

# **ENVIRONMENTAL ASSESSMENT**

## **Farrow to Finish Farm 7-Acre Undeveloped Parcel Brooksville, Florida**

**GLE Project No.: 18000-19835**

**Prepared for:**

**U.S. Department Of Agriculture  
Farm Service Agency**

**November 2018**

**Prepared by:**



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DRAFT Environmental Assessment

Conducted at:  
Farrow to Finish Farm  
7-Acre Undeveloped Parcel  
Brooksville, Florida

GLE Project No.: 18000-19835

Prepared for:  
U.S. Department Of Agriculture  
Farm Service Agency

November 9, 2018

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\_\_\_\_\_  
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## COVER SHEET

<b>Proposed Action:</b>	The Farm Service Agency of the United States Department of Agriculture proposes to finance the purchase of real estate to establish a Farrow to Finish Pastureland Swine Farm north of the terminus of Aylesboro Court in Aylesboro Court in Brooksville, Florida.
<b>Type of Document:</b>	This is a site-specific Environmental Assessment to determine the environmental effects of the proposed project. The United States Department of Agriculture Farm Service Agency will be the lead agency evaluating this action.
<b>Lead Agency:</b>	For further information, please contact Catalina Carrasco-Alamo who is the Farm Loan Officer at the USDA – FSA – Sumter Office, 7620 SR 471, Suite 3, Bushnell, FL 33513. Office Number: 352-793-2691, Fax Number: 855-478-8384, Email: catalina.carrasco@fl.usda.gov
<b>Cooperating Agencies:</b>	None
<b>Further Information:</b>	The Environmental Assessment (EA) was prepared in accordance with USDA FSA National Environmental Policy Act (NEPA) Implementing procedures found in 7 CFR 799, as well as the NEPA of 1969 (40 CFR 1500-1508/42 US Code 4321-4347), as amended. A copy of the Draft EA is available at Pasco-Hernando County FSA Office, 30435 Commerce Drive, Suite 103, San Antonio, FL 33576. Written comments regarding this EA can be submitted to Florida FSA State Office, Attn: Environmental Compliance at PO Box 141030, Gainesville, FL 32614-1030 until <b>Date</b> .
<b>Comments:</b>	

# TABLE OF CONTENTS

<b>1.0</b>	<b>INTRODUCTION.....</b>	<b>1</b>
1.1	Background.....	1
1.2	Purpose and Need for the Proposed Action .....	1
1.3	Regulatory Compliance.....	1
1.3.1	Right to Farm .....	1
1.4	Public Involvement and Consultation.....	4
1.4.1	Public Involvement .....	4
1.4.2	Agency Consultation.....	5
<b>2.0</b>	<b>DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVE.....</b>	<b>5</b>
2.1	Proposed Action.....	5
2.2	No Action Alternative.....	6
<b>3.0</b>	<b>AFFECTED ENVIRONMENT AND IMPACTS .....</b>	<b>7</b>
3.1	Resources Elimated from Detailed Analysis.....	7
3.1.1	Wildlife and Habitat .....	7
3.1.2	Cultural Resources .....	8
3.1.3	Coastal Barrier .....	8
3.1.4	Coastal Zone .....	8
3.1.5	Wilderness Areas .....	8
3.1.6	Wild and Scenic Rivers/Nationwide Rivers Inventory (NRI).....	8
3.1.7	National Natural Landmarks .....	9
3.1.8	Sole Source Aquifers .....	9
3.1.9	Floodplains.....	9
3.1.10	Wetlands .....	9
3.1.11	Soils .....	10
3.1.12	Water Quality.....	10
3.1.13	Air Quality .....	12
3.1.14	Noise .....	12
3.1.15	Important Land Resources .....	12
3.1.16	Socioeconomic Impacts and Environmental Justice.....	12
3.2	Resources Eliminated from Detailed Analysis.....	12
3.3	Name Resource A .....	12
3.3.1	Existing Conditions.....	12
3.3.2	Impacts of Proposed Action.....	13



## **TABLE OF CONTENTS (CONT.)**

<b>4.0</b>	<b>CUMULATIVE IMPACTS .....</b>	<b>13</b>
<b>5.0</b>	<b>LIST OF PREPARERS AND PERSONS AND AGENCIES CONTACTED.....</b>	<b>13</b>
<b>6.0</b>	<b>REFERENCES.....</b>	<b>14</b>

### **ATTACHMENTS**

#### **FIGURES**

- 1 - Project Location Aerial Map
- 2 - Project Location Topography Map
- 3 - Platt Map

#### **PHOTOGRAPHS**

- Site Photograph Log

### **APPENDICES**

#### **APPENDIX A - Wildlife and Habitat/Supporting Documentation**

- A-1 IPaC Map
- A-2 U.S. Fish and Wildlife Consultation Letter

#### **APPENDIX B - Cultural Resources Supporting Documentation**

- B-1 SHPO/THPO Consultation Letters

#### **APPENDIX C - Coastal Barrier Supporting Documentation**

- C-1 Coastal Barrier Resource Map
- C-2 Coastal Barrier Consultation Letter

#### **APPENDIX D - Coastal Zone Supporting Documentation**

- D-1 Coastal Zone Management Area (CZMA) Consultation Letter

#### **APPENDIX E - Wilderness Areas Supporting Documentation**

- E-1 Wilderness Areas Map

#### **APPENDIX F - Wild and Scenic Rivers/Nationwide Rivers Inventory Supporting Documentation**

- F-1 National River Inventory Map

#### **APPENDIX G - National Landmark Supporting**

- G-1 National Natural Landmark Map

## **TABLE OF CONTENTS (CONT.)**

APPENDIX H - Sole Source Aquifers Supporting Documentation  
H-1 Sole Source Aquifer Map

APPENDIX I - Floodplains Supporting Documentation  
I-1 Floodplain Map  
I-2 Flood Zone Consultation Letter

APPENDIX J - Wetlands Supporting Documentation  
J-1 Wetland Screening Tool and Supporting Documents  
J-2 Wetlands Consultation Letter

APPENDIX K - Soils Supporting Documentation  
K-1 Web Soil Survey Map  
K-2 HEL Soils Map  
K-3 Informal Consultation Letter SWFWMD

APPENDIX L - Water Quality Supporting Documentation  
L-1 Conservation Plan (WMP WQMP NMP)  
L-2 Storm Water Pollution Prevention Plan

APPENDIX M - Air Quality Supporting Documentation

APPENDIX N - Noise Supporting Documentation (Not applicable)

APPENDIX O - Important Land Resources Supporting Documentation  
O-1 Farmland Map  
O-2 Prime Farmland Map

APPENDIX P - Socioeconomic Impacts and Economic Justice Supporting Documentation  
P-1 Low Income Map  
P-2 Poverty Map

APPENDIX Q - Other Supporting Documentation

APPENDIX R - Public Comment Advertisements

## Acronyms and Abbreviations

NEPA	National Environmental Policy Act
USDA	United States Department of Agriculture
FSA	Farm Service Agency
EA	Environmental Assessment
USFWS	US Fish and Wildlife Service
SHPO	State Historic Preservation Office
THPO	Tribal Historic Preservation Office
NRCS	Natural Resource Conservation Service
USACE	US Army Corps of Engineers
IPac	Information Planning & Conservation System
SWFWMD	Southwest Florida Water Management District
HEL	Highly Erodible Soils
AGSWM	Agricultural Ground and Surface Water Management

## 1.0 INTRODUCTION

### 1.1 Background

The United States Department of Agriculture (USDA) Farm Service Agency proposes to finance the purchase of real estate to establish a small-scale swine farm. The Property consists of one (1) parcel of land (Parcel ID No. R13 123 19 0015 0000 0010) totaling approximately 7-acres in Brooksville, Hernando County, Florida (the “Property”). The Property was located at the end and directly north of Aylesboro Court. No site address is currently available for the site. GLE's representative, Mr. John Romeis, performed the site reconnaissance on September 5, 2018, and was escorted by the prospective buyer. A parcel map, provided by the Hernando County Property Appraiser, was used to locate the Property boundaries in the field. A portion of the applicable USGS 7.5-Minute Series Topographical Quadrangle Map with the Property location, and a Property and area layout are provided in **Figures 1-3** of this report.

### 1.2 Purpose and Need for the Proposed Action

The purpose of the Proposed Action is to respond to the applicant's request to finance the purchase of real estate to establish a small scale swine farm on the Property referenced above.

### 1.3 Regulatory Compliance

The Environmental Assessment is prepared to satisfy the requirements of NEPA (Public Law 91-190, 42 United States Code 4321 et seq.); its implementing regulation (40 CFR 1500-1508); and FSA implementing regulations, *Environmental Quality and Related Environmental Concerns – Compliance with the National Environmental Policy Act (7 CFR 799)*. The intent of the NEPA is to protect, restore, and enhance the human environment through well informed federal decisions. A variety of laws, regulations, and Executive Orders (EO) apply to actions undertaken by Federal agencies and form the basis of the analysis.

#### 1.3.1 Right to Farm

All fifty states have enacted right-to-farm laws that seek to protect qualifying farmers and ranchers from nuisance lawsuits filed by individuals who move into a rural area where normal farming operations exist, and who later use nuisance actions to attempt to stop these ongoing operations. The Right to Farm law for Florida includes the following protections:

##### § 823.14. Florida Right to Farm Act

1. Short title.--This section shall be known and may be cited as the “Florida Right to Farm Act.”

2. Legislative findings and purpose.--The Legislature finds that agricultural production is a major contributor to the economy of the state; that agricultural lands constitute unique and irreplaceable resources of statewide importance; that the continuation of agricultural activities preserves the landscape and environmental resources of the state, contributes to the increase of tourism, and furthers the economic self-sufficiency of the people of the state; and that the encouragement, development, improvement, and preservation of agriculture will result in a general benefit to the health and welfare of the people of the state. The Legislature further finds that agricultural activities conducted on farm land in urbanizing areas are potentially subject to lawsuits based on the theory of nuisance and that these suits encourage and even force the premature removal of the farm land from agricultural use. It is the purpose of this act to protect reasonable agricultural activities conducted on farm land from nuisance suits.
3. Definitions.--As used in this section:
  - a. "Farm" means the land, buildings, support facilities, machinery, and other appurtenances used in the production of farm or aquaculture products.
  - b. "Farm operation" means all conditions or activities by the owner, lessee, agent, independent contractor, and supplier which occur on a farm in connection with the production of farm, honeybee, or apiculture products and includes, but is not limited to, the marketing of produce at roadside stands or farm markets; the operation of machinery and irrigation pumps; the generation of noise, odors, dust, and fumes; ground or aerial seeding and spraying; the placement and operation of an apiary; the application of chemical fertilizers, conditioners, insecticides, pesticides, and herbicides; and the employment and use of labor.
  - c. "Farm product" means any plant, as defined in insect useful to humans and includes, but is not limited to, any product derived therefrom.
  - d. "Established date of operation" means the date the farm operation commenced. If the farm operation is subsequently expanded within the original boundaries of the farm land,

the established date of operation of the expansion shall also be considered as the date the original farm operation commenced. If the land boundaries of the farm are subsequently expanded, the established date of operation for each expansion is deemed to be a separate and independent established date of operation. The expanded operation shall not divest the farm operation of a previous established date of operation.

4. Farm operation not to be or become a nuisance.
  - a. No farm operation which has been in operation for 1 year or more since its established date of operation and which was not a nuisance at the time of its established date of operation shall be a public or private nuisance if the farm operation conforms to generally accepted agricultural and management practices, except that the following conditions shall constitute evidence of a nuisance:
    - The presence of untreated or improperly treated human waste, garbage, offal, dead animals, dangerous waste materials, or gases which are harmful to human or animal life.
    - The presence of improperly built or improperly maintained septic tanks, water closets, or privies.
  3. The keeping of diseased animals which are dangerous to human health, unless such animals are kept in accordance with a current state or federal disease control program.
  4. The presence of unsanitary places where animals are slaughtered, which may give rise to diseases which are harmful to human or animal life.
  - b. No farm operation shall become a public or private nuisance as a result of a change in ownership, a change in the type of farm product being produced, a change in conditions in or around the locality of the farm, or a change brought about to comply with Best Management Practices adopted by local, state, or federal agencies if such farm has been in operation for 1 year or more since its established date of operation and if it was not a nuisance at the time of its established date of operation.

5. When expansion of operation not permitted.--This act shall not be construed to permit an existing farm operation to change to a more excessive farm operation with regard to noise, odor, dust, or fumes where the existing farm operation is adjacent to an established homestead or business on March 15, 1982.
6. Limitation on duplication of government regulation.--It is the intent of the Legislature to eliminate duplication of regulatory authority over farm operations as expressed in this subsection. Except as otherwise provided for in this section and s. 487.051(2), and notwithstanding any other provision of law, a local government may not adopt any ordinance, regulation, rule, or policy to prohibit, restrict, regulate, or otherwise limit an activity of a bona fide farm operation on land classified as agricultural land pursuant to s. 193.461, where such activity is regulated through implemented best management practices or interim measures developed by the Department of Environmental Protection, the Department of Agriculture and Consumer Services, or water management districts and adopted under chapter 120 as part of a statewide or regional program. When an activity of a farm operation takes place within a wellfield protection area as defined in any wellfield protection ordinance adopted by a local government, and the adopted best management practice or interim measure does not specifically address wellfield protection, a local government may regulate that activity pursuant to such ordinance. This subsection does not limit the powers and duties provided for in s. 373.4592 or limit the powers and duties of any local government to address an emergency as provided for in chapter 252.

## **1.4 Public Involvement and Consultation**

### **1.4.1 Public Involvement**

This document is available for public review and comment from **XX** to **XX** at **XX** or by **XX**. A notice of the availability of the document was published in **XX** on **XX**. Written comments may be submitted to **XXX** through **XXX**.

A notice of the availability of the Draft EA for public review and comment was published in **XXX** on **XXX**. The Draft EA was made available **XXX** for public review and comments were accepted for 30 calendar days from **XXX** to **XXX**.

## **1.4.2 Agency Consultation**

USDA undertook the following efforts and research to aid in determining the potential impacts of the proposed action:

- Researched the U.S. Fish and Wildlife Service (USFWS) – Information, Planning, and Conservation System (IPac) about the project’s potential to affect federally listed species.
- Consulted with the State Historic Preservation Officer (SHPO) to ensure the requirements of 54 U.S.C. 306108 (Commonly known as Section 106 of the National Historic Preservation Act) was properly addressed.
- Consulted with Tribal Historic Preservation Officer (THPO) to ensure the requirement with Native American Graves Protection and Repatriation Action (NAGPRA).
- USACE completed a review, and determined that the proposed work as described would be part of a new farming, ranching operation. Therefore, would not be exempted from obtaining a USACE permit, if the project would affect waters of the United States. In addition, the USACE stated that “The ranching and farming operation must be ongoing on the exact footprint to be exempt and completely fall under NRCS purview”

## **2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES**

### **2.1 Proposed Action**

- North of the terminus of Aylesboro Court, Brooksville, FL (Latitude 28.484520, Longitude 82.356524, Elevation 54 meters) Unimproved Hammock zoned Agriculture.
- Land is undeveloped, vacant and heavily wooded with a moderate slope to the south-southwest.
- Dimensions are approximately 620’ x 464’: Beginning at the southwest corner of said lot 1, thence N 01 degrees 13’28” E along the western boundary of said Lot 1 200.00 feet; thence S 89 degrees 27’34” E 250.00 feet; thence S 80 degrees 51’30” E 220.62 feet to the easterly boundary of said Lot 1; thence S 28 degrees 21’54” E 342.60 feet to the most easterly corner of said Lot 1; thence S 28 degrees 27’54” E 342.60 feet to the most easterly corner of said Lot 1; said corner being on a curve concave Southeasterly. Having a radius of 60.00 feet, a delta of 61 degrees 05’41”, a chord bearing of S 31 degrees 05’16” west and a chord of 60.99 feet; thence along the arc of



said curve. 63.98 feet to the southwest corner of said lot 1; thence N 89 degrees 27'34" W long the south boundary of said Lot 1 934.27 feet to the point beginning.

- Proposed use requires removal of small brush along the property line and utility easement in order to install a perimeter fence. Based on a consultation with the Hernando County Zoning Department, the Property is exempt from a land clearing permit for agricultural proposed as long as the Majestic trees are preserved.
- Pending financing and closing date, most of the work will be done during the summer to fall months over weekends. Work hours will likely be limited to dawn to dusk. Most work will be accomplished with the use of hand tools.
- Per Hernando County Zoning, the Property is Zoned AG. The Property may be used as farm for raising and breeding swine on the Property. No additional zoning approval is required for animal specialty establishment uses. However, based upon information on the Floodplain Justification Report by Applied Science and Hydro Solutions for Hernando County and the SWFWMD, a stream bed, floodplain, and possible wetlands were identified on the Property. Activities and development of these areas may be limited and possibly require additional permits and approval from local, state and federal agencies.
- Proposed use falls below the stocking densities for Pastured Farrow to Finish operations as published by Penn State which determines 20 sows on 10 acres to be an acceptable stocking rate.
- Based on an informal consultation with SWFWMD, offset of potential wetland and seepage areas is not required. However, the prospective operator has proposed to create a 50 foot buffer from these sensitive areas to ensure minimal disturbance within these areas. The SWFWMD encourages buffers for this very reason.

## **2.2 No Action Alternative**

The no action alternative means the proposed farm would not be built. This would result in the continuation of existing conditions on the proposed site and no changes to the existing environmental would occur.

### 3.0 AFFECTED ENVIRONMENTAL AND IMPACTS

#### 3.1 Resources Eliminated from Detailed analysis

##### 3.1.1 Wildlife and Habitat

The USFWS IPaC system was utilized to obtain an official species list for the Area of Potential Effect (APE). Threatened species listed in the APE are the West Indian Manatee, Florida Scrub-jay, Red Knot, Red-cockaded Woodpecker, Wood Stork, Eastern Indigo Snakes, Loggerhead Sea Turtle, and Atlantic Sturgeon. Endangered species listed in the APE are Brooksville Bellflower and Cooley's Water-willow.

Furthermore, please see below for an excerpt of the communication with Mr. Joseph Prenger of the U.S. Fish and Wildlife Service.

*Based on the site plan, proposed activities, species list, and the apparent absence of habitat for all but the Eastern Indigo Snake (EIS), there appears to be a low probability of direct impacts to listed species. Although proposed construction and tree removal will be minimal, we recommend making the applicant aware of the potential presence of EIS and providing them with the Standard Protection Measures for Eastern Indigo Snake, dated August 2013. To further minimize potential impacts to gopher tortoise and eastern indigo snakes, the following conservation practice standards should be provided to the participant:*

1. Construction or mechanical tree removal / mowing activities should occur during daytime hours only. Implementation of the Standard Protection Measures for the Eastern Indigo Snake requires adequate visibility.
2. Avoid direct impacts to gopher tortoises and their burrows, if present.

*Based on implementation of the Standard Protection Measures for the Eastern Indigo Snake and the above conservation practice standards, we have determined that the project is not likely to adversely affect resources protected by the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.).*

Please refer to **Appendix A** for a copy of the pertinent documents regarding Wildlife and Habitat.

### **3.1.2 Cultural Resources**

Effects to cultural resources were eliminated from detailed analysis because the proposed undertaking is confined to an area that does not exceed prior ground disturbance. Please refer to **Appendix B** for a copy of the pertinent documents regarding Cultural Resources.

### **3.1.3 Coastal Barrier Resources**

Effects to coastal barriers were eliminated from detailed analysis, because the property is 19 miles inland from the Gulf of Mexico and not located in a coastal region of Hernando County. Please refer to **Appendix C** for a copy of the pertinent documents regarding Coastal Barrier Resources.

### **3.1.4 Coastal Zone**

Florida's coastal zone is the entire State, but has two tiers. Local governments eligible to receive coastal management funds are limited to those Gulf and Atlantic coastal cities and counties which include or are contiguous to state water bodies where marine species of vegetation constitute the dominant plant community. Florida's seaward boundary in the Gulf of Mexico is 3 marine leagues (9 nautical miles) and is 3 nautical miles in the Atlantic.

