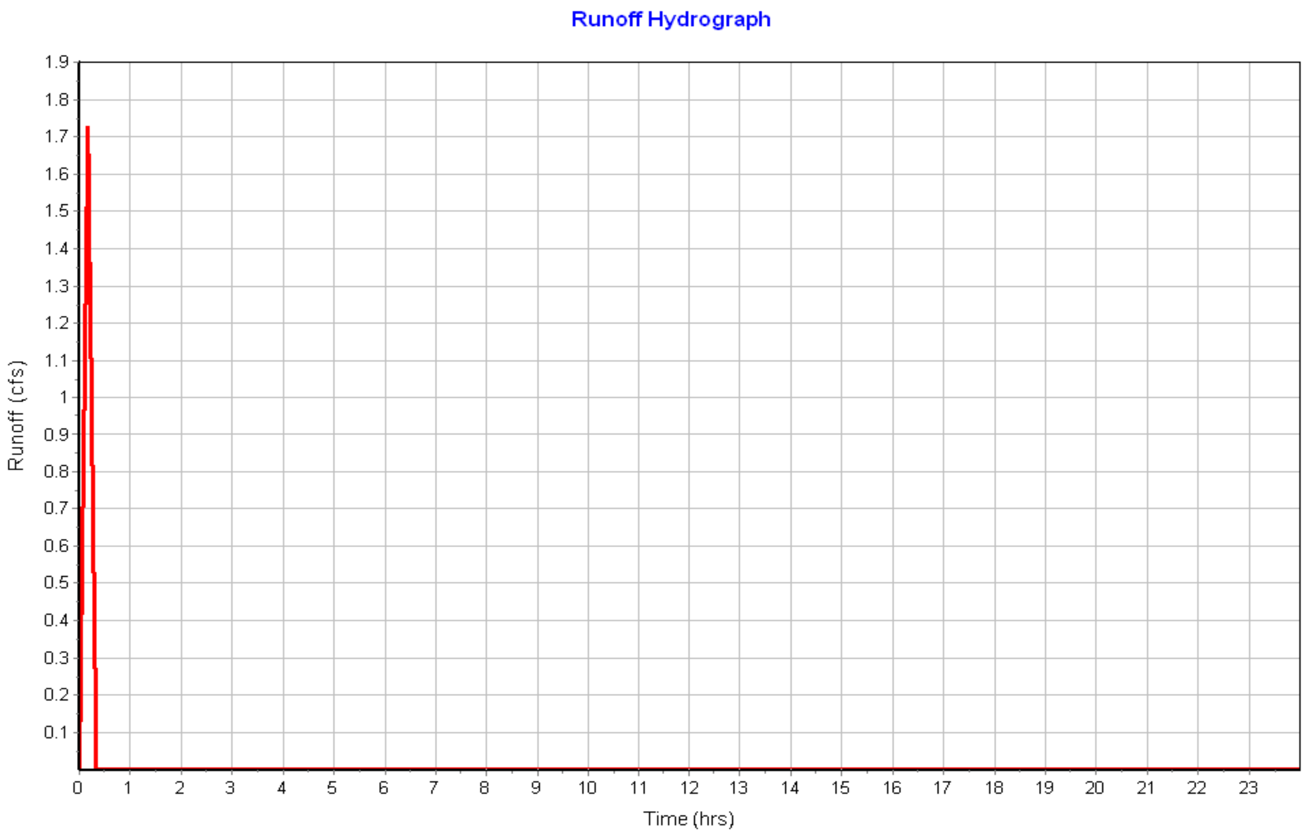
Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.22	-	0.90
-	0.20	-	0.30
Composite Area & Weighted Runoff Coeff.	0.42		0.61

Subbasin Runoff Results

Total Rainfall (in) 1.12
Total Runoff (in) 0.68
Peak Runoff (cfs) 1.72
Rainfall Intensity 6.710
Weighted Runoff Coefficient 0.6100
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : Sub-14



Subbasin : Sub-15

Input Data

Area (ac) 1.39
Weighted Runoff Coefficient 0.4400

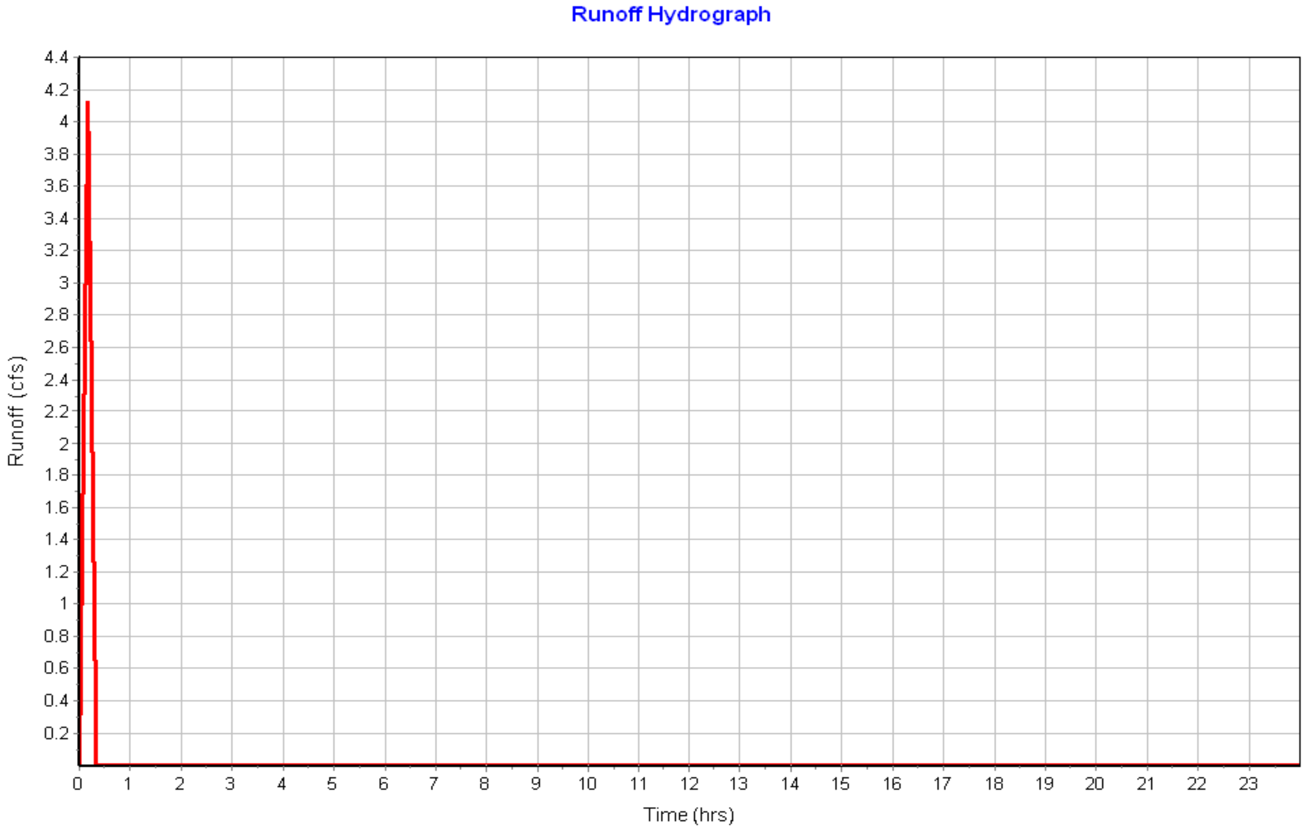
Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.33	-	0.90
-	1.06	-	0.30
Composite Area & Weighted Runoff Coeff.	1.39		0.44

Subbasin Runoff Results

Total Rainfall (in) 1.12
Total Runoff (in) 0.49
Peak Runoff (cfs) 4.12
Rainfall Intensity 6.710
Weighted Runoff Coefficient 0.4400
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : Sub-15



Subbasin : Sub-16

Input Data

Area (ac) 1.13
Weighted Runoff Coefficient 0.5800

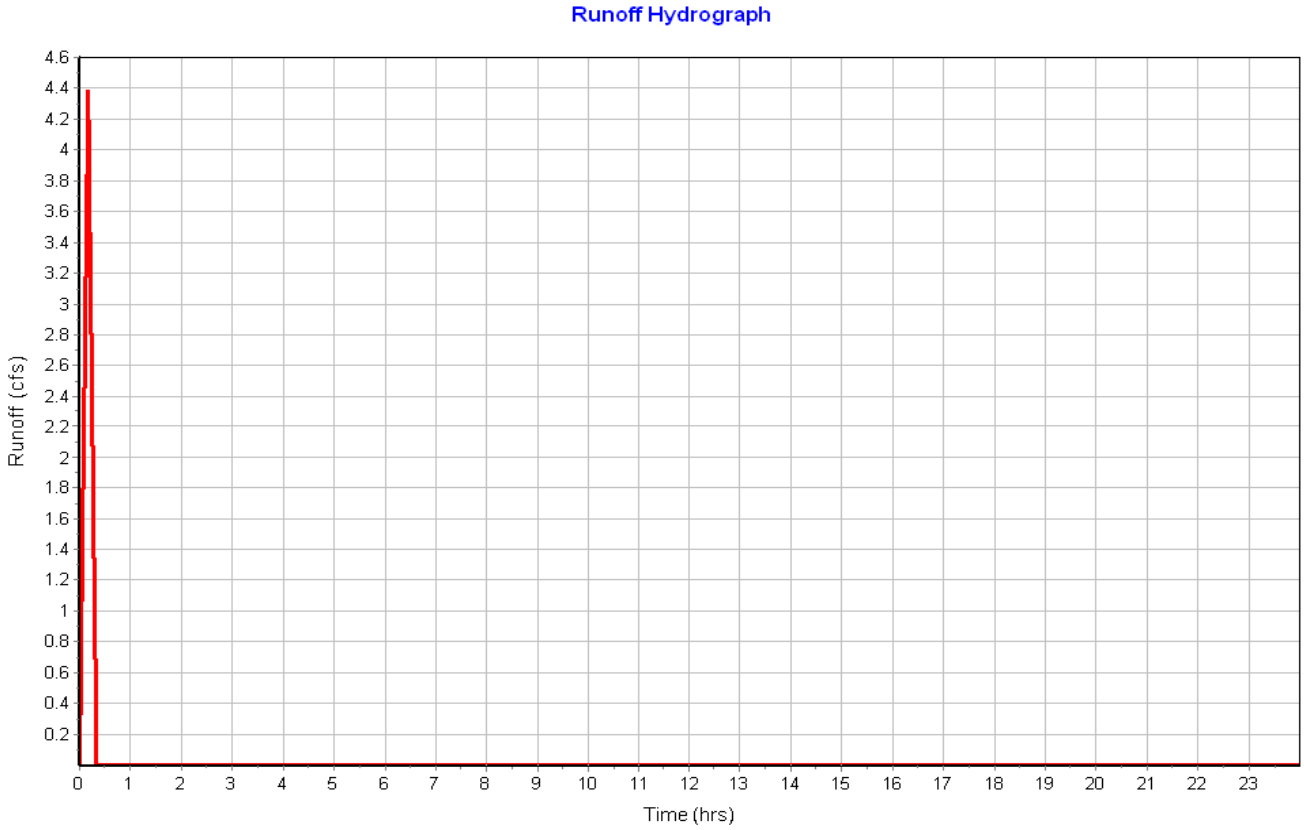
Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.53	-	0.90
-	0.60	-	0.30
Composite Area & Weighted Runoff Coeff.	1.13		0.58

Subbasin Runoff Results

Total Rainfall (in) 1.12
Total Runoff (in) 0.65
Peak Runoff (cfs) 4.38
Rainfall Intensity 6.710
Weighted Runoff Coefficient 0.5800
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : Sub-16



Subbasin : Sub-17

Input Data

Area (ac) 1.05
Weighted Runoff Coefficient 0.4800

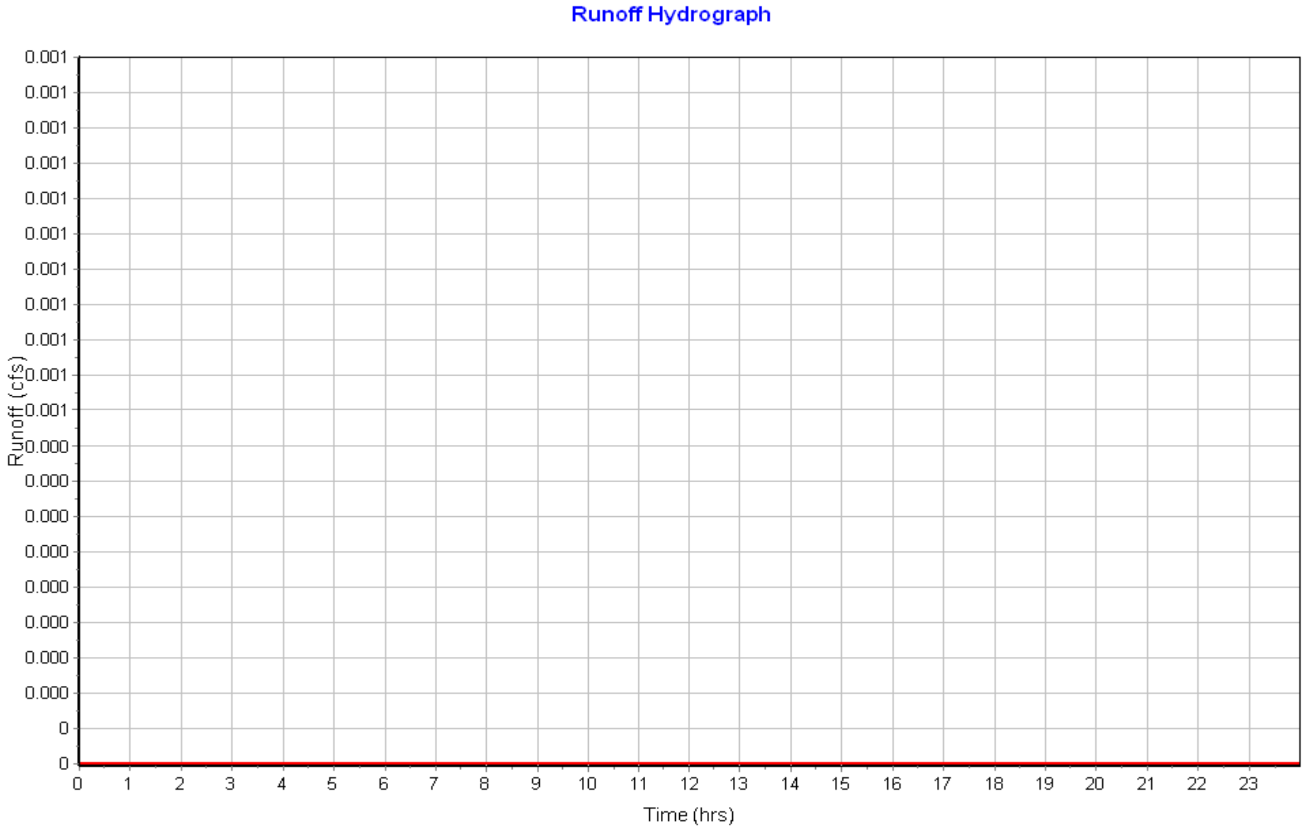
Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.32	-	0.90
-	0.73	-	0.30
Composite Area & Weighted Runoff Coeff.	1.05		0.48

Subbasin Runoff Results

Total Rainfall (in) 0.00
Total Runoff (in) 0.00
Peak Runoff (cfs) 3.37
Rainfall Intensity 6.710
Weighted Runoff Coefficient 0.4800
Time of Concentration (days hh:mm:ss) 0 00:00:00

Subbasin : Sub-17



Subbasin : Sub-18

Input Data

Area (ac) 1.03
Weighted Runoff Coefficient 0.4800

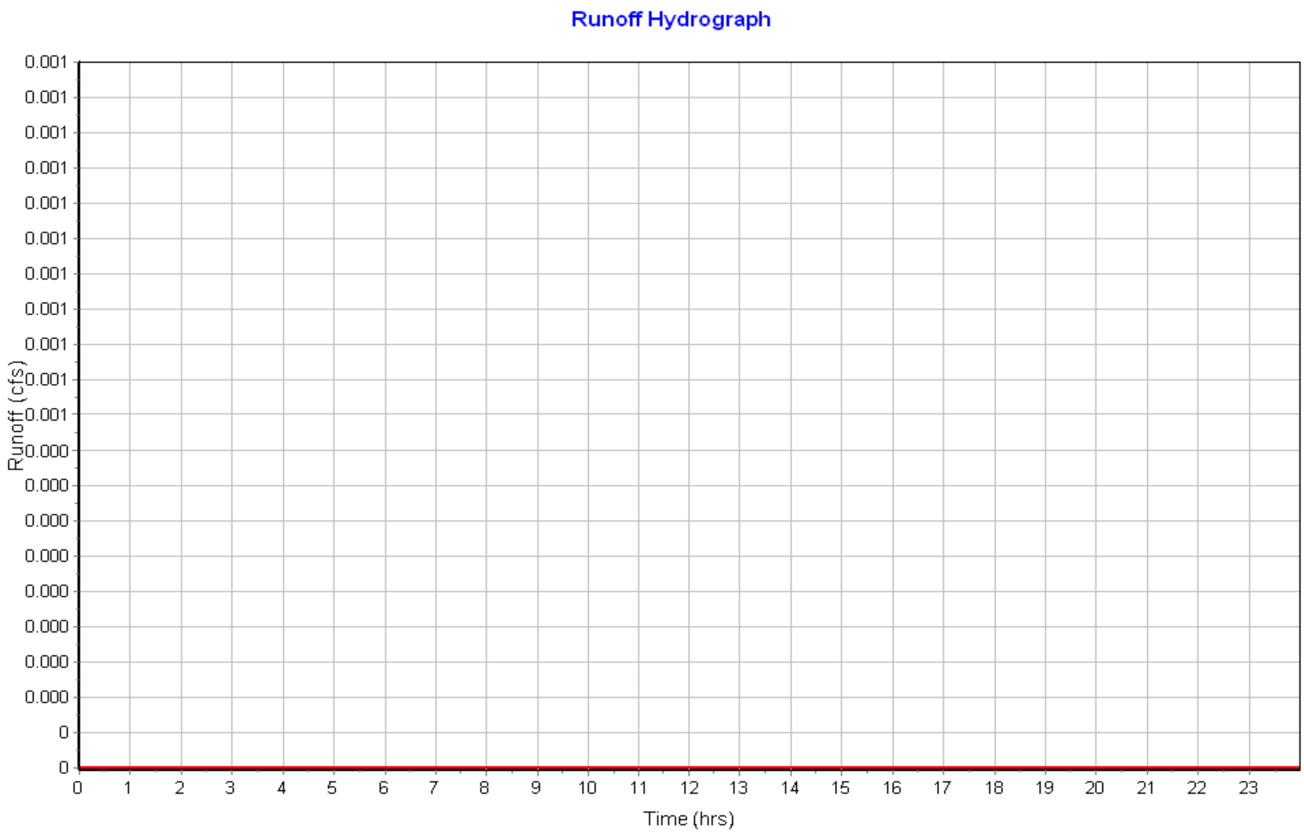
Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.31	-	0.90
-	0.71	-	0.30
Composite Area & Weighted Runoff Coeff.	1.02		0.48

Subbasin Runoff Results

Total Rainfall (in) 0.00
Total Runoff (in) 0.00
Peak Runoff (cfs) 3.31
Rainfall Intensity 6.710
Weighted Runoff Coefficient 0.4800
Time of Concentration (days hh:mm:ss) 0 00:00:00

Subbasin : Sub-18



Subbasin : Sub-19

Input Data

Area (ac) 2.02
Weighted Runoff Coefficient 0.5600

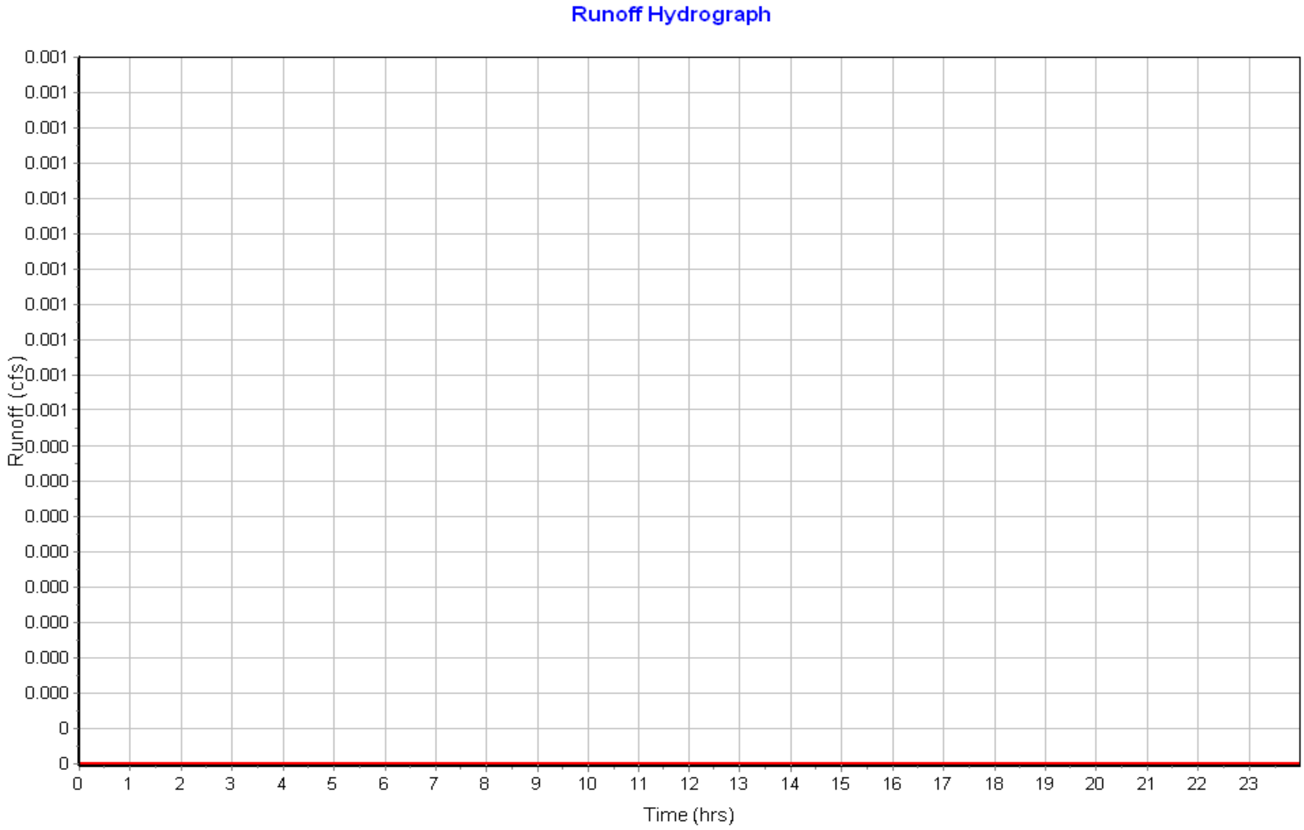
Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.88	-	0.90
-	1.14	-	0.30
Composite Area & Weighted Runoff Coeff.	2.02		0.56

Subbasin Runoff Results

Total Rainfall (in) 0.00
Total Runoff (in) 0.00
Peak Runoff (cfs) 7.58
Rainfall Intensity 6.710
Weighted Runoff Coefficient 0.5600
Time of Concentration (days hh:mm:ss) 0 00:00:00

Subbasin : Sub-19



Subbasin : Sub-20

Input Data

Area (ac) 0.98
Weighted Runoff Coefficient 0.5800

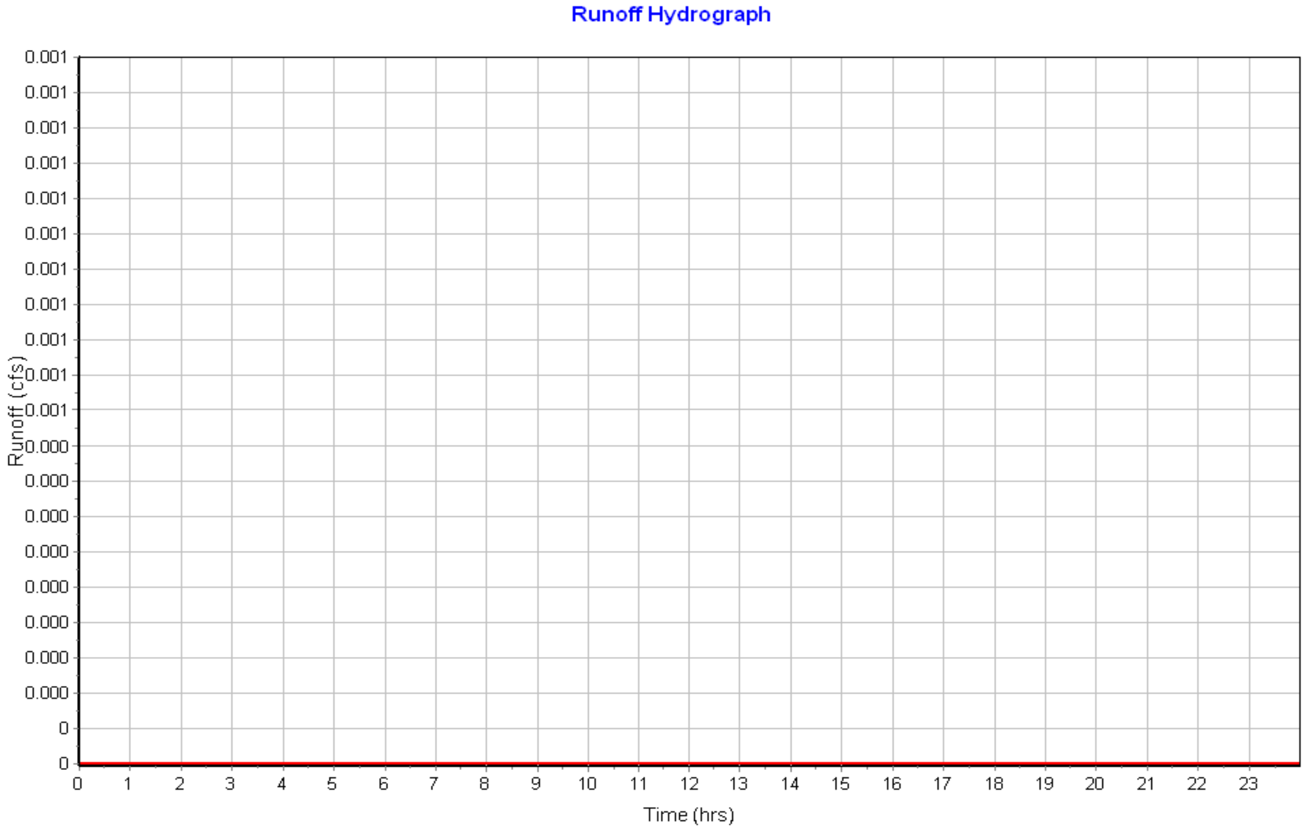
Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.45	-	0.90
-	0.53	-	0.30
Composite Area & Weighted Runoff Coeff.	0.98		0.58

Subbasin Runoff Results

Total Rainfall (in) 0.00
Total Runoff (in) 0.00
Peak Runoff (cfs) 3.83
Rainfall Intensity 6.710
Weighted Runoff Coefficient 0.5800
Time of Concentration (days hh:mm:ss) 0 00:00:00

Subbasin : Sub-20



Subbasin : Sub-21

Input Data

Area (ac) 0.95
Weighted Runoff Coefficient 0.4800

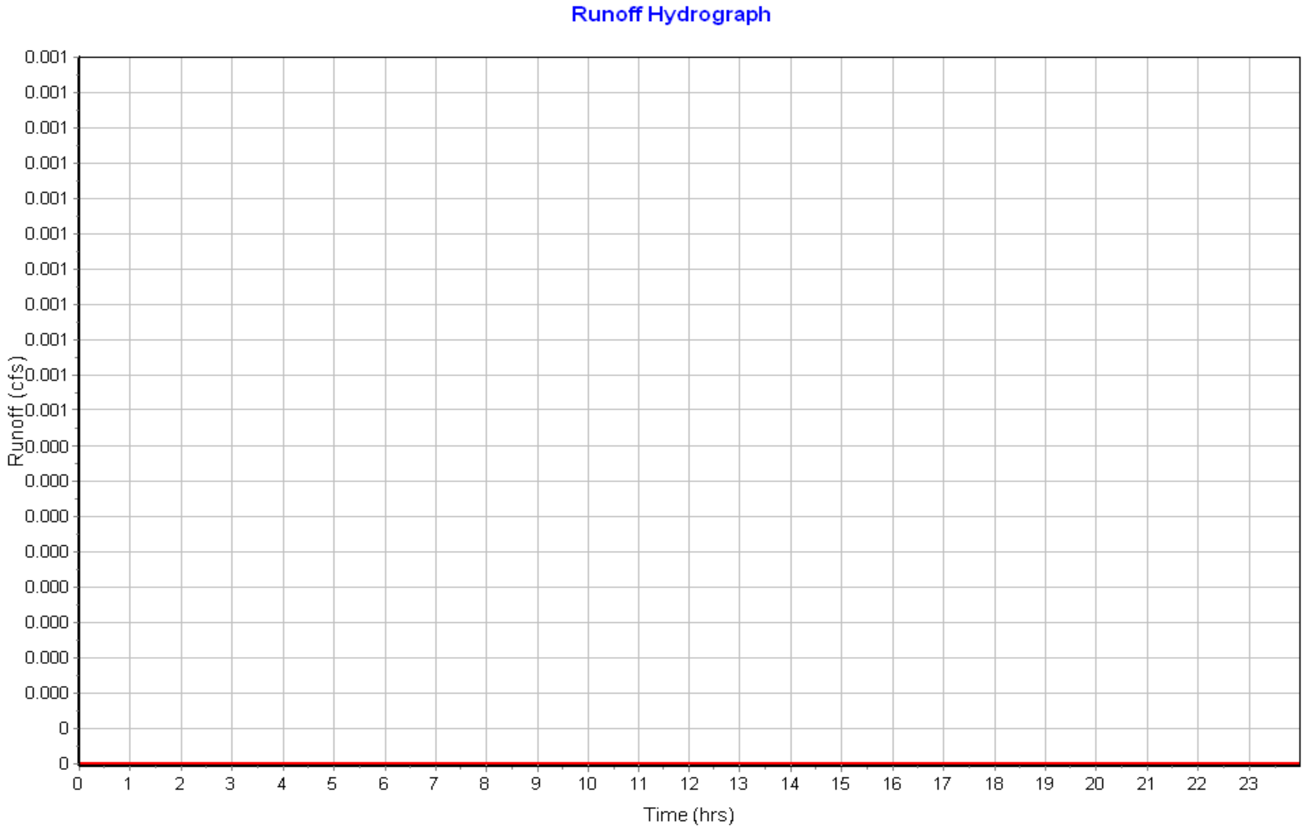
Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.29	-	0.90
-	0.66	-	0.30
Composite Area & Weighted Runoff Coeff.	0.95		0.48

Subbasin Runoff Results

Total Rainfall (in) 0.00
Total Runoff (in) 0.00
Peak Runoff (cfs) 3.05
Rainfall Intensity 6.710
Weighted Runoff Coefficient 0.4800
Time of Concentration (days hh:mm:ss) 0 00:00:00

Subbasin : Sub-21



Subbasin : Sub-22

Input Data

Area (ac) 0.28
Weighted Runoff Coefficient 0.4700

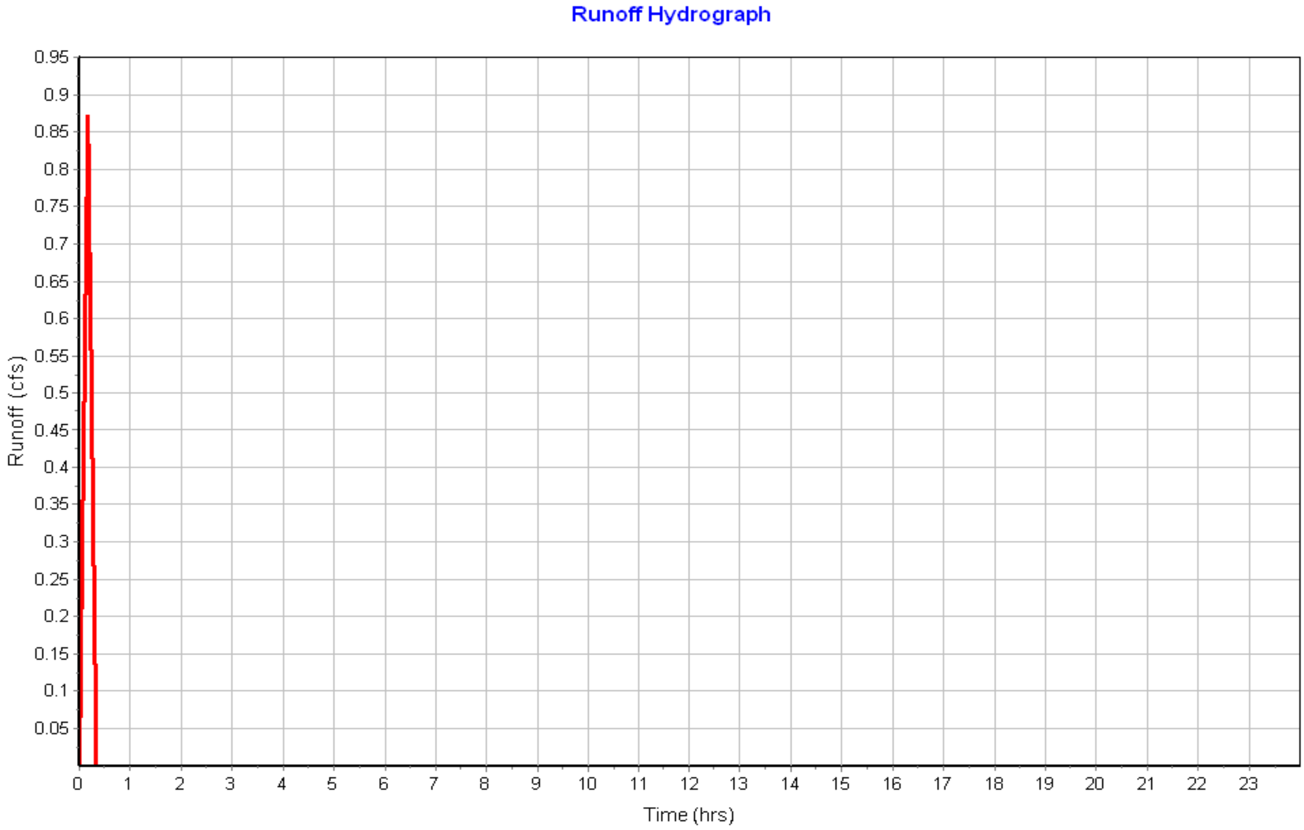
Runoff Coefficient

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.08	-	0.90
-	0.20	-	0.30
Composite Area & Weighted Runoff Coeff.	0.28		0.47

Subbasin Runoff Results

Total Rainfall (in) 1.12
Total Runoff (in) 0.53
Peak Runoff (cfs) 0.87
Rainfall Intensity 6.710
Weighted Runoff Coefficient 0.4700
Time of Concentration (days hh:mm:ss) 0 00:10:00

Subbasin : Sub-22



Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Minimum Pipe Cover (in)
1	STRUCT -133	58.69	61.98	3.29	0.00	-58.69	0.00	-61.98	0.00	0.00
2	STRUCT-10	66.88	68.67	1.79	0.00	-66.88	0.00	-68.67	0.00	0.00
3	STRUCT-11	74.22	72.43	-1.79	0.00	-74.22	0.00	-72.43	0.00	0.00
4	STRUCT-117	63.90	66.87	2.97	0.00	-63.90	6.00	-60.87	0.00	0.00
5	STRUCT-118	63.90	66.87	2.97	0.00	-63.90	0.00	-66.87	0.00	0.00
6	STRUCT-12	72.59	74.38	1.79	0.00	-72.59	0.00	-74.38	0.00	0.00
7	STRUCT-120	61.30	64.51	3.21	0.00	-61.30	0.00	-64.51	0.00	0.00
8	STRUCT-121	61.19	64.09	2.90	0.00	-61.19	0.00	-64.09	0.00	0.00
9	STRUCT-125	63.50	69.09	5.59	0.00	-63.50	0.00	-69.09	0.00	0.00
10	STRUCT-126	66.50	69.51	3.01	0.00	-66.50	0.00	-69.51	0.00	0.00
11	STRUCT-130	60.67	64.84	4.17	0.00	-60.67	0.00	-64.84	0.00	0.00
12	STRUCT-131	60.56	64.37	3.81	0.00	-60.56	0.00	-64.37	0.00	0.00
13	STRUCT-134	58.58	62.40	3.82	0.00	-58.58	0.00	-62.40	0.00	0.00
14	STRUCT-147	64.30	66.80	2.50	0.00	-64.30	0.00	-66.80	0.00	0.00
15	STRUCT-152	65.90	69.94	4.04	0.00	-65.90	0.00	-69.94	0.00	0.00
16	STRUCT-153	67.30	70.36	3.06	0.00	-67.30	0.00	-70.36	0.00	0.00
17	STRUCT-154	65.10	71.05	5.95	0.00	-65.10	0.00	-71.05	0.00	0.00
18	STRUCT-155	64.30	70.79	6.49	0.00	-64.30	0.00	-70.79	0.00	0.00
19	STRUCT-156	62.45	64.78	2.33	0.00	-62.45	0.00	-64.78	0.00	0.00
20	STRUCT-157	62.34	64.67	2.33	0.00	-62.34	0.00	-64.67	0.00	0.00
21	STRUCT-9	66.61	68.40	1.79	0.00	-66.61	0.00	-68.40	0.00	0.00
22	STRUCTURE45	63.10	68.34	5.24	0.00	-63.10	0.00	-68.34	0.00	0.00

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	STRUCT -133	0.00	0.00	58.69	0.00	0.00	5.29	58.69	0.00	0 00:00	0 00:00	0.00	0.00
2	STRUCT-10	1.72	1.72	67.91	1.03	0.00	0.76	66.89	0.01	0 00:04	0 00:00	0.00	0.00
3	STRUCT-11	2.37	0.00	74.55	0.33	0.00	1.67	74.23	0.01	0 00:15	0 00:00	0.00	0.00
4	STRUCT-117	3.48	3.48	65.49	1.59	0.00	1.38	64.21	0.31	0 00:10	0 00:00	0.00	0.00
5	STRUCT-118	6.23	2.26	65.44	1.54	0.00	1.43	64.11	0.21	0 00:10	0 00:00	0.00	0.00
6	STRUCT-12	2.37	2.37	75.88	3.29	0.00	0.00	74.39	1.80	0 00:04	0 00:04	0.00	0.00
7	STRUCT-120	0.00	0.00	61.30	0.00	0.00	3.21	61.30	0.00	0 00:00	0 00:00	0.00	0.00
8	STRUCT-121	0.00	0.00	61.19	0.00	0.00	2.90	61.19	0.00	0 00:00	0 00:00	0.00	0.00
9	STRUCT-125	11.30	1.23	66.68	3.18	0.00	2.41	64.83	1.33	0 00:14	0 00:00	0.00	0.00
10	STRUCT-126	4.46	4.46	66.96	0.46	0.00	2.55	66.50	0.00	0 00:10	0 00:00	0.00	0.00
11	STRUCT-130	4.11	4.11	62.37	1.70	0.00	2.47	60.69	0.02	0 00:10	0 00:00	0.00	0.00
12	STRUCT-131	8.70	4.37	62.33	1.77	0.00	4.04	60.59	0.03	0 00:10	0 00:00	0.00	0.00
13	STRUCT-134	0.00	0.00	58.58	0.00	0.00	3.82	58.58	0.00	0 00:00	0 00:00	0.00	0.00
14	STRUCT-147	0.78	0.78	65.47	1.17	0.00	1.33	64.39	0.09	0 00:10	0 00:00	0.00	0.00
15	STRUCT-152	7.14	4.03	68.43	2.53	0.00	1.51	67.21	1.31	0 00:11	0 00:00	0.00	0.00
16	STRUCT-153	3.22	2.61	68.48	1.18	0.00	3.88	67.33	0.03	0 00:11	0 00:00	0.00	0.00
17	STRUCT-154	7.96	1.24	67.71	2.61	0.00	3.34	66.42	1.32	0 00:12	0 00:00	0.00	0.00
18	STRUCT-155	8.38	1.04	67.12	2.82	0.00	3.67	65.62	1.32	0 00:14	0 00:00	0.00	0.00
19	STRUCT-156	0.00	0.00	62.45	0.00	0.00	2.33	62.45	0.00	0 00:00	0 00:00	0.00	0.00
20	STRUCT-157	0.00	0.00	62.34	0.00	0.00	2.33	62.34	0.00	0 00:00	0 00:00	0.00	0.00
21	STRUCT-9	1.72	0.00	66.91	0.30	0.00	1.70	66.62	0.01	0 00:16	0 00:00	0.00	0.00
22	STRUCTURE45	11.56	0.87	65.94	2.84	0.00	2.40	64.25	1.15	0 00:14	0 00:00	0.00	0.00

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate
1	DITCH-153	654.32	72.43	-1.79	70.36	3.06	2.07	0.3200	Trapezoidal	2.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No
2	Link-18	588.10	66.61	0.00	64.37	3.81	2.24	0.3800	Trapezoidal	2.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No
3	Link-25	200.00	62.34	0.00	61.98	3.29	0.36	0.1800	Trapezoidal	2.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No

Channel Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	DITCH-153	1.11	0 00:15	70.48	0.02	1.23	8.87	0.24	0.12	0.00		
2	Link-18	0.70	0 00:16	56.63	0.01	0.92	10.65	0.21	0.10	0.00		
3	Link-25	0.00	0 00:00	38.93	0.00	0.00		0.00	0.00	0.00		

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	Link-04	57.00	67.30	0.00	67.19	1.29	0.11	0.1900	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
2	Link-05	57.00	64.90	1.40	64.79	-1.71	0.11	0.1900	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
3	Link-08	400.00	65.59	1.29	64.79	1.29	0.80	0.2000	CIRCULAR	24.000	24.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
4	Link-09	400.00	67.19	1.29	66.39	1.29	0.80	0.2000	CIRCULAR	24.000	24.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
5	Link-10	400.00	66.39	1.29	65.59	1.29	0.80	0.2000	CIRCULAR	24.000	24.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
6	Link-11	69.00	64.21	1.11	64.07	0.07	0.14	0.2000	CIRCULAR	24.000	24.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
7	Link-12	165.00	64.30	0.00	64.38	0.48	-0.08	-0.0500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
8	Link-13	57.00	64.20	0.30	64.10	0.20	0.10	0.1800	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
9	Link-14	62.00	64.10	0.20	64.00	0.00	0.10	0.1600	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
10	Link-15	82.00	60.56	0.00	60.40	0.00	0.16	0.2000	CIRCULAR	24.000	24.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
11	Link-16	52.00	60.67	0.00	60.56	0.00	0.11	0.2100	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
12	Link-17	57.00	66.88	0.00	66.61	0.00	0.27	0.4700	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
13	Link-24	32.00	62.45	0.00	62.34	0.00	0.11	0.3400	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
14	Link-26	57.00	58.69	0.00	58.58	0.00	0.11	0.1900	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
15	Link-27	89.00	58.58	0.00	58.40	0.00	0.18	0.2000	CIRCULAR	24.000	24.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
16	Link-28	57.00	61.30	0.00	61.19	0.00	0.11	0.1900	CIRCULAR	24.000	24.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
17	Link-29	64.00	61.19	0.00	61.00	0.00	0.19	0.3000	CIRCULAR	24.000	24.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
18	Link-30	285.00	64.79	1.29	64.21	1.11	0.58	0.2000	CIRCULAR	24.000	24.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
19	PIPE-1	50.00	74.38	1.79	72.59	-1.63	1.79	3.5800	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	Link-04	3.16	0 00:10	9.94	0.32	1.88	0.51	1.21	0.60	0.00		Calculated
2	Link-05	4.45	0 00:10	37.90	0.12	5.50	0.17	1.08	0.54	0.00		Calculated
3	Link-08	7.63	0 00:14	10.96	0.70	2.78	2.40	1.71	0.86	0.00		Calculated
4	Link-09	6.85	0 00:11	10.96	0.63	3.31	2.01	1.26	0.63	0.00		Calculated
5	Link-10	7.58	0 00:12	10.96	0.69	3.42	1.95	1.40	0.70	0.00		Calculated
6	Link-11	11.53	0 00:14	11.04	1.04	4.65	0.25	1.47	0.74	0.00		> CAPACITY
7	Link-12	0.79	0 00:11	2.31	0.34	0.80	3.44	1.11	0.74	0.00		Calculated
8	Link-13	3.39	0 00:10	9.48	0.36	1.57	0.61	1.31	0.66	0.00		Calculated
9	Link-14	6.03	0 00:10	9.09	0.66	2.88	0.36	1.26	0.63	0.00		Calculated
10	Link-15	8.54	0 00:10	8.66	0.99	3.02	0.45	1.69	0.85	0.00		Calculated
11	Link-16	3.99	0 00:10	10.40	0.38	1.39	0.62	1.73	0.87	0.00		Calculated
12	Link-17	1.72	0 00:10	7.23	0.24	4.79	0.20	0.53	0.35	0.00		Calculated
13	Link-24	0.00	0 00:00	6.16	0.00	0.00		0.00	0.00	0.00		Calculated
14	Link-26	0.00	0 00:00	9.94	0.00	0.00		0.00	0.00	0.00		Calculated
15	Link-27	0.00	0 00:00	10.17	0.00	0.00		0.00	0.00	0.00		Calculated
16	Link-28	0.00	0 00:00	8.61	0.00	0.00		0.00	0.00	0.00		Calculated
17	Link-29	0.00	0 00:00	10.68	0.00	0.00		0.00	0.00	0.00		Calculated
18	Link-30	11.03	0 00:14	11.06	1.00	3.69	1.29	1.81	0.91	0.00		Calculated
19	PIPE-1	2.37	0 00:10	5.94	0.40	5.07	0.16	0.76	0.51	0.00		Calculated

APPENDIX F

SWMM MODEL

Cecil EPASWMM Model Node Summary

		EXISTING	PROPOSED		NODE LOCATION FLOODPLAIN	FLOODWAY
Node	**Type**	**Maximum HGL Feet**	**Maximum HGL (Feet)2**	**Delta from EXISTING3**	**Y/N**	**Y/N2**
RC0090	JUNCTION	52.36	52.36	0.00	Y	Y
RC0091S	JUNCTION	52.44	52.44	0.00	Y	Y
RC0093	JUNCTION	52.86	52.86	0.00	Y	Y
RC0095	JUNCTION	53.30	53.30	0.00	Y	Y
RC0100	STORAGE	53.67	53.67	0.00	Y	Y
RC0105	JUNCTION	55.01	55.01	0.00	Y	Y
RC0110	JUNCTION	55.89	55.89	0.00	Y	Y
RC0111S	JUNCTION	65.67	65.67	0.00	Y	Y
RC0115	JUNCTION	65.67	65.67	0.00	Y	Y
RC0120	STORAGE	65.67	65.67	0.00	Y	Y
RC0121	JUNCTION	65.67	65.67	0.00	Y	Y
RC0121AP	JUNCTION	65.82	65.82	0.00	Y	Y
RC0121APS	STORAGE	69.46	69.46	0.00	Y	Y
RC0122	JUNCTION	65.67	65.67	0.00	Y	Y
RC0123S	JUNCTION	65.86	65.86	0.00	Y	Y
RC0125	STORAGE	67.57	67.57	0.00	Y	Y
RC0131S	JUNCTION	65.68	65.68	0.00	Y	Y
RC0132	JUNCTION	65.68	65.68	0.00	Y	Y
RC0133S	JUNCTION	65.76	65.76	0.00	Y	Y
RC0134S	STORAGE	67.68	67.68	0.00	Y	Y
RC0135	JUNCTION	65.68	65.68	0.00	Y	Y
RC0138	JUNCTION	65.69	65.69	0.00	Y	Y
RC0140	JUNCTION	65.73	65.73	0.00	Y	Y
RC0141S	STORAGE	65.82	65.82	0.00	Y	Y
RC0145	JUNCTION	66.08	66.08	0.00	Y	Y
RC0147	JUNCTION	66.75	66.75	0.00	Y	Y
RC0150	JUNCTION	67.45	67.45	0.00	Y	Y
RC0151S	JUNCTION	68.01	68.01	0.00	Y	Y
RC0154	JUNCTION	68.85	68.85	0.00	Y	Y
RC0155	JUNCTION	70.79	70.79	0.00	Y	Y
RC0157	JUNCTION	71.42	71.42	0.00	Y	Y
RC0160	JUNCTION	73.54	73.54	0.00	Y	Y
RC0164	JUNCTION	73.88	73.88	0.00	Y	Y
RC0171S	JUNCTION	74.39	74.39	0.00	Y	N
RC0176	JUNCTION	75.03	75.03	0.00	Y	N
RC0178	JUNCTION	75.94	75.94	0.00	Y	N
RC0180	JUNCTION	76.32	76.32	0.00	Y	N
RC0181S	JUNCTION	77.34	77.34	0.00	Y	N
RC0190	JUNCTION	78.70	78.70	0.00	Y	N
RC0191S	JUNCTION	79.20	79.20	0.00	Y	N
RC0192L1	JUNCTION	79.21	79.21	0.00	Y	N
RC0192L2	JUNCTION	79.44	79.44	0.00	Y	N
RC0192L3	JUNCTION	79.69	79.69	0.00	Y	N
RC0193	JUNCTION	79.83	79.83	0.00	Y	N
RC0193S	JUNCTION	79.83	79.83	0.00	Y	N
RC0194	JUNCTION	79.84	79.84	0.00	Y	N
RC0195	JUNCTION	80.49	80.49	0.00	Y	N
RC0196AP	JUNCTION	80.84	80.84	0.00	Y	N
RC0197AP	JUNCTION	80.55	80.55	0.00	Y	N
RC0199AP	STORAGE	80.55	80.55	0.00	Y	N
RC0200	JUNCTION	78.83	78.83	0.00	Y	N
RC0202	JUNCTION	79.13	79.13	0.00	Y	N
RC0205	STORAGE	79.92	79.92	0.00	Y	N
RC0206S	JUNCTION	80.17	80.17	0.00	Y	N
RC0208	JUNCTION	80.23	80.23	0.00	Y	N