Based on consultation with Mr. Chris Stahl, Coordinator of the Florida State Clearinghouse of the FDEP, "While it is covered by EO 12372, the Florida State Clearinghouse would not select the project for review. You may proceed with your project."

Please refer to **Appendix D** for a copy of the pertinent documents regarding Coastal Zone.

### **3.1.5 Wilderness Areas**

Effects to wilderness areas were eliminated from detailed analysis. The nearest wilderness area is Chassahowitzka Wilderness. It is located 20 miles from the project location and will not be impacted. Please refer to **Appendix E** for a copy of the pertinent documents regarding Wilderness Areas.

### **3.1.6 Wild and Scenic Rivers/Nationwide Rivers Inventory**

Effects to Wild and Scenic Rivers Inventory were eliminated from detailed analysis because the project area is located approximately nine (9) miles west of the Withlacoochee River. Please refer to **Appendix F** for a copy of the pertinent documents regarding Wild and Scenic River/Nationwide Rivers Inventory.

### 3.1.7 National Natural Landmarks

Effects to national natural landmarks were eliminated from detailed analysis because the nearest landmark is Emerald Marsh and is located 43 miles from the project location. The landmark will not be impacted by this project. Please refer to **Appendix G** for a copy of the pertinent documents related to the National Natural Landmarks.

### 3.1.8 Sole Source Aquifers

Effects to sole source aquifers were eliminated from detailed analysis because Hernando County does not have any sole source aquifers or sole source aquifer recharge areas located beneath the surface. Please refer to **Appendix H** for a copy of the pertinent documents related to the Sole Source Aquifers.

### 3.1.9 Floodplains

Based on FEMA Floodplain Map 12053C0351D, dated February 2, 2012, the Property is located in Zone X “unshaded”, which is an area of minimal flood hazard. **Figure I-1** indicates that the Property is not located within a flood zone.

Please see below for an excerpt of the communication with Mr. John A. Burnett, Stormwater Inspector for Hernando County Public Works.

*This property is mostly clear of floodplain except for two small areas. A gully with a stream in the southeast corner of the lot and the edge of a low area (pit) on the westerly property line. Access to the site may have to cross the stream, which may have wetland associated with it. This may be a seepage slope which would need drainage improvements to create a driveway. An engineer should be consulted based on the data I have.*

Please refer to **Appendix I** for a copy of the pertinent documents related to Floodplain Management.

### 3.1.10 Wetlands

Based on the United States Fish and Wildlife Service National Wetlands Inventory (NWI) map, defined and regulated wetlands are not present on the Property. **Figure J-1** indicates that identified and regulated wetlands do not exist on the Property.

SWFWMD has determined by site walk that the wet area is a “seepage” starting at elevation 187’ that follows a gully down to the low area (pit) via the above

mentioned gully. The project includes setting a permeable bridge across the small gully, but the area in question could also be easily crossed with a truck or tractor. Furthermore, the project is proposed to be registered with the AGSWM program.

Based on an informal consultation with Mr. Jeff Whealton of the SWFWMD, offset of potential wetland and seepage areas is not required. However, the prospective operator has proposed to create a 50 foot buffer from these sensitive areas to ensure minimal disturbance within these areas. The SWFWMD encourages buffers for this very reason.

Acting Chief Edgar W. Garcia of the Tampa Permitting Section of the USACE completed a review of the proposed work for the site, and determined that the proposed work as described would be part of a new farming, ranching operation. Therefore, would not be exempted from obtaining a Department of the Army Permit, if the project would affect waters of the United States. In addition, Mr. Garcia stated that “the ranching and farming operation must be ongoing on the exact footprint to be exempt and completely fall under NRCS purview

Please refer to **Appendix J** for a copy of the pertinent documents related to Wetland Management.

### **3.1.11 Soils**

Effects to soils were eliminated from detailed analysis because NRCS HEL Soils Map provides that HEL Soils are not present on the respective Property.

Please refer to **Appendix K** for a copy of the pertinent documents related to Soils. The soils exposed at the surface are not necessarily susceptible to erosion. However, there is a slope of greater than 50 feet across the Property from the northeast towards the southwest. As part of a best management plan for operation of the swine farm, any signs and degree of erosion should be monitored, and if necessary, changes in operation should be made to mitigate any identified erosion.

### **3.1.12 Water Quality**

#### **Surface Water Quality**

Based upon a site walk, review of USGS topographic surveys, and SWFWMD data, a surface water body does not exist on site. However, during periods of heavy precipitation, overland flow of storm water down slope is possible and will collect into the existing intermittent creeks and drainage ditches which in turn ultimately discharge into Gold Lake and a surrounding wetland located<sup>10</sup>

approximately 1,500 feet south of the Property. In order to mitigate any potential for surface water impacts during significant precipitation events, all agricultural activities will be a minimum of 50 feet from the intermittent seeps.

The USACE has indicated that a permit will be required and that an official delineation or determinations as to whether a surface water body or wetland is affected by the proposed development will be made by the USACE.

### **Groundwater Quality**

Shallow and/or perched groundwater is very limited in the area, and the primary aquifer in the region is the Floridan Aquifer. The Property and surrounding area is a recharge area for the Floridan Aquifer. The potentiometric surface of the Floridan Aquifer varies with precipitation, but is generally at 50 feet above sea level which is 100 to 150 feet below the surface of the Property. Although the area is a recharge area for the Floridan Aquifer, the depth to water of 100 to 150 feet greatly reduces the likelihood of any impacts to the quality of the groundwater from surface water infiltration.

In addition, based on information provided by the prospective owner/operator, any effects to the groundwater quality would be mitigated based on a detailed analysis indicating relatively low stocking density for the total acreage of the Property. The low stocking density produces minimal waste that is dispersed across the large area at a rate below recommended fertilized applications for agriculture. Furthermore, based on Section 651.0403 Animal Waste Characteristics in the Agricultural Waste Management Field Handbook, "The primary concern of this chapter is livestock manure and waste produced in confinement and semi-confinement facilities. Not considered is manure produced by live stock or poultry on a pasture or range. Manure produced in this manner is generally not collected for further management by transfer, storage, and treatment."

*Per Penn State publications, a 4 sow system produces 2.7 cubic yards of solid waste per week. Each cubic yard weighs roughly 600 pounds for a total weight of 1,620 pounds (.81 tons) per week. With an average of 14# of nitrogen per ton, this equates to 1.64 pounds of nitrogen per acre per week and 86 pounds per acre annually. The sow system will produce 42 tons of manure over 365 days. This is a ratio of 6 tons per acre per year.*

Please refer to **Appendix L** for a copy of the pertinent documents related to Water Quality.

### **3.1.13 Air Quality**

Effects to air quality were eliminated from detailed analysis because emissions or degradation to air quality are not permanent in nature and will be limited to the duration of the construction activity. Any potential impacts during construction can be minimized by the implementation of standard construction control measures.

Please refer to **Appendix M** for a copy of the pertinent documents related to Air Quality.

### **3.1.14 Noise**

Effects on noise were eliminated from detailed analysis because the project will not create noise that will interfere with communication, is intense enough to damage hearing, or is otherwise annoying.

### **3.1.15 Important Land Resources**

Effects on farmland, forest land and rangeland resources were eliminated from detailed analysis because the proposed action will not result in prime and/or important land being converted to nonagricultural use. Please refer to **Appendix O** for a copy of the pertinent documents related to Important Land Resources.

### **3.1.16 Socioeconomic Impacts and Environmental Justice**

The proposed action will not cause any adverse human health or environmental effects as defined in Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations”. Furthermore, there is no indication that there is a significant amount of minority or low-income population in the vicinity of the Property. Please refer to **Appendix P** for a copy of the pertinent documents related to Socioeconomic Impacts and Environmental Justice.

## **3.2 Resources Considered with Detailed analysis**

### **3.3 Erosion**

#### **3.3.1 Existing Conditions**

Based on information provided on the USGS Topographic Map (Spring Lake 1988), the elevation of the Property ranges from approximately 120-185 ft-bls with a topographic gradient to the south-southwest. Please refer to **Figure 2** for a copy of the USGS Topographic Map.

### 3.3.2 Impacts of Proposed Action

There is the potential for swine rooting activities to create opportunities for erosion. Project intent is to utilize the AGSWM program to analyze and engineer best management practices to limit or eliminate and erosion of the Property. Current, the plan outlines cross fencing on contours against grade, rotational grazing, and back seeding with annuals as well as perennials and tree crops with 90 day cycles of the rest, as ways to mitigate erosion.

## 4.0 CUMULATIVE IMPACTS

The cumulative impacts analysis is important to understanding how multiple actions in a particular time and space (e.g. geographic area) impact the environment. The CEQ regulations define cumulative effects as "...the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal and non-federal) or person undertakes such actions " (40 CFR & 1508.7). Whereas the individual impact of one project in a particular area or region may not be considered significant, the result of numerous projects in the same area or region may cumulatively result in significant impacts. Cumulatively impact analysis is subject to interpretation in analyzing the magnitude of impacts to a particular area or region. For this EA, the analysis area for cumulative impacts is Hernando County.

The proposed action is not associated with any other project; therefore, there will be no need for analysis of Cumulative Impacts.

## 5.0 List of Preparers and Persons and Agencies Contacted

<b>List of Preparers</b>	
<b>Name and title</b>	<b>Education and Experience</b>
John Romeis, Project Manager	BS Environmental Science, University of South Florida, Years' Experience: 14 years)

<b>Persons and Agencies Contacted</b>	
<b>Name and title</b>	<b>Affiliation</b>
Mr. Jason Aldridge, Compliance Review supervisor	State Historic Preservation Officer
Mr. Cody VanderPloeg, Archeological Data analyst	Florida Master Site File
Mr. Chris Stahl, Coordinator	Florida State Clearinghouse
Mr. John Burnett, Stormwater Inspector	Hernando county Public Works
Mr. Joseph Prenger, State Coordinator	U.S. Fish and Wildlife Services
Mr. Jeff Whealton, Senior Environmental Scientist	Southwest Florida Water Management District
Ms. Rebecca Garret, Zoning Coordinator	Hernando County Zoning Department
Ms. Corain Lowe-Zepeda, THPO	Muscogee Nation
Ms. Raelynn Butler, THPO	Muscogee Nation
Mr. James Floyd, Principal Chief	Muscogee Nation
Mr. Ha Nguyen	USDA
Mr. Edgar Garcia, Acting Chief Tampa Permitting	USACE



## 6.0 References

USFWS 2018. IPaC-Information, Planning and Conservation System. Listed and Sensitive Species in Hernando County, Florida. [Website] U.S. Fish and Wildlife Service Environmental Conservation Online System. Available online at: <https://ecos.fws.gov/ipac/>

FSA Handbook, USDA – FSA, Environmental Quality Programs 1-EQ (Revision 3)

Draft Environmental Assessment, Farrow to Finish Farm by the Prospective Owner/Operator (2018)

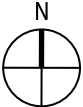
USDA-NRCS Part 651 Agriculture Waste Management Field Handbook, Chapter 4 – Agricultural Waste Characteristics (March 2008)

Penn State Extension, Agricultural Alternatives – Swine Production, Penn State University (September 2016)

**FIGURES**  
**Aerial Map, Topography Map and Platt Map**



**Approximate Property Boundary**



**Figure 1**  
Aerial Map  
Aylesboro Court, Brooksville, FL

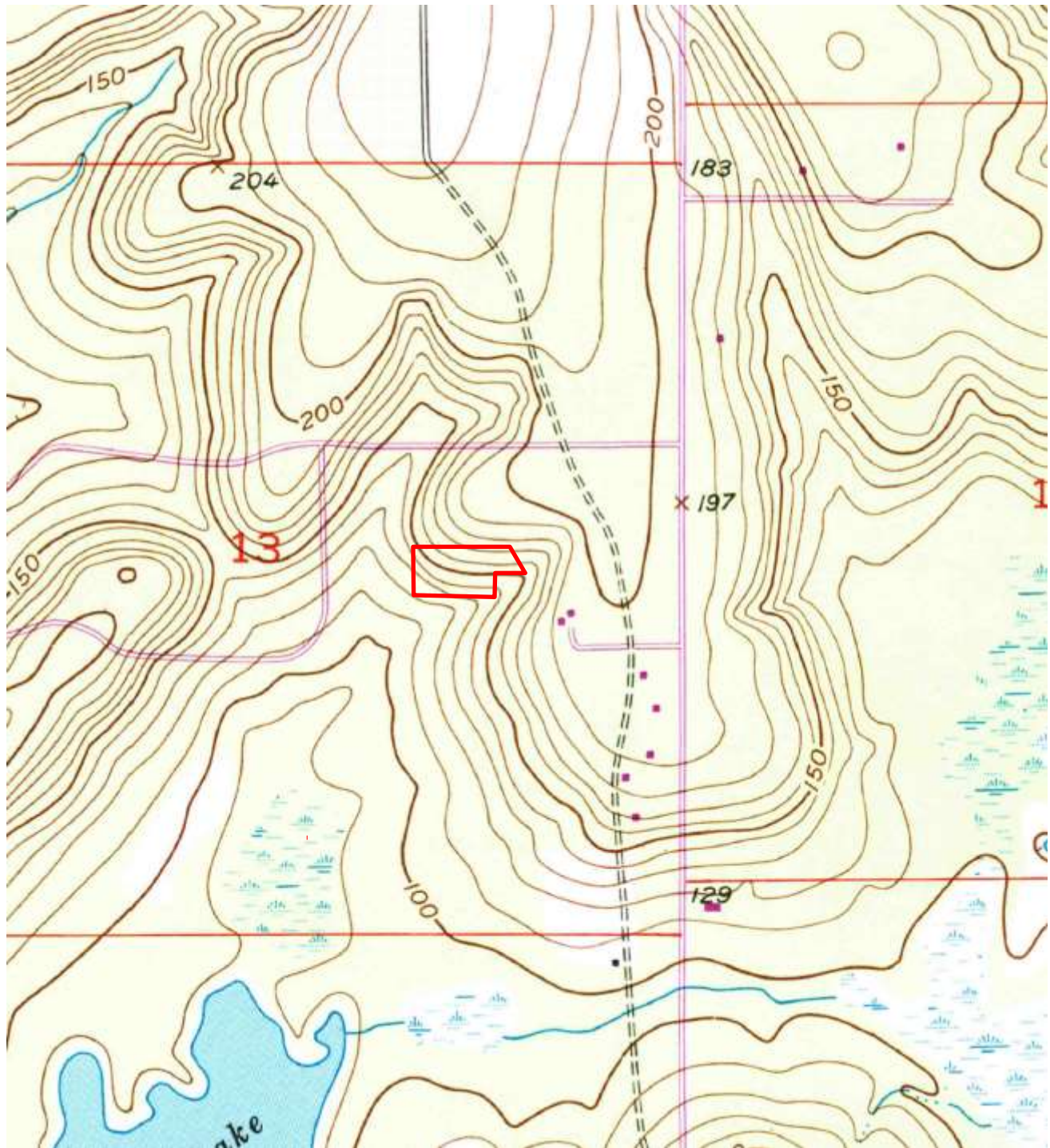
Not to Scale

Prepared By: GLE Associates, Inc.  
5405 Cypress Center Drive, Suite 110  
Tampa, FL 33609  
Phone: (813) 241-8350 fax: (813) 241-8737

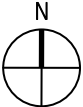


<b>Farrow to Finish Farm</b> Brooksville, FL	
Drawn JJR	Job No. 18000-19835
Checked JKH	Figure 1
Date 9/14/2018	





**Approximate Property Boundary**



**Figure 2**  
 USGS Topographical Map of Subject Area  
 Spring Lake, FL  
 Dated 1988

Not to Scale

Prepared By: GLE Associates, Inc.  
 5405 Cypress Center Drive, Suite 110  
 Tampa, FL 33609  
 Phone: (813) 241-8350 fax: (813) 241-8737



<b>Farrow to Finish Farm</b> Brooksville, FL	
Drawn JJR	Job No. 18000-19835
Checked JKH	Figure 2
Date 9/14/2018	





### Hernando County Property Appraiser

John C. Emerson, CFA - Brooksville, Florida - 352-754-4190

PARCEL: R13 123 19 0015 0000 0010 | KEY: 34689

AYERS HEIGHTS LOT 1 LESS THAT PT DES IN ORB 1505 PG 13 AKA TR A IN \*\*  
CONTINUED \*\*

Name: STRAIN WILLIAM J, STRAIN RONDA P

Site: AYLESBORO CT

Mail: 1215 BRANDON LAKES AVE  
VALRICO FL 33594-5815

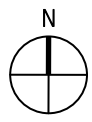
Last Sale: 02/26/2002 \$100.00 V(D)

Levy Code: CWES



This information was derived from data which was compiled by the Hernando County Property Appraiser Office solely for the governmental purpose of property assessment. This information should not be relied upon by anyone as a determination of the market value, ownership, or zoning of the property. Zoning information should be obtained from the Hernando County Development Department. No warranties, expressed or implied, are provided for the accuracy of the data herein, its use, or its interpretation. Although it is periodically updated, this information may not reflect the data currently on file in the Property Appraiser's office. The assessed values are NOT certified values and therefore are subject to change before being finalized for ad valorem assessment purposes.

Approximate Property Boundary



#### Figure 3

#### Plat Map

Aylesboro Court, Brooksville, FL

Not to Scale

Prepared By: GLE Associates, Inc.  
5405 Cypress Center Drive, Suite 110  
Tampa, FL 33609  
Phone: (813) 241-8350 fax: (813) 241-8737



#### Farrow to Finish Farm Brooksville, FL

Drawn: JJR Job No. 18000-19835

Checked: JKH

Date: 9/14/2018

Figure

3

# **PHOTOGRAPHS**





Upper Photo: Water feature on eastern boundary of the Property.

Lower Photo: Water feature on eastern boundary of the Property.

Photograph Date:  
May 5, 2018

Prepared By:  
GLE Associates, Inc.



**GLE**

Farrow to Finish Swine Farm

Job No.  
18000-19835

Figure

1





Upper Photo: Central portions of the Property.

Lower Photo: Central portions of the Property.

Photograph Date:  
May 5, 2018

Prepared By:  
GLE Associates, Inc.



**GLE**

Farrow to Finish Swine Farm

Job No.  
18000-19835

Figure  
**2**





Upper Photo: Central portions of the Property.

Lower Photo: Central portions of the Property.

Photograph Date:  
May 5, 2018

Prepared By:  
GLE Associates, Inc.



**GLE**

Farrow to Finish Swine Farm

Job No.  
18000-19835

Figure

**3**





Upper Photo: Southern portion of the Property.

Lower Photo: Southern boundary of the Property facing south.

Photograph Date:  
May 5, 2018

Prepared By:  
GLE Associates, Inc.



**GLE**

Farrow to Finish Swine Farm

Job No.  
18000-19835

Figure

4





Upper Photo: Southwestern corner of the Property at water feature.

Lower Photo: Western portion of the Property.

Photograph Date:  
May 5, 2018

Prepared By:  
GLE Associates, Inc.



**GLE**

Farrow to Finish Swine Farm

Job No.  
18000-19835

Figure  
**5**

**APPENDIX A**  
**Endangered Species**

**IPaC**

U.S. Fish &amp; Wildlife Service

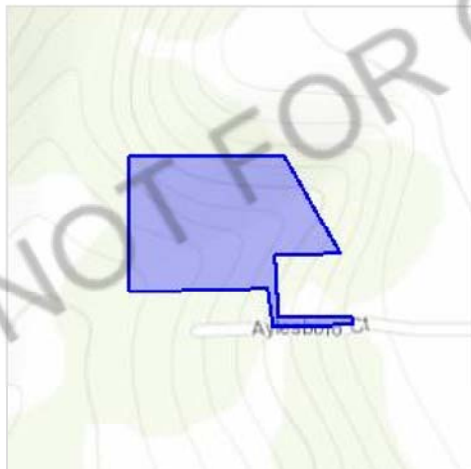
# IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

## Location

Hernando County, Florida



## Local office

North Florida Ecological Services Field Office

(904) 731-3336

(904) 731-3045

7915 Baymeadows Way, Suite 200  
Jacksonville, FL 32256-7517

NOT FOR CONSULTATION



# Endangered species

**This resource list is for informational purposes only and does not constitute an analysis of project level impacts.**

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

## Listed species

<sup>1</sup> and their critical habitats are managed by the [Ecological Services Program](#) of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries<sup>2</sup>).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact [NOAA Fisheries](#) for [species under their jurisdiction](#).