Cecil EPASWMM Model Node Summary

		EXISTING	PROPOSED		NODE LOCATION FLOODPLAIN	FLOODWAY
Node	**Type**	**Maximum HGL Feet**	**Maximum HGL (Feet)2**	**Delta from EXISTING3**	**Y/N**	**Y/N2**
RC0210	JUNCTION	80.45	80.45	0.00	Y	N
RC0211	STORAGE	82.11	82.11	0.00	Y	N
RC0212	JUNCTION	80.52	80.52	0.00	Y	N
RC0215	JUNCTION	80.62	80.62	0.00	Y	N
RC0216S	JUNCTION	81.81	81.81	0.00	Y	N
RC0220	STORAGE	82.11	82.11	0.00	Y	N
RC0221S	STORAGE	82.11	82.11	0.00	Y	N
RC0222	JUNCTION	82.11	82.11	0.00	Y	N
RC0224	JUNCTION	82.12	82.12	0.00	Y	N
RC0225	JUNCTION	82.12	82.12	0.00	Y	N
RC0227	JUNCTION	82.12	82.12	0.00	Y	N
RC0229	JUNCTION	82.13	82.13	0.00	Y	N
RC0230	JUNCTION	82.13	82.13	0.00	Y	N
RC0231S	STORAGE	82.17	82.17	0.00	Y	N
RC0240	STORAGE	82.97	82.97	0.00	Y	N
RC0315	JUNCTION	82.16	82.16	0.00	Y	N
RC0317	JUNCTION	82.51	82.51	0.00	Y	N
RC0319	JUNCTION	82.87	82.87	0.00	Y	N
RC0320	JUNCTION	83.36	83.36	0.00	Y	N
RC0321	STORAGE	83.39	83.39	0.00	Y	N
RC1111S	JUNCTION	67.50	67.50	0.00	Y	N
RC1120	JUNCTION	67.52	67.52	0.00	Y	N
RC1121S	JUNCTION	68.09	68.09	0.00	Y	N
RC1130	JUNCTION	68.12	68.12	0.00	Y	N
RC1131S	JUNCTION	68.51	68.51	0.00	Y	N
RC1140	JUNCTION	68.52	68.52	0.00	Y	N
RC1141S	JUNCTION	70.58	70.58	0.00	Y	N
RC1150	STORAGE	70.61	70.61	0.00	Y	N
RC1151S	STORAGE	70.68	70.68	0.00	Y	N
RC1161S	STORAGE	72.71	72.71	0.00	Y	N
RC1171S	STORAGE	73.06	73.06	0.00	Y	N
RC1176	JUNCTION	73.12	73.12	0.00	Y	N
RC1178	JUNCTION	73.21	73.21	0.00	Y	N
RC1180	STORAGE	73.33	73.33	0.00	Y	N
RC1181S	JUNCTION	73.81	73.81	0.00	Y	N
RC1186	JUNCTION	73.89	73.89	0.00	Y	N
RC1188	JUNCTION	74.08	74.08	0.00	Y	N
RC1190	JUNCTION	74.16	74.16	0.00	Y	N
RC1191S	JUNCTION	76.77	76.77	0.00	Y	N
RC1200	STORAGE	76.79	76.79	0.00	Y	N
RC1201S	STORAGE	76.92	76.92	0.00	Y	N
RC1204	JUNCTION	77.04	77.04	0.00	Y	N
RC1205S	STORAGE	77.46	77.46	0.00	Y	N
RC1211S	STORAGE	78.27	78.27	0.00	Y	N
RC1220	JUNCTION	76.97	76.97	0.00	Y	N
RC1300	STORAGE	76.99	76.99	0.00	Y	N
S-1	JUNCTION	-	63.70	-	N	N
S-2	JUNCTION	-	64.11	-	N	N
S-3	JUNCTION	-	63.28	-	N	N
S-4	JUNCTION	-	63.29	-	N	N
S-5	JUNCTION	-	63.90	-	Y	N
S-6	JUNCTION	-	63.92	-	Y	N
TC0090	JUNCTION	49.90	49.90	0.00	Y	N
TC0091	JUNCTION	50.25	50.25	0.00	N	N
TC0092	JUNCTION	50.58	50.58	0.00	Y	N

Cecil EPASWMM Model Node Summary

		EXISTING	PROPOSED		NODE LOCATION	
					FLOODPLAIN	FLOODWAY
Node	**Type**	**Maximum HGL Feet**	**Maximum HGL (Feet)2**	**Delta from EXISTING3**	**Y/N**	**Y/N2**
TC0094	JUNCTION	51.05	51.05	0.00	Y	N
TC0096	JUNCTION	51.69	51.68	(0.01)	Y	N
TC0098	JUNCTION	52.07	52.07	0.00	Y	N
TC0100	JUNCTION	52.37	52.36	(0.01)	Y	N
TC0104	JUNCTION	52.44	52.43	(0.01)	Y	N
TC0106	JUNCTION	52.71	52.70	(0.01)	Y	N
TC0108	JUNCTION	53.02	53.02	0.00	Y	N
TC0110	JUNCTION	53.51	53.50	(0.01)	Y	N
TC0111S	JUNCTION	57.48	57.47	(0.01)	Y	N
TC0120	JUNCTION	57.51	57.50	(0.01)	Y	N
TC0130	JUNCTION	57.59	57.57	(0.02)	Y	N
TC0131S	JUNCTION	57.60	57.58	(0.02)	Y	N
TC0134	JUNCTION	57.64	57.63	(0.01)	Y	N
TC0138	JUNCTION	57.73	57.71	(0.02)	Y	N
TC0140	JUNCTION	57.76	57.75	(0.01)	Y	N
TC0141	OUTFALL	57.85	57.85	0.00	Y	N
TC0141APS	JUNCTION	57.78	57.78	0.00	Y	N
TC0142	JUNCTION	64.46	64.46	0.00	Y	N
TC0143	JUNCTION	68.67	68.67	0.00	Y	N
TC0144	JUNCTION	59.07	59.07	0.00	Y	N
TC0145	JUNCTION	61.42	61.42	0.00	Y	N
TC0146	STORAGE	58.74	58.74	0.00	Y	N
TC0147	JUNCTION	60.55	60.55	0.00	Y	N
TC0148	JUNCTION	63.11	63.11	0.00	Y	N
TC0149	JUNCTION	58.04	58.03	(0.01)	Y	N
TC0149L1	JUNCTION	57.90	57.88	(0.02)	Y	N
TC0150S	JUNCTION	59.29	59.25	(0.04)	Y	N
TC0151S	JUNCTION	60.50	60.45	(0.05)	Y	N
TC0155AP	JUNCTION	68.64	68.63	(0.01)	Y	N
TC0156AP	STORAGE	68.05	68.05	0.00	Y	N
TC0158AP	JUNCTION	61.15	61.16	**0.01**	Y	N
TC0160	JUNCTION	60.60	60.55	(0.05)	Y	Y
TC0161	JUNCTION	60.73	60.69	(0.04)	Y	N
TC0161APS	STORAGE	60.73	60.69	(0.04)	N	N
TC0161S	JUNCTION	60.72	60.68	(0.04)	N	N
TC0162S	JUNCTION	62.18	62.17	(0.01)	N	N
TC0170	STORAGE	60.91	60.87	(0.04)	N	N
TC0171S	JUNCTION	61.06	61.02	(0.04)	N	N
TC0174	STORAGE	61.21	61.16	(0.05)	N	N
TC0176	JUNCTION	61.25	61.21	(0.04)	N	N
TC0180	STORAGE	61.33	61.29	(0.04)	N	N
TC0181S	STORAGE	61.34	61.30	(0.04)	N	N
TC0190	JUNCTION	61.48	61.44	(0.04)	Y	Y
TC0191S	JUNCTION	62.01	62.00	(0.01)	Y	Y
TC0194	STORAGE	62.22	62.22	0.00	Y	Y
TC0196	STORAGE	62.72	62.72	0.00	Y	Y
TC0198	STORAGE	64.51	64.51	0.00	N	N
TC0200	JUNCTION	66.87	66.87	0.00	Y	N
TC0203APS	JUNCTION	68.45	68.45	0.00	Y	N
TC0204L	STORAGE	69.30	69.30	0.00	Y	N
TC0205AP	JUNCTION	69.74	69.74	0.00	Y	N
TC0210L	JUNCTION	67.15	67.15	0.00	Y	N
TC0211APS	STORAGE	67.05	67.05	0.00	N	N
TC1090	STORAGE	61.41	61.37	(0.04)	N	N
TC1100	JUNCTION	61.42	61.37	(0.05)	Y	Y

Cecil EPASWMM Model Node Summary

		EXISTING	PROPOSED		NODE LOCATION	
					FLOODPLAIN	FLOODWAY
Node	**Type**	**Maximum HGL Feet**	**Maximum HGL (Feet)2**	**Delta from EXISTING3**	**Y/N**	**Y/N2**
TC1101S	JUNCTION	61.42	61.38	(0.04)	Y	Y
TC1105	JUNCTION	61.43	61.38	(0.05)	Y	Y
TC1107	JUNCTION	61.45	61.41	(0.04)	Y	Y
TC1110	JUNCTION	61.52	61.48	(0.04)	Y	Y
TC1111S	JUNCTION	63.31	63.28	(0.03)	Y	Y
TC1112	STORAGE	63.75	64.12	**0.37**	Y	N
TC1112S1	STORAGE	61.52	61.48	(0.04)	Y	N
TC1112S2	JUNCTION	63.73	63.70	(0.03)	Y	N
TC1113	JUNCTION	66.80	66.90	**0.10**	Y	N
TC1114	JUNCTION	63.31	63.28	(0.03)	Y	Y
TC1115	STORAGE	63.31	63.29	(0.02)	Y	N
TC1116	JUNCTION	65.58	65.58	0.00	Y	N
TC1117	JUNCTION	69.04	69.04	0.00	Y	N
TC1118	STORAGE	63.32	63.29	(0.03)	N	N
TC1119	STORAGE	63.31	63.29	(0.02)	N	N
TC1120	JUNCTION	63.93	63.90	(0.03)	Y	Y
TC1121	JUNCTION	63.94	63.92	(0.02)	Y	N
TC1122	JUNCTION	72.62	72.62	0.00	Y	Y
TC1123	JUNCTION	72.62	72.62	0.00	Y	Y
TC1124	JUNCTION	63.94	63.93	(0.01)	Y	Y
TC1125	JUNCTION	63.94	63.92	(0.02)	Y	N
TC1126	STORAGE	63.98	63.95	(0.03)	Y	Y
TC1128	JUNCTION	64.11	64.07	(0.04)	Y	Y
TC1130	JUNCTION	64.23	64.20	(0.03)	N	Y
TC1131S	JUNCTION	68.71	68.48	(0.23)	Y	Y
TC1132	JUNCTION	68.76	68.53	(0.23)	Y	Y
TC1133AP	STORAGE	68.97	68.60	(0.37)	N	N
TC1133APS1	JUNCTION	68.77	68.54	(0.23)	Y	Y
TC1133APS2	STORAGE	68.88	68.57	(0.31)	N	N
TC1134AP	STORAGE	75.59	75.59	0.00	Y	N
TC1135AP	STORAGE	76.37	76.37	0.00	Y	N
TC1140	JUNCTION	70.03	69.91	(0.12)	Y	N
TC1140RS	JUNCTION	69.37	69.20	(0.17)	Y	N
TC1140S	JUNCTION	69.07	68.88	(0.19)	Y	Y
TC1141S	STORAGE	72.79	72.76	(0.03)	Y	N
TC1150	STORAGE	70.23	70.12	(0.11)	Y	N
TC1151S	STORAGE	71.51	71.35	(0.16)	Y	N
TC1151SNW	JUNCTION	71.79	71.63	(0.16)	Y	N
TC1154	JUNCTION	71.52	71.37	(0.15)	Y	N
TC1155AP	JUNCTION	79.36	79.37	**0.01**	Y	N
TC1155APS1	JUNCTION	73.55	73.55	0.00	Y	N
TC1155APS2	JUNCTION	75.05	75.05	0.00	Y	N
TC1155APS3	STORAGE	75.98	75.98	0.00	Y	N
TC1155APS4	JUNCTION	79.32	79.33	**0.01**	Y	N
TC1156	STORAGE	71.70	71.56	(0.14)	N	N
TC1156N	JUNCTION	73.09	73.10	**0.01**	N	N
TC1157	JUNCTION	74.82	74.82	0.00	N	N
TC1158	STORAGE	76.22	76.22	0.00	Y	N
TC1158S1	JUNCTION	75.35	75.35	0.00	Y	N
TC1158S2	JUNCTION	76.13	76.13	0.00	Y	N
TC1160	JUNCTION	76.62	76.62	0.00	Y	N
TC1161S	JUNCTION	76.58	76.58	0.00	Y	N
TC1163	JUNCTION	77.36	77.36	0.00	Y	N
TC1164S	JUNCTION	77.54	77.54	0.00	Y	N
TC1165S	JUNCTION	79.24	79.24	0.00	Y	N

Cecil EPASWMM Model Node Summary

		EXISTING	PROPOSED		NODE LOCATION FLOODPLAIN	FLOODWAY
Node	**Type**	**Maximum HGL Feet**	**Maximum HGL (Feet)2**	**Delta from EXISTING3**	**Y/N**	**Y/N2**
TC2040	JUNCTION	72.82	72.79	(0.03)	Y	N
TC2050	JUNCTION	72.91	72.88	(0.03)	Y	N
TC2051	JUNCTION	73.03	72.96	(0.07)	Y	N
TC2052	JUNCTION	73.97	73.97	0.00	Y	N
TC2053	STORAGE	74.06	74.06	0.00	Y	N
TC2054	JUNCTION	75.45	75.45	0.00	Y	N
TC2090	JUNCTION	73.01	72.93	(0.08)	Y	N
TC2100	JUNCTION	76.33	76.35	**0.02**	Y	N
TC2100S1	JUNCTION	76.22	76.24	**0.02**	Y	N
TC2100S2	JUNCTION	76.11	76.17	**0.06**	Y	N
TC2101S	JUNCTION	76.54	76.54	0.00	Y	N
TC2102	JUNCTION	77.06	77.06	0.00	Y	N
TC2104	JUNCTION	77.84	77.84	0.00	Y	N
TC2105S	JUNCTION	78.84	78.84	0.00	Y	N
TC2111S	JUNCTION	80.21	80.21	0.00	Y	N
TC2130	JUNCTION	80.30	80.30	0.00	Y	N
W1RC0111	STORAGE	58.55	58.55	0.00	Y	Y
W2RC0111	STORAGE	64.59	64.59	0.00	Y	Y

APPENDIX G

CORRESPONDENCE

JACKSONVILLE AVIATION AUTHORITY
CECIL AIRPORT
APPROACH RD & UTILITY CORRIDOR EXTENSION
COJ DEVELOPMENT NO. 4963.071
JAA PROJECT S2019-03
PURCHASE ORDER NO. 50391
RS&H PROJECT NO. 1001-0049-002

Approach Road Extension – SJWRMD: Wetland Impacts and Permitting

August 29, 2022 – 2:00 PM
Virtual Meeting

MEETING MINUTES

1. **Introductions and Sign In**

Andrew Samberg	RS&H	(904) 256-2149	Andrew.Samberg@rsandh.com
Steven Wilson	RS&H	(904) 256-2347	Steven.Wilson@rsandh.com
Pamela Zenon	RS&H	(904) 256-2121	Pam.Zenon@rsandh.com
David Alberts	RS&H	(904) 256-2469	David.Alberts@rsandh.com
Everett Frye	SJRWMD		Efrye@sjrwmd.com
Nicholas Madderom	SJRWMD		NMadderom@sjrwmd.com
Jaime Eaton	ECO		Jaime.Eaton@ecodesignconsulting.com
Thomas Brumfield	ERS		TBrumfield@ses-grp.com
Walt Esser	ERS		Wesser@ses-grp.com

2. **Discussion**

A meeting was held with the SJRWMD regarding the extension of Approach Road at Cecil Airport from the Boeing Facility to the existing Spaceport. The proposed project impacts approximately 1,000 acres of upland and wetland areas and includes widening of an existing road and construction of new road with associated utilities. The following bullets summarize key topics of discussion from the meeting.

- The Jacksonville Aviation Authority will be requesting the permit with Derek Powder as the applicant. The permit fee will be included with the application submission. SJRWMD indicated the initial review will be completed within 28 days of submission.
- A formal wetland determination was completed by ERS in 2019 (Permit No. 70452-108). The wetland conditions will be confirmed in a field visit scheduled between ERS and SJRWMD at a later date. The project will impact wetlands corresponding to approximately areas 17 and 20 of the conceptual permit (Permit No. 70452-55) as shown on the Wetland Impact Map. Wetland impacts are anticipated to be mitigated in the onsite mitigation bank.
- RS&H mentioned the proposed projects overlaps with an expired permit for a previous roadway extension that was not constructed. RS&H stated the design has changed and been extended since the previous permit, and asked if a new permit or modification should be submitted. SJRWMD said a new permit can be submitted for the entire proposed project.

- Stormwater management will be designed in accordance with the ERP Applicant Handbook Volume 2. Stormwater management facilities are anticipated to be on-line dry retention ponds with liner and underdrains to minimize secondary impacts to groundwater and wetlands. Water quality treatment volume is the greater of 0.5 inch over the entire drainage area or 1.25 inches over the impervious area, plus an additional 0.5 inch of runoff from the entire drainage area for on-line systems. Proposed peak discharge from the site must not exceed the pre-development for the 25-year 24-hour storm event.
- SJRWMD mentioned that criteria for the floodway and 10 year floodplain may apply to the project if the upstream and contributing watershed area is greater than 5 acres. Floodplain criteria is located in the Applicant Handbook Vol. 2 Section 3.3.2 and 3.3.4. RS&H will determine the contributing watershed and incorporate as appropriate.
- Plan requirements for permit submission include:
    - Cross Sections
    - Grading and Drainage
    - Pond Locations
    - Wetland Boundaries
    - Erosion and Control Sheets

APPENDIX H

TIME OF CONCENTRATION CALCULATIONS

JAA APPROACH ROAD AND UTILITY CORRIDOR EXTENSION	Comp. By:	EEJC
	Date:	7/6/2022
	Chk. By:	LM
	Job No:	201-0049-002

Time of Concentration Calculations

Sub-Basin Name: EXT-1
Condition: Post-Development

Sheet Flow [TR-55 equation 3-3]

	EXT-1									
Surface Description	Woods, Light underbrush									
Manning's Roughness coeff., n	0.4									
Flow Length, L (should be <= 100 ft)	300	ft		ft		ft		ft		
Two-yr, 24-hr rainfall, P_2	4.60	in		in		in		in		
Elevation 1, E_1	66.00	ft		ft		ft		ft		
Elevation 2, E_2	65.00	ft		ft		ft		ft		
Land Slope, s = $(E_1 - E_2)$ / L	0.00	ft/ft		ft/ft		ft/ft		ft/ft		
Tt = 0.007 * $(n * L)^{0.8} / (P_2^{0.5} * s^{0.4})$	1.47	hr		hr		hr		hr		
	88.3	+		+		+		=	88.3	min

Shallow Concentrated Flow [TR-55 figure 3-1]

	EXT-1									
Surface Description	Unpaved									
Flow Length, L	213	ft		ft		ft		ft		
Elevation 1, E_1	65.00	ft		ft		ft		ft		
Elevation 2, E_2	58.00	ft		ft		ft		ft		
Watercourse Slope, s = $(E_1 - E_2)$ / L	0.033			ft/ft		ft/ft		ft/ft		
Velocity, V	2.92			ft/s		ft/s		ft/s		
T_t = L / (3600 * V)	0.02			hr		hr		hr		
	1.2	+		+		+		=	1.2	min

Open Channel Flow [TR-55 equation 3-4]

Open Channel	Front Slope, s_1		:1		:1		:1		:1		
	Bottom width, B		ft		ft		ft		ft		
	Back Slope, s_2		:1		:1		:1		:1		
	Depth, H		ft		ft		ft		ft		
Pipe	Diameter, D		in		in		in		in		
Cross Sectional Flow Area, a		0.00	sq ft		sq ft		sq ft		sq ft		
		0.00	ft		ft		ft		ft		
Hydraulic radius, r = a / P_w		#DIV/0!	ft		ft		ft		ft		
Flow Length, L			ft		ft		ft		ft		
Elevation 1, E_1			ft		ft		ft		ft		
Elevation 2, E_2			ft		ft		ft		ft		
Channel Slope, s = $(E_1 - E_2)$ / L		#DIV/0!	ft/ft		ft/ft		ft/ft		ft/ft		
Manning's Roughness coeff., n											
Velocity, V = 1.49 * $r^{2/3} * s^{1/2}$ / n		0.00	ft/s		ft/s		ft/s		ft/s		
T_t = L / (3600 * V)		0.00	ft/s		ft/s		ft/s		ft/s		
		0.0	+						=	0.0	min

Total Time of Concentration

Sub-Basin TC = **89.5** **min**

JAA APPROACH ROAD AND UTILITY CORRIDOR EXTENSION

Comp. By:	EEJC
Date:	7/6/2022
Chk. By:	LM
Job No:	1001-0049-002

Time of Concentration Calculations

Sub-Basin Name: EXT-2
Condition: Pre-Development

Sheet Flow [TR-55 equation 3-3]

	EXT-2							
Surface Description	Woods, Light underbrush							
Manning's Roughness coeff., n	0.4							
Flow Length, L (should be <= 100 ft)	300	ft		ft		ft		ft
Two-yr, 24-hr rainfall, P_2	4.60	in		in		in		in
Elevation 1, E_1	64.00	ft		ft		ft		ft
Elevation 2, E_2	60.29	ft		ft		ft		ft
Land Slope, $s = (E_1 - E_2) / L$	0.01	ft/ft		ft/ft		ft/ft		ft/ft
$Tt = 0.007 * (n * L)^{0.8} / (P_2^{0.5} * s^{0.4})$	0.87	hr		hr		hr		hr
	52.3	+		+		+		= 52.3 min

Shallow Concentrated Flow [TR-55 figure 3-1]

	EXT-2							
Surface Description	Unpaved							
Flow Length, L	1266	ft		ft		ft		ft
Elevation 1, E_1	60.29	ft		ft		ft		ft
Elevation 2, E_2	57.00	ft		ft		ft		ft
Watercourse Slope, $s = (E_1 - E_2) / L$	0.003			ft/ft		ft/ft		ft/ft
Velocity, V	0.82			ft/s		ft/s		ft/s
$T_t = L / (3600 * V)$	0.43			hr		hr		hr
	25.7	+		+		+		= 25.7 min

Open Channel Flow [TR-55 equation 3-4]

Open Channel	Front Slope, s_1		:1		:1		:1		:1
	Bottom width, B		ft		ft		ft		ft
	Back Slope, s_2		:1		:1		:1		:1
	Depth, H		ft		ft		ft		ft
Pipe	Diameter, D		in		in		in		in
Cross Sectional Flow Area, a		0.00	sq ft		sq ft		sq ft		sq ft
		0.00	ft		ft		ft		ft
Hydraulic radius, $r = a / P_w$		#DIV/0!	ft		ft		ft		ft
Flow Length, L			ft		ft		ft		ft
Elevation 1, E_1			ft		ft		ft		ft
Elevation 2, E_2			ft		ft		ft		ft
Channel Slope, $s = (E_1 - E_2) / L$		#DIV/0!	ft/ft		ft/ft		ft/ft		ft/ft
Manning's Roughness coeff., n									
Velocity, $V = 1.49 * r^{2/3} * s^{1/2} / n$		0.00	ft/s		ft/s		ft/s		ft/s
$T_t = L / (3600 * V)$		0.00	ft/s		ft/s		ft/s		ft/s
		0.0	+		+		+		= 0.0 min

Total Time of Concentration

Sub-Basin TC = 77.9 **min**

JAA APPROACH ROAD AND UTILITY CORRIDOR EXTENSION

Comp. By:	EEJC
Date:	7/6/2022
Chk. By:	LM
Job No:	1001-0049-002

Time of Concentration Calculations

Sub-Basin Name: EXT-3
Condition: Pre-Development

Sheet Flow [TR-55 equation 3-3]

	EXT-3									
Surface Description	Smooth surfaces									
Manning's Roughness coeff., n	0.011									
Flow Length, L (should be <= 100 ft)	12	ft		ft		ft		ft		
Two-yr, 24-hr rainfall, P_2	4.60	in		in		in		in		
Elevation 1, E_1	67.01	ft		ft		ft		ft		
Elevation 2, E_2	67.00	ft		ft		ft		ft		
Land Slope, s = $(E_1 - E_2) / L$	0.00	ft/ft		ft/ft		ft/ft		ft/ft		
Tt = 0.007 * $(n * L)^{0.8} / (P_2^{0.5} * s^{0.4})$	0.01	hr		hr		hr		hr		
	0.7	+		+		+		=	0.7	min

Shallow Concentrated Flow [TR-55 figure 3-1]

	EXT-3									
Surface Description	Unpaved									
Flow Length, L	338	ft		ft		ft		ft		
Elevation 1, E_1	67.00	ft		ft		ft		ft		
Elevation 2, E_2	66.90	ft		ft		ft		ft		
Watercourse Slope, s = $(E_1 - E_2) / L$	0.000			ft/ft		ft/ft		ft/ft		
Velocity, V	0.28			ft/s		ft/s		ft/s		
T_t = L / (3600 * V)	0.34			hr		hr		hr		
	20.3	+		+		+		=	20.3	min

Open Channel Flow [TR-55 equation 3-4]

Open Channel	Front Slope, s_1		:1		:1		:1		:1		
	Bottom width, B		ft		ft		ft		ft		
	Back Slope, s_2		:1		:1		:1		:1		
	Depth, H		ft		ft		ft		ft		
Pipe	Diameter, D		in		in		in		in		
Cross Sectional Flow Area, a		0.00	sq ft		sq ft		sq ft		sq ft		
		0.00	ft		ft		ft		ft		
Hydraulic radius, r = a / P_w		#DIV/0!	ft		ft		ft		ft		
Flow Length, L			ft		ft		ft		ft		
Elevation 1, E_1			ft		ft		ft		ft		
Elevation 2, E_2			ft		ft		ft		ft		
Channel Slope, s = $(E_1 - E_2) / L$		#DIV/0!	ft/ft		ft/ft		ft/ft		ft/ft		
Manning's Roughness coeff., n											
Velocity, V = 1.49 * $r^{2/3}$ * $s^{1/2}$ / n		0.00	ft/s		ft/s		ft/s		ft/s		
T_t = L / (3600 * V)		0.00	ft/s		ft/s		ft/s		ft/s		
		0.0	+				+		=	0.0	min

Total Time of Concentration

Sub-Basin TC = **20.9** **min**

JAA APPROACH ROAD AND UTILITY CORRIDOR EXTENSION

Comp. By:	EEJC
Date:	7/6/2022
Chk. By:	
Job No:	1001-0049-002

Time of Concentration Calculations

Sub-Basin Name: EXT-4
Condition: Pre-Development

Sheet Flow [TR-55 equation 3-3]

	EXT-4										
Surface Description	Smooth surfaces										
Manning's Roughness coeff., n	0.011										
Flow Length, L (should be <= 100 ft)	12	ft		ft		ft		ft			
Two-yr, 24-hr rainfall, P_2	4.60	in		in		in		in			
Elevation 1, E_1	73.62	ft		ft		ft		ft			
Elevation 2, E_2	73.56	ft		ft		ft		ft			
Land Slope, $s = (E_1 - E_2) / L$	0.01	ft/ft		ft/ft		ft/ft		ft/ft			
$Tt = 0.007 * (n * L)^{0.8} / (P_2^{0.5} * s^{0.4})$	0.01	hr		hr		hr		hr			
	0.3	+		+		+		=	0.3	min	

Shallow Concentrated Flow [TR-55 figure 3-1]

	EXT-4									
Surface Description	Unpaved									
Flow Length, L	1415	ft		ft		ft		ft		
Elevation 1, E_1	73.56	ft		ft		ft		ft		
Elevation 2, E_2	68.00	ft		ft		ft		ft		
Watercourse Slope, $s = (E_1 - E_2) / L$	0.004			ft/ft		ft/ft		ft/ft		
Velocity, V	1.01			ft/s		ft/s		ft/s		
$T_t = L / (3600 * V)$	0.39			hr		hr		hr		
	23.3	+		+		+		=	23.3	min

Open Channel Flow [TR-55 equation 3-4]

Open Channel	Front Slope, s_1		:1		:1		:1		:1		
Open Channel	Bottom width, B		ft		ft		ft		ft		
Open Channel	Back Slope, s_2		:1		:1		:1		:1		
Open Channel	Depth, H		ft		ft		ft		ft		
Pipe	Diameter, D		in		in		in		in		
Cross Sectional Flow Area, a		0.00	sq ft		sq ft		sq ft		sq ft		
		0.00	ft		ft		ft		ft		
Hydraulic radius, $r = a / P_w$		#DIV/0!	ft		ft		ft		ft		
Flow Length, L			ft		ft		ft		ft		
Elevation 1, E_1			ft		ft		ft		ft		
Elevation 2, E_2			ft		ft		ft		ft		
Channel Slope, $s = (E_1 - E_2) / L$		#DIV/0!	ft/ft		ft/ft		ft/ft		ft/ft		
Manning's Roughness coeff., n											
Velocity, $V = 1.49 * r^{2/3} * s^{1/2} / n$		0.00	ft/s		ft/s		ft/s		ft/s		
$T_t = L / (3600 * V)$		0.00	ft/s		ft/s		ft/s		ft/s		
		0.0	+						=	0.0	min

Total Time of Concentration

Sub-Basin TC = **23.7** **min**

JAA APPROACH ROAD AND UTILITY CORRIDOR EXTENSION		
	Comp. By:	EEJC
	Date:	7/6/2022
	Chk. By:	
	Job No:	1001-0049-002

Time of Concentration Calculations

Sub-Basin Name: POND 1

Condition: Post-Development

Sheet Flow [TR-55 equation 3-3]

	POND 1									
Surface Description	Smooth surfaces									
Manning's Roughness coeff., n	0.011									
Flow Length, L (should be <= 100 ft)	12	ft		ft		ft		ft		
Two-yr, 24-hr rainfall, P_2	4.60	in		in		in		in		
Elevation 1, E_1	68.36	ft		ft		ft		ft		
Elevation 2, E_2	68.00	ft		ft		ft		ft		
Land Slope, s = $(E_1 - E_2)$ / L	0.03	ft/ft		ft/ft		ft/ft		ft/ft		
Tt = 0.007 * $(n * L)^{0.8} / (P_2^{0.5} * s^{0.4})$	0.00	hr		hr		hr		hr		
	0.2	+		+		+		=	0.2	min

Shallow Concentrated Flow [TR-55 figure 3-1]

	POND 1									
Surface Description	Unpaved									
Flow Length, L	12	ft		ft		ft		ft		
Elevation 1, E_1	68.00	ft		ft		ft		ft		
Elevation 2, E_2	66.00	ft		ft		ft		ft		
Watercourse Slope, s = $(E_1 - E_2)$ / L	0.164			ft/ft		ft/ft		ft/ft		
Velocity, V	6.54			ft/s		ft/s		ft/s		
T_t = L / (3600 * V)	0.00			hr		hr		hr		
	0.0	+		+		+		=	0.0	min

Open Channel Flow [TR-55 equation 3-4]

		POND 1									
		Channel									
Open Channel	Front Slope, s_1	3.00	:1		:1		:1		:1		
	Bottom width, B	3.00	ft		ft		ft		ft		
	Back Slope, s_2	3.00	:1		:1		:1		:1		
	Depth, H	2.00	ft		ft		ft		ft		
Pipe	Diameter, D		in		in		in		in		
Cross Sectional Flow Area, a		18.00	sq ft		sq ft		sq ft		sq ft		
		15.65	ft		ft		ft		ft		
Hydraulic radius, r = a / P_w		1.15	ft		ft		ft		ft		
Flow Length, L		919	ft		ft		ft		ft		
Elevation 1, E_1		66.00	ft		ft		ft		ft		
Elevation 2, E_2		63.46	ft		ft		ft		ft		
Channel Slope, s = $(E_1 - E_2)$ / L		0.003	ft/ft		ft/ft		ft/ft		ft/ft		
Manning's Roughness coeff., n		0.030									
Velocity, V = 1.49 * $r^{2/3} * s^{1/2}$ / n		2.87	ft/s		ft/s		ft/s		ft/s		
T_t = L / (3600 * V)		0.09	ft/s		ft/s		ft/s		ft/s		
		5.3	+						=	5.3	min

Total Time of Concentration

Sub-Basin TC = 10.0 * **min**

** 10-minute minimum per COJ Land Development Manual*

JAA APPROACH ROAD AND UTILITY CORRIDOR EXTENSION	Comp. By:	EEJC
	Date:	7/6/2022
	Chk. By:	LM
	Job No:	1001-0049-002

Time of Concentration Calculations

Sub-Basin Name: POND 2
Condition: Post-Development

Sheet Flow [TR-55 equation 3-3]

	POND 2										
Surface Description	Smooth surfaces										
Manning's Roughness coeff., n	0.011										
Flow Length, L (should be <= 100 ft)	12	ft		ft		ft		ft			
Two-yr, 24-hr rainfall, P_2	4.60	in		in		in		in			
Elevation 1, E_1	67.86	ft		ft		ft		ft			
Elevation 2, E_2	67.60	ft		ft		ft		ft			
Land Slope, s = $(E_1 - E_2)$ / L	0.02	ft/ft		ft/ft		ft/ft		ft/ft			
Tt = 0.007 * $(n * L)^{0.8} / (P_2^{0.5} * s^{0.4})$	0.00	hr		hr		hr		hr			
	0.2	+		+		+		=	0.2	min	

Shallow Concentrated Flow [TR-55 figure 3-1]

	POND 2									
Surface Description	Unpaved									
Flow Length, L	8	ft		ft		ft		ft		
Elevation 1, E_1	67.60	ft		ft		ft		ft		
Elevation 2, E_2	66.90	ft		ft		ft		ft		
Watercourse Slope, s = $(E_1 - E_2)$ / L	0.089			ft/ft		ft/ft		ft/ft		
Velocity, V	4.80			ft/s		ft/s		ft/s		
T_t = L / (3600 * V)	0.00			hr		hr		hr		
	0.0	+		+		+		=	0.0	min

Open Channel Flow [TR-55 equation 3-4]

		POND 2									
		Channel									
Open Channel	Front Slope, s_1	3.00	:1		:1		:1		:1		
	Bottom width, B	3.00	ft		ft		ft		ft		
	Back Slope, s_2	3.00	:1		:1		:1		:1		
	Depth, H	2.00	ft		ft		ft		ft		
Pipe	Diameter, D		in		in		in		in		
Cross Sectional Flow Area, a		18.00	sq ft		sq ft		sq ft		sq ft		
		15.65	ft		ft		ft		ft		
Hydraulic radius, r = a / P_w		1.15	ft		ft		ft		ft		
Flow Length, L		825	ft		ft		ft		ft		
Elevation 1, E_1		66.90	ft		ft		ft		ft		
Elevation 2, E_2		62.21	ft		ft		ft		ft		
Channel Slope, s = $(E_1 - E_2)$ / L		0.006	ft/ft		ft/ft		ft/ft		ft/ft		
Manning's Roughness coeff., n		0.030									
Velocity, V = 1.49 * $r^{2/3} * s^{1/2}$ / n		4.11	ft/s		ft/s		ft/s		ft/s		
T_t = L / (3600 * V)		0.06	ft/s		ft/s		ft/s		ft/s		
		3.3	+				+		=	3.3	min

Total Time of Concentration

Sub-Basin TC = 10.0 * **min**

** 10-minute minimum per COJ Land Development Manual*

JAA APPROACH ROAD AND UTILITY CORRIDOR EXTENSION	Comp. By:	EEJC
	Date:	7/6/2022
	Chk. By:	LM
	Job No:	1001-0049-002

Time of Concentration Calculations

Sub-Basin Name: POND 3
Condition: Post-Development

Sheet Flow [TR-55 equation 3-3]

	POND 3								
Surface Description	Smooth surfaces								
Manning's Roughness coeff., n	0.011								
Flow Length, L (should be <= 100 ft)	12	ft		ft		ft		ft	
Two-yr, 24-hr rainfall, P_2	4.60	in		in		in		in	
Elevation 1, E_1	70.60	ft		ft		ft		ft	
Elevation 2, E_2	70.16	ft		ft		ft		ft	
Land Slope, $s = (E_1 - E_2) / L$	0.04	ft/ft		ft/ft		ft/ft		ft/ft	
$Tt = 0.007 * (n * L)^{0.8} / (P_2^{0.5} * s^{0.4})$	0.00	hr		hr		hr		hr	
	0.1	+		+		+		=	0.1 min

Shallow Concentrated Flow [TR-55 figure 3-1]

	POND 3								
Surface Description	Unpaved								
Flow Length, L	8	ft		ft		ft		ft	
Elevation 1, E_1	70.16	ft		ft		ft		ft	
Elevation 2, E_2	69.15	ft		ft		ft		ft	
Watercourse Slope, $s = (E_1 - E_2) / L$	0.128			ft/ft		ft/ft		ft/ft	
Velocity, V	5.77			ft/s		ft/s		ft/s	
$T_t = L / (3600 * V)$	0.00			hr		hr		hr	
	0.0	+		+		+		=	0.0 min

Open Channel Flow [TR-55 equation 3-4]

		POND 3								
		Channel								
Open Channel	Front Slope, s_1	3.00	:1		:1		:1		:1	
	Bottom width, B	3.00	ft		ft		ft		ft	
	Back Slope, s_2	3.00	:1		:1		:1		:1	
	Depth, H	2.00	ft		ft		ft		ft	
Pipe	Diameter, D		in		in		in		in	
Cross Sectional Flow Area, a		18.00	sq ft		sq ft		sq ft		sq ft	
		15.65	ft		ft		ft		ft	
Hydraulic radius, $r = a / P_w$		1.15	ft		ft		ft		ft	
Flow Length, L		1030	ft		ft		ft		ft	
Elevation 1, E_1		68.30	ft		ft		ft		ft	
Elevation 2, E_2		64.20	ft		ft		ft		ft	
Channel Slope, $s = (E_1 - E_2) / L$		0.004	ft/ft		ft/ft		ft/ft		ft/ft	
Manning's Roughness coeff., n		0.011								
Velocity, $V = 1.49 * r^{2/3} * s^{1/2} / n$		9.38	ft/s		ft/s		ft/s		ft/s	
$T_t = L / (3600 * V)$		0.03	ft/s		ft/s		ft/s		ft/s	
		1.8	+						=	1.8 min

Total Time of Concentration

Sub-Basin TC = 10.0 * **min**

** 10-minute minimum per COJ Land Development Manual*

JAA APPROACH ROAD AND UTILITY CORRIDOR EXTENSION	Comp. By:	EEJC
	Date:	7/6/2022
	Chk. By:	LM
	Job No:	201-0049-002

Time of Concentration Calculations

Sub-Basin Name: POND 4
Condition: Post-Development

Sheet Flow [TR-55 equation 3-3]

	POND 4							
Surface Description	Smooth surfaces							
Manning's Roughness coeff., n	0.011							
Flow Length, L (should be <= 100 ft)	12	ft		ft		ft		ft
Two-yr, 24-hr rainfall, P_2	4.60	in		in		in		in
Elevation 1, E_1	76.92	ft		ft		ft		ft
Elevation 2, E_2	76.68	ft		ft		ft		ft
Land Slope, s = $(E_1 - E_2)$ / L	0.02	ft/ft		ft/ft		ft/ft		ft/ft
Tt = 0.007 * $(n * L)^{0.8} / (P_2^{0.5} * s^{0.4})$	0.00	hr		hr		hr		hr
	0.2	+		+		+		= 0.2 min

Shallow Concentrated Flow [TR-55 figure 3-1]

	POND 4							
Surface Description	Unpaved							
Flow Length, L	15	ft		ft		ft		ft
Elevation 1, E_1	76.68	ft		ft		ft		ft
Elevation 2, E_2	74.96	ft		ft		ft		ft
Watercourse Slope, s = $(E_1 - E_2)$ / L	0.112			ft/ft		ft/ft		ft/ft
Velocity, V	5.41			ft/s		ft/s		ft/s
T_t = L / (3600 * V)	0.00			hr		hr		hr
	0.0	+		+		+		= 0.0 min

Open Channel Flow [TR-55 equation 3-4]

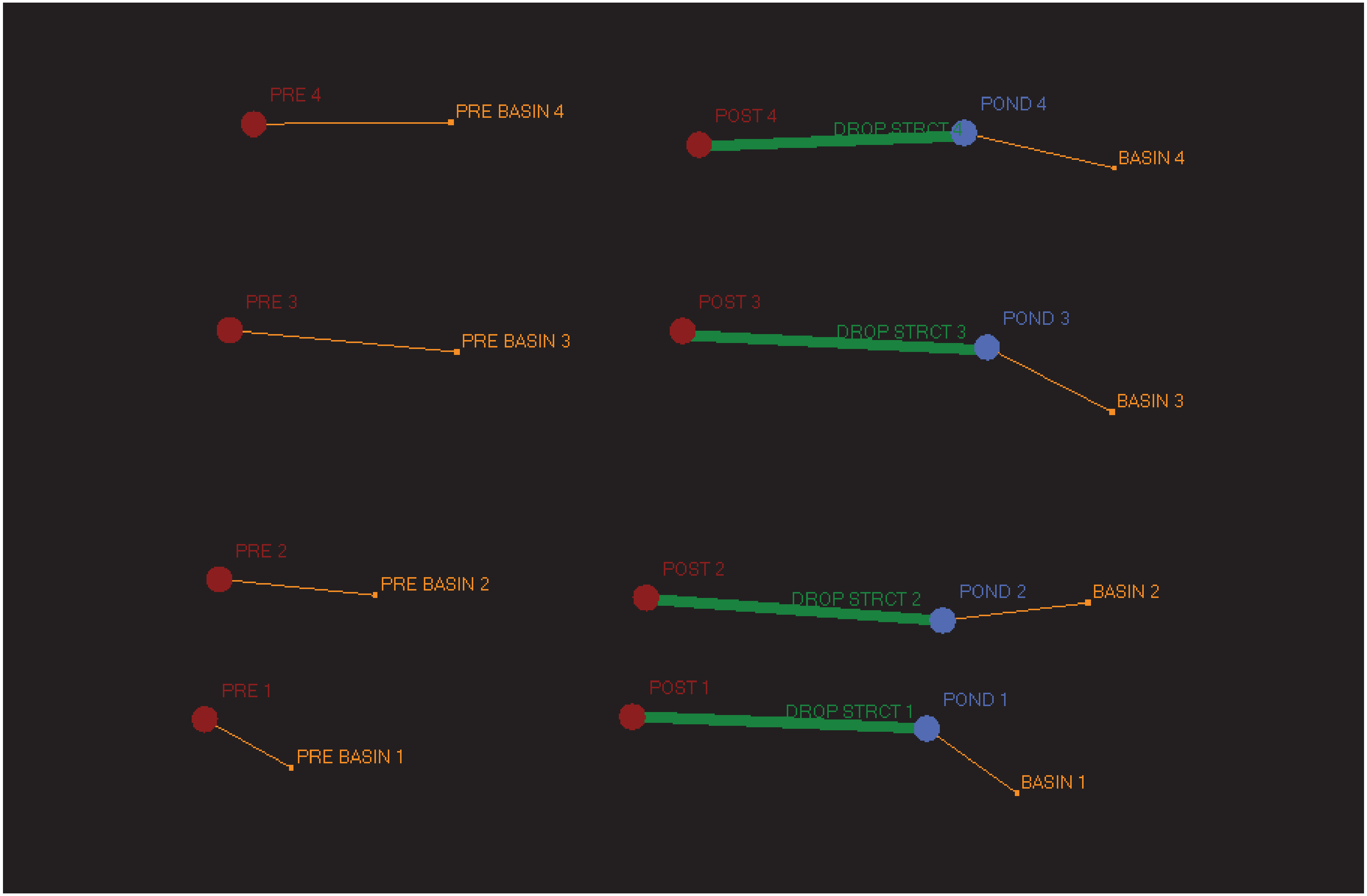
		POND 4							
		Channel							
Open Channel	Front Slope, s_1	3.00	:1		:1		:1		:1
	Bottom width, B	3.00	ft		ft		ft		ft
	Back Slope, s_2	3.00	:1		:1		:1		:1
	Depth, H	2.00	ft		ft		ft		ft
Pipe	Diameter, D		in		in		in		in
Cross Sectional Flow Area, a		18.00	sq ft		sq ft		sq ft		sq ft
		15.65	ft		ft		ft		ft
Hydraulic radius, r = a / P_w		1.15	ft		ft		ft		ft
Flow Length, L		2500	ft		ft		ft		ft
Elevation 1, E_1		74.96	ft		ft		ft		ft
Elevation 2, E_2		69.09	ft		ft		ft		ft
Channel Slope, s = $(E_1 - E_2)$ / L		0.002	ft/ft		ft/ft		ft/ft		ft/ft
Manning's Roughness coeff., n		0.030							
Velocity, V = 1.49 * $r^{2/3} * s^{1/2}$ / n		2.64	ft/s		ft/s		ft/s		ft/s
T_t = L / (3600 * V)		0.26	ft/s		ft/s		ft/s		ft/s
		15.8	+						= 15.8 min

Total Time of Concentration

Sub-Basin TC = 16.0 min

APPENDIX I

STORMWATER QUANTITY CALCULATIONS


PRE 4
PRE BASIN 4
POST 4
DROP STRCT 4
POND 4
BASIN 4
PRE 3
PRE BASIN 3
POST 3
DROP STRCT 3
POND 3
BASIN 3
PRE 2
PRE BASIN 2
POST 2
DROP STRCT 2
POND 2
BASIN 2
PRE 1
PRE BASIN 1
POST 1
DROP STRCT 1
POND 1
BASIN 1

Scenario: Scenario1
Node: POND 1
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 10.0000 min
Max Allowable Q: 0.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH484
Peaking Factor: 484.0
Area: 3.0000 ac

2.2800	Pervious	A/D			
0.7200	Impervious	-			

Comment:

Scenario: Scenario1
Node: POND 2
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 10.0000 min
Max Allowable Q: 0.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH484
Peaking Factor: 484.0
Area: 5.7300 ac

4.2700	Pervious	A/D			
1.4600	Impervious	-			

Comment:

Scenario: Scenario1
Node: POND 3
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 10.0000 min
Max Allowable Q: 0.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH484

Peaking Factor: 484.0
Area: 5.2600 ac

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coefficient Zone	Reference ET Station
1.0400	IMPERVIOUS	-			
4.2200	PERVIOUS	A/D			

Comment:

Manual Basin: BASIN 4

Scenario: Scenario1
Node: POND 4
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 10.0000 min
Max Allowable Q: 0.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH484
Peaking Factor: 484.0
Area: 8.5700 ac

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coefficient Zone	Reference ET Station
2.5200	Impervious	-			
6.0500	Pervious	A/D			

Comment:

Manual Basin: PRE BASIN 1

Scenario: Scenario1
Node: PRE 1
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 89.5000 min
Max Allowable Q: 0.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH484
Peaking Factor: 484.0
Area: 3.0000 ac

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coefficient Zone	Reference ET Station
3.0000	Woods	A/D			

Comment:

Manual Basin: PRE BASIN 2

Scenario: Scenario1
Node: PRE 2
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 77.9000 min
Max Allowable Q: 0.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH484
Peaking Factor: 484.0
Area: 5.7300 ac

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coefficient Zone	Reference ET Station
5.7300	Woods	A/D			

Comment:

Manual Basin: PRE BASIN 3

Scenario: Scenario1
Node: PRE 3
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 20.9000 min
Max Allowable Q: 0.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH484
Peaking Factor: 484.0
Area: 5.2600 ac

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coefficient Zone	Reference ET Station
0.1200	Impervious	-			
4.8800	Pervious	A/D			
0.2600	Woods	A/D			

Comment:

Manual Basin: PRE BASIN 4

Scenario: Scenario1
Node: PRE 4
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 23.7000 min
Max Allowable Q: 0.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH484

Peaking Factor: 484.0
Area: 8.5700 ac

Area [ac]	Land Cover Zone	Soil Zone	Rainfall Name	Crop Coefficient Zone	Reference ET Station
1.9400	Impervious	-			
6.4500	Pervious	A/D			
0.1800	Woods	A/D			

Comment:

Node: POND 1

Scenario: Scenario1
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 61.00 ft
Warning Stage: 63.00 ft

Stage [ft]	Area [ac]	Area [ft2]
61.00	0.3320	14462
64.00	0.5890	25657

Comment:

Node: POND 2

Scenario: Scenario1
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 60.00 ft
Warning Stage: 64.00 ft

Stage [ft]	Area [ac]	Area [ft2]
60.00	0.2150	9365
65.00	0.6190	26964

Comment:

Node: POND 3

Scenario: Scenario1
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 60.50 ft
Warning Stage: 65.00 ft

Stage [ft]	Area [ac]	Area [ft2]
60.50	0.1810	7884
66.00	0.5890	25657

Comment:

Node: POND 4

Scenario: Scenario1
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 63.50 ft
Warning Stage: 68.00 ft

Stage [ft]	Area [ac]	Area [ft2]
63.50	0.2060	8973
69.00	0.5830	25395

Comment:

Node: POST 1

Scenario: Scenario1
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 61.20 ft
Warning Stage: 61.20 ft
Boundary Stage: BASIN 1

Year	Month	Day	Hour	Stage [ft]
0	0	0	0.0000	61.20
0	0	0	30.0000	61.20

Comment: SOURCE: COJ MSMP NODE TC 1111S

Node: POST 2

Scenario: Scenario1
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 62.10 ft
Warning Stage: 62.10 ft
Boundary Stage: BASIN 2

Year	Month	Day	Hour	Stage [ft]
0	0	0	0.0000	62.10
0	0	0	30.0000	62.10

Comment: SOURCE: COJ MSMP NODE TC 1114

Node: POST 3

Scenario: Scenario1
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 62.60 ft
Warning Stage: 62.60 ft
Boundary Stage: BASIN 3

Year	Month	Day	Hour	Stage [ft]
0	0	0	0.0000	62.60
0	0	0	30.0000	62.60

Comment: SOURCE: COJ MSMP NODE TC 1120

Node: POST 4

Scenario: Scenario1
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 63.60 ft
Warning Stage: 63.60 ft
Boundary Stage: BASIN 4

Year	Month	Day	Hour	Stage [ft]
0	0	0	0.0000	63.60
0	0	0	30.0000	63.60

Comment: SOURCE: COJ MSMP NODE TC 1130

Node: PRE 1

Scenario: Scenario1
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 61.20 ft
Warning Stage: 61.20 ft
Boundary Stage: BASIN 1

Year	Month	Day	Hour	Stage [ft]
0	0	0	0.0000	61.20
0	0	0	30.0000	61.20

Comment: SOURCE: COJ MSMP NODE TC 1111S

Node: PRE 2

Scenario: Scenario1
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 62.10 ft
Warning Stage: 62.10 ft
Boundary Stage: BASIN 2

Year	Month	Day	Hour	Stage [ft]
0	0	0	0.0000	62.10
0	0	0	30.0000	62.10

Comment: SOURCE: COJ MSMP NODE TC 1114

Node: PRE 3

Scenario: Scenario1
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 62.60 ft
Warning Stage: 62.60 ft
Boundary Stage: BASIN 3

Year	Month	Day	Hour	Stage [ft]
0	0	0	0.0000	60.00
0	0	0	30.0000	60.00

Comment: SOURCE: COJ MSMP NODE TC 1120

Node: PRE 4

Scenario: Scenario1
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 63.60 ft
Warning Stage: 63.60 ft
Boundary Stage: BASIN 4