- 
1. Species listed under the [Endangered Species Act](#) are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the [listing status page](#) for more information.
  2. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

## Mammals

NAME	STATUS
West Indian Manatee <i>Trichechus manatus</i> There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat. <a href="https://ecos.fws.gov/ecp/species/4469">https://ecos.fws.gov/ecp/species/4469</a>	Threatened <b>Marine mammal</b>

## Birds

NAME	STATUS
Florida Scrub-jay <i>Aphelocoma coerulescens</i> No critical habitat has been designated for this species. <a href="https://ecos.fws.gov/ecp/species/6174">https://ecos.fws.gov/ecp/species/6174</a>	Threatened
Red Knot <i>Calidris canutus rufa</i> No critical habitat has been designated for this species. <a href="https://ecos.fws.gov/ecp/species/1864">https://ecos.fws.gov/ecp/species/1864</a>	Threatened
Red-cockaded Woodpecker <i>Picoides borealis</i> No critical habitat has been designated for this species. <a href="https://ecos.fws.gov/ecp/species/7614">https://ecos.fws.gov/ecp/species/7614</a>	Endangered
Wood Stork <i>Mycteria americana</i> No critical habitat has been designated for this species. <a href="https://ecos.fws.gov/ecp/species/8477">https://ecos.fws.gov/ecp/species/8477</a>	Threatened

## Reptiles

NAME	STATUS
Eastern Indigo Snake <i>Drymarchon corais couperi</i> No critical habitat has been designated for this species. <a href="https://ecos.fws.gov/ecp/species/646">https://ecos.fws.gov/ecp/species/646</a>	Threatened
Loggerhead Sea Turtle <i>Caretta caretta</i> There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat. <a href="https://ecos.fws.gov/ecp/species/1110">https://ecos.fws.gov/ecp/species/1110</a>	Threatened



## Fishes

NAME	STATUS
Atlantic Sturgeon (gulf Subspecies) <i>Acipenser oxyrinchus</i> (=oxyrhynchus) <i>desotoi</i> There is <b>final</b> critical habitat for this species. Your location is outside the critical habitat. <a href="https://ecos.fws.gov/ecp/species/651">https://ecos.fws.gov/ecp/species/651</a>	Threatened

## Flowering Plants

NAME	STATUS
Brooksville Bellflower <i>Campanula robinsiae</i> No critical habitat has been designated for this species. <a href="https://ecos.fws.gov/ecp/species/5809">https://ecos.fws.gov/ecp/species/5809</a>	Endangered
Cooley's Water-willow <i>Justicia cooleyi</i> No critical habitat has been designated for this species. <a href="https://ecos.fws.gov/ecp/species/4653">https://ecos.fws.gov/ecp/species/4653</a>	Endangered

## Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

## Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act

<sup>1</sup> and the Bald and Golden Eagle Protection Act<sup>2</sup>.

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described [below](#).

1. The [Migratory Birds Treaty Act](#) of 1918.
2. The [Bald and Golden Eagle Protection Act](#) of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern <http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php>
- Measures for avoiding and minimizing impacts to birds <http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php>
- Nationwide conservation measures for birds <http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf>

The birds listed below are birds of particular concern either because they occur on the [USFWS Birds of Conservation Concern](#) (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ [below](#). This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME

BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

American Kestrel *Falco sparverius paulus*

Breeds Apr 1 to Aug 31

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

<p><b>Bald Eagle</b> <i>Haliaeetus leucocephalus</i></p> <p>This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.</p>	<p>Breeds Sep 1 to Jul 31</p>
<p><b>Common Ground-dove</b> <i>Columbina passerina exigua</i></p> <p>This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA</p>	<p>Breeds Feb 1 to Dec 31</p>
<p><b>Lesser Yellowlegs</b> <i>Tringa flavipes</i></p> <p>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p> <p><a href="https://ecos.fws.gov/ecp/species/9679">https://ecos.fws.gov/ecp/species/9679</a></p>	<p>Breeds elsewhere</p>
<p><b>Prairie Warbler</b> <i>Dendroica discolor</i></p> <p>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	<p>Breeds May 1 to Jul 31</p>
<p><b>Prothonotary Warbler</b> <i>Protonotaria citrea</i></p> <p>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	<p>Breeds Apr 1 to Jul 31</p>
<p><b>Red-headed Woodpecker</b> <i>Melanerpes erythrocephalus</i></p> <p>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p>	<p>Breeds May 10 to Sep 10</p>
<p><b>Swallow-tailed Kite</b> <i>Elanoides forficatus</i></p> <p>This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.</p> <p><a href="https://ecos.fws.gov/ecp/species/8938">https://ecos.fws.gov/ecp/species/8938</a></p>	<p>Breeds Mar 10 to Jun 30</p>

## Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

### Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is  $0.25/0.25 = 1$ ; at week 20 it is  $0.05/0.25 = 0.2$ .
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

#### Breeding Season (■)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

#### Survey Effort (|)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

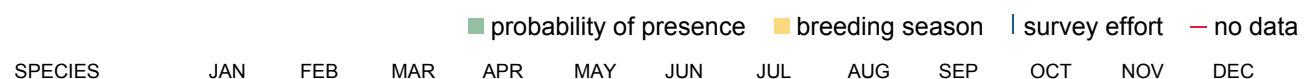
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

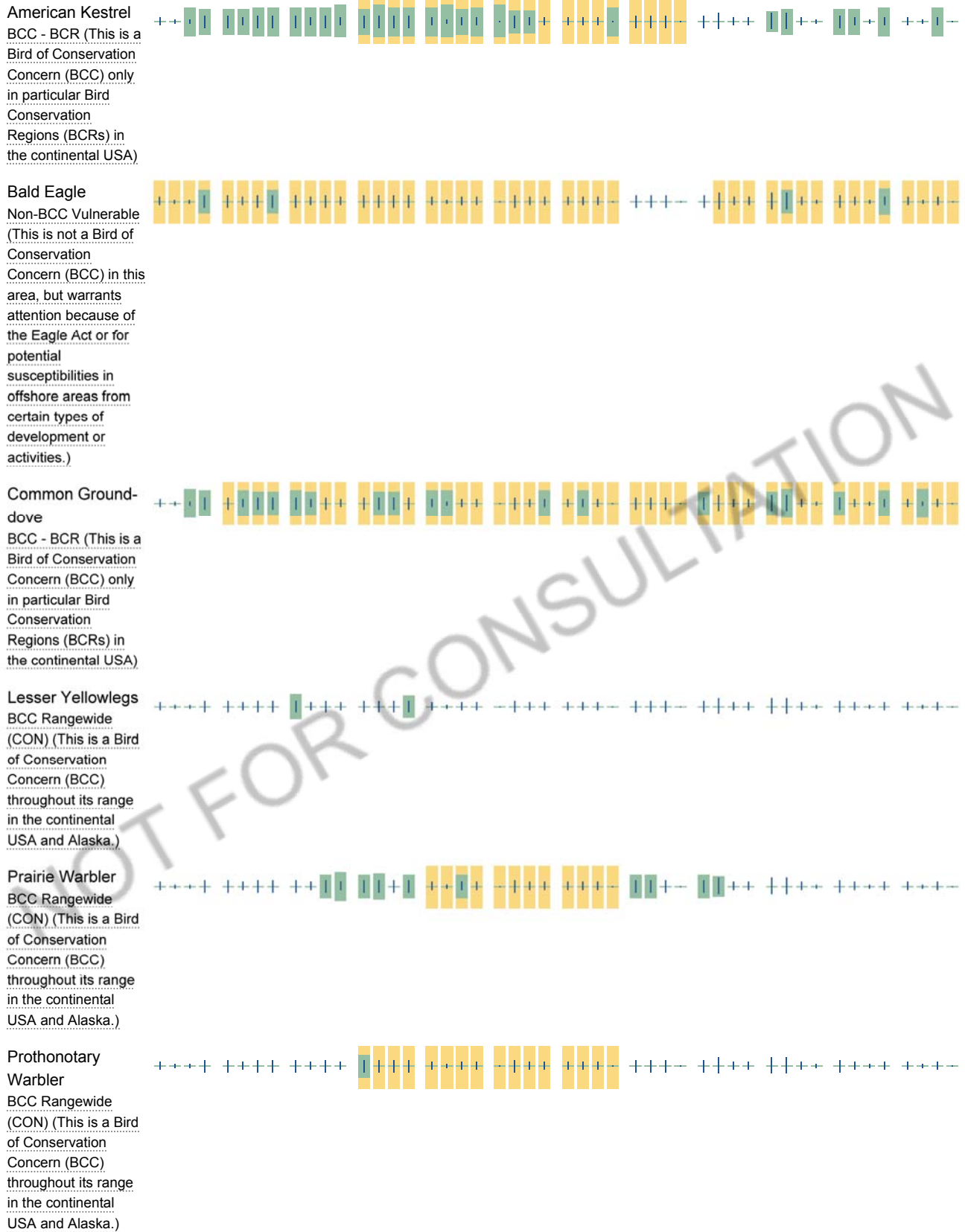
#### No Data (-)

A week is marked as having no data if there were no survey events for that week.

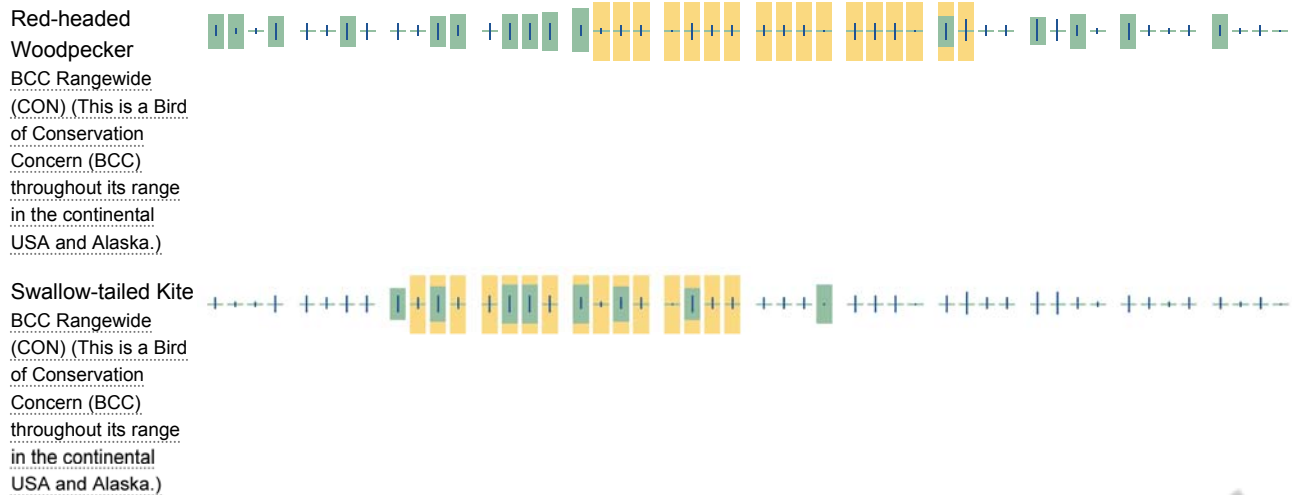
#### Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.









### Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. [Additional measures](#) and/or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

### What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [E-bird Explore Data Tool](#).

### What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

### **How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?**

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: [The Cornell Lab of Ornithology All About Birds Bird Guide](#), or (if you are unsuccessful in locating the bird of interest there), the [Cornell Lab of Ornithology Neotropical Birds guide](#). If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

### **What are the levels of concern for migratory birds?**

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

### **Details about birds that are potentially affected by offshore projects**

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

### **What if I have eagles on my list?**

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

### **Proper Interpretation and Use of Your Migratory Bird Report**

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ “What does IPaC use to generate the migratory birds potentially occurring in my specified location”. Please be aware this report provides the “probability of presence” of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the “no data” indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, *should presence be confirmed*. To learn more about conservation measures, visit the FAQ “Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds” at the bottom of your migratory bird trust resources page.

NOT FOR CONSULTATION



# Marine mammals

Marine mammals are protected under the [Marine Mammal Protection Act](#). Some are also protected under the Endangered Species Act

<sup>1</sup> and the Convention on International Trade in Endangered Species of Wild Fauna and Flora<sup>2</sup>.

The responsibilities for the protection, conservation, and management of marine mammals are shared by the U.S. Fish and Wildlife Service [responsible for otters, walrus, polar bears, manatees, and dugongs] and NOAA Fisheries

<sup>3</sup> [responsible for seals, sea lions, whales, dolphins, and porpoises]. Marine mammals under the responsibility of NOAA Fisheries are **not** shown on this list; for additional information on those species please visit the [Marine Mammals](#) page of the NOAA Fisheries website.

The Marine Mammal Protection Act prohibits the take (to harass, hunt, capture, kill, or attempt to harass, hunt, capture or kill) of marine mammals and further coordination may be necessary for project evaluation. Please contact the U.S. Fish and Wildlife Service Field Office shown.

1. The [Endangered Species Act](#) (ESA) of 1973.
2. The [Convention on International Trade in Endangered Species of Wild Fauna and Flora](#) (CITES) is a treaty to ensure that international trade in plants and animals does not threaten their survival in the wild.
3. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following marine mammals under the responsibility of the U.S. Fish and Wildlife Service are potentially affected by activities in this location:

NAME

West Indian Manatee *Trichechus manatus*  
<https://ecos.fws.gov/ecp/species/4469>

## Facilities

### National Wildlife Refuge lands

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

## Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

## Wetlands in the National Wetlands Inventory

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

THERE ARE NO KNOWN WETLANDS AT THIS LOCATION.

### Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

### Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tubercid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

### Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or

local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NOT FOR CONSULTATION

*Excerpt is from pages 18/19 of the Florida Fish and Wildlife Gopher Tortoise Management Plan*

<http://myfwc.com/media/2286685/GT-Management-Plan.pdf>

### ***Agricultural, Silvicultural, and Wildlife Management Activities***

Approximately 61 percent of Florida's landscape is in some form of agricultural or silvicultural land use (National Agricultural Statistics Service 2007, U.S. Forest Service 2007).

Florida's fish and wildlife, including many state-listed species, occur on lands utilized for agriculture. The FWC has long recognized that agriculture provides a valuable benefit to the conservation and management of fish and wildlife in Florida, including species designated under Rule 68A-27.003, F.A.C. On March 6, 2008, the FWC Executive Director issued a General Policy Statement on the application of the FWC permitting requirements for Agricultural, Silvicultural and Wildlife Management Activities as they relate to gopher tortoises. The Policy Statement is included in Appendix 2 of this plan and in the Gopher Tortoise Permitting Guidelines (April 2008, as amended). The policy provides in part:

*This policy is for the purpose of enforcement of Chapter 68A-27 relating to gopher tortoises with respect to agricultural and silvicultural activities or activities intended to improve native wildlife habitat. The adoption of the Gopher Tortoise Burrow rule does not expand pre-existing gopher tortoise regulatory prohibitions or change existing policy or practice with respect to agricultural and silvicultural activities... Gopher tortoise or gopher tortoise burrow permits are not required to conduct agricultural activities, silvicultural activities, or activities intended to improve native wildlife habitat. Such activities include, but are not limited to: tilling, planting, mowing, harvesting, prescribed burning, mowing, disking, roller-chopping and tree-cutting.*

In November 2011, the FWC amended its rules relating to Endangered or Threatened Species, Chapter 68A-27 F.A.C. Once again, recognizing agriculture's contribution to fish and wildlife conservation and management, Rule 68A-27.007(2)(d), F.A.C., provides that agriculture conducted in accordance with best management practices (BMPs) adopted by the Department of Agriculture and Consumer Service does not require an incidental take permit from the FWC. In accordance with this Rule, FWC will work with the Florida Department of Agriculture and Consumer Services, landowners, and other stakeholders to legislatively authorize, develop, and adopt BMPs to protect wildlife species. Until such time that the BMPs are developed, refined and adopted, the General Policy Statement attached in Appendix 2 will remain in effect. It is anticipated that as agriculture opts into the adopted BMP program, the General Policy Statement will be phased out of both the Gopher Tortoise Management Plan and the Gopher Tortoise Permitting Guidelines.



## Carrasco, Catalina - FSA, Bushnell, FL

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**From:** Prenger, Joseph <joseph\_prenger@fws.gov>  
**Sent:** Friday, May 4, 2018 10:14 AM  
**To:** Marshall, Christy - FSA, Gainesville, FL  
**Cc:** Roller, Amy - FSA, Gainesville, FL; Carrasco, Catalina - FSA, Bushnell, FL; Bethea-Rowland, Bronwyn - FSA, Plant City, FL  
**Subject:** Re: [EXTERNAL] Informal Consultation with USFWS - - Hernando County

Dear Ms. Marshall,

Thank you for consulting the U.S. Fish and Wildlife Service regarding the proposed loan to \_\_\_\_\_ to purchase property and establish a pastured hog operation at Aylesboro Court, Brooksville, FL in Hernando County Florida (Sec/Twnshp/Rng: 13-23-19). The proposed activity to be funded through an FSA loan is purchase of a 7 acre parcel to be used to produce butcher hogs. The applicant has submitted a detailed proposal that outlines minimal ground disturbance, retention of much of the canopy cover, rotational grazing, and protection of water features through construction of a Bailey (portable) bridge and internal fencing with wetland buffers. Applicant states their intent to use NRCS best practices. No building construction is planned at this time, but long term plans include construction of an ancillary agricultural structure. From aerial photos, the property appears to be nearly totally hardwood canopy cover.

This e-mail will serve as informal consultation as requested. Based on the site plan, proposed activities, species list, and the apparent absence of habitat for all but the Eastern Indigo Snake (EIS), there appears to be a low probability of direct impacts to listed species. Although proposed construction and tree removal will be minimal, we recommend making the applicant aware of the potential presence of EIS and providing them with the Standard Protection Measures for Eastern Indigo Snake, dated August 2013. To further minimize potential impacts to gopher tortoise and eastern indigo snakes, the following conservation practice standards should be provided to the participant:

1. Construction or mechanical tree removal / mowing activities should occur during daytime hours only. Implementation of the *Standard Protection Measures for the Eastern Indigo Snake* requires adequate visibility.
2. Avoid direct impacts to gopher tortoises and their burrows, if present.

Based on implementation of the Standard Protection Measures for the Eastern Indigo Snake and the above conservation practice standards, we have determined that the project is not likely to adversely affect resources protected by the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.).

We thank FSA for their continued interest and help in conserving federally listed species. If you have any question regarding this response, please feel free to contact me.