Year	Month	Day	Hour	Stage [ft]
0	0	0	0.0000	63.60
0	0	0	30.0000	63.60

Comment: SOURCE: COJ MSMP NODE TC 1130

Drop Structure Link: DROP STRCT 1		Upstream Pipe		Downstream Pipe	
Scenario:	Scenario1	Invert:	58.00 ft	Invert:	56.50 ft
From Node:	POND 1	Manning's N:	0.0130	Manning's N:	0.0130
To Node:	POST 1	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	2.00 ft	Max Depth:	2.00 ft
Flow Direction:	Both	Bottom Clip			
Solution:	Combine	Default:	0.00 ft	Default:	0.00 ft
Increments:	0	Op Table:		Op Table:	
Pipe Count:	1	Ref Node:		Ref Node:	
Damping:	0.0000 ft	Manning's N:	0.0000	Manning's N:	0.0000
Length:	75.00 ft	Top Clip			
FHWA Code:	0	Default:	0.00 ft	Default:	0.00 ft
Entr Loss Coef:	0.50	Op Table:		Op Table:	
Exit Loss Coef:	1.00	Ref Node:		Ref Node:	
Bend Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Location:	0.00 ft				
Energy Switch:	Energy				

Pipe Comment:

Weir Component			
Weir:	1	Bottom Clip	
Weir Count:	1	Default:	0.00 ft
Weir Flow Direction:	Both	Op Table:	
Damping:	0.0000 ft	Ref Node:	
Weir Type:	Sharp Crested Vertical	Top Clip	
Geometry Type:	Rectangular	Default:	0.00 ft
Invert:	62.00 ft	Op Table:	
Control Elevation:	62.00 ft	Ref Node:	
Max Depth:	1.00 ft	Discharge Coefficients	
Max Width:	2.00 ft	Weir Default:	3.200
Fillet:	0.00 ft	Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Weir Comment:

Weir Component			
Weir:	2	Bottom Clip	
Weir Count:	1	Default:	0.00 ft
Weir Flow Direction:	Both	Op Table:	
Damping:	0.0000 ft	Ref Node:	
Weir Type:	Horizontal	Top Clip	

Geometry Type:	Rectangular		
Invert:	63.00 ft	Default:	0.00 ft
Control Elevation:	63.00 ft	Op Table:	
Max Depth:	2.00 ft	Ref Node:	
Max Width:	3.08 ft	**Discharge Coefficients**	
Fillet:	0.00 ft	Weir Default:	3.200
		Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Weir Comment:

Drop Structure Comment:

Drop Structure Link: DROP STRCT 2		Upstream Pipe		Downstream Pipe	
Scenario:	Scenario1	Invert:	57.50 ft	Invert:	56.80 ft
From Node:	POND 2	Manning's N:	0.0130	Manning's N:	0.0130
To Node:	POST 2	**Geometry: Circular**		**Geometry: Circular**	
Link Count:	1	Max Depth:	2.00 ft	Max Depth:	2.00 ft
Flow Direction:	Both	**Bottom Clip**			
Solution:	Combine	Default:	0.00 ft	Default:	0.00 ft
Increments:	0	Op Table:		Op Table:	
Pipe Count:	1	Ref Node:		Ref Node:	
Damping:	0.0000 ft	Manning's N:	0.0000	Manning's N:	0.0000
Length:	349.00 ft	**Top Clip**			
FHWA Code:	0	Default:	0.00 ft	Default:	0.00 ft
Entr Loss Coef:	0.50	Op Table:		Op Table:	
Exit Loss Coef:	1.00	Ref Node:		Ref Node:	
Bend Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Location:	0.00 ft				
Energy Switch:	Energy				

Pipe Comment:

Weir Component			
Weir:	1	**Bottom Clip**	
Weir Count:	1	Default:	0.00 ft
Weir Flow Direction:	Both	Op Table:	
Damping:	0.0000 ft	Ref Node:	
Weir Type:	Sharp Crested Vertical	**Top Clip**	
Geometry Type:	Rectangular	Default:	0.00 ft
Invert:	62.10 ft	Op Table:	
Control Elevation:	62.10 ft	Ref Node:	
Max Depth:	1.60 ft	**Discharge Coefficients**	
Max Width:	2.50 ft	Weir Default:	3.200
Fillet:	0.00 ft	Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Weir Comment:

Weir Component		Bottom Clip	
Weir:	2		
Weir Count:	1	Default:	0.00 ft
Weir Flow Direction:	Both	Op Table:	
Damping:	0.0000 ft	Ref Node:	
		Top Clip	
Weir Type:	Horizontal		
Geometry Type:	Rectangular	Default:	0.00 ft
Invert:	63.70 ft	Op Table:	
Control Elevation:	63.70 ft	Ref Node:	
		Discharge Coefficients	
Max Depth:	1.30 ft		
Max Width:	3.08 ft	Weir Default:	3.200
Fillet:	0.00 ft	Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Weir Comment:

Drop Structure Comment:

Drop Structure Link: DROP STRCT 3		Upstream Pipe		Downstream Pipe	
Scenario:	Scenario1	Invert:	58.00 ft	Invert:	57.30 ft
From Node:	POND 3	Manning's N:	0.0130	Manning's N:	0.0130
		Geometry: Circular		**Geometry: Circular**	
To Node:	POST 3				
Link Count:	1	Max Depth:	2.00 ft	Max Depth:	2.00 ft
		Bottom Clip			
Flow Direction:	Both				
Solution:	Combine	Default:	0.00 ft	Default:	0.00 ft
Increments:	0	Op Table:		Op Table:	
Pipe Count:	1	Ref Node:		Ref Node:	
Damping:	0.0000 ft	Manning's N:	0.0000	Manning's N:	0.0000
		Top Clip			
Length:	144.00 ft				
FHWA Code:	0	Default:	0.00 ft	Default:	0.00 ft
Entr Loss Coef:	0.50	Op Table:		Op Table:	
Exit Loss Coef:	1.00	Ref Node:		Ref Node:	
Bend Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Location:	0.00 ft				
Energy Switch:	Energy				

Pipe Comment:

Weir Component		Bottom Clip	
Weir:	1		
Weir Count:	1	Default:	0.00 ft
Weir Flow Direction:	Both	Op Table:	
Damping:	0.0000 ft	Ref Node:	
		Top Clip	
Weir Type:	Sharp Crested Vertical		
Geometry Type:	Rectangular	Default:	0.00 ft
Invert:	62.60 ft	Op Table:	
Control Elevation:	62.60 ft	Ref Node:	

Max Depth:	1.40 ft		
Max Width:	2.50 ft	**Discharge Coefficients**	
Fillet:	0.00 ft	Weir Default:	3.200
		Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Weir Comment:

Weir Component			
Weir:	2	**Bottom Clip**	
Weir Count:	1	Default:	0.00 ft
Weir Flow Direction:	Both	Op Table:	
Damping:	0.0000 ft	Ref Node:	
Weir Type:	Horizontal	**Top Clip**	
Geometry Type:	Rectangular	Default:	0.00 ft
Invert:	64.00 ft	Op Table:	
Control Elevation:	64.00 ft	Ref Node:	
Max Depth:	2.00 ft	**Discharge Coefficients**	
Max Width:	3.08 ft	Weir Default:	3.200
Fillet:	0.00 ft	Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Weir Comment:

Drop Structure Comment:

Drop Structure Link: DROP STRCT 4		Upstream Pipe		Downstream Pipe	
Scenario:	Scenario1	Invert:	60.75 ft	Invert:	58.70 ft
From Node:	POND 4	Manning's N:	0.0130	Manning's N:	0.0130
To Node:	POST 4	**Geometry: Circular**		**Geometry: Circular**	
Link Count:	1	Max Depth:	2.50 ft	Max Depth:	2.50 ft
Flow Direction:	Both	**Bottom Clip**			
Solution:	Combine	Default:	0.00 ft	Default:	0.00 ft
Increments:	0	Op Table:		Op Table:	
Pipe Count:	1	Ref Node:		Ref Node:	
Damping:	0.0000 ft	Manning's N:	0.0000	Manning's N:	0.0000
Length:	459.00 ft	**Top Clip**			
FHWA Code:	0	Default:	0.00 ft	Default:	0.00 ft
Entr Loss Coef:	0.50	Op Table:		Op Table:	
Exit Loss Coef:	1.00	Ref Node:		Ref Node:	
Bend Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Location:	0.00 ft				
Energy Switch:	Energy				

Pipe Comment:

Weir Component	
Weir:	1

Weir Count:	1
Weir Flow Direction:	Both
Damping:	0.0000 ft
Weir Type:	Sharp Crested Vertical
Geometry Type:	Rectangular
Invert:	65.90 ft
Control Elevation:	65.90 ft
Max Depth:	1.10 ft
Max Width:	2.50 ft
Fillet:	0.00 ft

Default:	0.00 ft
Op Table:	
Ref Node:	
Top Clip	
Default:	0.00 ft
Op Table:	
Ref Node:	
Discharge Coefficients	
Weir Default:	3.200
Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Weir Comment:

Weir Component

Weir:	2
Weir Count:	1
Weir Flow Direction:	Both
Damping:	0.0000 ft
Weir Type:	Horizontal
Geometry Type:	Rectangular
Invert:	67.00 ft
Control Elevation:	67.00 ft
Max Depth:	2.00 ft
Max Width:	3.08 ft
Fillet:	0.00 ft

Bottom Clip	
Default:	0.00 ft
Op Table:	
Ref Node:	
Top Clip	
Default:	0.00 ft
Op Table:	
Ref Node:	
Discharge Coefficients	
Weir Default:	3.200
Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Weir Comment:

Drop Structure Comment:

Curve Number: 1 [Set]

Land Cover Zone	Soil Zone	Curve Number [dec]
Impervious	-	98.0
Pervious	A	39.0
Pervious	A/D	80.0
Woods	A	30.0
Woods	A/D	77.0

Impervious: 1 [Set]

Land Cover Zone	% Impervious	% DCIA	% Direct	Ia Impervious [in]	Ia Pervious [in]

Land Cover Zone	% Impervious	% DCIA	% Direct	Ia Impervious [in]	Ia Pervious [in]
Impervious	0.00	0.00	0.00	0.000	0.000
Pervious	0.00	0.00	0.00	0.000	0.000
Woods	0.00	0.00	0.00	0.000	0.000

Boundary Stage: BASIN 1

Boundary Stage Set: 100YR-24HR

Year	Month	Day	Hour [hr]	Stage [ft]
0	0	0	0.0000	61.60
0	0	0	30.0000	61.60

Comment:

Boundary Stage: BASIN 2

Boundary Stage Set: 100YR-24HR

Year	Month	Day	Hour [hr]	Stage [ft]
0	0	0	0.0000	63.00
0	0	0	30.0000	63.00

Comment:

Boundary Stage: BASIN 3

Boundary Stage Set: 100YR-24HR

Year	Month	Day	Hour [hr]	Stage [ft]
0	0	0	0.0000	63.20
0	0	0	30.0000	63.20

Comment:

Boundary Stage: BASIN 4

Boundary Stage Set: 100YR-24HR

Year	Month	Day	Hour [hr]	Stage [ft]
0	0	0	0.0000	64.00
0	0	0	30.0000	64.00

Comment:

Boundary Stage: BASIN 1

Boundary Stage Set: 25YR-24HR

Year	Month	Day	Hour [hr]	Stage [ft]
0	0	0	0.0000	61.20
0	0	0	30.0000	61.20

Comment:

Boundary Stage: BASIN 2

Boundary Stage Set: 25YR-24HR

Year	Month	Day	Hour [hr]	Stage [ft]
0	0	0	0.0000	62.10
0	0	0	30.0000	62.10

Comment:

Boundary Stage: BASIN 3

Boundary Stage Set: 25YR-24HR

Year	Month	Day	Hour [hr]	Stage [ft]
0	0	0	0.0000	62.60
0	0	0	30.0000	62.60

Comment:

Boundary Stage: BASIN 4

Boundary Stage Set: 25YR-24HR

Year	Month	Day	Hour [hr]	Stage [ft]
0	0	0	0.0000	63.60
0	0	0	30.0000	63.60

Comment:

Boundary Stage: BASIN 1

Boundary Stage Set: 5YR-24HR

Year	Month	Day	Hour [hr]	Stage [ft]

Year	Month	Day	Hour [hr]	Stage [ft]
0	0	0	0.0000	61.00
0	0	0	30.0000	61.00

Comment:

Boundary Stage: BASIN 2

Boundary Stage Set: 5YR-24HR

Year	Month	Day	Hour [hr]	Stage [ft]
0	0	0	0.0000	60.00
0	0	0	30.0000	60.00

Comment:

Boundary Stage: BASIN 3

Boundary Stage Set: 5YR-24HR

Year	Month	Day	Hour [hr]	Stage [ft]
0	0	0	0.0000	61.00
0	0	0	30.0000	61.00

Comment:

Boundary Stage: BASIN 4

Boundary Stage Set: 5YR-24HR

Year	Month	Day	Hour [hr]	Stage [ft]
0	0	0	0.0000	63.00
0	0	0	30.0000	63.00

Comment:

Simulation: 100YR-24HR

Scenario: Scenario1
Run Date/Time: 11/2/2022 11:50:57 AM
Program Version: ICPR4 4.05.02

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	0	0	0	0.0000
End Time:	0	0	0	30.0000

	Hydrology [sec]	Surface Hydraulics [sec]	Groundwater [sec]
Min Calculation Time:	60.0000	0.1000	900.0000
Max Calculation Time:		30.0000	

Output Time Increments

Hydrology

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	5.0000

Surface Hydraulics

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	5.0000

Groundwater

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	60.0000

Restart File

Save Restart: False

Resources & Lookup Tables

Resources

Rainfall Folder:
Reference ET Folder:
Unit Hydrograph Folder:

Lookup Tables

Boundary Stage Set: 100YR-24HR
Extern Hydrograph Set:
Curve Number Set: 1
Green-Ampt Set:
Vertical Layers Set:
Impervious Set: 1
Roughness Set:
Crop Coef Set:
Fillable Porosity Set:
Conductivity Set:
Leakage Set:

Tolerances & Options

Time Marching: SAOR
Max Iterations: 6
IA Recovery Time: 24.0000 hr
ET for Manual Basins: False

Over-Relax Weight Fact:	0.5 dec		
dZ Tolerance:	0.0010 ft	Smp/Man Basin Rain Opt:	Global
Max dZ:	1.0000 ft	OF Region Rain Opt:	Global
Link Optimizer Tol:	0.0001 ft	Rainfall Name:	~FLMOD
		Rainfall Amount:	10.90 in
Edge Length Option:	Automatic	Storm Duration:	24.0000 hr
Dflt Damping (2D):	0.0050 ft	Dflt Damping (1D):	0.0050 ft
Min Node Srf Area (2D):	100 ft2	Min Node Srf Area (1D):	100 ft2
Energy Switch (2D):	Energy	Energy Switch (1D):	Energy

Comment:

Simulation: 25Y-24H

Scenario:	Scenario1
Run Date/Time:	11/2/2022 11:51:48 AM
Program Version:	ICPR4 4.05.02

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	0	0	0	0.0000
End Time:	0	0	0	30.0000

	Hydrology [sec]	Surface Hydraulics [sec]	Groundwater [sec]
Min Calculation Time:	60.0000	0.1000	900.0000
Max Calculation Time:		30.0000	

Output Time Increments

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	5.0000

Surface Hydraulics

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	5.0000

Groundwater

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	60.0000

Save Restart: False

Resources & Lookup Tables

Resources

Rainfall Folder:
Reference ET Folder:
Unit Hydrograph Folder:

Lookup Tables

Boundary Stage Set: 25YR-24HR
Extern Hydrograph Set:
Curve Number Set: 1
Green-Ampt Set:
Vertical Layers Set:
Impervious Set: 1
Roughness Set:
Crop Coef Set:
Fillable Porosity Set:
Conductivity Set:
Leakage Set:

Tolerances & Options

Time Marching: SAOR
Max Iterations: 6
Over-Relax Weight Fact: 0.5 dec
dZ Tolerance: 0.0010 ft
Max dZ: 1.0000 ft
Link Optimizer Tol: 0.0001 ft
Edge Length Option: Automatic
Dflt Damping (2D): 0.0050 ft
Min Node Srf Area (2D): 100 ft2
Energy Switch (2D): Energy

IA Recovery Time: 24.0000 hr
ET for Manual Basins: False
Smp/Man Basin Rain Opt: Global
OF Region Rain Opt: Global
Rainfall Name: ~FLMOD
Rainfall Amount: 8.06 in
Storm Duration: 24.0000 hr
Dflt Damping (1D): 0.0050 ft
Min Node Srf Area (1D): 100 ft2
Energy Switch (1D): Energy

Comment:

Simulation: 5YR-24H

Scenario: Scenario1
Run Date/Time: 11/2/2022 11:52:15 AM
Program Version: ICPR4 4.05.02

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	0	0	0	0.0000
End Time:	0	0	0	30.0000

	Hydrology [sec]	Surface Hydraulics [sec]	Groundwater [sec]
Min Calculation Time:	60.0000	0.1000	900.0000
Max Calculation Time:		30.0000	

Output Time Increments

Hydrology

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	5.0000

Surface Hydraulics

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	5.0000

Groundwater

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	60.0000

Restart File

Save Restart: False

Resources & Lookup Tables

Resources

Rainfall Folder:
Reference ET Folder:
Unit Hydrograph Folder:

Lookup Tables

Boundary Stage Set: 5YR-24HR
Extern Hydrograph Set:
Curve Number Set: 1
Green-Ampt Set:
Vertical Layers Set:
Impervious Set: 1
Roughness Set:
Crop Coef Set:
Fillable Porosity Set:
Conductivity Set:
Leakage Set:

Tolerances & Options

Time Marching:	SAOR	IA Recovery Time:	24.0000 hr
Max Iterations:	6	ET for Manual Basins:	False
Over-Relax Weight Fact:	0.5 dec		
dZ Tolerance:	0.0010 ft	Smp/Man Basin Rain Opt:	Global
Max dZ:	1.0000 ft	OF Region Rain Opt:	Global
Link Optimizer Tol:	0.0001 ft	Rainfall Name:	~FLMOD
		Rainfall Amount:	5.52 in
Edge Length Option:	Automatic	Storm Duration:	24.0000 hr
Dflt Damping (2D):	0.0050 ft	Dflt Damping (1D):	0.0050 ft
Min Node Srf Area (2D):	100 ft2	Min Node Srf Area (1D):	100 ft2
Energy Switch (2D):	Energy	Energy Switch (1D):	Energy

Comment:

Node Max Conditions [Scenario1]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
POND 1	100YR-24HR	63.00	63.25	0.0010	22.07	12.50	22871
POND 1	25Y-24H	63.00	62.89	0.0007	15.55	5.36	21510
POND 1	5YR-24H	63.00	62.40	0.0009	9.71	1.63	19691

Node Max Conditions [Scenario1]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
POND 2	100YR-24HR	64.00	65.17	0.0010	42.23	14.84	26964
POND 2	25Y-24H	64.00	63.77	0.0010	29.78	11.70	22623
POND 2	5YR-24H	64.00	62.89	0.0010	18.64	5.58	19524

Node Max Conditions [Scenario1]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
POND 3	100YR-24HR	65.00	65.11	0.0010	38.51	18.41	22786
POND 3	25Y-24H	65.00	64.13	0.0010	27.05	13.49	19622
POND 3	5YR-24H	65.00	63.37	0.0010	16.79	5.44	17169

Node Max Conditions [Scenario1]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
POND 4	100YR-24HR	68.00	68.78	0.0010	63.44	33.57	24733
POND 4	25Y-24H	68.00	67.85	0.0010	44.86	31.65	21953
POND 4	5YR-24H	68.00	67.21	0.0010	28.23	14.74	20061

Node Max Conditions [Scenario1]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
POST 1	100YR-24HR	61.20	61.60	0.0000	12.50	0.00	0
POST 1	25Y-24H	61.20	61.20	0.0000	5.36	0.00	0
POST 1	5YR-24H	61.20	61.00	0.0000	1.63	0.00	0

Node Max Conditions [Scenario1]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
POST 2	100YR-24HR	62.10	63.00	0.0000	14.84	4.68	0
POST 2	25Y-24H	62.10	62.10	0.0000	11.70	0.00	0
POST 2	5YR-24H	62.10	60.00	0.0000	5.57	0.00	0

Node Max Conditions [Scenario1]

POST 3	100YR-24HR	62.60	63.20	0.0000	18.41	3.23	0
POST 3	25Y-24H	62.60	62.60	0.0000	13.49	0.00	0
POST 3	5YR-24H	62.60	61.00	0.0000	5.44	0.00	0

Node Max Conditions [Scenario1]

POST 4	100YR-24HR	63.60	64.00	0.0000	33.57	0.00	0
POST 4	25Y-24H	63.60	63.60	0.0000	31.65	0.00	0
POST 4	5YR-24H	63.60	63.00	0.0000	14.74	0.00	0

Node Max Conditions [Scenario1]

PRE 1	100YR-24HR	61.20	61.60	0.0000	8.55	0.00	0
PRE 1	25Y-24H	61.20	61.20	0.0000	5.75	0.00	0
PRE 1	5YR-24H	61.20	61.00	0.0000	3.30	0.00	0

Node Max Conditions [Scenario1]

PRE 2	100YR-24HR	62.10	63.00	0.0000	17.86	0.00	0
PRE 2	25Y-24H	62.10	62.10	0.0000	12.02	0.00	0
PRE 2	5YR-24H	62.10	60.00	0.0000	6.91	0.00	0

Node Max Conditions [Scenario1]

PRE 3	100YR-24HR	62.60	63.20	0.0000	32.07	0.00	0
PRE 3	25Y-24H	62.60	62.60	0.0000	22.10	0.00	0
PRE 3	5YR-24H	62.60	61.00	0.0000	13.23	0.00	0

Node Max Conditions [Scenario1]

PRE 4	100YR-24HR	63.60	64.00	0.0000	51.42	0.00	0
PRE 4	25Y-24H	63.60	63.60	0.0000	36.02	0.00	0
PRE 4	5YR-24H	63.60	63.00	0.0000	22.30	0.00	0

APPENDIX J

GEOTECHNICAL REPORT EXCERPTS

Geotechnical · CMT · CEI

Geotechnical Exploration and Evaluation Report

East Roadway & Taxiway Improvements

Cecil Airport
Jacksonville, Florida

JAA Project No. F2011-03, Phase I
JAA Contract No. C-759
CSI Geo Project No. 71-11-120-08
RS&H Project No. 201-7262-025

Prepared for

Reynolds, Smith & Hills, Inc.

August 15, 2011

2.0 GEOTECHNICAL EXPLORATION

2.1 Purpose of Exploration

The purpose of the geotechnical exploration was to obtain site and subsurface information to evaluate the soil conditions within the project limits and formulate site preparation and earthwork construction recommendations. The geotechnical exploration required field exploration, laboratory testing, and geotechnical analysis and evaluation of the collected data.

2.2 Field Exploration

Taxiway Improvements - To explore the subsurface conditions in the areas of the proposed taxiway improvements a total of 16 Auger borings (TW-1, TW-2, TW-4 through TW-7, and TW-9 through TW-18) and 2 Standard Penetration Test (SPT) borings (TW-3 through TW-8) were performed. The auger borings and SPT borings were drilled to depths of 10 and 15 feet respectively below the existing ground surface.

Three bulk soil samples were also collected at specific test locations for determination of the California Bearing Ratio (CBR) values of the existing subgrade soils. The CBR samples were taken at a depth of about 1.5 to 2.5 feet below the existing ground surface.

Approach Road - To explore the subsurface conditions in the areas of the proposed roadway improvements 7 Auger borings (RW-1, RW-2, and RW-4 through RW-8) were drilled to a depth of 6 feet below the existing grade, and 2 Auger borings (RW-3 and RW-9) were extended to a depth of 15 feet below the existing grade adjacent to the existing roadway. Additionally 8 pavement cores, C-1 through C-8, were also taken along the roadway alignment to evaluate the thickness of the existing pavement system layers. One bulk sample was collected adjacent to pavement core C-4 for Limerock Bearing Ratio (LBR) testing.

Retention Ponds - To evaluate the subsurface conditions and permeability characteristics with regard to the ponds, 8 Auger borings were drilled to a depth of 25 feet below the existing grade. To determine the permeability characteristics of the existing soils, four Double Ring Infiltration

(DRI) tests DRI-1 through DRI-4 were performed at a depth of 2 feet below the existing ground surface in the area of the ponds.

The location of the soil borings, core locations, and DRI tests were selected by RS&H, Inc., and located in the field by Ghiotto & Associates. These locations are shown on the Field Exploration Plan sheets presented in the Appendix. A brief description of the exploratory drilling and sampling techniques used are presented in the Field and Laboratory Test Procedure sheets included in the Appendix.

2.3 Laboratory Testing

Quantitative laboratory testing was performed on selected representative samples of the soils encountered in the field exploration. The laboratory tests were performed to better define the composition of the soils encountered. Laboratory tests were performed to determine moisture contents, fines content, grain size analyses, Atterberg limits, and organic contents of the soils encountered. Results of the laboratory testing performed for soil classification are shown on the Summary of Laboratory Test Results sheet presented in the Appendix.

Additionally, three CBR tests CBR-1 through CBR-3 were performed on bulk samples of the subgrade soils taken from the proposed taxiway alignment. One LBR test, LBR-1, was performed on a bulk sample of the subgrade soils taken from the proposed roadway alignment. Laboratory test procedures used are also presented in the Field and Laboratory Test Procedure sheets included in the Appendix.

1.5 inch previous asphalt layer was encountered. A summary of the existing pavement system thickness is included in the Appendix.

3.4 Groundwater Conditions

Taxiway - The groundwater level was encountered at the time of drilling at a depth ranging from about 5.0 to 13.0 feet below the existing ground surface in the area of the proposed roadway. The estimated seasonal high water level ranged between 3.5 feet and 6 feet beneath the existing ground surface.