Joseph Prenger  
State Coordinator, Partners for Fish and Wildlife Program  
North Florida Ecological Services Office  
U.S. Fish & Wildlife Service  
7915 Baymeadows Way, Suite 200  
Jacksonville, FL 32256-7517  
TEL: 904.731.3096  
FAX: 904.731.3045

[www.fws.gov/northflorida/Partners/index.html](http://www.fws.gov/northflorida/Partners/index.html)

***NOTE: This email correspondence and any attachments to and from this sender is subject to the Freedom of Information Act (FOIA) and may be disclosed to third parties.***

On Thu, May 3, 2018 at 2:21 PM, Marshall, Christy - FSA, Gainesville, FL <[Christy.Marshall@fl.usda.gov](mailto:Christy.Marshall@fl.usda.gov)> wrote:

We are completing an environmental review to finance the purchase of a 7A parcel in Hernando County (Folio # R13-123-19-0015-0000-0010) and establish a pastured hog operation per the attached project proposal. Included are copies of the property appraiser card/map, floodplain map, wetland data map, iPAC report and site plan. Please let me know if you need additional information or have any questions - thanks

Christy A. Marshall

Farm Loan Specialist

USDA Farm Service Agency

Florida State Office

P.O. Box 141030

Gainesville, FL 32614-1030

Phone: (352 )379-4523

Fax: (352) 379-4580

Email: [christy.marshall@fl.usda.gov](mailto:christy.marshall@fl.usda.gov)

[www.fsa.usda.gov/fl](http://www.fsa.usda.gov/fl)

Courier Address:

4440 NW 25th Place, Suite 1

Gainesville, FL 32606

“Happiness at work, like happiness in life, is a choice that we make”

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## Carrasco, Catalina - FSA, Bushnell, FL

---

**From:** Marshall, Christy - FSA, Gainesville, FL  
**Sent:** Thursday, May 3, 2018 2:22 PM  
**To:** Joseph Prenger (joseph\_prenger@fws.gov)  
**Cc:** Roller, Amy - FSA, Gainesville, FL; Carrasco, Catalina - FSA, Bushnell, FL; Bethea-Rowland, Bronwyn - FSA, Plant City, FL  
**Subject:** Informal Consultation with USFWS - - Hernando County  
**Attachments:** Property Appraiser Card.pdf; Property Appraiser Map 050218.JPG; Wetlands Datamapper 050218.JPG; Floodplain Map 050218.JPG; FWS iPAC report 050318.pdf; project proposal.pdf

We are completing an environmental review to finance the purchase of a 7A parcel in Hernando County (Folio # R13-123-19-0015-0000-0010) and establish a pastured hog operation per the attached project proposal. Included are copies of the property appraiser card/map, floodplain map, wetland data map, iPAC report and site plan. Please let me know if you need additional information or have any questions - thanks

Christy A. Marshall  
Farm Loan Specialist  
USDA Farm Service Agency  
Florida State Office  
P.O. Box 141030  
Gainesville, FL 32614-1030  
Phone: (352 )379-4523  
Fax: (352) 379-4580  
Email: [christy.marshall@fl.usda.gov](mailto:christy.marshall@fl.usda.gov)  
[www.fsa.usda.gov/fl](http://www.fsa.usda.gov/fl)

Courier Address:  
4440 NW 25th Place, Suite 1  
Gainesville, FL 32606

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**STANDARD PROTECTION MEASURES FOR THE EASTERN INDIGO SNAKE**  
**U.S. Fish and Wildlife Service**  
**August 12, 2013**

The eastern indigo snake protection/education plan (Plan) below has been developed by the U.S. Fish and Wildlife Service (USFWS) in Florida for use by applicants and their construction personnel. At least **30 days prior** to any clearing/land alteration activities, the applicant shall notify the appropriate USFWS Field Office via e-mail that the Plan will be implemented as described below (North Florida Field Office: [jaxregs@fws.gov](mailto:jaxregs@fws.gov); South Florida Field Office: [verobeach@fws.gov](mailto:verobeach@fws.gov); Panama City Field Office: [panamacity@fws.gov](mailto:panamacity@fws.gov)). As long as the signatory of the e-mail certifies compliance with the below Plan (including use of the attached poster and brochure), no further written confirmation or “approval” from the USFWS is needed and the applicant may move forward with the project.

If the applicant decides to use an eastern indigo snake protection/education plan other than the approved Plan below, written confirmation or “approval” from the USFWS that the plan is adequate must be obtained. At least 30 days prior to any clearing/land alteration activities, the applicant shall submit their unique plan for review and approval. The USFWS will respond via e-mail, typically within 30 days of receiving the plan, either concurring that the plan is adequate or requesting additional information. A concurrence e-mail from the appropriate USFWS Field Office will fulfill approval requirements.

The Plan materials should consist of: 1) a combination of posters and pamphlets (see **Poster Information** section below); and 2) verbal educational instructions to construction personnel by supervisory or management personnel before any clearing/land alteration activities are initiated (see **Pre-Construction Activities** and **During Construction Activities** sections below).

**POSTER INFORMATION**

Posters with the following information shall be placed at strategic locations on the construction site and along any proposed access roads (a final poster for Plan compliance, to be printed on 11” x 17” or larger paper and laminated, is attached):

**DESCRIPTION:** The eastern indigo snake is one of the largest non-venomous snakes in North America, with individuals often reaching up to 8 feet in length. They derive their name from the glossy, blue-black color of their scales above and uniformly slate blue below. Frequently, they have orange to coral reddish coloration in the throat area, yet some specimens have been reported to only have cream coloration on the throat. These snakes are not typically aggressive and will attempt to crawl away when disturbed. Though indigo snakes rarely bite, they should NOT be handled.

**SIMILAR SNAKES:** The black racer is the only other solid black snake resembling the eastern indigo snake. However, black racers have a white or cream chin, thinner bodies, and WILL BITE if handled.

**LIFE HISTORY:** The eastern indigo snake occurs in a wide variety of terrestrial habitat types throughout Florida. Although they have a preference for uplands, they also utilize some wetlands

and agricultural areas. Eastern indigo snakes will often seek shelter inside gopher tortoise burrows and other below- and above-ground refugia, such as other animal burrows, stumps, roots, and debris piles. Females may lay from 4 - 12 white eggs as early as April through June, with young hatching in late July through October.

**PROTECTION UNDER FEDERAL AND STATE LAW:** The eastern indigo snake is classified as a Threatened species by both the USFWS and the Florida Fish and Wildlife Conservation Commission. “Taking” of eastern indigo snakes is prohibited by the Endangered Species Act without a permit. “Take” is defined by the USFWS as an attempt to kill, harm, harass, pursue, hunt, shoot, wound, trap, capture, collect, or engage in any such conduct. Penalties include a maximum fine of \$25,000 for civil violations and up to \$50,000 and/or imprisonment for criminal offenses, if convicted.

Only individuals currently authorized through an issued Incidental Take Statement in association with a USFWS Biological Opinion, or by a Section 10(a)(1)(A) permit issued by the USFWS, to handle an eastern indigo snake are allowed to do so.

**IF YOU SEE A LIVE EASTERN INDIGO SNAKE ON THE SITE:**

- Cease clearing activities and allow the live eastern indigo snake sufficient time to move away from the site without interference;
- Personnel must NOT attempt to touch or handle snake due to protected status.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Immediately notify supervisor or the applicant’s designated agent, **and** the appropriate USFWS office, with the location information and condition of the snake.
- If the snake is located in a vicinity where continuation of the clearing or construction activities will cause harm to the snake, the activities must halt until such time that a representative of the USFWS returns the call (within one day) with further guidance as to when activities may resume.

**IF YOU SEE A DEAD EASTERN INDIGO SNAKE ON THE SITE:**

- Cease clearing activities and immediately notify supervisor or the applicant’s designated agent, **and** the appropriate USFWS office, with the location information and condition of the snake.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Thoroughly soak the dead snake in water and then freeze the specimen. The appropriate wildlife agency will retrieve the dead snake.

**Telephone numbers of USFWS Florida Field Offices to be contacted if a live or dead eastern indigo snake is encountered:**

**North Florida Field Office – (904) 731-3336**  
**Panama City Field Office – (850) 769-0552**  
**South Florida Field Office – (772) 562-3909**

## **PRE-CONSTRUCTION ACTIVITIES**

1. The applicant or designated agent will post educational posters in the construction office and throughout the construction site, including any access roads. The posters must be clearly visible to all construction staff. A sample poster is attached.
2. Prior to the onset of construction activities, the applicant/designated agent will conduct a meeting with all construction staff (annually for multi-year projects) to discuss identification of the snake, its protected status, what to do if a snake is observed within the project area, and applicable penalties that may be imposed if state and/or federal regulations are violated. An educational brochure including color photographs of the snake will be given to each staff member in attendance and additional copies will be provided to the construction superintendent to make available in the onsite construction office (a final brochure for Plan compliance, to be printed double-sided on 8.5" x 11" paper and then properly folded, is attached). Photos of eastern indigo snakes may be accessed on USFWS and/or FWC websites.
3. Construction staff will be informed that in the event that an eastern indigo snake (live or dead) is observed on the project site during construction activities, all such activities are to cease until the established procedures are implemented according to the Plan, which includes notification of the appropriate USFWS Field Office. The contact information for the USFWS is provided on the referenced posters and brochures.

## **DURING CONSTRUCTION ACTIVITIES**

1. During initial site clearing activities, an onsite observer may be utilized to determine whether habitat conditions suggest a reasonable probability of an eastern indigo snake sighting (example: discovery of snake sheds, tracks, lots of refugia and cavities present in the area of clearing activities, and presence of gopher tortoises and burrows).
2. If an eastern indigo snake is discovered during gopher tortoise relocation activities (i.e. burrow excavation), the USFWS shall be contacted within one business day to obtain further guidance which may result in further project consultation.
3. Periodically during construction activities, the applicant's designated agent should visit the project area to observe the condition of the posters and Plan materials, and replace them as needed. Construction personnel should be reminded of the instructions (above) as to what is expected if any eastern indigo snakes are seen.

## **POST CONSTRUCTION ACTIVITIES**

Whether or not eastern indigo snakes are observed during construction activities, a monitoring report should be submitted to the appropriate USFWS Field Office within 60 days of project completion. The report can be sent electronically to the appropriate USFWS e-mail address listed on page one of this Plan.



# **ATTENTION:**

## **THREATENED EASTERN INDIGO SNAKES MAY BE PRESENT ON THIS SITE!!!**

### **IF YOU SEE A LIVE EASTERN INDIGO SNAKE ON THE SITE:**

- Cease clearing activities and allow the eastern indigo snake sufficient time to move away from the site without interference.
- Personnel must NOT attempt to touch or handle snake due to protected status.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Immediately notify supervisor or the applicant's designated agent, **and** the appropriate U.S. Fish and Wildlife Service (USFWS) office, with the location information and condition of the snake.
- If the snake is located in a vicinity where continuation of the clearing or construction activities will cause harm to the snake, the activities must halt until such time that a representative of the USFWS returns the call (within one day) with further guidance as to when activities may resume.

### **IF YOU SEE A DEAD EASTERN INDIGO SNAKE ON THE SITE:**

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- Thoroughly soak the dead snake in water and then freeze the specimen. The appropriate wildlife agency will retrieve the dead snake.

### **USFWS Florida Field Offices to be contacted if a live or dead eastern indigo snake is encountered:**

**North Florida Field Office – (904) 731-3336**

**Panama City Field Office – (850) 769-0552**

**South Florida Field Office – (772) 562-3909**

### **Killing, harming, or harassing indigo snakes is strictly prohibited and punishable under State and Federal Law.**

**DESCRIPTION:** The eastern indigo snake is one of the largest non-venomous snakes in North America, with individuals often reaching up to 8 feet in length. They derive their name from the glossy, blue-black color of their scales above and uniformly slate blue below. Frequently, they have orange to coral reddish coloration in the throat area, yet some specimens have been reported to only have cream coloration on the throat. These snakes are not typically aggressive and will attempt to crawl away when disturbed. Though indigo snakes rarely bite, they should NOT be handled.

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**PROTECTION:** The eastern indigo snake is classified as a Threatened species by both the USFWS and the Florida Fish and Wildlife Conservation Commission. "Taking" of eastern indigo snakes is prohibited by the Endangered Species Act without a permit. "Take" is defined by the USFWS as an attempt to kill, harm, harass, pursue, hunt, shoot, wound, trap, capture, collect, or engage in any such conduct. Penalties include a maximum fine of \$25,000 for civil violations and up to \$50,000 and/or imprisonment for criminal offenses, if convicted.

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INDIGO SNAKE ON THE SITE:**

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**USFWS Florida Field Offices to be  
contacted if a live or dead eastern indigo  
snake is encountered:**

**North Florida ES Office – (904) 731-3336**  
**Panama City ES Office – (850) 769-0552**  
**South Florida ES Office – (772) 562-3909**

**DESCRIPTION:** The eastern indigo snake is one of the largest non-venomous snakes in North America, with individuals often reaching up to 8 feet in length. They derive their name from the glossy, blue-black color of their scales above and uniformly slate blue below. Frequently, they have orange to coral reddish coloration in the throat area, yet some specimens have been reported to only have cream coloration on the throat. These snakes are not typically aggressive and will attempt to crawl away when disturbed. Though indigo snakes rarely bite, they should NOT be handled.

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**LEGAL STATUS:** The eastern indigo snake is classified as a Threatened species by both the USFWS and the Florida Fish and Wildlife Conservation Commission. “Taking” of eastern indigo snakes is prohibited by the Endangered Species Act without a permit. “Take” is defined by the USFWS as an attempt to kill, harm, harass, pursue, hunt, shoot, wound, trap, capture, collect, or engage in any such conduct. Penalties include a maximum fine of \$25,000 for civil violations and up to \$50,000 and/or imprisonment for criminal offenses, if convicted.



August 12, 2013

**ATTENTION:**  
THREATENED EASTERN INDIGO  
SNAKES MAY BE PRESENT ON  
THIS SITE!!!



Please read the following information provided by the U.S. Fish and Wildlife Service to become familiar with standard protection measures for the eastern indigo snake.

**APPENDIX B**  
**Cultural Resources**



## FLORIDA DEPARTMENT *of* STATE

**RICK SCOTT**  
Governor

**KEN DETZNER**  
Secretary of State

Ms. Christy Marshall  
USDA Farm Service Agency  
P.O. Box 141030  
Gainesville, Florida 32614

May 21, 2018

RE: DHR Project File No.: 2018-2218, Received by DHR: May 03, 2018  
Project: *-(Folio # R13-123-19-0015-0000-0010)*  
County: Hernando

Ms. Marshall:

The Florida State Historic Preservation Officer reviewed the referenced project for possible effects on historic properties listed, or eligible for listing, on the *National Register of Historic Places* (NRHP). The review was conducted in accordance with Section 106 of the *National Historic Preservation Act of 1966*, as amended, and its implementing regulations in *36 CFR Part 800: Protection of Historic Properties*. Based on the information, it is our understanding that the proposed undertaking is confined to an area that does not exceed prior ground disturbance. Therefore, our office concurs with the USDA's determination of *no effect on historic properties*. However, the project should include the following special condition regarding unexpected 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 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 Rachel Thompson, Historic Sites Specialist, by email at [Rachel.Thompson@dos.myflorida.com](mailto:Rachel.Thompson@dos.myflorida.com), or by telephone at 850.245.6453 or 800.847.7278.

Sincerely,

Timothy A Parsons, Ph.D.  
Director, Division of Historical Resources  
& State Historic Preservation Officer

Division of Historical Resources  
R.A. Gray Building • 500 South Bronough Street • Tallahassee, Florida 32399  
850.245.6300 • 850.245.6436 (Fax) FLHeritage.com



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B3

## Carrasco, Catalina - FSA, Bushnell, FL

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**From:** Marshall, Christy - FSA, Gainesville, FL  
**Sent:** Tuesday, July 3, 2018 5:26 AM  
**To:** Carrasco, Catalina - FSA, Bushnell, FL  
**Cc:** Bethea-Rowland, Bronwyn - FSA, Plant City, FL; Roller, Amy - FSA, Gainesville, FL  
**Subject:** FW: Request for Concurrence from Muscogee (Creek) Nation for - Hernando County

Here is THPO response – long after the 30 day response time – please include a copy in the file with the other attachments to your 850 form and save a copy of this email to your electronic environmental folder for the customer – any questions please let me know - thanks

Christy A. Marshall  
Farm Loan Specialist  
USDA Farm Service Agency  
Florida State Office  
P.O. Box 141030  
Gainesville, FL 32614-1030  
Phone: (352 )379-4523  
Fax: (352) 379-4580  
Email: [christy.marshall@fl.usda.gov](mailto:christy.marshall@fl.usda.gov)  
[www.fsa.usda.gov/fl](http://www.fsa.usda.gov/fl)

Courier Address:  
4440 NW 25th Place, Suite 1  
Gainesville, FL 32606

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---

**From:** Section106 [mailto:Section106@mcn-nsn.gov]  
**Sent:** Monday, July 02, 2018 2:49 PM  
**To:** Marshall, Christy - FSA, Gainesville, FL <Christy.Marshall@fl.usda.gov>  
**Subject:** RE: Request for Concurrence from Muscogee (Creek) Nation for - Hernando County

Christy A. Marshall  
United States Department of Agriculture  
Farm Service Agency  
P.O. Box 141030  
Gainesville, FL 32614-1030

Ms. Marshall,



Thank you for the correspondence regarding the environmental review for a direct farm operating loan to finance the purchase of a 7A parcel and establish a pastured hog operation. The project located in Hernando County, Florida is within our historic area of interest. The Muscogee (Creek) Nation is **unaware of any Muscogee cultural or sacred sites located within the immediate project area**. We concur that there should be **no effects to any known historic cultural properties** and that work should proceed as planned. However, as the project is located in an area that is of general historic interest to the Tribe, we request that work be stopped and our office contacted immediately if any Native American cultural materials are encountered. This stipulation should be placed on the construction plans to insure contractors are aware of it. Please feel free to contact me with any questions or concerns.

**Ms. Corain Lowe-Zepeda**

Historic and Cultural Preservation Department, THPO  
Muscogee (Creek) Nation  
P. O. Box 580  
Okmulgee, OK 74447  
T 918.732.7835  
[clowe@mcn-nsn.gov](mailto:clowe@mcn-nsn.gov)

---

**From:** Marshall, Christy - FSA, Gainesville, FL [<mailto:Christy.Marshall@fl.usda.gov>]

**Sent:** Thursday, May 03, 2018 1:48 PM

**To:** James Floyd; Section106

**Cc:** Roller, Amy - FSA, Gainesville, FL; Carrasco, Catalina - FSA, Bushnell, FL; Bethea-Rowland, Bronwyn - FSA, Plant City, FL

**Subject:** Request for Concurrence from Muscogee (Creek) Nation for - Hernando County

**TO** James Floyd, Principal Chief  
RaeLynn Butler, THPO

**FROM** Christy A. Marshall, Farm Loan Specialist

**SUBJECT** Request for Concurrence

The United States Department of Agriculture (USDA), Farm Service Agency (FSA) is completing an environmental review for a direct farm operating loan to finance the purchase of a 7A parcel in Hernando County (Folio # R13-123-19-0015-0000-0010) and establish a pastured hog operation per the attached project plan and maps. (See attached property appraiser card information, map, plot plan and floodplain map.

In considering FSA's responsibilities pursuant to Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulations in 36 CFR Part 800, Protection of Historic Properties, we are requesting your assistance in identifying historic properties and/or other cultural resources that might be affected by this undertaking.

FSA has reviewed the National Register of Historic Places and submitted request for concurrence to SHPO on 5/3//2018. To the best of our knowledge there is no indication of the presence or the probability of an historic property or cultural resource at the site.

FSA has made a finding of no effect by this proposed project. Your concurrence with this determination is requested within thirty (30) days of the email delivery

receipt or delivery of this letter based on standard United States Post Office delivery schedules not to exceed 5 days from the related post mark. If we do not hear from you within the specified time frame it will be assumed you are in agreement and have no further interest in this matter.

Please feel free to contact me at (352) 379-4523 or [christy.marshall@fl.usda.gov](mailto:christy.marshall@fl.usda.gov) should you have any questions or need further information. Correspondence may be sent electronically or to 4440 NW 25<sup>th</sup> Place, Suite 1, Gainesville, FL 32606.