Approach Road - The groundwater level was encountered at the time of drilling at a depth of approximately 7.9 feet below the existing ground surface in the area of the proposed roadway. The estimated seasonal high water level was measured at approximately 6.8 feet beneath the existing ground surface.

For constructability reasons, we recommend that the bottom of the stabilized subgrade should be at least one foot above the ESHWT. Therefore, where applicable, the grades must be raised if ESHWT is in conflict with the base.

Retention Ponds - The groundwater level was encountered at the time of drilling at a depth ranging from about 6.5 to 8.2 feet below the existing ground surface in the area of the proposed ponds. The estimated seasonal high water level ranged between 4.7 feet and 5.5 feet beneath the existing ground surface.

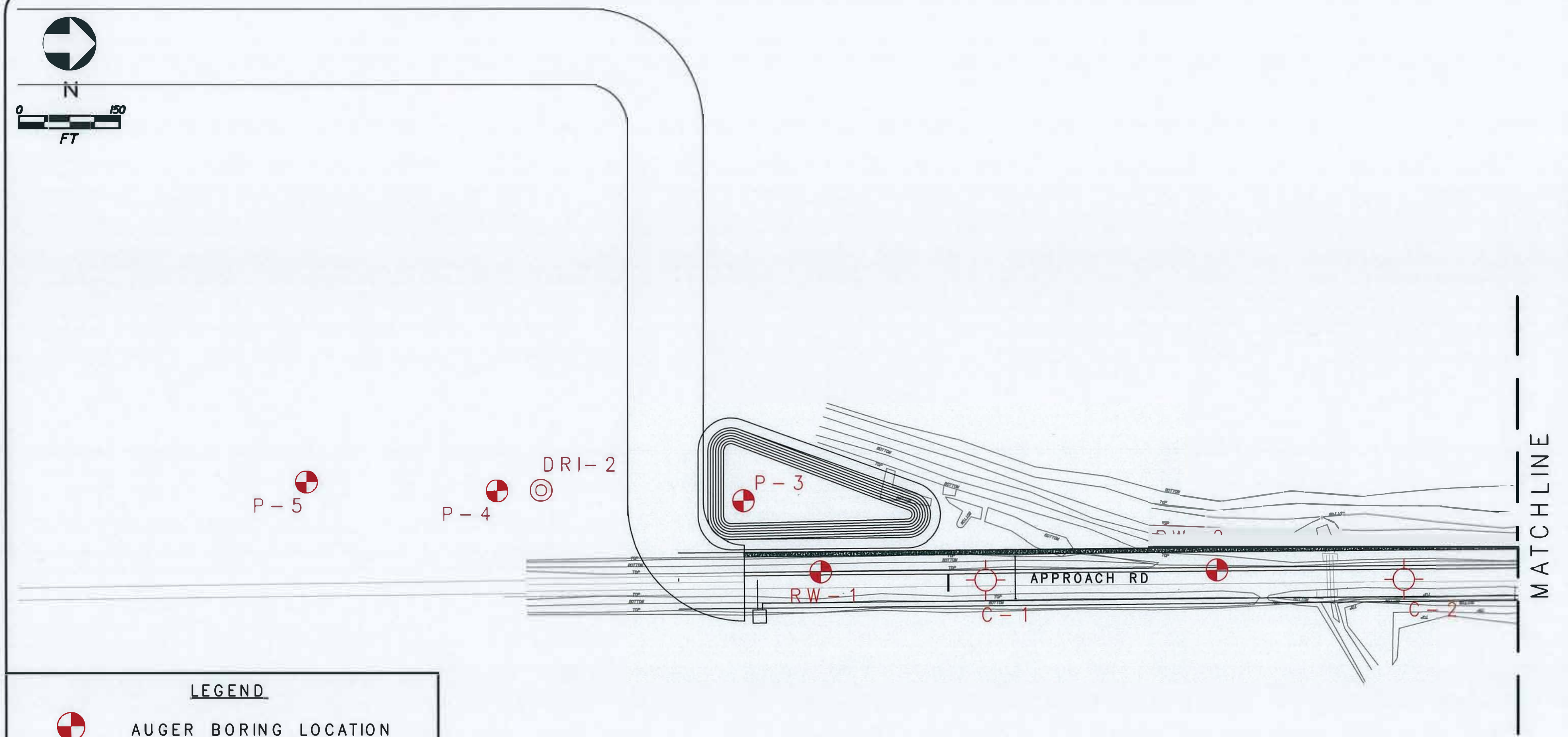
Fluctuations of the groundwater level should be anticipated as a result of seasonal climatic variations, surface water runoff patterns, construction activities, and other related factors. Groundwater may perch on near surface clayey soils during and following periods of prolonged or intense rainfall. During seasonal high precipitation periods, groundwater levels can be expected to rise above the levels recorded during this exploration. Therefore, design drawings and specifications should account for the possibility of groundwater level variations, and construction planning should be based on the assumption that such variations will occur.

3.7 Double Ring Infiltration Test Results

The results of the field double ring infiltration tests performed for the areas of the proposed pond sites indicate that the soil infiltration rates are as follows:

Test Location	**Infiltration Rate (in/hour)**
DRI-1	10.6
DRI-2	12.2
DRI-3	11.4
DRI-4	10.8

*The values presented in the table above indicate the conditions at the specific test locations.



LEGEND

AUGER BORING LOCATION

PAVEMENT CORE LOCATION

DOUBLE RING INFILTRATION TEST LOCATION

CSIGeo
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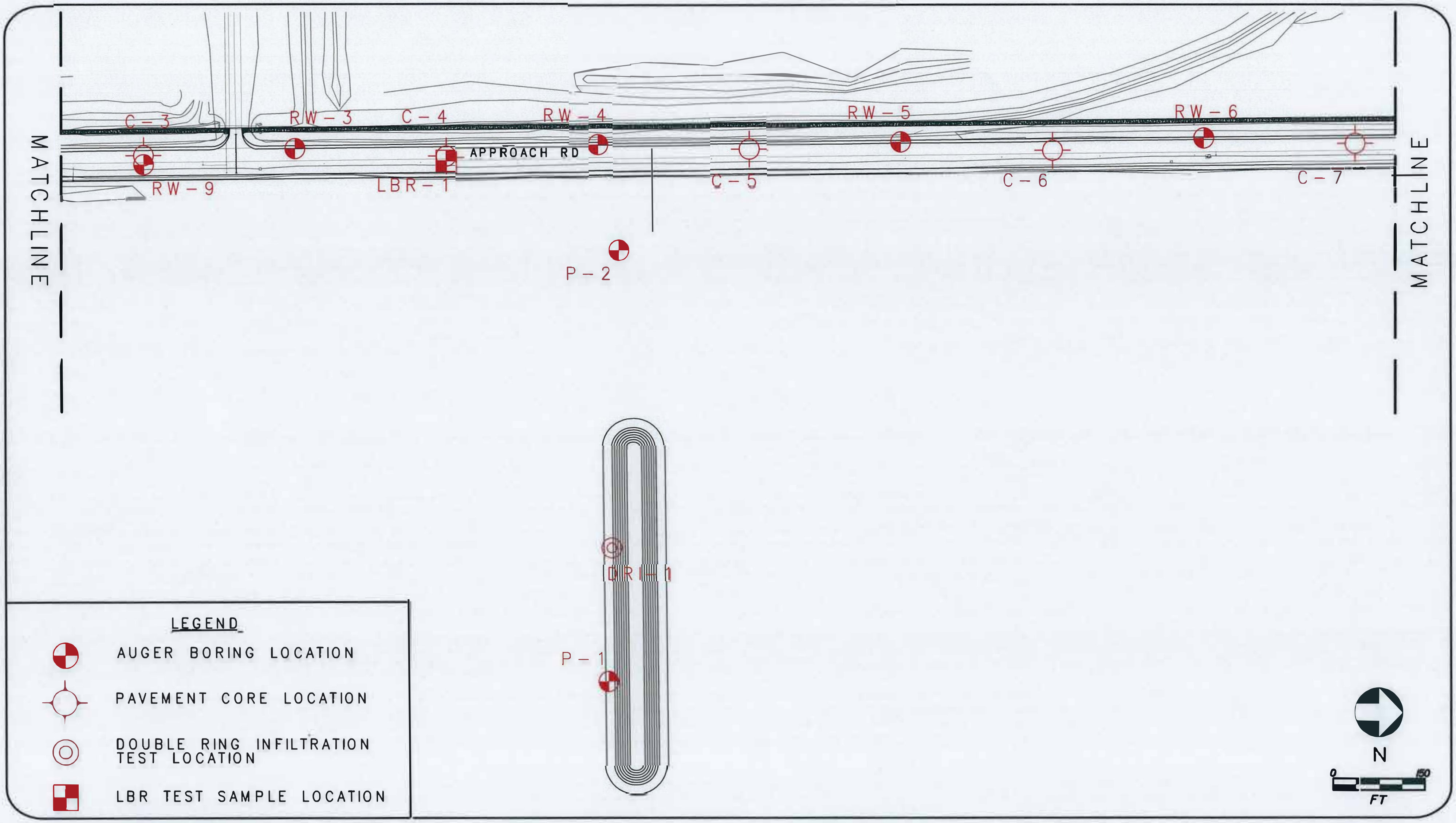
GEOTECHNICAL ENGINEERING
CONSTRUCTION MATERIAL TESTING
CONSTRUCTION ENGINEERING INSPECTION

FIELD EXPLORATION PLAN
APPROACH ROAD
EAST ROADWAY & TAXIWAY IMPROVEMENTS
CECIL FIELD - JACKSONVILLE, FLORIDA



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CONSTRUCTION MATERIAL TESTING
CONSTRUCTION ENGINEERING INSPECTION

FIELD EXPLORATION PLAN
APPROACH ROAD
EAST ROADWAY & TAXIWAY IMPROVEMENTS
CECIL FIELD - JACKSONVILLE, FLORIDA

LEGEND

AUGER BORING LOCATION

PAVEMENT CORE LOCATION

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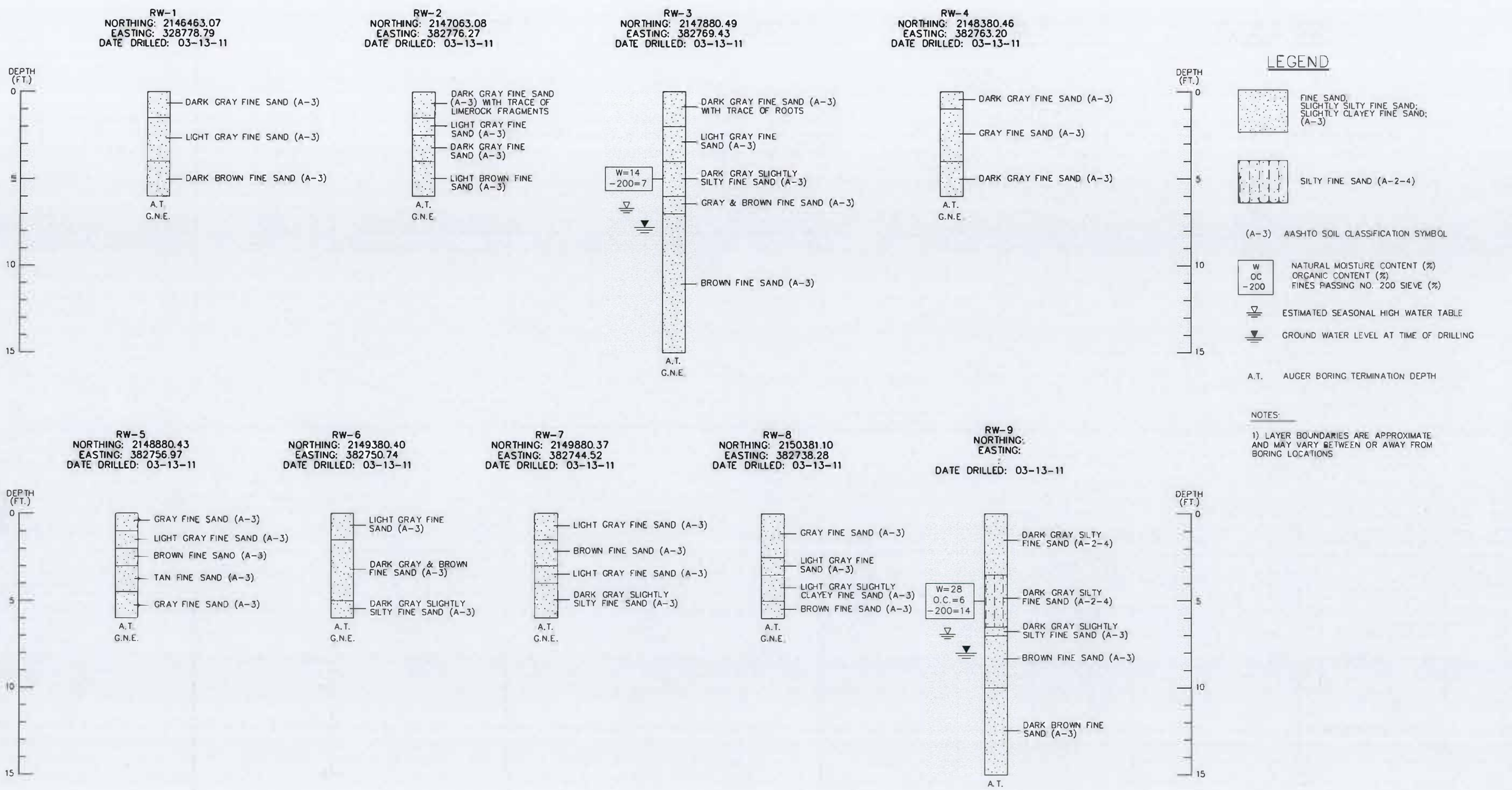
CONSTRUCTION MATERIAL TESTING
CONSTRUCTION ENGINEERING INSPECTION

FIELD EXPLORATION PLAN
APPROACH ROAD
EAST ROADWAY & TAXIWAY IMPROVEMENTS
CECIL FIELD – JACKSONVILLE, FLORIDA



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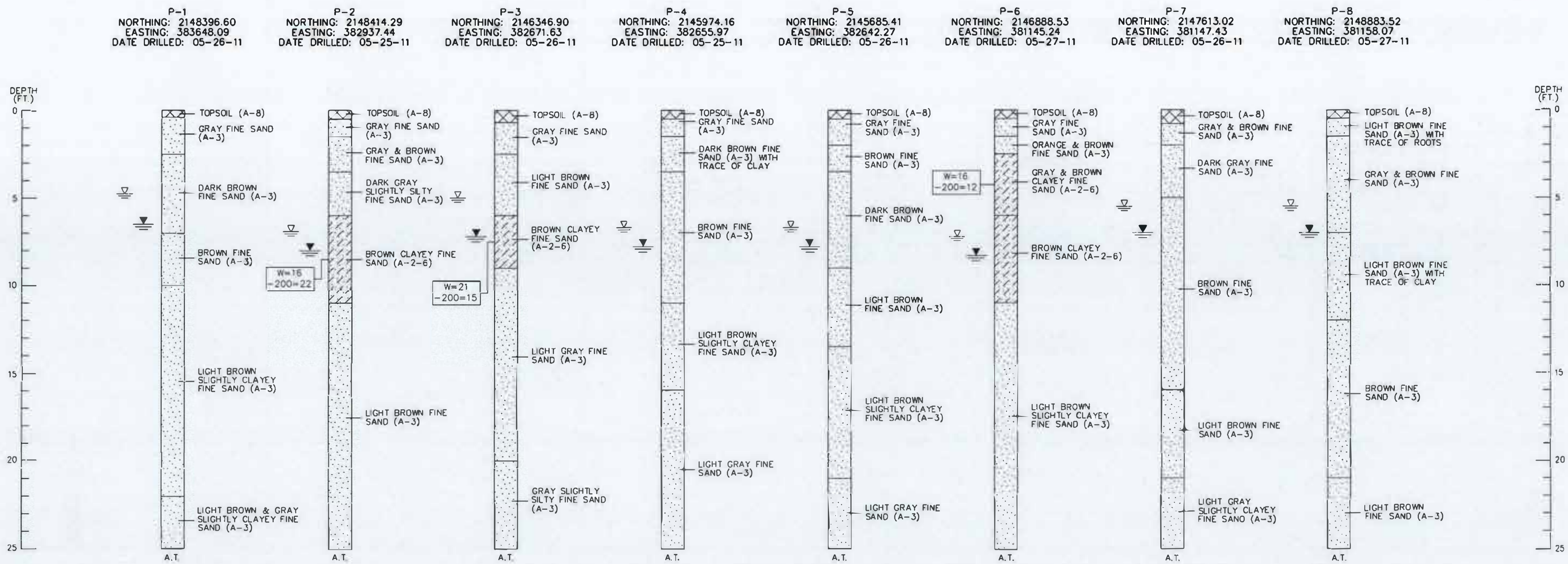
GEOTECHNICAL ENGINEERING
CONSTRUCTION MATERIAL TESTING
CONSTRUCTION ENGINEERING INSPECTION

REPORT OF CORE BORINGS
APPROACH ROAD
EAST ROADWAY & TAXIWAY IMPROVEMENTS
CECIL FIELD - JACKSONVILLE, FLORIDA



LEGEND

FINE SAND; SLIGHTLY SILTY FINE SAND; SLIGHTLY CLAYEY FINE SAND; (A-3)

CLAYEY FINE SAND; (A-2-6)

TOPSOIL; (A-8)

(A-3) AASHTO SOIL CLASSIFICATION SYMBOL

W / -200 NATURAL MOISTURE CONTENT (%) FINES PASSING NO. 200 SIEVE (%)

ESTIMATED SEASONAL HIGH WATER TABLE

GROUND WATER LEVEL AT TIME OF DRILLING

A.T. AUGER BORING TERMINATION DEPTH

NOTES

1) LAYER BOUNDARIES ARE APPROXIMATE AND MAY VARY BETWEEN OR AWAY FROM BORING LOCATIONS.

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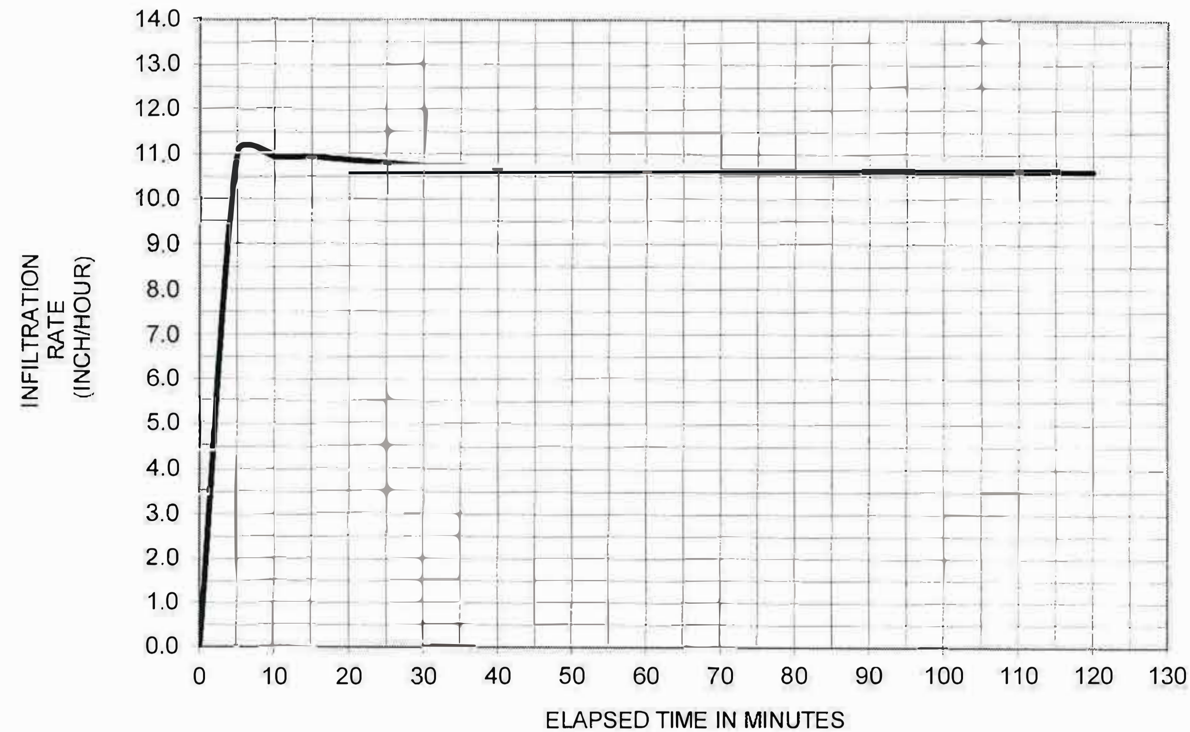
CONSTRUCTION MATERIAL TESTING
CONSTRUCTION ENGINEERING INSPECTION

REPORT OF CORE BORINGS

PONDS
EAST ROADWAY & TAXIWAY IMPROVEMENTS
CECIL FIELD - JACKSONVILLE, FLORIDA

ELAPSED TIME MIN.	INFILTRATION RATE (INCH/HOUR)
0	0
5	11.01
10	10.95
15	10.95
20	10.88
25	10.82
30	10.75
35	10.75
40	10.69
45	10.69
50	10.69
55	10.62
60	10.62
65	10.62
70	10.62
75	10.62
80	10.62
85	10.62
90	10.62
95	10.62
100	10.62
105	10.62
110	10.62
115	10.62
120	10.62



LOCATION: DRI-1

DATE PERFORMED: 05/27/11

INFILTRATION RATE: 10.6 inch/hr

DEPTH: 24 inches

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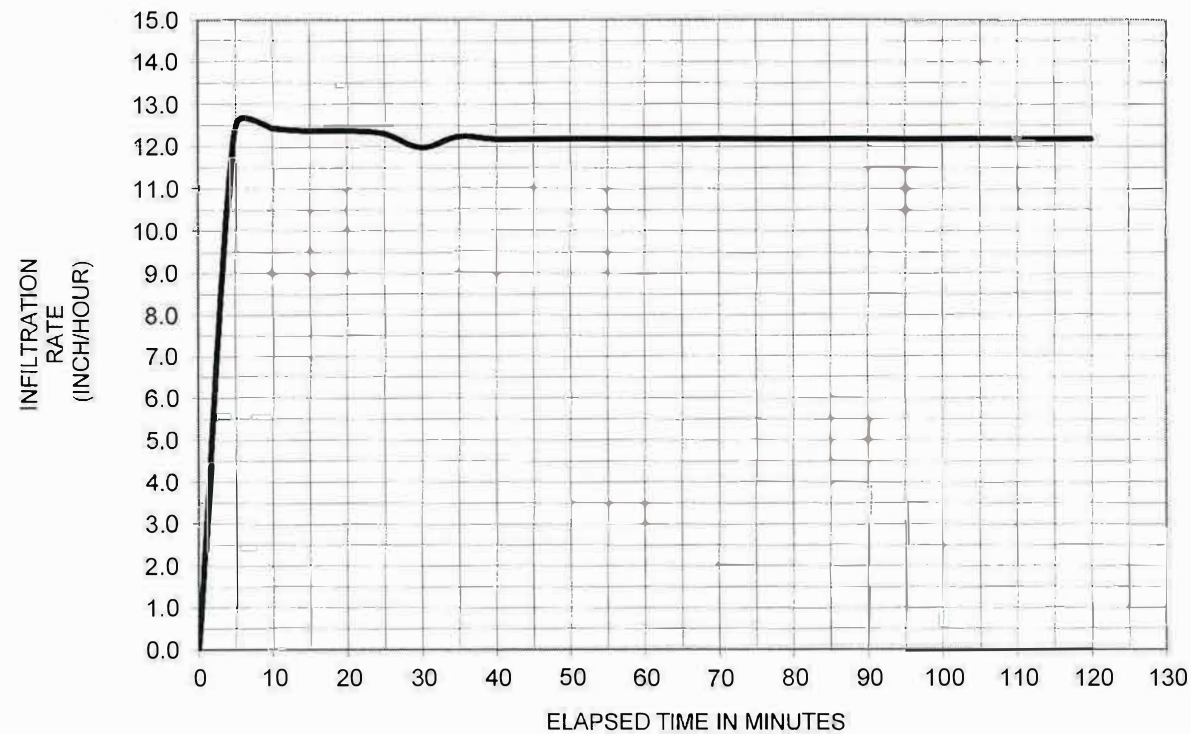
DOUBLE-RING INFILTRATION TEST

DRI-1

East Roadway & Taxiway Improvements
Cecil Field - Jacksonville, Florida

f:\projects\04-072002\docs\DR-1

ELAPSED TIME MIN.	INFILTRATION RATE (INCH/HOUR)
0	0
5	12.50
10	12.43
15	12.37
20	12.37
25	12.31
30	11.98
35	12.24
40	12.18
45	12.18
50	12.18
55	12.18
60	12.18
65	12.18
70	12.18
75	12.18
80	12.18
85	12.18
90	12.18
95	12.18
100	12.18
105	12.18
110	12.18
115	12.18
120	12.18



LOCATION: DRI-2

DATE PERFORMED: 05/27/11

INFILTRATION RATE: 12.2 inch/hr

DEPTH: 24 inches

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DOUBLE-RING INFILTRATION TEST

DRI-2

East Roadway & Taxiway Improvements
Cecil Field - Jacksonville, Florida

f:\projects\04-072002\docs\DR-1

Geotechnical • CMT • CEI

Geotechnical Exploration and Evaluation Report

Cecil Airport Approach Extension
Jacksonville, Florida

CSI Geo Project No.: 71-22-120-39
RS&H Project No.: 10010049XXX

Prepared by:

CSI Geo, Inc.
2394 St. Johns Bluff Road S., Suite 200
Jacksonville, FL 32246
Tel: (904) 641-1993

Prepared for:

RS&H, Inc.

July 25, 2022

CSI Geo, Inc.
2394 St. Johns Bluff Road South, Suite 200
Jacksonville, FL 32246

July 25, 2022

Mr. Andrew Samberg, P.E.
RS&H, Inc.
10748 Deerwood Park Blvd. S.
Jacksonville, FL 32256-0597

RE: Cecil Airport Approach Extension
Jacksonville, Florida

Subject: Geotechnical Exploration and Evaluation Report
CSI Geo Project No. 71-22-120-39

Dear Mr. Samberg:

CSI Geo, Inc. has performed the authorized geotechnical exploration for the proposed Cecil Airport Approach Extension at Cecil Airport in Jacksonville, Florida. This report presents our understanding of the subsurface conditions along with our engineering evaluation and recommendations for the proposed site improvements.

We have enjoyed working with you on this project and look forward to working with you on future projects. If you have any questions concerning this report, please contact our office.

Sincerely,

CSI Geo, Inc.

Nader Amer, Ph.D
Geotechnical Engineer

JOHN A. IYA LICENSE No. 77294 STATE OF FLORIDA PROFESSIONAL ENGINEER

John A, Iya, P.E.
Senior Geotechnical
Registered, Florida No. 77294

CSI Geo, Inc. • 2394 St. Johns Bluff Road S, #200 • Jacksonville, FL 32246 • (904) 641-1993 • www.csi-geo.com

TABLE OF CONTENTS

LIST OF TABLES

APPENDIX

- Site Location Map
- Field Exploration Plan
- Report of Core Borings
- Limerock Bearing Ratio (LBR) & Modified Proctor Compaction Test Results
- Summary of Laboratory Test Results
- Environmental Corrosion Test Results
- Key to Soil Classification
- Field and Laboratory Test Procedures

3.0 General Subsurface Conditions

3.1 General

An illustrated representation of the subsurface conditions encountered in the proposed construction areas is shown on the Report of Core Borings sheet presented in the **Appendix**. The soil conditions outlined below highlight the major subsurface stratification. The Report of Core Borings should be consulted for a detailed description of the subsurface conditions encountered at each boring location. When reviewing the Report of Core Borings, it should be understood that soil conditions may vary outside of the explored areas.

3.2 Soil Conditions

Review of the soil borings indicates that the proposed roadway is generally underlain by fine sands and slightly silty sands (A-3 AASHTO), silty fine sands (A-2-4), plastic clayey sands (A-2-6), highly plastic sandy clays (A-7-6), and unsuitable organic soils (A-8) until the boring termination depths of 10 and 15 feet below the existing ground surface.

The unsuitable organic soils consisting of topsoil and organic soils (A-8) were encountered throughout the roadway alignment, generally to depths ranging from 6 inches to 5 feet below the existing ground surface.

3.3 Groundwater Conditions

The groundwater level in the area of the proposed roadway was encountered at the time of drilling at depths ranging from 1.0 to 4.0 feet below the existing ground surface. Standing and perched water was observed in several areas near to the proposed roadway alignment.

3.4 Estimated Seasonal High Water Level

The estimated seasonal high water level (ESHWL) is anticipated to be at depths ranging from above the existing ground surface to 2.5 feet beneath the existing ground surface. In certain areas, especially those considered wetlands or in close proximity to such, the ESHWL should be expected to be higher than the existing ground surface.

The presence of interbedded and random deposits of A-2-4, A-2-6, A-7-6, and A-8 type soils should be expected throughout the site at varying depths below the existing ground surface.

It is cautioned that these soils may be present at depths shallower than two feet below the existing ground surface. These soils tend to have poor infiltration characteristics which may cause groundwater to perch beneath and near the pavement base. This will cause the pavement base material to become saturated and therefore may cause pavement system failure unless adequate clearance is provided between the base course and the estimated seasonal high water level.

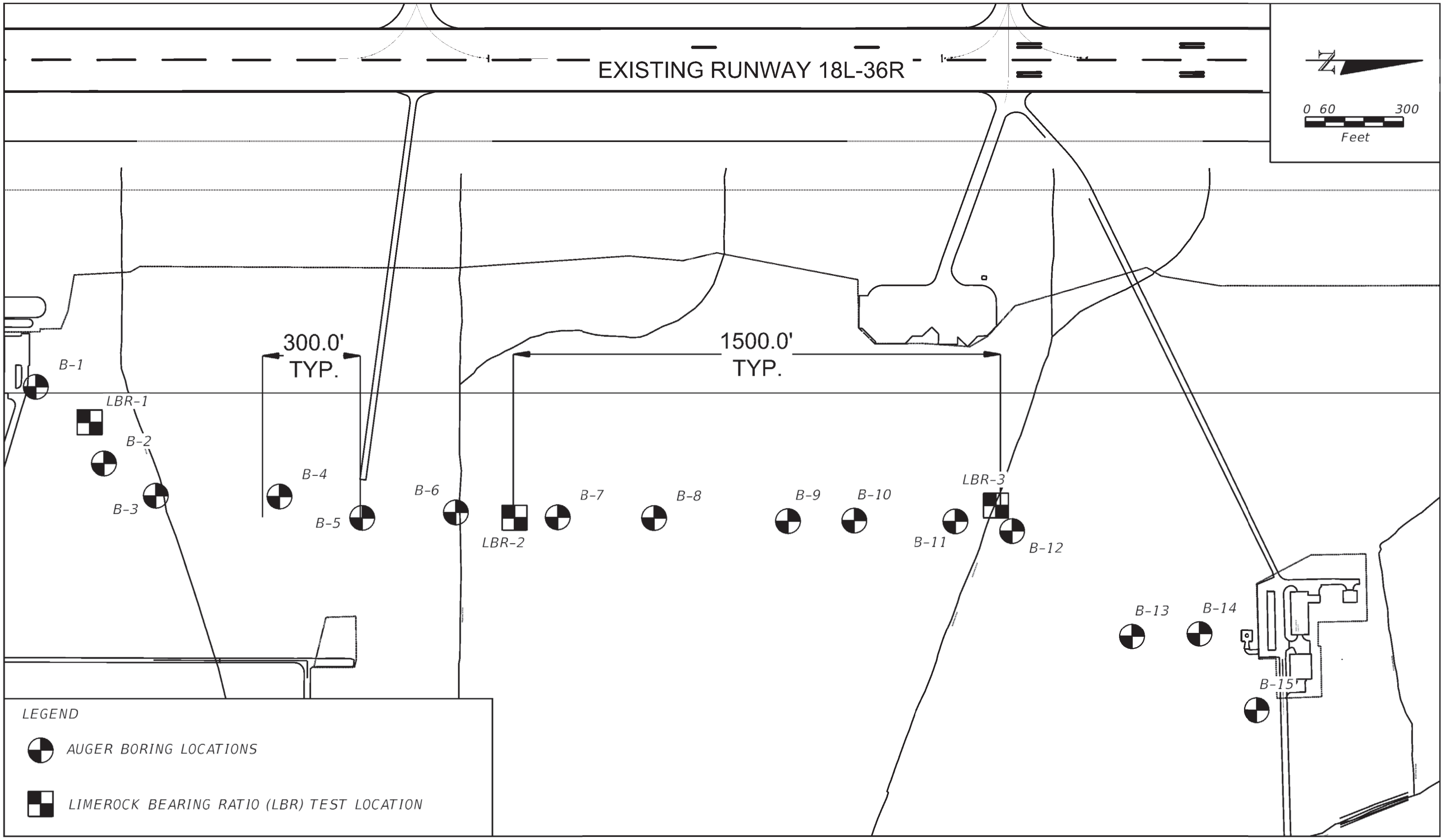
At the time this report was prepared the roadway cross sections had not been developed to enable us to determine if the ESHWL is in conflict with the base/stabilized subgrade. For constructability reasons, we recommend that the bottom of the stabilized subgrade should be at least one foot above the ESHWL. Therefore, where applicable or practical, the ground surface should be raised if the ESHWL is in conflict with the base.

Fluctuations of the groundwater level should be anticipated as a result of seasonal climatic variations, surface water runoff patterns, construction activities, and other related factors. Groundwater may perch on near surface clayey or silty soils during and following periods of prolonged or intense rainfall. During seasonal high precipitation periods, groundwater levels can be expected to rise above the levels recorded during this exploration. Therefore, design drawings and specifications should account for the possibility of groundwater level variations, and construction planning should be based on the assumption that such variations will occur.

3.5 Environmental Corrosion Test Results

The laboratory test data was used to determine the substructure environmental classification in accordance with the FDOT Structures Design Guidelines. Based on the test results, the substructures environmental classification for the majority of the project site can be generally classified as “Extremely Aggressive” for steel and “Moderately to Extremely Aggressive” for concrete. Detailed results of the environmental corrosion tests are presented in the Environmental Corrosion Test Results sheet included in the **Appendix**.

Field Exploration Plan



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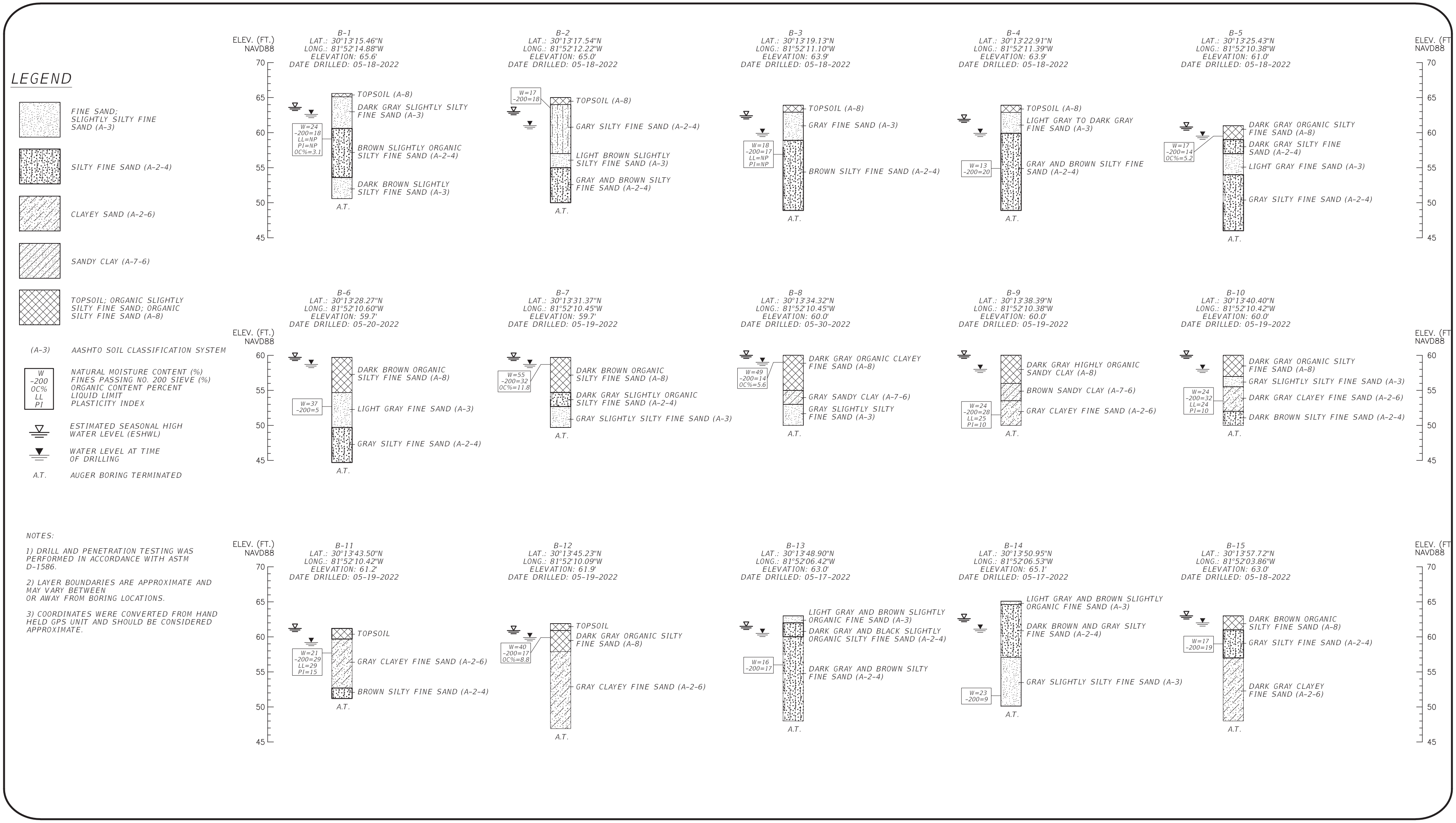
CONSTRUCTION ENGINEERING INSPECTION

FIELD EXPLORATION PLAN

JAA CECIL AIRPORT APPROACH EXTENSION
JACKSONVILLE, FLORIDA

Report of Core Borings



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REPORT OF CORE BORINGS
CECIL AIRPORT
APPROACH EXTENSION
JACKSONVILLE, FLORIDA

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Geotechnical Exploration Report

JAA Cecil Field Roadway Extension
Cecil Airport
Jacksonville, Florida

CSI Geo Project No. 71-16-120-26
RS&H Project No. 201-2275-048
Work Order No.: 001

Prepared for:

RS&H, Inc.

January 23, 2017

January 23, 2017

Mrs. Jaime Eaton, P.E.
RS&H, Inc.
10748 Deerwood Park Boulevard South
Jacksonville, Florida 32256

RE: JAA Cecil Field Roadway Extension
Cecil Airport
Jacksonville, Florida

Subject: Geotechnical Exploration Report
CSI Geo Project No.: 71-16-120-26
RS&H Project No.: 201-2275-048
Work Order No.: 001

Dear Mrs. Eaton:

CSI Geo, Inc. has performed the authorized geotechnical exploration and laboratory testing for the JAA Cecil Field Roadway Extension project at Cecil Airport in Jacksonville, Florida. This report describes our field and laboratory testing activities and presents our findings.

We have enjoyed working with you on this project and look forward to working with you on future projects. If you have any questions concerning this report, please contact our office.

Sincerely,

CSI Geo, Inc.

Brad Sheffield, P.E.
Geotechnical Engineer
Registered, Florida No. 82409

Bruce Khosrozadeh, P.E.
Senior Geotechnical and
Materials Engineer
Registered, Florida No. 45273

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont.)

APPENDIX

3.4 Groundwater Conditions

The groundwater level in the area of the proposed roadway was encountered at the time of drilling at depths ranging from 1.5 to 5.0 feet below the existing ground surface.

3.5 Estimated Seasonal High Water Level

The estimated seasonal high water level (ESHWL) is anticipated to be at depths ranging from above the existing ground surface to 3.0 feet beneath the existing ground surface. In certain areas, especially those considered wetlands or in close proximity to such, the ESHWL should be expected to be higher than the existing ground surface.

The presence of interbedded and random deposits of A-2-4, A-2-6, A-7-6, A-4 and A-8 type soils should be expected throughout the site at varying depths below the existing grades. It is cautioned that these soils may be present at depths shouldower than two feet below the existing grades. These soils tend to have poor infiltration characteristics which may cause groundwater to perch beneath and near the pavement base. This will cause the pavement base material to become saturated and therefore may cause pavement system failure unless adequate clearance is provided between the base course and the estimated seasonal high water level.

At the time this report was prepared the roadway cross sections had not been developed to enable us to determine if the ESHWL is in conflict with the base/stabilized subgrade. For constructability reasons, we recommend that the bottom of the stabilized subgrade should be at least one foot above the ESHWL. Therefore, where applicable or practical, the grades should be raised if the ESHWL is in conflict with the base.

Fluctuations of the groundwater level should be anticipated as a result of seasonal climatic variations, surface water runoff patterns, construction activities, and other related factors. Groundwater may perch on near surface clayey or silty soils during and following periods of prolonged or intense rainfall. During seasonal high precipitation periods, groundwater levels can be expected to rise above the levels recorded during this exploration. Therefore, design drawings and specifications should account for the possibility of groundwater level variations, and construction planning should be based on the assumption that such variations will occur.

3.6 Environmental Classification Testing Results

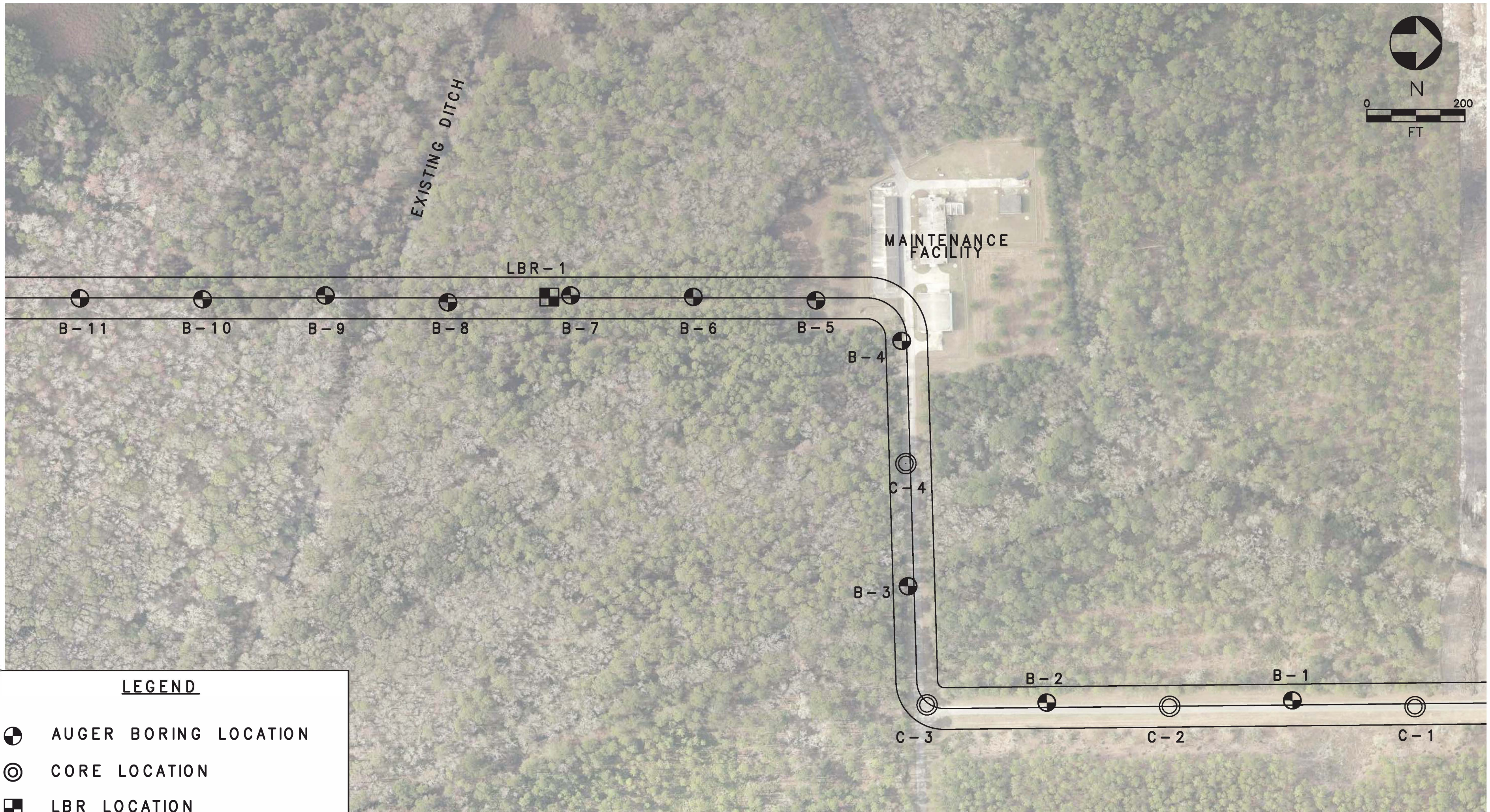
Environmental classification tests were performed on soil samples obtained from selected locations. The tests performed include pH, sulfates content, chlorides content, and electrical resistivity of the samples. Results of the environmental testing indicate that the soil materials encountered along the planned roadways are classified as “Moderately Aggressive” for concrete and “Extremely Aggressive” for steel. Results of the environmental corrosion testing performed are included in the **Appendix**.

3.7 Dynamic Cone Penetrometer Test Results

The subgrade soils underlying the existing pavement system were evaluated by means of Dynamic Cone Penetrometer (DCP) tests. The results of these tests can provide an indication of the Limerock Bearing Ratio (LBR) values of the underlying subgrade soils. From the test results, it can be concluded that the subgrade beneath the existing pavement is relatively dense with equivalent LBR values ranging from 41 to greater than 100 within the upper 18 inches of depth. Detailed DCP test results are presented in the **Appendix**.

3.8 Limerock Bearing Ratio Test Results

Three laboratory Limerock Bearing Ratio (LBR) and Modified Proctor compaction tests were performed on bulk samples obtained from the proposed roadway subgrade soils. The LBR value is based on assumed soil compaction criteria equal to 100 percent of the Modified Proctor maximum dry density. The LBR and Modified Proctor compaction test data are presented in the **Appendix** and summarized in the table below.



LEGEND

AUGER BORING LOCATION

CORE LOCATION

LBR LOCATION

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JAA CECIL FIELD ROADWAY EXTENSION
JACKSONVILLE, FLORIDA

LEGEND

ASPHALT

FINE SAND (A–3);
SLIGHTLY SILTY FINE SAND (A–3);
SLIGHTLY CLAYEY FINE SAND (A–3)

CLAYEY FINE SAND (A–2–6)

ORGANIC AND HIGHLY ORGANIC SILTY FINE SAND (A–8);
SILTY FINE SAND WITH MANY ROOTS AND MANY WOOD PIECES (A–8); PEAT (A–8);
TOPSOIL (A–8)

LIMEROCK

SILTY FINE SAND (A–2–4)

SANDY CLAY (A–7–6)

SANDY SILT (A–4)

(A–3) AASHTO SOIL CLASSIFICATION SYSTEM

A.T. AUGER BORING TERMINATION

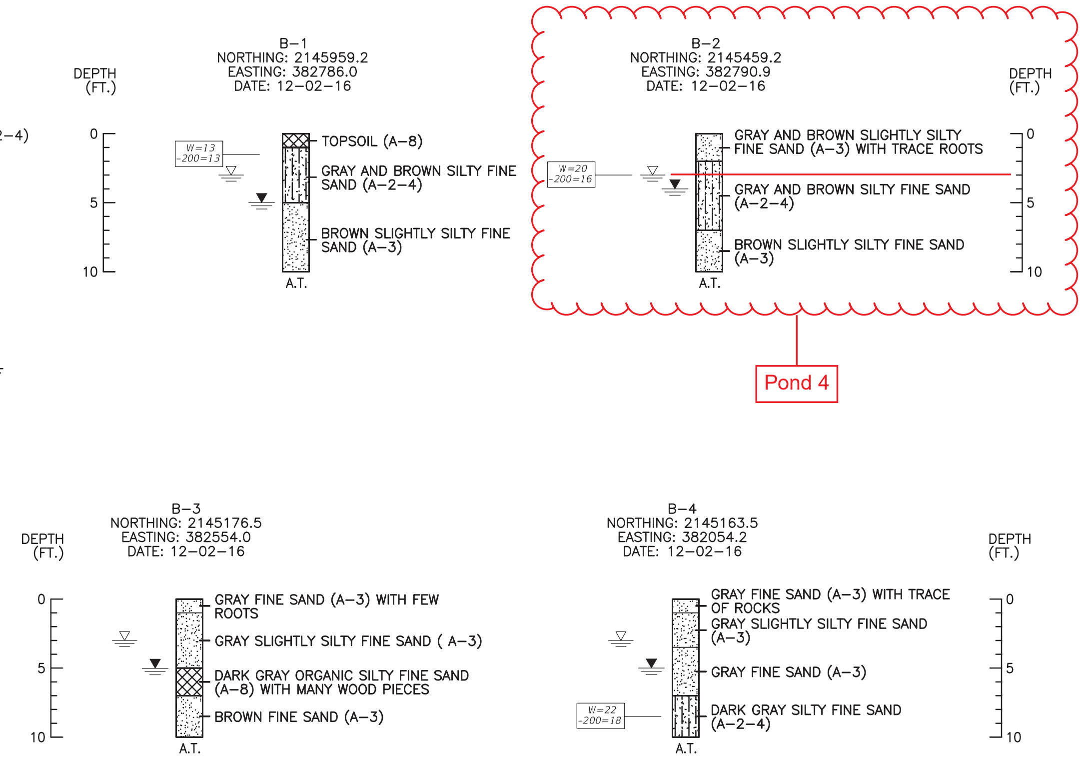
GROUND WATER LEVEL AT TIME OF DRILLING

SEASONAL HIGH GROUND WATER LEVEL

W	NATURAL MOISTURE CONTENT (%)
–200	FINES PASSING NO. 200 SIEVE (%)
OC%	ORGANIC CONTENT PERCENT (%)
LL	LIQUID LIMIT
PI	PLASTICITY INDEX

NOTES:

1) LAYER BOUNDARIES ARE APPROXIMATE AND MAY VARY BETWEEN OR AWAY FROM BORING LOCATIONS.