#### Attachments

Christy A. Marshall  
Farm Loan Specialist  
USDA Farm Service Agency  
Florida State Office  
P.O. Box 141030  
Gainesville, FL 32614-1030  
Phone: (352 )379-4523  
Fax: (352) 379-4580  
Email: [christy.marshall@fl.usda.gov](mailto:christy.marshall@fl.usda.gov)  
[www.fsa.usda.gov/fl](http://www.fsa.usda.gov/fl)

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## **Carrasco, Catalina - FSA, Bushnell, FL**

---

**From:** Marshall, Christy - FSA, Gainesville, FL  
**Sent:** Thursday, May 3, 2018 2:48 PM  
**To:** jfloyd@mcn-nsn.gov; section106@mcn-nsn.gov  
**Cc:** Roller, Amy - FSA, Gainesville, FL; Carrasco, Catalina - FSA, Bushnell, FL; Bethea-Rowland, Bronwyn - FSA, Plant City, FL  
**Subject:** Request for Concurrence from Muscogee (Creek) Nation for - Hernando County  
**Attachments:** Property Appraiser Card.pdf; Property Appraiser Map 050218.jpg; Wetlands Datamapper 050218.jpg; Floodplain Map 050218.jpg; Negative Parcel Letter Parcel 00034689 Hernando County.pdf; Parcel 00034689 Map.pdf; project proposal.pdf

**TO** James Floyd, Principal Chief  
RaeLynn Butler, THPO

**FROM** Christy A. Marshall, Farm Loan Specialist

**SUBJECT** Request for Concurrence

The United States Department of Agriculture (USDA), Farm Service Agency (FSA) is completing an environmental review for a direct farm operating loan to finance the purchase of a 7A parcel in Hernando County (Folio # R13-123-19-0015-0000-0010) and establish a pastured hog operation per the attached project plan and maps. (See attached property appraiser card information, map, plot plan and floodplain map.

In considering FSA's responsibilities pursuant to Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulations in 36 CFR Part 800, Protection of Historic Properties, we are requesting your assistance in identifying historic properties and/or other cultural resources that might be affected by this undertaking.

FSA has reviewed the National Register of Historic Places and submitted request for concurrence to SHPO on 5/3//2018. To the best of our knowledge there is no indication of the presence or the probability of an historic property or cultural resource at the site.

FSA has made a finding of no effect by this proposed project. Your concurrence with this determination is requested within thirty (30) days of the email delivery receipt or delivery of this letter based on standard United States Post Office delivery schedules not to exceed 5 days from the related post mark. If we do not hear from you within the specified time frame it will be assumed you are in agreement and have no further interest in this matter.

Please feel free to contact me at (352) 379-4523 or [christy.marshall@fl.usda.gov](mailto:christy.marshall@fl.usda.gov) should you have any questions or need further information. Correspondence may be sent electronically or to 4440 NW 25<sup>th</sup> Place, Suite 1, Gainesville, FL 32606.

Attachments

Christy A. Marshall  
Farm Loan Specialist  
USDA Farm Service Agency  
Florida State Office  
P.O. Box 141030  
Gainesville, FL 32614-1030  
Phone: (352 )379-4523  
Fax: (352) 379-4580  
Email: [christy.marshall@fl.usda.gov](mailto:christy.marshall@fl.usda.gov)  
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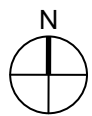
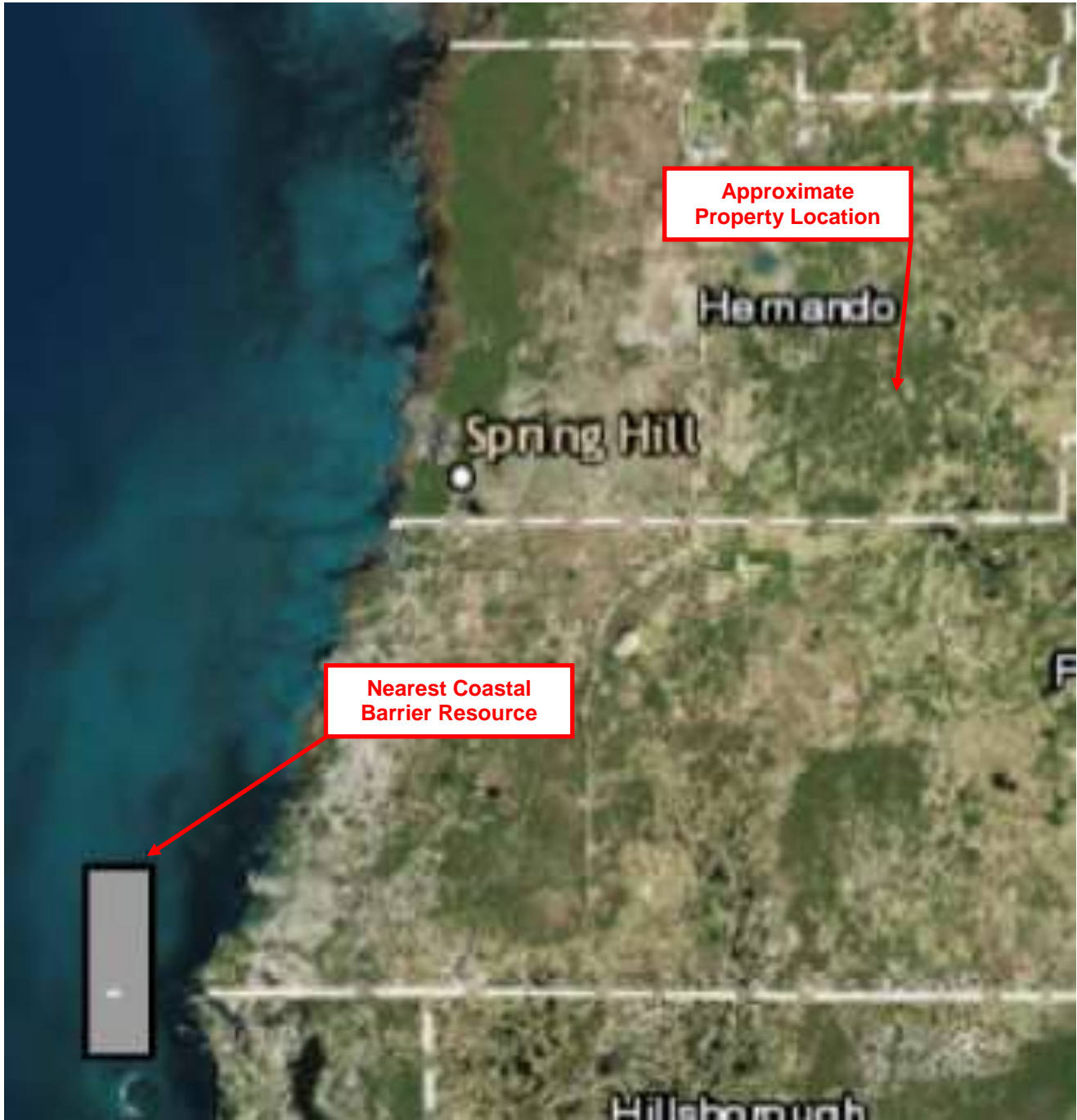
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**APPENDIX C**  
**Coastal Barrier Resources**





US Fish & Wildlife  
Coastal Barrier Resources

Not to Scale

Prepared By: GLE Associates, Inc.  
5405 Cypress Center Drive, Suite 110  
Tampa, Florida 33609 (813) 241-8350, fax: 241-8737



Farrow to Finish Farm  
Brooksville, FL

Drawn	JJR	FIGURE NO.	18000-19835
Checked	JKH	Figure	
Date	9/13/2018		C-1

**APPENDIX D**  
**Coastal Zone Management**

**STATE COASTAL ZONE BOUNDARIES**

February 9, 2012

<b>STATE</b>	<b>DEFINITION OF STATE'S COASTAL ZONE</b> <b>(The seaward boundary of the Great Lake States is the U.S.-Canada International boundary, and for all other States is the 3 nautical mile territorial sea, except for those States marked with an asterisk (*))</b>
<b>ALABAMA</b>	Alabama's coastal zone extends inland to the continuous 10-foot elevation contour in Baldwin and Mobile Counties.
<b>ALASKA</b>	As of July 1, 2011, Alaska no longer has a federally approved coastal management program or defined coastal zone and federal consistency does not apply to Alaska. Contact NOAA's Office of Ocean and Coastal Resource Management for additional information.
<b>AMERICAN SAMOA</b>	American Samoa's coastal zone is the entire Territory.
<b>CALIFORNIA &amp; BCDC</b>	California's coastal zone generally extends 1,000 yards inland from the mean high tide line. In significant coastal estuarine habitat and recreational areas it extends inland to the first major ridgeline or 5 miles from the mean high tide line, whichever is less. In developed urban areas, the boundary is generally less than 1,000 yards.  The coastal zone for the San Francisco Bay Conservation and Development Commission (BCDC) includes the open water, marshes and mudflats of greater San Francisco Bay, and areas 100 feet inland from the line of highest tidal action. The boundary also includes: the Suisun marsh and buffer zone; managed wetlands diked off from the Bay; and open waters diked off from the Bay and used in salt production.
<b>CONNECTICUT</b>	Connecticut's coastal zone has two tiers incorporated within the 36 coastal townships. The first tier is bounded by a continuous line delineated by a 1,000 foot linear setback measured from the mean high water mark in coastal waters; or a 1,000 foot linear setback measured from the inland boundary of state regulated tidal wetlands; or the continuous interior contour elevation of the one hundred year frequency coastal flood zone; whichever is farthest inland. The second tier is the area between the inland boundary of the 36 coastal communities and the inland boundary of the first tier.
<b>DELAWARE</b>	Delaware's coastal zone includes the whole state.
<b>FLORIDA *</b>	Florida's coastal zone is the entire State, but has two tiers. Local governments eligible to receive coastal management funds are limited to those Gulf and Atlantic coastal cities and counties which include or are contiguous to state water bodies where marine species of vegetation constitute the dominant plant community. Florida's seaward boundary in the Gulf of Mexico is 3 marine leagues (9 nautical miles) and is 3 nautical miles in the Atlantic.
<b>GEORGIA</b>	Georgia's coastal zone includes the 11 counties that border tidally-influenced waters or have economies that are closely tied to coastal resources.
<b>GUAM</b>	Guam's coastal zone is the entire Territory.
<b>HAWAII</b>	Hawaii's coastal zone is the entire state.

<b>ILLINOIS</b>	Illinois' coastal zone has two components. The Lakeshore Boundary is based on the Lake Michigan watershed and is generally parallel to the Lake Michigan shoreline. The Inland Waterway Boundary includes Inland Waterway Corridors, which are select segments of the Chicago River system (North Branch, South Branch, Main Branch and North Shore Channel) and select segments of the Little Calumet and Grand Calumet Rivers. The Inland Waterway Corridors consist of both the waterway and designated land area to either side of the waterway.
<b>INDIANA</b>	Indiana's coastal zone is based on watershed boundaries within coastal townships and the counties of Lake, Porter and LaPorte. To create an inland boundary that is identifiable in practical landmarks, the coastal zone boundary is described based on the U.S. Geological Survey Quadrangle maps and major roads for each county. The coastal zone boundary is located in the northern portions of Lake, Porter, and LaPorte Counties. At its widest extent, the boundary extends away from the shoreline 17 miles to the Crown Point area and at its narrowest point, less than 2 miles, just north of Hudson Lake in LaPorte County. See NOAA, <i>Indiana Lake Michigan Coastal Program and Final Environmental Impact Statement</i> , Appendix C (April 2002), to determine the precise coastal zone boundary in a particular area of the State.
<b>LOUISIANA</b>	Louisiana's coastal zone varies from 16 to 32 miles inland from the Gulf coast and generally follows the Intracoastal Waterway running from the Texas-Louisiana state line then follows highways through Vermilion, Iberia, and St. Mary parishes, then dipping southward following the natural ridges below Houma, then turning northward to take in Lake Pontchartrain and ending at the Mississippi-Louisiana border.
<b>MAINE</b>	Maine's coastal zone includes the inland line of coastal towns on tidewaters and all islands.
<b>MARYLAND</b>	Maryland's coastal zone extends to the inland boundary of the 16 counties bordering the Atlantic Ocean, the Chesapeake Bay, and the Potomac River (as far as the municipal limits of Washington, D.C), and includes Baltimore City and all local jurisdictions within the counties.
<b>MASSACHUSETTS</b>	Massachusetts' coastal zone extends 100 feet inland of specified major roads, RR tracks, or other visible right of ways which are located within a half mile of coastal waters or salt marshes. The coastal zone includes all islands, transitional and intertidal areas, and coastal wetlands and beaches. In instances where the road boundary excludes significant resource areas, the boundary line may depart from the road to encompass.
<b>MICHIGAN</b>	Michigan's coastal zone, generally, extends a minimum of 1,000 feet from the ordinary high water mark. The boundary extends further inland in some locations to encompass coastal lakes, rivermouths, and bays; floodplains; wetlands; dune areas; urban areas; and public park, recreation, and natural areas.
<b>MINNESOTA</b>	Minnesota's coastal zone is divided into three areas. The first includes the area of the St. Louis River in Carlton County, south of Duluth. The second is the city of Duluth and surrounding areas of urban growth and expansion to the north and west. The third is the region between the Duluth city limits north to the Canadian border, also known as the "North Shore," which includes portions of St. Louis, Lake, and Cook Counties. See NOAA, <i>Minnesota's Lake Superior Coastal Program Final Environmental Impact Statement</i> , Chapter One, (May 1999), to determine the precise coastal zone boundary in a particular area of the State.

<b>MISSISSIPPI</b>	Mississippi's coastal zone includes the 3 counties adjacent to the coast. The coastal zone includes these counties, as well as all adjacent coastal waters. Included in this definition are the barrier islands of the coast.
<b>NEW HAMPSHIRE</b>	New Hampshire's coastal zone is the 17 coastal municipalities.
<b>NEW JERSEY</b>	New Jersey's coastal zone recognizes four distinct regions of the State and treats them separately. From the New York border to the Raritan Bay, the boundary extends landward from mean high water to the first road or property line. From the Raritan Bay south along the Atlantic shoreline and up to the Delaware Memorial Bridge, the boundary extends from half a mile to 24 miles inland (1,376 square miles of land area). From the Delaware Memorial Bridge northward up the Delaware River to Trenton, the boundary extends landward to the first road inclusive of all wetlands. The fourth boundary serves a 31-mile square area in the northeast corner of the state bordering the Hudson river (New Jersey Meadowlands Commission).
<b>NEW YORK</b>	New York's coastal zone varies from region to region while incorporating the following conditions: The inland boundary is approximately 1,000 feet from the shoreline of the mainland. In urbanized and developed coastal locations the landward boundary is approximately 500 feet from the mainland's shoreline, or less than 500 feet where a roadway or railroad line runs parallel to the shoreline at a distance of under 500 feet and defines the boundary. In locations where major state-owned lands and facilities or electric power generating facilities abut the shoreline, the boundary extends inland to include them. In some areas, such as Long Island Sound and the Hudson River Valley, the boundary may extend inland up to 10,000 feet to encompass significant coastal resources, such as areas of exceptional scenic value, agricultural or recreational lands, and major tributaries and headlands.
<b>NORTH CAROLINA</b>	North Carolina's coastal zone includes the 20 counties that in whole or in part are adjacent to, adjoining, intersected by or bounded by the Atlantic Ocean or any coastal sound(s). Within this boundary, there are two tiers. The first tier is comprised of Areas of Environmental Concern (AEC) and is subject to more thorough regulatory controls. AECs include: coastal wetlands, estuarine waters, public trust areas, estuarine shorelines, ocean beaches, frontal dunes, ocean erosion areas, inlet lands, small surface water supply watersheds, public water supply well-fields, and fragile natural resource areas. The second tier includes land uses which have potential to affect coastal waters even though they are not located in AECs.
<b>NORTHERN MARIANA ISLANDS</b>	Northern Mariana Islands' coastal zone is the entire Commonwealth. (Note: a recent federal court decision ruled that the Commonwealth does not own the adjacent territorial sea. A consent decree allows the CNMI to manage the area.)
<b>OHIO</b>	Ohio's coastal zone includes portions of 9 counties bordering Lake Erie and its tributaries and varies depending on biophysical characteristics of various coastal regions— in the western part of the coast the boundary extends inland up to 15 miles along certain low lying wetland and floodplain areas; in most of the eastern part of the State, areas with high bluffs, the boundary extends inland for only about an eighth of a mile, with the exception of the Mentor Marsh area.
<b>OREGON</b>	Oregon's coastal zone extends inland to the crest of the coastal range, except for the following: along the Umpqua River, where it extends upstream to Scottsburg; along the Rogue River, where it extends upstream to Agness; and except in the Columbia River Basin, where it extends upstream to the downstream end of Puget Island.



<b>PENNSYLVANIA</b>	Pennsylvania's coastal zone along Lake Erie varies from 900 feet in urban areas to over 3 miles in more rural areas, and encompasses the floodplains of Lake Erie and tributary streams, bluff hazards recession areas, and coastal wetlands. The coastal zone along the Delaware River Estuary extends inland to 660 feet in urbanized areas, to 3.5 miles in rural areas, and includes floodplains of the Delaware and Schuylkill Rivers and their tributaries to the upper limit of tidal influence, and tidal and freshwater wetlands.
<b>PUERTO RICO *</b>	Puerto Rico's coastal zone, generally, extends 1,000 meters inland; however, it extends further inland in certain areas to include important coastal resources. Puerto Rico's seaward boundary is 3 marine leagues (9 nautical miles).
<b>RHODE ISLAND</b>	Rhode Island's coastal zone includes the whole state. However, the inland extent of the regulatory authority of the State's CZMA agency is 200 feet inland from any coastal feature, to watersheds, and to certain activities that occur anywhere within the State that include: power-generating plants; petroleum storage facilities; chemical or petroleum processing; minerals extraction; sewage treatment and disposal plants; solid waste disposal facilities; and, desalination plants.
<b>SOUTH CAROLINA</b>	South Carolina's coastal zone includes all lands and waters in the counties which contain any one or more of the critical areas (coastal waters, tidelands, beaches, and primary oceanfront sand dunes).
<b>TEXAS *</b>	Texas' coastal zone is generally the area seaward of the Texas coastal facility designation line which roughly follows roads that are parallel to coastal waters and wetlands generally within one mile of tidal rivers. The boundary encompasses all or portions of 18 coastal counties. Texas' seaward boundary is 3 marine leagues (9 nautical miles).
<b>VIRGINIA</b>	Virginia's coastal zone includes the 29 counties, 17 cities, and 42 incorporated towns of <i>Tidewater Virginia</i> , including the Atlantic Coast watershed and portions of the Chesapeake Bay and Albemarle-Pamlico Sound watersheds.
<b>VIRGIN ISLANDS</b>	Virgin Islands' coastal zone includes the entire territory.
<b>WASHINGTON</b>	Washington's coastal zone is the 15 coastal counties that front saltwater.
<b>WISCONSIN</b>	Wisconsin's coastal zone is the 15 counties that front Lake Superior, Lake Michigan, or Green Bay.

## Deborah DeVars

---

**From:** State\_Clearinghouse <State.Clearinghouse@dep.state.fl.us>  
**Sent:** Monday, May 7, 2018 1:39 PM  
**To:** Carrasco, Catalina - FSA, Bushnell, FL; State\_Clearinghouse  
**Subject:** RE: Environmental Consultation - - Farm Ownership Loan

While it is covered by EO 12372, the Florida State Clearinghouse would not select the project for review. You may proceed with your project.

Please continue to send future electronic requests directly to the State Clearinghouse email address, [State.Clearinghouse@dep.state.fl.us](mailto:State.Clearinghouse@dep.state.fl.us).

Good Luck.

*Chris Stahl*

Chris Stahl, Coordinator  
Florida State Clearinghouse  
Florida Department of Environmental Protection  
2600 Blair Stone Road, M.S. 47  
Tallahassee, FL 32399-2400  
ph. (850) 717-9076  
[State.Clearinghouse@dep.state.fl.us](mailto:State.Clearinghouse@dep.state.fl.us)

---

**From:** Carrasco, Catalina - FSA, Bushnell, FL <[Catalina.Carrasco@fl.usda.gov](mailto:Catalina.Carrasco@fl.usda.gov)>  
**Sent:** Friday, May 4, 2018 4:49 PM  
**To:** State\_Clearinghouse <[State.Clearinghouse@dep.state.fl.us](mailto:State.Clearinghouse@dep.state.fl.us)>  
**Subject:** Environmental Consultation - - Farm Ownership Loan

To whom it may concern:

Submission of Project to FL State Clearinghouse – CFDA# 10.406

USDA-Farm Service Agency is currently working with \_\_\_\_\_ on a direct farm ownership loan to finance the purchase of a 7 acres parcel in Hernando County, Florida and establish a pastured swine operation. This will be a small livestock operation (projected 80 hogs per year) that is not a CAFO. FSA is submitting this request to the State Clearinghouse for a consistency review or written exemption under the Coastal Zone Management Act for concurrence with the Coastal Barrier in Coastal Barrier Resources System.