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GENERAL SUBSURFACE PROFILES

JAA CECIL FIELD ROADWAY EXTENSION
JACKSONVILLE, FLORIDA

APPENDIX K

STORMWATER QUALITY CALCULATIONS

JAA Approach Road and Utility Corridor Extension	Comp. By:	EEJC
	Date:	11/2/2022
	Chk. By:	SRW
	Job No:	1001-0049-002

Underdrain Pond Design Calculations (SJRWMD)

Pond Name: POND-1
OFW: FALSE

Required Treatment Volume

	Area (ac)	Runoff (ac-ft)	OFW Req. (ac-ft)	Total Runoff (ac-ft)	
(Offline A) 0.5" over Total Area	3.00	0.13	0.00	0.13	
(Offline B) 1.25" over Impervious Area	0.72	0.07	0.00	0.07	
(Online) 0.5" over Total Area	3.00	0.13	0.00	0.13	
Required Treatment Volume [max(A, B)+Online]				**0.25**	**ac-ft**

Dry Retention Pond Geometry

		Elevation (ft)	Area (ac)	Volume (ac-ft)
Berm Front		64.00	0.59	1.38
Treatment Weir	**Provided**	**62.00**	0.42	**0.37**
	Required	61.69	0.39	**0.25**
Bottom		61.00	0.33	0.00
Sump Top		61.00		0.00
Sump Bottom		61.00		0.00

JAA Approach Road and Utility Corridor Extension

Comp. By:	EEJC
Date:	11/2/2022
Chk. By:	SRW
Job No:	1001-0049-002

Underdrain Pond Design Calculations (SJRWMD)

Pond Name: POND-2
OFW: FALSE

Required Treatment Volume

	Area (ac)	Runoff (ac-ft)	OFW Req. (ac-ft)	Total Runoff (ac-ft)	
(Offline A) 0.5" over Total Area	**5.51**	0.23	0.00	0.23	
(Offline B) 1.25" over Impervious Area	**1.46**	0.15	0.00	0.15	
(Online) 0.5" over Total Area	**5.51**	0.23	0.00	0.23	
Required Treatment Volume [max(A, B)+Online]				**0.46**	**ac-ft**

Dry Retention Pond Geometry

		Elevation (ft)	Area (ac)	Volume (ac-ft)
Berm Front		**65.00**	**0.62**	2.09
Treatment Weir	**Provided**	**62.10**	0.38	**0.63**
	Required	**61.63**	0.35	**0.46**
Bottom		**60.00**	**0.21**	0.00
Sump Top		**60.00**		0.00
Sump Bottom		**60.00**		0.00

JAA Approach Road and Utility Corridor Extension	Comp. By:	EEJC
	Date:	11/2/2022
	Chk. By:	SRW
	Job No:	1001-0049-002

Underdrain Pond Design Calculations (SJRWMD)

Pond Name: Pond-3
OFW: FALSE

Required Treatment Volume

	Area (ac)	Runoff (ac-ft)	OFW Req. (ac-ft)	Total Runoff (ac-ft)	
(Offline A) 0.5" over Total Area	4.75	0.20	0.00	0.20	
(Offline B) 1.25" over Impervious Area	1.04	0.11	0.00	0.11	
(Online) 0.5" over Total Area	4.75	0.20	0.00	0.20	
Required Treatment Volume [max(A, B)+Online]				**0.40**	**ac-ft**

Dry Retention Pond Geometry

		Elevation (ft)	Area (ac)	Volume (ac-ft)
Berm Front		66.00	0.59	2.12
Treatment Weir	**Provided**	**62.60**	0.34	**0.54**
	Required	62.14	0.30	**0.40**
Bottom		60.50	0.18	0.00
Sump Top		60.50		0.00
Sump Bottom		60.50		0.00

JAA Approach Road and Utility Corridor Extension

Comp. By:	EEJC
Date:	11/2/2022
Chk. By:	SRW
Job No:	1001-0049-002

Underdrain Pond Design Calculations (SJRWMD)

Pond Name: Pond-4
OFW: FALSE

Required Treatment Volume

	Area (ac)	Runoff (ac-ft)	OFW Req. (ac-ft)	Total Runoff (ac-ft)
(Offline A) 0.5" over Total Area	**8.04**	0.34	0.00	0.34
(Offline B) 1.25" over Impervious Area	**2.52**	0.26	0.00	0.26
(Online) 0.5" over Total Area	**8.04**	0.34	0.00	0.34
Required Treatment Volume [max(A, B)+Online]				**0.67** ac-ft

Dry Retention Pond Geometry

		Elevation (ft)	Area (ac)	Volume (ac-ft)
Berm Front		**69.00**	**0.58**	2.17
Treatment Weir	**Provided**	**65.90**	0.37	**0.69**
	Required	**65.84**	0.37	**0.67**
Bottom		**63.50**	**0.21**	0.00
Sump Top		**63.50**		0.00
Sump Bottom		**63.50**		0.00

RS&H	**JAA Cecil Airport** Approach Road and Utility Corridor Extension	Comp. By: EEJC Date: 10/31/2022 Chk. By: SRW Job No: 1001-0049-002

Underdrain Calculations

Location: Pond 1

Spacing Underdrain Laterals

Reference: Ellipse Equation From SJRWMD Manual Vol. II Part X Section 24.1

$$S = \sqrt{\frac{4k(m^2 + 2\,a\,m)}{q}} \quad - \quad m = d - c \qquad a = D - d$$

S =	13.53	Drain spacing (ft) - Calculated Minimum
S =	**8.00**	**Drain spacing (ft) - Use. based on even spacing and pond dimensions.**
K =	6.10	Permeability rate of the soil (in/hr)
m =	1.50	Height of SHWT above drain after drawdown measured at midpoint between laterals (ft)
a =	0.50	Height of drain center above impermeable layer (ft)
q =	0.042	Drainage coefficient (ft/hr)
c =	1.00	Depth from the ground surface to SHWT after drawdown (ft)
t =	24	Recovery time (hr)
d =	2.50	Depth to drainage pipe center from the natural ground surface elevation (ft)
D =	3.00	Depth to impermeable layer from the natural ground surface elevation (ft) (where no impermeable layer present D = 2d). Assumed 2d, none reported.
r =	1	Depth from basin bottom to GWT elevation after drawdown (ft) (min r = 0.5')

Notes: 1) Veritical permeability of soil from geotech report used for permeability rate (DRI-2)
2) Factor of safey of 2 used w/recovery time of 48 hrs = 24 hrs and permeability rate
3) Impermeable liner used as impermeable layer
4) Pond bottom used as "natural ground" due to isolation with impermeable liner

Sizing Underdrain

Reference: SJRWMD Manual Vol. II Section 24.3

$$Qr = \frac{q\,S(L + \frac{S}{2})}{CF}$$

Qr =	0.040	Relief drain discharge (cfs)
S =	8.00	Drain spacing (ft)
L =	430	Drain Length (ft) - longest proposed run
q =	0.50	Drainage coefficient (in/hr)
CF =	43200	Conversion factor = 43200

Underdrain Details

8	in	= Pipe diameter
0	in	= gravel on each side of underdrain pipe. See note 1.
3.00	ft	= Depth from natural ground to impermeable barrier. See "D" above.
0.1	%	= Lateral Slope
0.015	*n*	= Manning's n value
2150	ft	= Total length of underdrain laterals
0.20	cfs	= Total combined flow of underdrains
0.33	cfs	= Underdrain capacity from manning's equation, assume full flow

Notes: 1) Fabric-wrapped pipe will be used in place of gravel envelope.

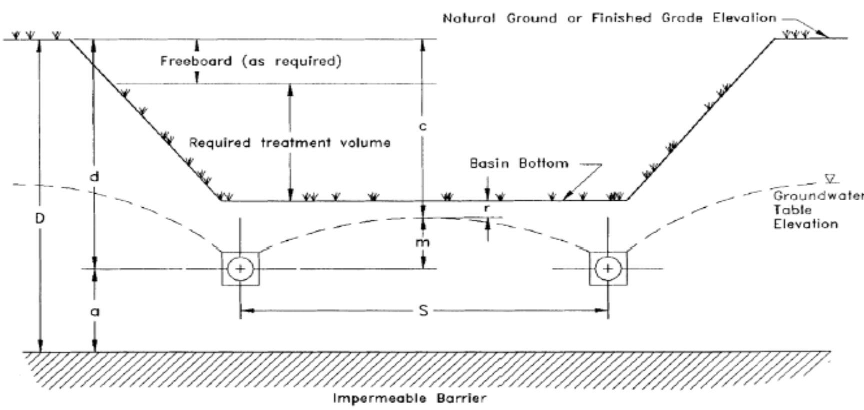

Figure 24-1. Cross-section of underdrain system illustrating variables used in the ellipse equation (N.T.S.)

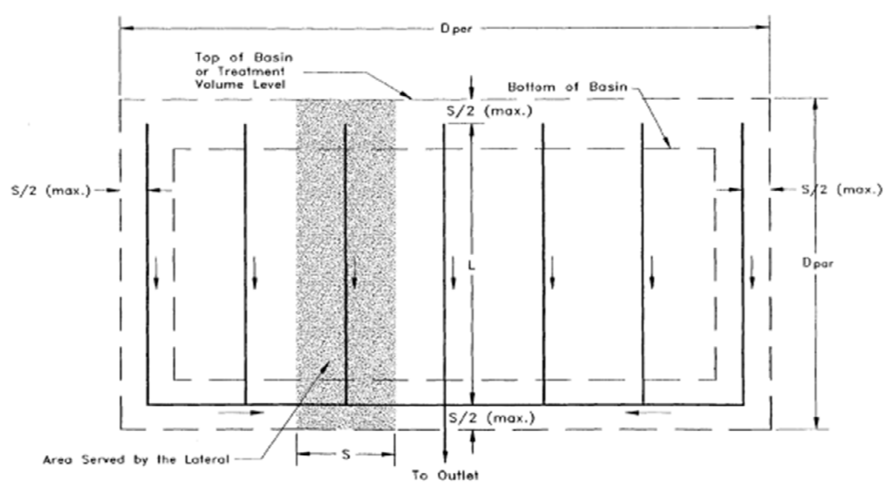

Figure 24-2. Top view of underdrain system illustrating variables used in the ellipse equation (N.T.S.)

Figure Reference: SJRWMD Manual Vol. II Section 24.3

RS&H	**JAA Cecil Airport** Approach Road and Utility Corridor Extension	Comp. By: EEJC Date: 10/31/2022 Chk. By: SRW Job No: 1001-0049-002

Underdrain Calculations

Location: Pond 2

Spacing Underdrain Laterals

Reference: Ellipse Equation From SJRWMD Manual Vol. II Part X Section 24.1

$$S = \sqrt{\frac{4k(m^2 + 2\,a\,m)}{q}} \qquad q = \frac{c}{t} \qquad m = d - c \qquad a = D - d$$

S =	13.53	Drain spacing (ft) - Calculated Minimum
S =	**8.00**	**Drain spacing (ft) - Use. based on even spacing and pond dimensions.**
K =	6.10	Permeability rate of the soil (in/hr)
m =	1.50	Height of SHWT above drain after drawdown measured at midpoint between laterals (ft)
a =	0.50	Height of drain center above impermeable layer (ft)
q =	0.042	Drainage coefficient (ft/hr)
c =	1.00	Depth from the ground surface to SHWT after drawdown (ft)
t =	24	Recovery time (hr)
d =	2.50	Depth to drainage pipe center from the natural ground surface elevation (ft)
D =	3.00	Depth to impermeable layer from the natural ground surface elevation (ft) (where no impermeable layer present D = 2d). Assumed 2d, none reported.
r =	1	Depth from basin bottom to GWT elevation after drawdown (ft) (min r = 0.5')

Notes: 1) Veritical permeability of soil from geotech report used for permeability rate (DRI-2)
2) Factor of safey of 2 used w/recovery time of 48 hrs = 24 hrs and permeability rate
3) Impermeable liner used as impermeable layer
4) Pond bottom used as "natural ground" due to isolation with impermeable liner

Sizing Underdrain

Reference: SJRWMD Manual Vol. II Section 24.3

$$Qr = \frac{q\,S(L + \frac{S}{2})}{CF}$$

Qr =	0.034	Relief drain discharge (cfs)
S =	8.00	Drain spacing (ft)
L =	360	Drain Length (ft) - longest proposed run
q =	0.50	Drainage coefficient (in/hr)
CF =	43200	Conversion factor = 43200

Underdrain Details

8	in	= Pipe diameter
0	in	= gravel on each side of underdrain pipe. See note 1.
3.00	ft	= Depth from natural ground to impermeable barrier. See "D" above.
0.1	%	= Lateral Slope
0.015	*n*	= Manning's n value
1800	ft	= Total length of underdrain laterals
0.17	cfs	= Total combined flow of underdrains
0.33	cfs	= Underdrain capacity from manning's equation, assume full flow

Notes: 1) Fabric-wrapped pipe will be used in place of gravel envelope.

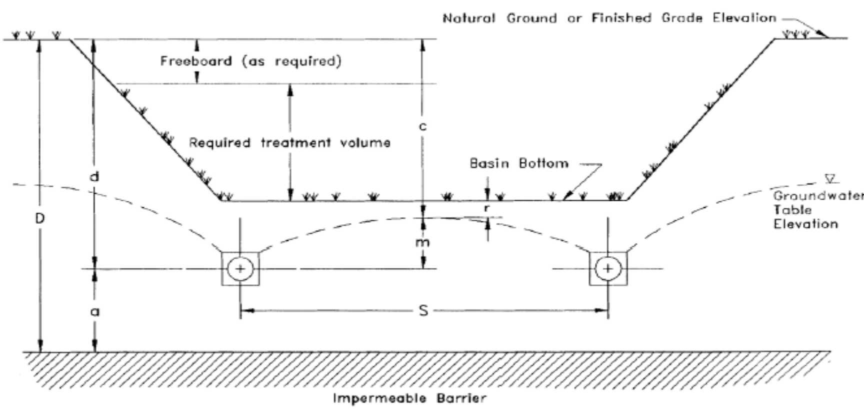

Figure 24-1. Cross-section of underdrain system illustrating variables used in the ellipse equation (N.T.S.)

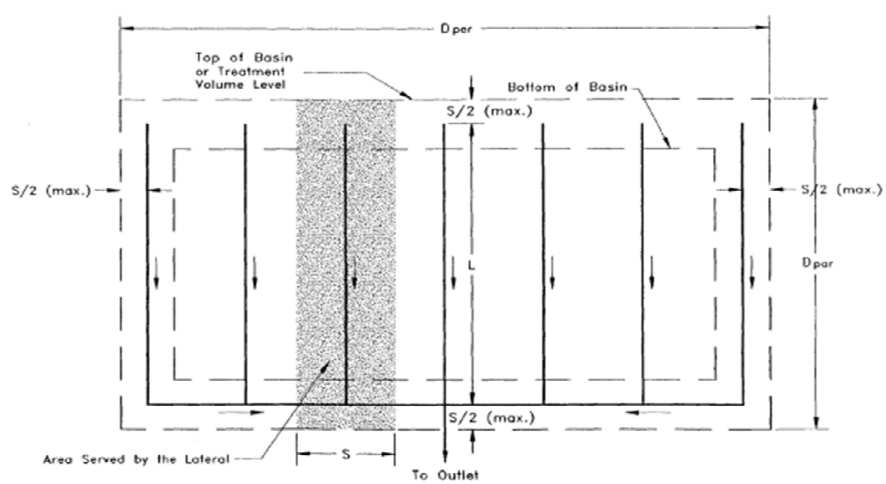

Figure 24-2. Top view of underdrain system illustrating variables used in the ellipse equation (N.T.S.)

Figure Reference: SJRWMD Manual Vol. II Section 24.3

Underdrain Calculations

Location: Pond 3

Spacing Underdrain Laterals

Reference: Ellipse Equation From SJRWMD Manual Vol. II Part X Section 24.1

$$S = \sqrt{\frac{4k(m^2 + 2\,a\,m)}{q}} \qquad q = \frac{c}{t} \qquad m = d - c \qquad a = D - d$$

S =	13.53	Drain spacing (ft) - Calculated Minimum
***S* =**	**8.00**	**Drain spacing (ft) - Use. based on even spacing and pond dimensions.**
K =	6.10	Permeability rate of the soil (in/hr)
m =	1.50	Height of SHWT above drain after drawdown measured at midpoint between laterals (ft)
a =	0.50	Height of drain center above impermeable layer (ft)
q =	0.042	Drainage coefficient (ft/hr)
c =	1.00	Depth from the ground surface to SHWT after drawdown (ft)
t =	24	Recovery time (hr)
d =	2.50	Depth to drainage pipe center from the natural ground surface elevation (ft)
D =	3.00	Depth to impermeable layer from the natural ground surface elevation (ft) (where no impermeable layer present D = 2d). Assumed 2d, none reported.
r =	1	Depth from basin bottom to GWT elevation after drawdown (ft) (min r = 0.5')

Notes: 1) Veritical permeability of soil from geotech report used for permeability rate (DRI-2)
2) Factor of safey of 2 used w/recovery time of 48 hrs = 24 hrs and permeability rate
3) Impermeable liner used as impermeable layer
4) Pond bottom used as "natural ground" due to isolation with impermeable liner

Sizing Underdrain

Reference: SJRWMD Manual Vol. II Section 24.3

$$Qr = \frac{q\,S(L + \frac{S}{2})}{CF}$$

Qr =	0.026	Relief drain discharge (cfs)
S =	8.00	Drain spacing (ft)
L =	275	Drain Length (ft) - longest proposed run
q =	0.50	Drainage coefficient (in/hr)
CF =	43200	Conversion factor = 43200

Underdrain Details

8	in	= Pipe diameter
0	in	= gravel on each side of underdrain pipe. See note 1.
3.00	ft	= Depth from natural ground to impermeable barrier. See "D" above.
0.1	%	= Lateral Slope
0.015	*n*	= Manning's n value
1375	ft	= Total length of underdrain laterals
0.13	cfs	= Total combined flow of underdrains
0.33	cfs	= Underdrain capacity from manning's equation, assume full flow

Notes: 1) Fabric-wrapped pipe will be used in place of gravel envelope.

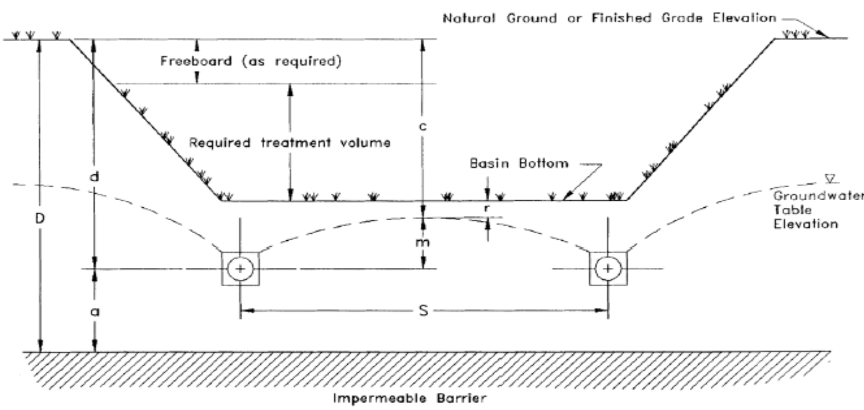

Figure 24-1. Cross-section of underdrain system illustrating variables used in the ellipse equation (N.T.S.)

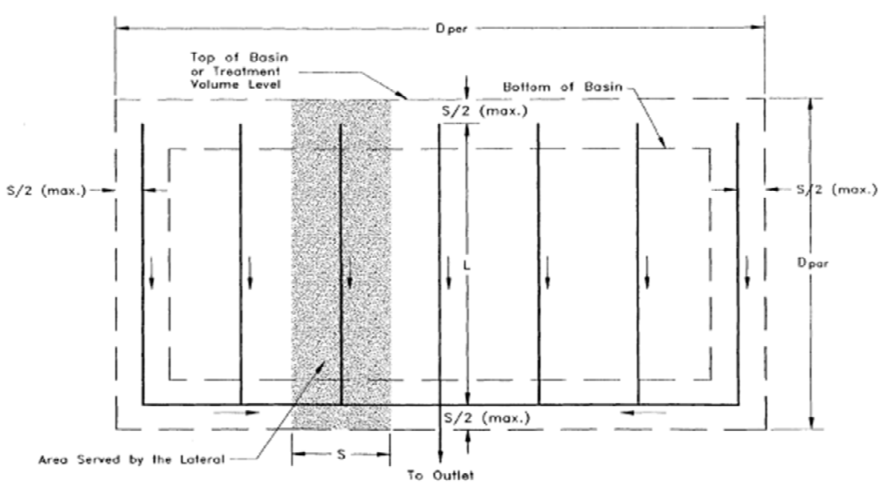

Figure 24-2. Top view of underdrain system illustrating variables used in the ellipse equation (N.T.S.)

Figure Reference: SJRWMD Manual Vol. II Section 24.3

RS&H	**JAA Cecil Airport** Approach Road and Utility Corridor Extension	Comp. By: EEJC Date: 10/31/2022 Chk. By: SRW Job No: 1001-0049-002

Underdrain Calculations

Location: Pond 4

Spacing Underdrain Laterals

Reference: Ellipse Equation From SJRWMD Manual Vol. II Part X Section 24.1

$$S = \sqrt{\frac{4k(m^2 + 2\,a\,m)}{q}} \qquad q = \frac{c}{t} \qquad m = d - c \qquad a = D - d$$

S =	13.53	Drain spacing (ft) - Calculated Minimum
S =	**8.00**	**Drain spacing (ft) - Use. based on even spacing and pond dimensions.**
K =	6.10	Permeability rate of the soil (in/hr)
m =	1.50	Height of SHWT above drain after drawdown measured at midpoint between laterals (ft)
a =	0.50	Height of drain center above impermeable layer (ft)
q =	0.042	Drainage coefficient (ft/hr)
c =	1.00	Depth from the ground surface to SHWT after drawdown (ft)
t =	24	Recovery time (hr)
d =	2.50	Depth to drainage pipe center from the natural ground surface elevation (ft)
D =	3.00	Depth to impermeable layer from the natural ground surface elevation (ft) (where no impermeable layer present D = 2d). Assumed 2d, none reported.
r =	1	Depth from basin bottom to GWT elevation after drawdown (ft) (min r = 0.5')

Notes: 1) Veritical permeability of soil from geotech report used for permeability rate (DRI-2)
2) Factor of safey of 2 used w/recovery time of 48 hrs = 24 hrs and permeability rate
3) Impermeable liner used as impermeable layer
4) Pond bottom used as "natural ground" due to isolation with impermeable liner

Sizing Underdrain

Reference: SJRWMD Manual Vol. II Section 24.3

$$Qr = \frac{q\,S(L + \frac{S}{2})}{CF}$$

Qr =	0.026	Relief drain discharge (cfs)
S =	8.00	Drain spacing (ft)
L =	275	Drain Length (ft) - longest proposed run
q =	0.50	Drainage coefficient (in/hr)
CF =	43200	Conversion factor = 43200

Underdrain Details

8	in	= Pipe diameter
0	in	= gravel on each side of underdrain pipe. See note 1.
3.00	ft	= Depth from natural ground to impermeable barrier. See "D" above.
0.1	%	= Lateral Slope
0.015	*n*	= Manning's n value
1375	ft	= Total length of underdrain laterals
0.13	cfs	= Total combined flow of underdrains
0.33	cfs	= Underdrain capacity from manning's equation, assume full flow

Notes: 1) Fabric-wrapped pipe will be used in place of gravel envelope.

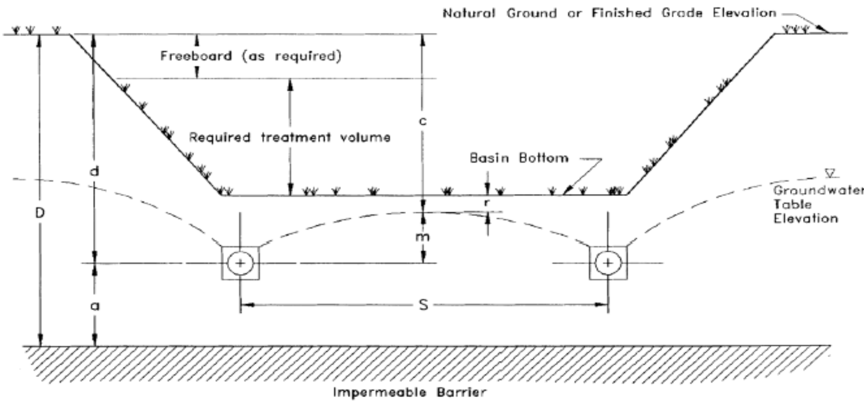

Figure 24-1. Cross-section of underdrain system illustrating variables used in the ellipse equation (N.T.S.)

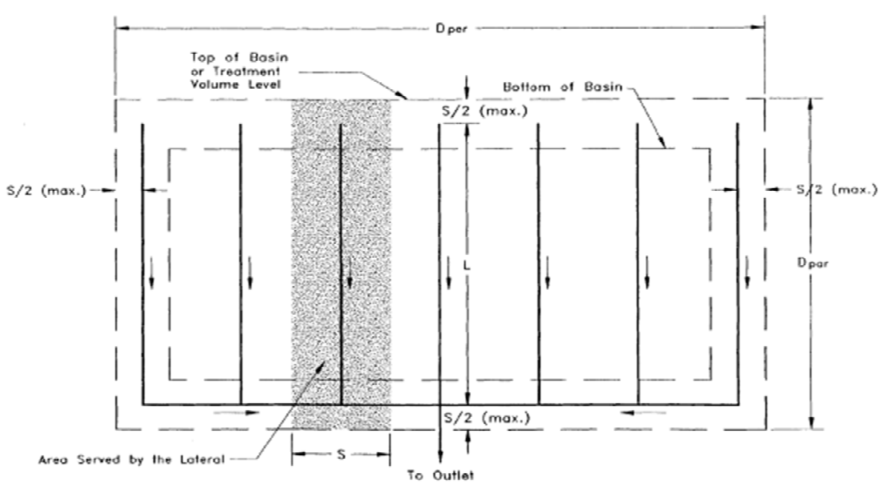

Figure 24-2. Top view of underdrain system illustrating variables used in the ellipse equation (N.T.S.)

Figure Reference: SJRWMD Manual Vol. II Section 24.3