Thank you for your consideration.

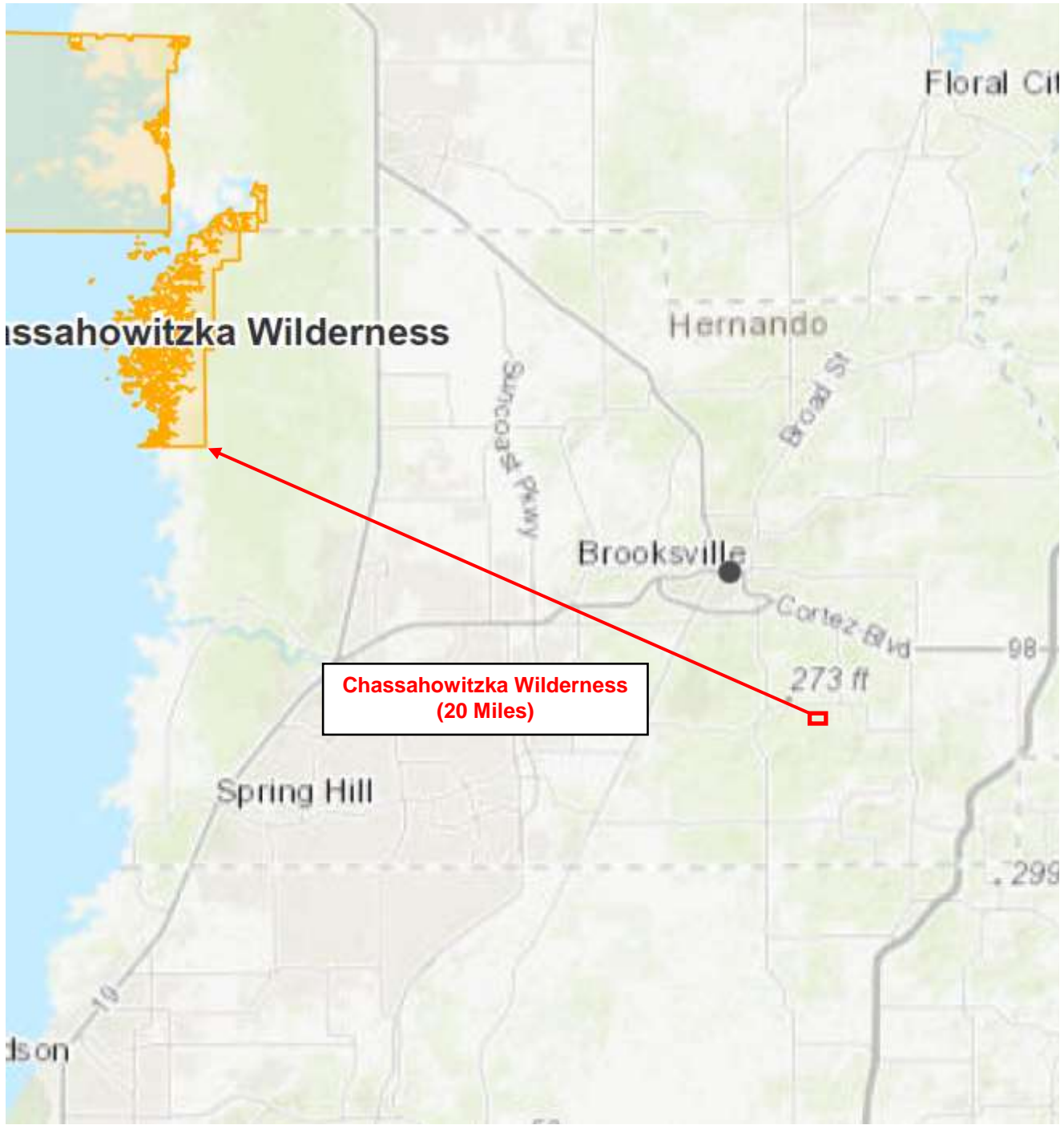
Catalina Carrasco-Alamo, Farm Loan Officer  
USDA - Farm Service Agency - Sumter Office  
7620 SR 471, Suite 3, Bushnell, FL 33513  
Tel: 352-793-2651 Fax: 855-478-8384  
Serving Sumter, Citrus, Hernando, Pasco and Marion Counties

e-mail: [catalina.carrasco@fl.usda.gov](mailto:catalina.carrasco@fl.usda.gov)

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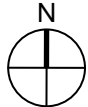


**APPENDIX E**  
**Wilderness Areas**



**Chassahowitzka Wilderness  
(20 Miles)**

**Approximate  
Property Location**



**Wilderness Areas  
Hernando County**

**Not to Scale**

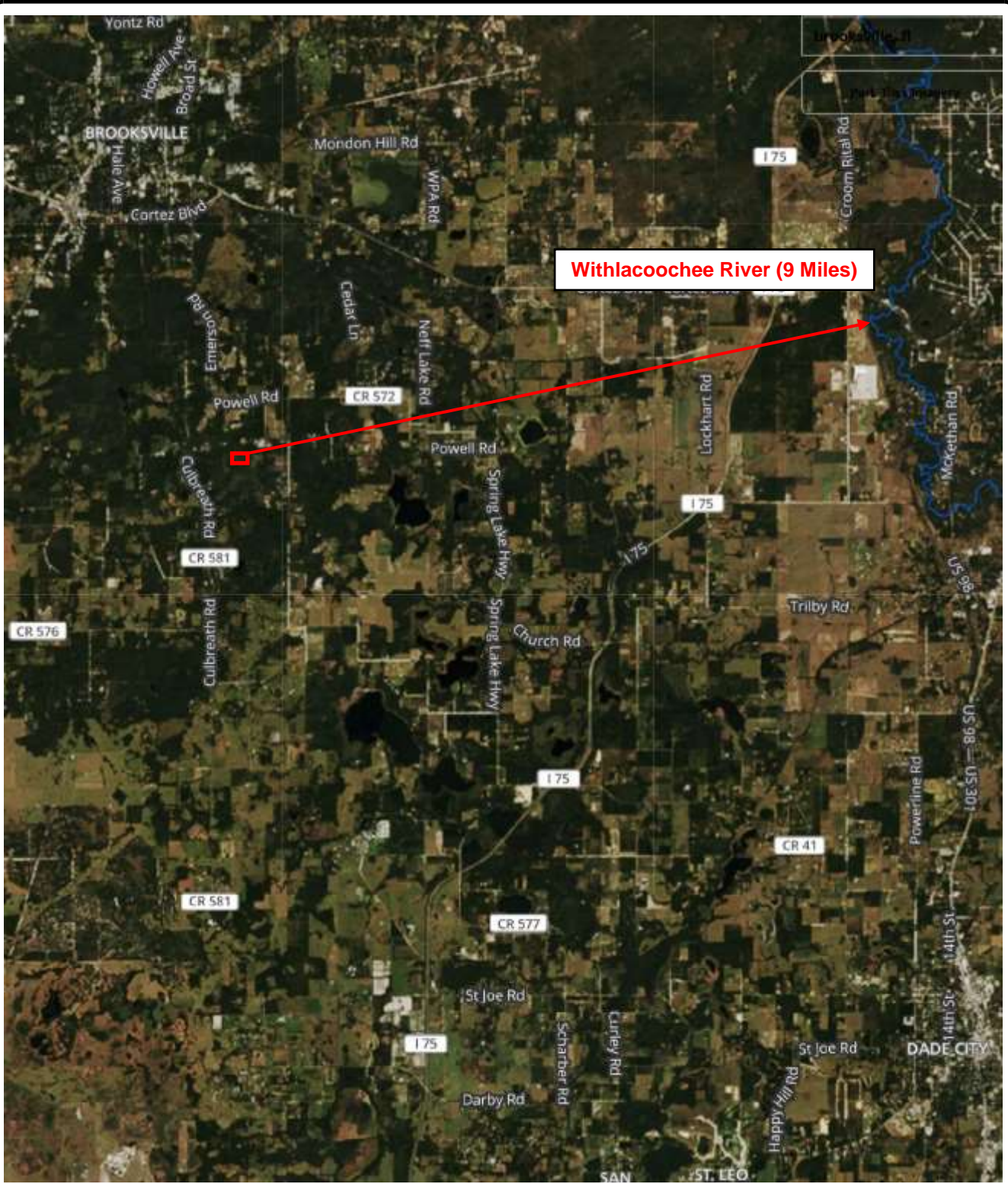
Prepared By: GLE Associates, Inc.  
5405 Cypress Center Drive, Suite 110  
Tampa, Florida 33609 (813) 241-8350, fax: 241-8737



<b>Farrow to Finish Farm Brooksville, FL</b>	
Drawn JJR	Job No. 18000-19835
Checked JKH	Figure
Date 9/13/2018	E-1

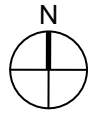


**APPENDIX F**  
**Wild and Scenic Rivers**



**Withlacoochee River (9 Miles)**

**Approximate  
Property Location**



Nationwide Rivers Inventory Hernando County	Not to Scale		<b>Farrow to Finish Farm</b> Brooksville, FL	
	Prepared By: GLE Associates, Inc. 5405 Cypress Center Drive, Suite 110 Tampa, Florida 33609 (813) 241-8350, fax: 241-8737		Drawn JJR	Date 9/13/2018



## FLORIDA

Florida has approximately 25,949 miles of river, of which 49.2 miles are designated as wild & scenic—approximately 1/5th of 1% of the state's river miles.

**Loxahatchee River**  
**Wekiva River**

Choose a State ▼ Go

Choose a River ▼ Go

*Rivers of the Southeast define diversity, from bayous and rivers pushed by the tides to clear mountain streams with world-class whitewater.*

**Designated Rivers**

About WSR Act  
State Listings  
Profile Pages

**National System**

WSR Table  
Study Rivers  
Stewardship  
WSR Act Legislation

**River Management**

Council  
Agencies  
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GIS Mapping

**Resources**

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S

## WEKIVA RIVER, FLORIDA

### Managing Agency:

National Park Service, Southeast Regional Office

### Designated Reach:

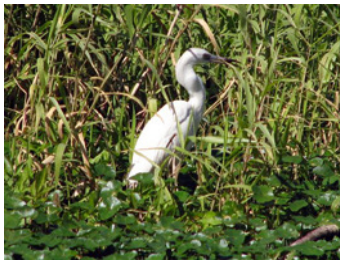
October 13, 2000. The Wekiva River from its confluence with the St. Johns River to Wekiwa Springs. Rock Springs Run from its headwaters at Rock Springs to the confluence with the Wekiwa Springs Run. Black Water Creek from the outflow from Lake Norris to the confluence with the Wekiwa River.

### Classification/Mileage:

Wild — 31.4 miles; Scenic — 2.1 miles; Recreational — 8.1 miles; Total — 41.6 miles.

Choose a State ▼	Go
Choose a River ▼	Go

*Rivers of the Southeast define diversity, from bayous and rivers pushed by the tides to clear mountain streams with world-class whitewater.*



### RELATED LINKS

[Wekiva National Wild & Scenic River System](#)

[Friends of the Wekiva River](#)

*Photo Credit: Unknown*

### Wekiva River

The Wekiva River Basin is a complex ecological system of rivers, springs, seepage areas, lakes, streams, sinkholes, wetland prairies, hardwood hammocks, pine flatwoods and sand pine scrub communities. Water quality is exhibited in two ways. Several streams are clear due to being spring-fed. Others are blackwater; blackwater streams receive most of their flow from precipitation resulting in annual rainy season over-bank flows. The Wekiva and its tributaries are in superb ecological condition. The basin is almost entirely within Florida State lands and supports many species of plant and animal life, some of which are endangered, threatened, or of special concern. Elevations range from sea level to about 35 feet above sea level. The climate is subtropical, with an average annual temperature of around 72 degrees. Mean annual rainfall over the Wekiva basin is 52 inches, most of which occurs during the June-October rainy season.



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**National System**

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[Study Rivers](#)  
[Stewardship](#)  
[WSR Act Legislation](#)

**River Management**

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HOME | NATIONAL SYSTEM | MANAGEMENT | RESOURCES | PUBLICATIONS | CONTACT US | KID'S SITE |

S

## LOXAHATCHEE RIVER, FLORIDA

### Managing Agency:

Jonathan Dickinson State Park

### Designated Reach:

May 17, 1985. From Riverbend Park downstream to Jonathan Dickinson State Park.

### Classification/Mileage:

Wild — 1.3 miles; Scenic — 5.8 miles; Recreational — 0.5 miles; Total — 7.6 miles.

Choose a State ▼	Go
Choose a River ▼	Go

*Rivers of the Southeast define diversity, from bayous and rivers pushed by the tides to clear mountain streams with world-class whitewater.*



### RELATED LINKS

- [Jonathan Dickinson State Park](#)
- [Friends of the Loxahatchee River](#)
- [Loxahatchee River Center](#)
- [Loxahatchee River Management Plan \(5.4 MB PDF\)](#)

*Photo Credit: American Rivers*

### Loxahatchee River

This scenic southern river flows through an interesting vegetative landscape which supports a wide range of aquatic and terrestrial fish and wildlife species. The river also provides for an abundance of bird species.

[NATIONWIDE RIVERS INVENTORY](#) | [KID'S SITE](#) | [CONTACT US](#) | [PRIVACY NOTICE](#) | [Q & A SEARCH ENGINE](#) | [SITE MAP](#)

**Designated Rivers**

[About WSR Act](#)  
[State Listings](#)  
[Profile Pages](#)

**National System**

[WSR Table](#)  
[Study Rivers](#)  
[Stewardship](#)  
[WSR Act Legislation](#)

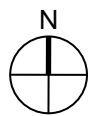
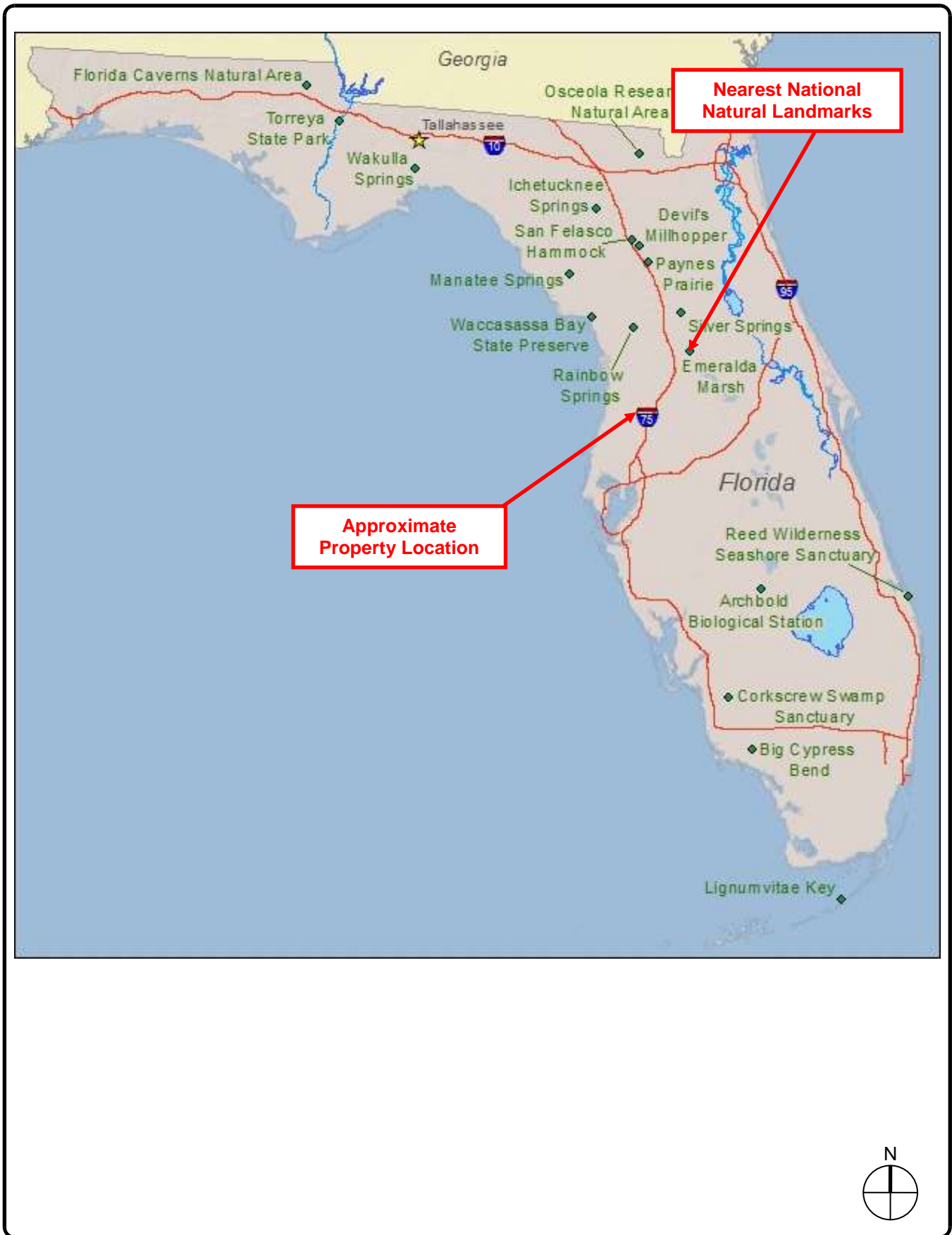
**River Management**

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**APPENDIX G**  
**National Natural Landmark**



National Natural Landmark Map  
State of Florida

Not to Scale

Prepared By: GLE Associates, Inc.  
5405 Cypress Center Drive, Suite 110  
Tampa, Florida 33609 (813) 241-8350, fax: 241-8737



Farrow to Finish Farm Brooksville, FL	
Drawn JJR	JOB NO. 18000-19835
Checked JKH	Figure
Date 9/13/2018	G-1



# National Natural Landmarks

---

## Emeralda Marsh

Emeralda Marsh is representative of a virtually undisturbed inland freshwater riverine sawgrass marsh. Located within the Emeralda Marsh Conservation Area, the bay hammock and surrounding aquatic vegetation provide an important fishery and nesting and feeding grounds for several species of waterfowl, including Florida and greater sandhill cranes, and bald eagles.

**Location:** [Lake County \(county.htm?County=351\)](#), FL ; [Marion County \(county.htm?County=358\)](#), FL

**Year designated:** 1974

**Acres:** 3,434

**Ownership:** State, Private



*Emeralda Marsh. Photo by J. Marbruger.*

---

← [Back to NNL listing for FL. \(state.htm?State=FL\)](#)

← [Back to listing of all states and territories. \(nation.htm\)](#)

*Please remember, National Natural Landmarks (NNLs) are not national parks. NNLs are owned by a variety of public and private entities and allowing visitation is at their discretion. Many NNL sites maintain public websites where additional information may be found.*

**EXPERIENCE MORE**

**ORGANIZATIONS**

**National Natural Landmarks Program (</orgs/1211/index.htm>)**

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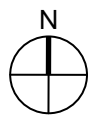
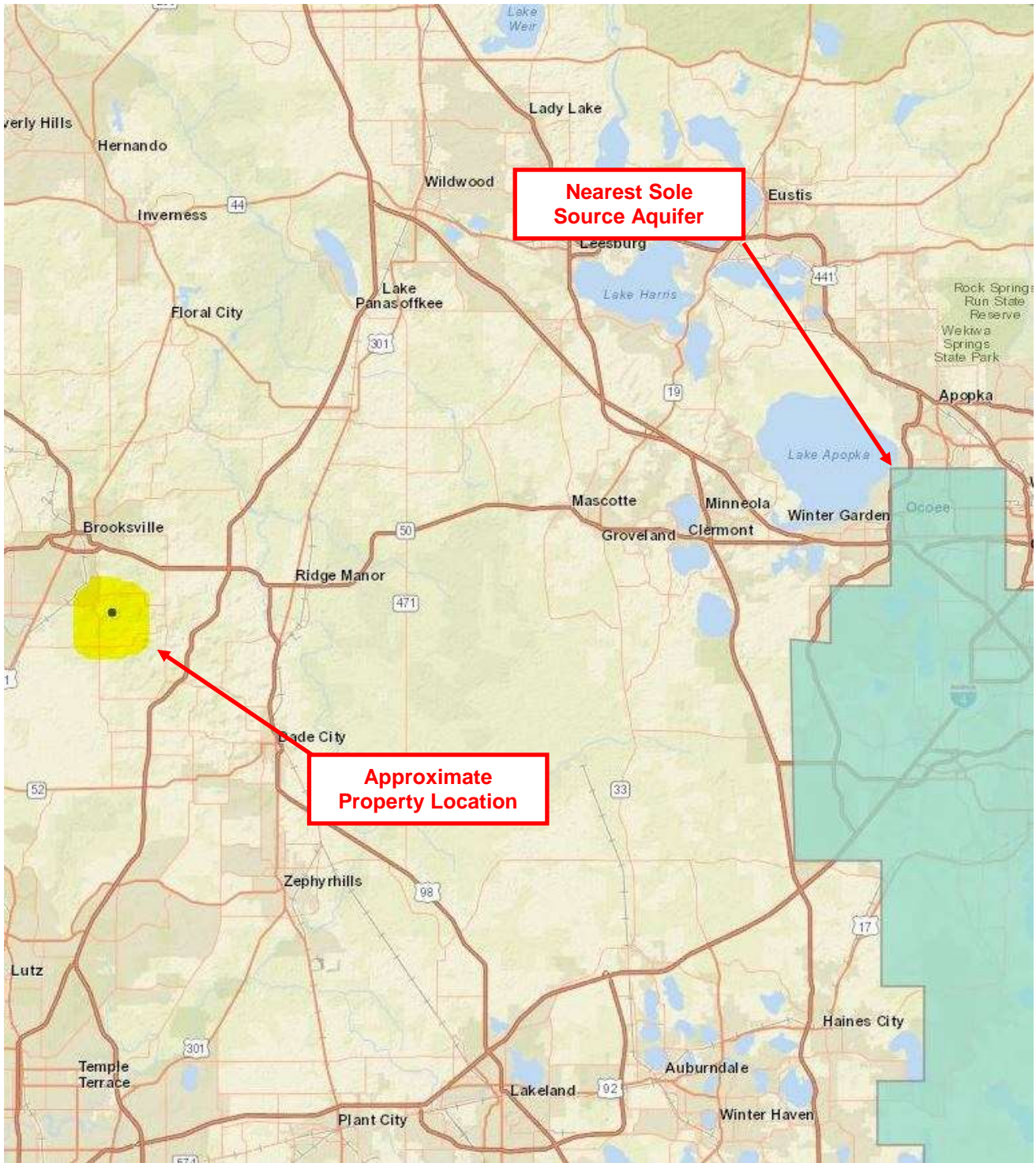


**(<https://www.nps.gov/>)**

**U.S. Department of the Interior**



**APPENDIX H**  
**Sole Source Aquifers**



Sole Source Aquifers  
State of Florida

Not to Scale

Prepared By: GLE Associates, Inc.  
5405 Cypress Center Drive, Suite 110  
Tampa, Florida 33609 (813) 241-8350, fax: 241-8737



Farrow to Finish Farm  
Brooksville, FL

Drawn	JJR	JOB NO.	18000-19835
Checked	JKH	Figure	H-1
Date	9/13/2018		



# **Sole Source Aquifers in the Southeast**

---

The Environmental Protection Agency (EPA) defines a sole source aquifer as an underground water source that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer. These areas have no alternative drinking water source(s) that could physically, legally, and economically supply all those who depend upon the aquifer for drinking water.

The [Sole Source Aquifer Program](#) is authorized by Section 1424(e) of the Safe Drinking Water Act of 1974. Designation of an aquifer as a sole source aquifer provides EPA with the authority to review federal financially assisted projects planned for the area to determine their potential for contaminating the aquifer.

Federally funded projects reviewed by EPA under the Sole Source Aquifer Program may include, but are not limited to, highway improvements and new road construction, public water supply wells, transmission lines, wastewater treatment facilities, construction projects involving disposal of storm water, and agricultural projects involving management of animal waste. Proposed projects that are funded entirely by state, local, or private concerns are not subject to EPA review.

## **Sole Source Aquifers in the Southeast**

EPA has designated three sole source aquifers that are entirely or partially within Region 4:

- [Biscayne Aquifer](#) in south Florida
- [Southern Hills Regional Aquifer System](#) in eastern Louisiana and southwestern Mississippi
- [Volusia-Floridan Aquifer](#) in east-central Florida.

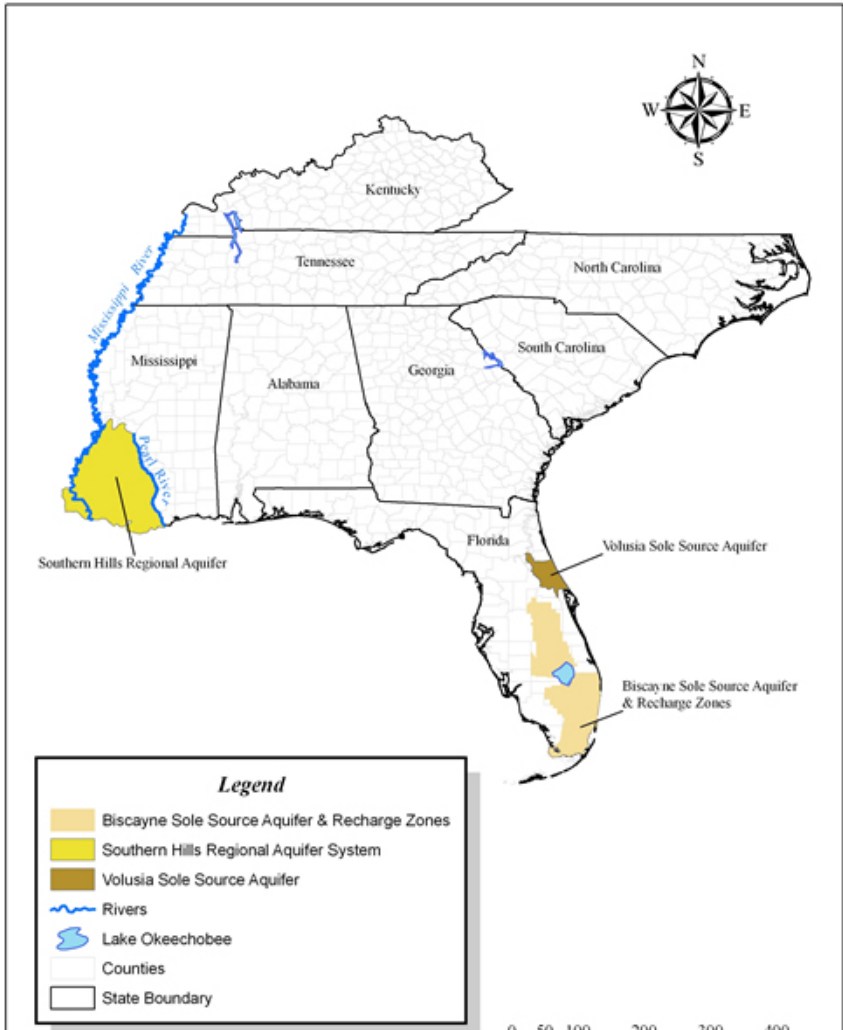
## **Approximate Boundaries of Region 4 Sole Source Aquifers**

### **Biscayne Sole Source Aquifer & Recharge Zones**

### On This Page...

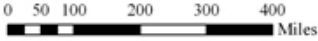
- [Sole Source Aquifers in the Southeast](#)
- [Biscayne Aquifer](#)
- [Southern Hills Regional Aquifer System](#)
- [Volusia-Floridan Aquifer](#)
- [Petition for Sole Source Aquifer Designation](#)
- [Post-Designation Review Authority](#)
- [Sole Source Coordinator](#)



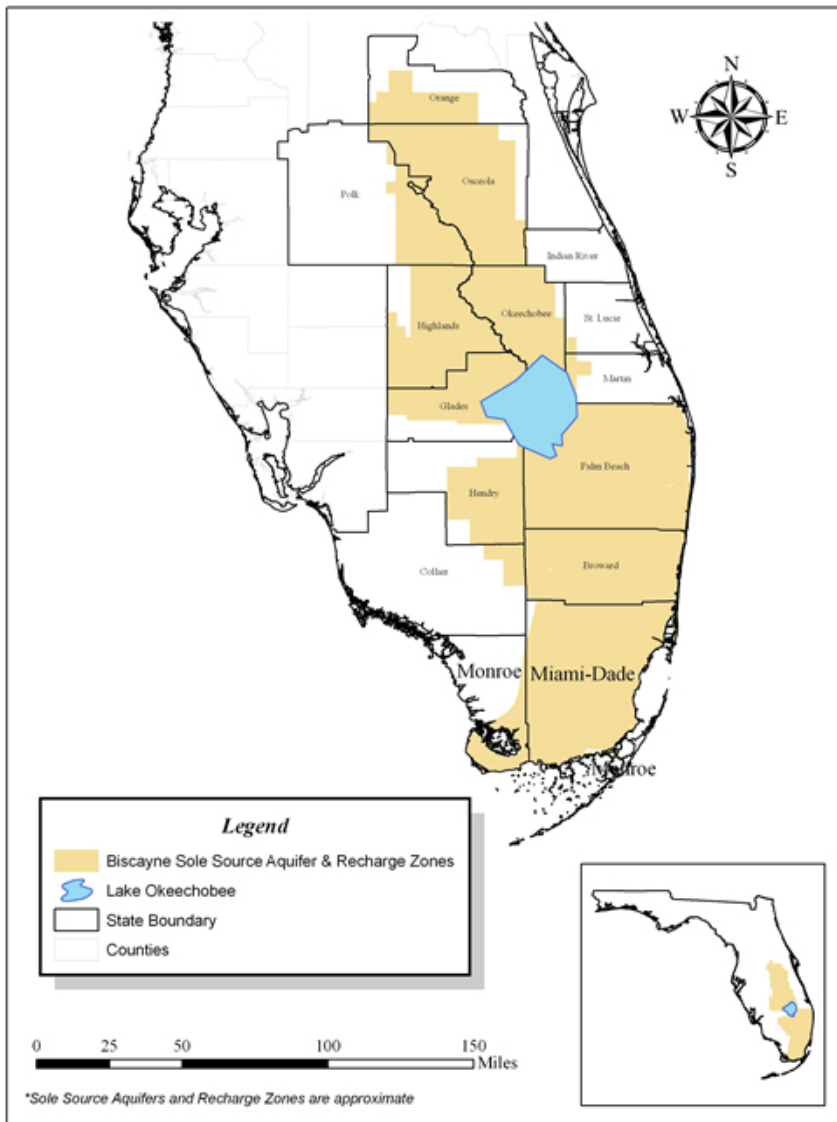


**Legend**

- Biscayne Sole Source Aquifer & Recharge Zones
- Southern Hills Regional Aquifer System
- Volusia Sole Source Aquifer
- Rivers
- Lake Okeechobee
- Counties
- State Boundary

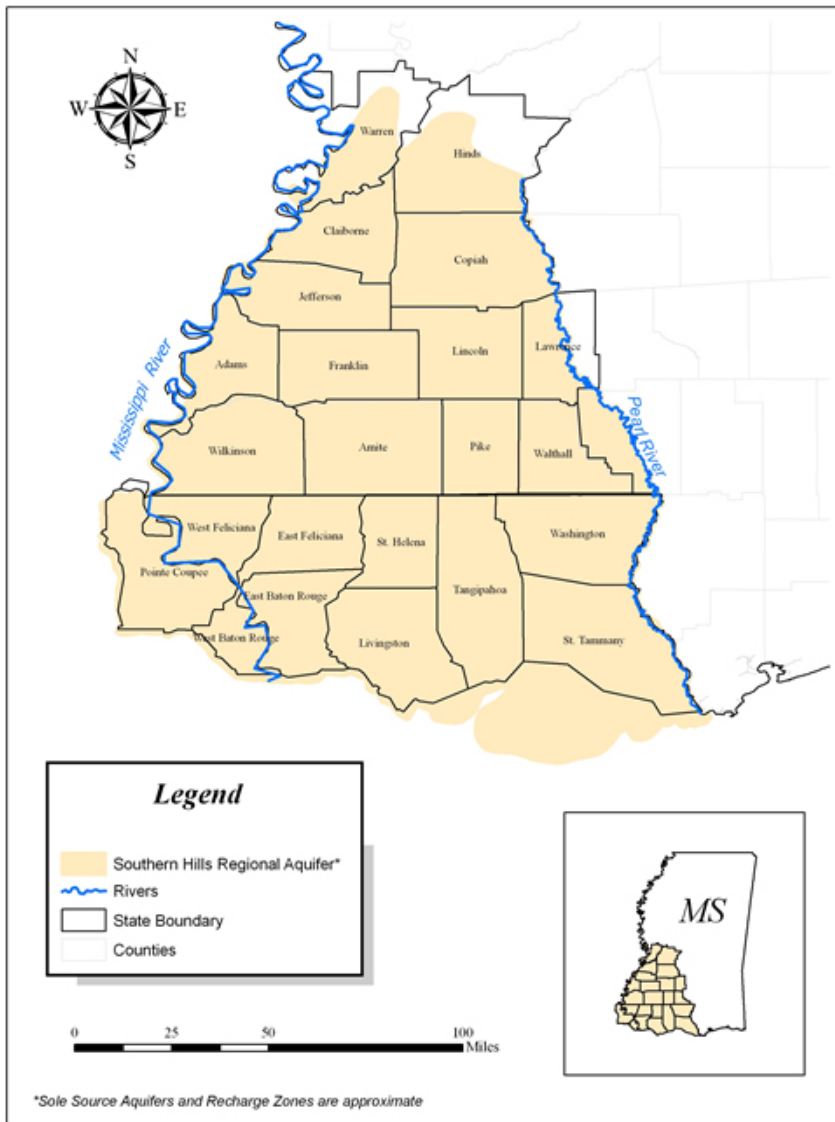


*\*Sole Source Aquifers and Recharge Zones are approximate*



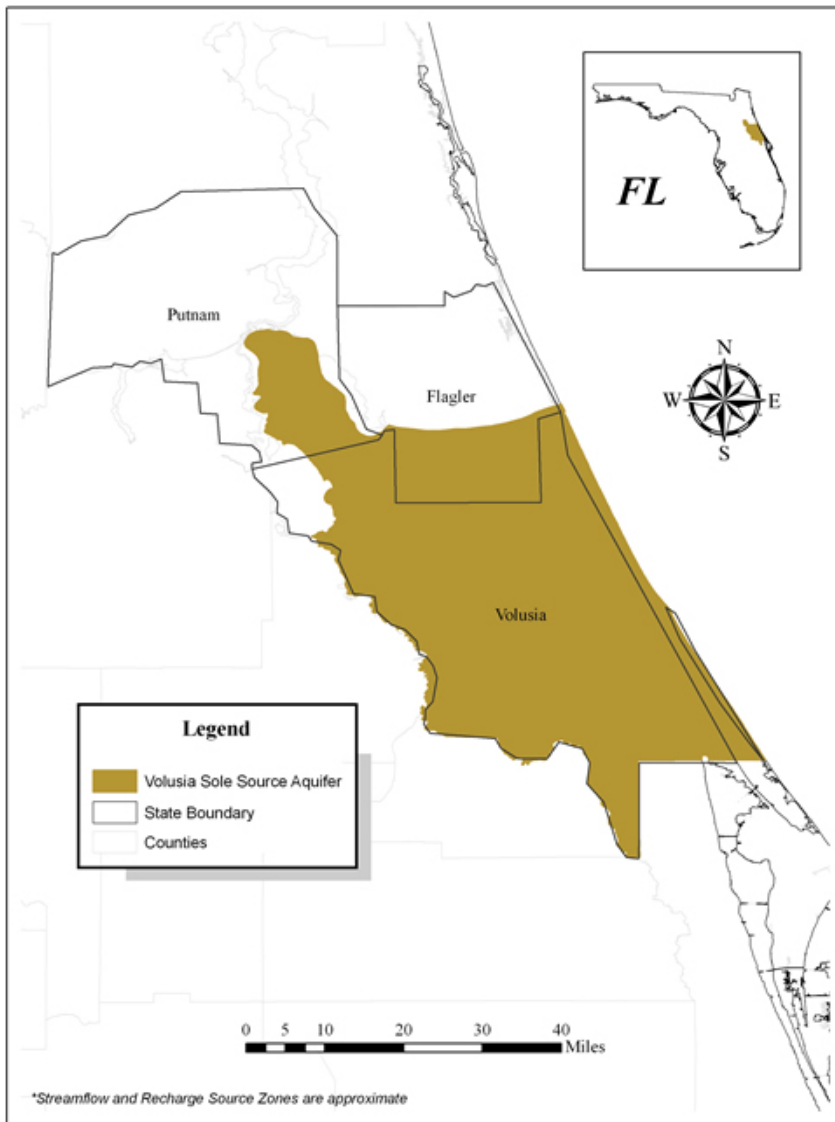
The Biscayne Aquifer lies within an area of south Florida bounded by the Atlantic Ocean and the Gulf of Mexico between Whitewater Bay in Monroe County and Delray Beach in Palm Beach County; and by a line drawn from the mouth of Whitewater Bay northeasterly and northerly to the intersection of the northern boundary of Monroe County and the western boundary of Dade County; and thence northerly and northeasterly to the intersection of the North New River Canal and the boundary line separating Broward and Palm Beach Counties; and finally east-northeasterly to Delray Beach. The enclosed area includes all of Dade County and parts of Broward, Monroe and Palm Beach Counties.

**Southern Hills Regional Aquifer System**



The designation area covers all of ten parishes in Louisiana (E. Baton Rouge, E. Feliciana, Livingston, Pointe Coupee, St. Helena, St. Tammany, Tangipahoa, Washington, W. Baton Rouge and W. Feliciana) and in Mississippi all of ten counties (Adams, Amite, Claiborne, Copiah, Franklin, Jefferson, Lincoln, Pike, Walthall and Wilkinson) as well as the parts of Hinds and Warren Counties underlain by the Catahoula Sandstone, and those portions of Marion and Lawrence Counties west of the Pearl River.

**Volusia Sole Source Aquifer**



The northern boundary of the designated area begins at the southeast corner of Flagler Beach State Park and curves south and west through the community of Karona at U.S. Highway Route Number 1. The boundary continues southwest, west and northwest to the intersection of Haw Creek and Crescent Lake. The boundary then follows the west bank of Crescent Lake to Dunn's Creek and follows the west bank of Dunn's Creek to its intersection with the St. John's River. The border of the designated area then follows the east bank of Lake George to its intersection with the boundary of Volusia County. The boundary of the designated area and the boundary of Volusia county are congruent for the remainder of the area's western and southern boundaries to the Atlantic Ocean. The area's eastern boundary is the Atlantic Ocean.

The designated area includes all of Volusia County and portions of Flagler and Putnam Counties, Florida and extends approximately 1,450 square miles. Major cities in the area include Ormond Beach, Daytona Beach, New Smyrna Beach and Deland.

### **Petition for Sole Source Aquifer Designation**

Even though EPA has authority to initiate sole source aquifer (SSA) petitions, EPA normally responds only to submitted petitions. Any individual, corporation, company, association, partnership, state, municipality, or federal agency may petition for SSA designation.

EPA published the [Sole Source Aquifer Designation Petitioner Guidance](#) to assist those interested in preparing and submitting SSA designation petitions.

### **Post-Designation Review Authority and Coordination**

Federal financially assisted projects that lie within the SSA boundaries should be sent to the appropriate EPA regional

office for aquifer impact determination review. Projects outside of the SSA boundaries and/or that do not receive federal funding are not required to have an SSA impact review.

### **EPA Region 4 Sole Source Coordinator**

Larry Cole  
U.S. Environmental Protection Agency  
Region 4  
Water Protection Division  
Ground Water and UIC Section  
Sam Nunn Atlanta Federal Center  
61 Forsyth Street  
Atlanta, GA 30303-8960

Email: [Larry Cole](mailto:cole.larry@epa.gov) (cole.larry@epa.gov)

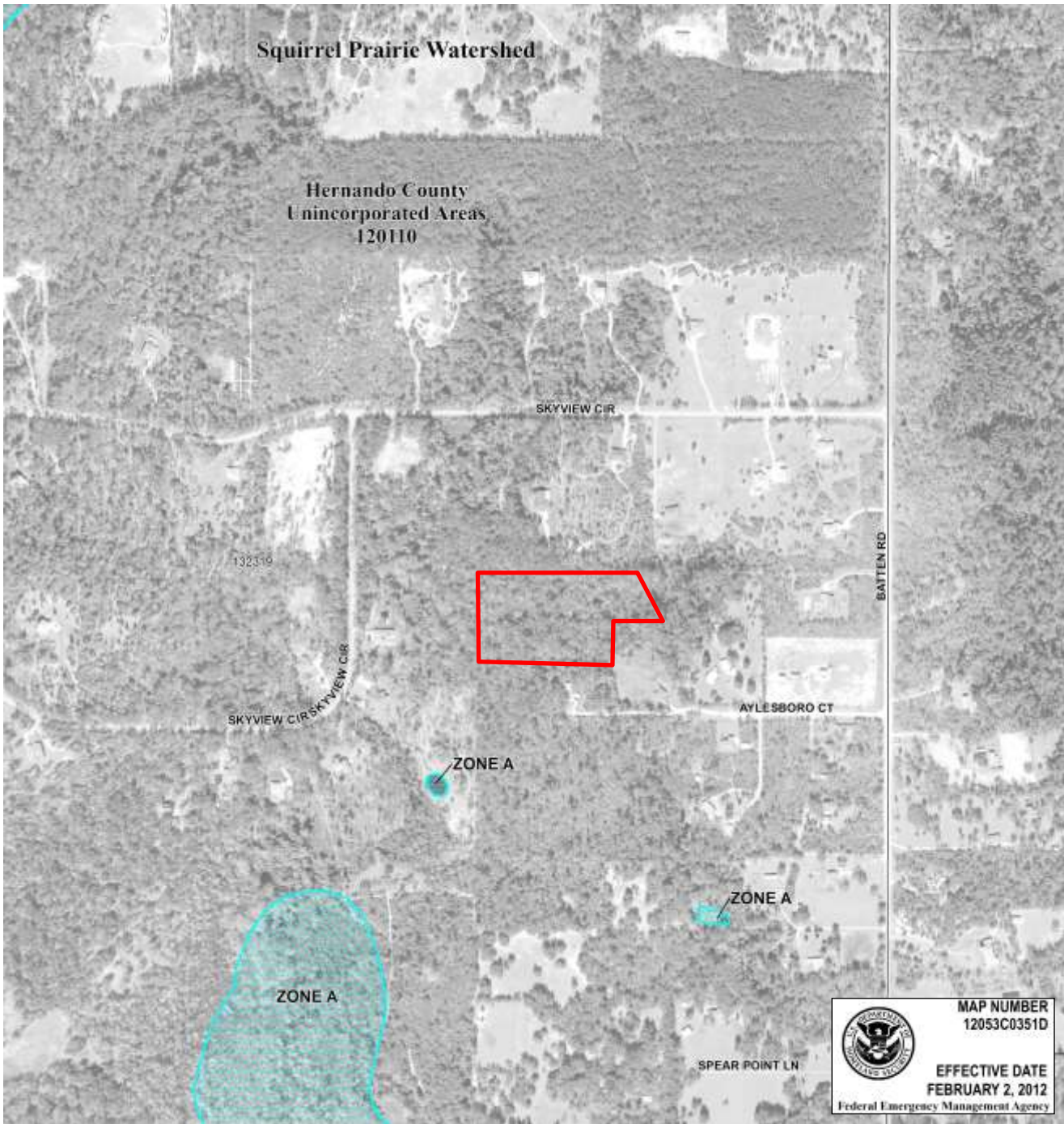
For information about the contents of this page, please contact [GWUIC.R4@epa.gov](mailto:GWUIC.R4@epa.gov)

**APPENDIX I**  
**Floodplain Management**



Squirrel Prairie Watershed

Hernando County  
Unincorporated Areas  
120110



 **MAP NUMBER**  
12053C0351D

**EFFECTIVE DATE**  
FEBRUARY 2, 2012

Federal Emergency Management Agency

**Approximate  
Property Location**



**FEMA Map**  
Map Number 12053C0351D

**Not to Scale**

Prepared By: GLE Associates, Inc.  
5405 Cypress Center Drive, Suite 110  
Tampa, Florida 33609 (813) 241-8350, fax: 241-8737

 **GLE**  
ARCHITECTS | ENGINEERS | ENVIRONMENTAL CONSULTANTS

<b>Farrow to Finish Farm</b> Brooksville, FL	
Drawn	JJR
Checked	JKH
Date	9/14/2018
FIGURE NO.	18000-19835
Figure	-1



DEPARTMENT OF PLANNING AND ZONING

ZONING DIVISION

789 PROVIDENCE BOULEVARD ☐ BROOKSVILLE, FLORIDA 34601

P 352.754.4050 ☐ F 352.754.4151 ☐ W [www.HernandoCounty.us](http://www.HernandoCounty.us)

June 7, 2018

RE: Parcel Key #34689, Parcel ID R13-123-19-0015-0000-0010  
Zoning confirmation Letter

Dear \_\_\_\_\_,

The property referenced above is Zoned AG. The Agricultural zoning district permitted uses are attached for your review. Your letter requests confirmation that the property may be used as a farm for raising and breeding swine on the property. The Agricultural zoning district permitted uses include animal husbandry activities as an animal specialty establishment. No additional Zoning approval is required for animal specialty establishment uses.

Your proposed perimeter access clearing is exempt from the land clearing permit requirements for bona fide agricultural operations provided Majestic trees are preserved. Majestic trees have a 36" or greater diameter at breast height excluding palm trees. Agriculturally zoned properties are not required to obtain a fence permit.

Permit requirements and permitted use information above is based solely on Hernando County Code of Ordinances.

The current FEMA Flood Insurance Rate Map 12053C0351 indicates this property is in the X flood zone. However, this site is located in the Squirrel Prairie Watershed. The Hernando County Engineering Department has provided information regarding noted floodplain on the Floodplain Justification Report by Applied Science and Hydro Solutions for Hernando County and Southwest Florida Water Management District. The result is attached and indicates a stream bed, floodplain and possible wetlands. Activities and development within that area may be limited and possibly require additional permits and approvals from local, state and federal agencies.

This letter summarizes the applicable regulations, laws and provisions in effect at this time, should not be construed to grant any rights inconsistent with any regulations in effect at this time, and does not purport to state what regulations may be in effect at some future date.

Sincerely,

A handwritten signature in blue ink, appearing to read "Rebecca Garrett", is written over a faint circular stamp.

Rebecca Garrett, CFM  
Zoning Coordinator  
Hernando County Zoning Dept.



---

**From:** John Burnett  
**Sent:** Thursday, May 17, 2018 8:23 AM  
**To:**  
**Cc:** Clay Black  
**Subject:** RE: KEY# 34689 squirrel prairie  
**Attachments:** 351-00034689.jpg

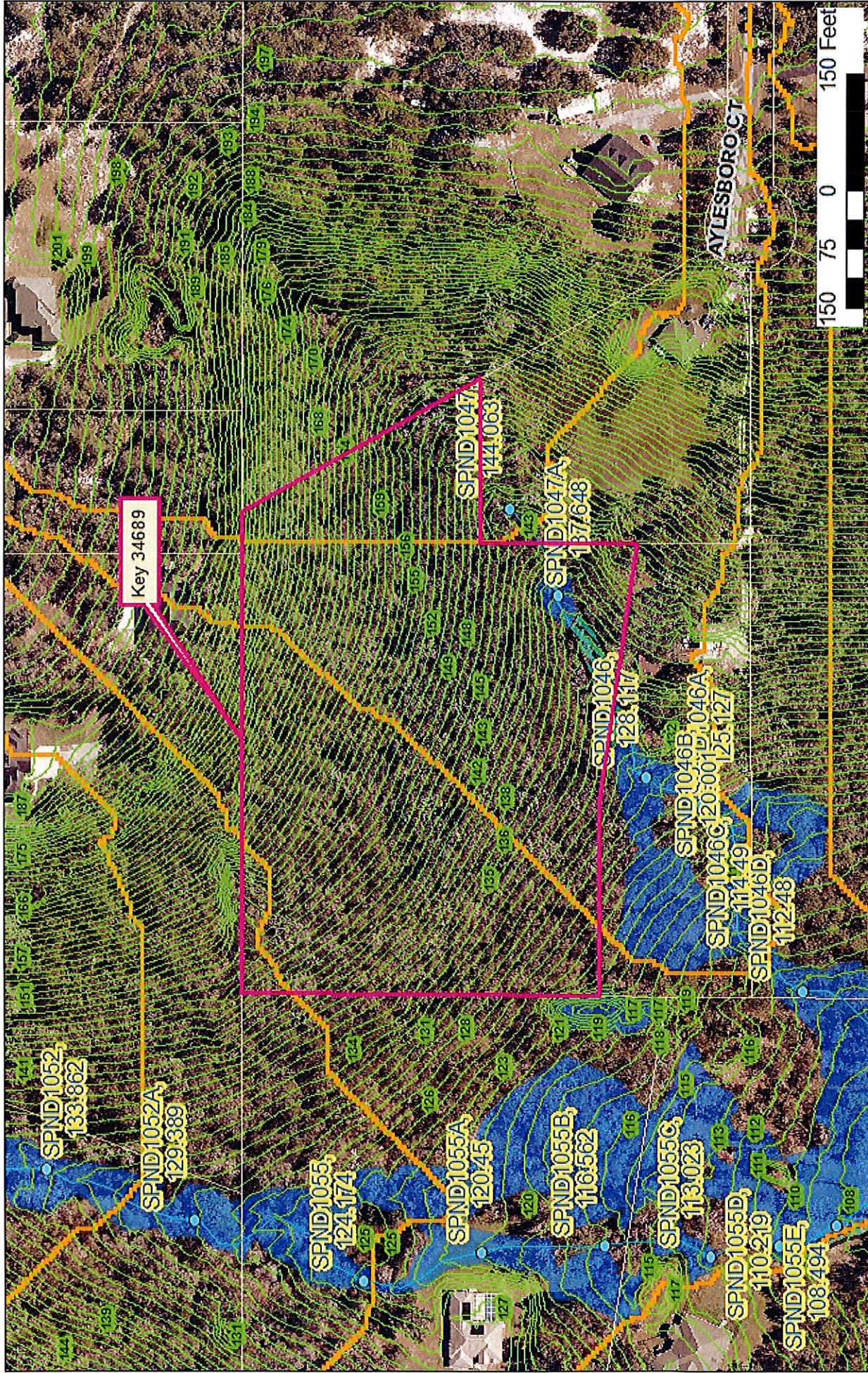
Good morning

This property is mostly clear of floodplain except for two small areas. A gully with a stream in the southeast corner of the lot and the edge of a low area (pit) on the westerly property line. Access to the site may have to cross the stream, which may have wetland associated with it. This may be a seepage slope which would need drainage improvements to create a driveway. An engineer should be consulted based on the data I have.

John A.H. Burnett, CFM.  
Stormwater Inspector,  
Hernando County Public Works, Stormwater Section.  
1525 East Jefferson St., Brooksville, FL 34601  
(352) 754-4062, Ex. 17005 [johnhb@co.hernando.fl.us](mailto:johnhb@co.hernando.fl.us)

---





**Parcel Key 34689, Portion of Lot 1, Ayers Heights, Aylesboro Ct., Brooksville**  
 This area of interest is located within the Squirrel Prairie Watershed. The floodplain is shown in blue, as delineated in the Floodplain Justification Report dated 08/09/2016, by Applied Science and Hydro Solutions for Hernando County and SWFWMD. The site contains an area of stream bed and a low point (on the westerly property line) designated as 1% annual chance floodplain.  
 Orange lines are drainage boundaries. Green lines are 1 foot changes in elevation.  
 This study is pending adoption by Hernando County.

\*Elevation data refers to NAVD '88 datum.

Scale - As shown  
 Prepared by - Applied Science & Hydro Solutions  
 Map Projection - Squirrel Prairie Watershed  
 Floodplain Justification Report  
 Report Date - 08/09/2016  
 Hernando County Information System (GIS)  
 Standard: Aerial Imagery  
 The information in this database is as represented upon a  
 erial County Commission. It is not necessarily current, and may  
 or may not reflect the most recent changes. (Last updated)  
 use of this information for the user's commercial and financial  
 report, or basis of any and all bank upon state or federal law.  
 The information has no liability for any purpose whatsoever.





- *Agricultural District:*

(1)

*Permitted Uses:* The following permitted uses shall apply in the agricultural district:

- (a) Animal specialty establishment;
- (b) Farming and farming service establishments;
- (c) Fisheries;
- (d) Forestry and forestry service establishments;
- (e) Horticultural specialty farms;
- (f) Hunting, trapping and game propagation;
- (g) Landscaping service establishment;
- (h) Single-family dwelling;
- (i) Mobile Home, provided that such mobile home meets all of the regulations, requirements and provisions of this ordinance for minimum living area within the zoning district;
- (j) Land Application of Domestic Septage, provided that such operation meets all of the special regulations, requirements and provisions of this ordinance for operation and siting and applicable Florida Statutes, Administrative Rules, and provisions of the Hernando County Code of Ordinances;
- (k) Wildlife management activities;
- (l) Resource-oriented recreational activities;
- (m) Aquaculture.

(2)

*Permitted accessory structures and uses:* The following permitted accessory structures and uses apply to all agricultural districts:

- (a) Agriculture buildings or structures accessory to the principal permitted use of the premises;
- (b) Single-family dwellings to house the owner or operator, his family, or hired workers who work on a bona fide agricultural operation, which are accessory to the principal permitted use of the premises;
- (c)

Carport, garage or other buildings not used as a dwelling and customarily incidental to the principal permitted use of the premises;

(d) Accessory uses customarily incidental to the principal permitted use of the premises;

(e) Signs identifying the name and type of permitted agricultural activity conducted on the same premises;

(f) Portable storage structures are allowable in conjunction with the permitted use provided they are not visible from the street. If the portable storage structures are placed adjacent to a residentially zoned property, the portable storage structure must be shielded from view;

(g) Sales on the premises of permitted agricultural products and services produced on the premises: provided that where such products or services are sold from roadside stand, such stand shall be set back a safe distance from any public street right-of-way and shall be provided with automobile access and off-street parking space in such a manner so as to not create an undue traffic hazard on the street on which such roadside stand is located.

(3)

*Special Exception Uses:* In the agricultural district the following are special exception uses that may be approved and may be subject to other ordinance provisions:

(a) Off-road vehicle tracks constructed for recreational use.

(b) Paint Ball ranges.

(c) Resource-oriented recreational activities where items are rented or transported and used on the premises.

(d) Commercial fishing ponds.

(e) Home occupations.

(f) Dude ranches

(g) Commercial riding stables.

(h) Private Airstrips.

(i) Hunting camps.

(j) Fishing camps.

(k) Government research and associated educational facilities.

(l)



Bed and breakfast establishments.

(m)

Horse Shows

(n)

Rodeos

(o)

Livestock auctions.

(p)

Exotic Animal Specialty Farms

(q)

Wineries and Distilleries

(r)

Petting Zoos

(4)

*Conditional uses:* In addition to those conditional uses permitted in all zoning districts of this ordinance, the following conditional use shall be permitted in the agricultural district:

(a)

Excavation on forty (40) acres of land or less.

(b)

Retail sales of permitted agricultural products not produced on the premises: provided that where such products or services are sold from roadside stand, such stand shall be set back from any public street right-of-way at least seventy-five (75) feet and shall be provided with automobile access and off-street parking space in such a manner so as to not create an undue traffic hazard on the street on which such roadside stand is located.

(5)

*Special regulations:*

(a)

No odor- or dust-producing substance or use, except in connection with cultivation of permitted uses, shall be permitted within one hundred (100) feet of the property line of an adjoining parcel containing a residence or the property line of a residentially zoned parcel.

(b)

No products shall be publicly displayed nor offered for sale from the roadside unless produced on the premises or a conditional use permit is obtained from the administrative official.

(c)

Horse shows:

1.

Shall be limited to two (2) events per thirty (30) days.

2.

May operate between the hours of 8:00 a.m. and 10:00 p.m. only on Friday, Saturday and Sunday.

3.

Shall maintain a minimum setback of one hundred (100) feet from all adjacent property lines.

4.

All lighting shall be shielded from adjacent properties and shall be aimed downward towards to the property on which the special exception was granted.

5. Shall provide adequate seating capacity and adequate parking capacity for the expected number of guests and participants.
6. Shall be on a minimum of ten (10) acres of land.
7. Any special exception application may be approved for up to five (5) years.

(d)

Rodeos:

1. Shall be limited to two (2) events per thirty (30) days.
2. May operate between the hours of 8:00 a.m. and 10:00 p.m. only on Friday, Saturday and Sunday.
3. Shall maintain a minimum setback of one hundred (100) feet from all adjacent property lines.
4. All lighting shall be shielded from adjacent properties and shall be aimed downward towards to the property on which the special exception was granted.
5. Shall provide adequate seating capacity and adequate parking capacity for the expected number of guests and participants.
6. Shall be on a minimum of ten (10) acres of land.
7. Any special exception application may be approved for up to five (5) years.

(e)

Live stock auctions:

1. Shall be limited to two (2) events per thirty (30) days.
2. May operate between the hours of 8:00 a.m. and 10:00 p.m. only on Friday and Saturday and between the hours of 8:00 a.m. and 6:00 p.m. on Sunday.
3. Shall provide adequate seating capacity and adequate parking capacity for the expected number of guests and participants.
4. Shall be on a minimum of ten (10) acres of land.
5. Shall have a minimum setback of one hundred (100) feet from adjacent properties.
6. Shall be limited to ten thousand (10,000) square feet of pen and buildings.

(f)

Land Application Domestic Septage:

1. Each site shall be a minimum of forty (40) acres and be entirely in the Agricultural Zoning District.
2. The underlying Hernando County Future Land Use Designation for the entire Agricultural zoned site shall be Rural.
3. A minimum 200-foot buffer zone will be maintained from the property lines of all adjoining property owners.
4. Each site shall be secured so as to effectively restrict access to all, except for the Owner, Owner's representatives and permitted haulers.
5. At access points and every one hundred (100) yards along the perimeter signs shall be posted conspicuously, indicating that the lands used for septage/sludge disposal.
6. This special regulation shall not apply to bona fide land application of domestic septage sites permitted by the Florida Department of Health prior to October 1, 2013.

(6)

*Special provisions:* Parcels existing prior to January 1, 1990, may be used as follows:

- i. The subdivision of a minimum five-acre parcel into a maximum of two (2) parcels each having a minimum lot size of two and one-half (2½) acres (including rights-of-way and access tracts) will be allowed, provided the county development and subdivision regulations are met.
- ii. The subdivision of a minimum 7½-acre parcel into a maximum of three (3) parcels each having a minimum lot size of two and one-half (2½) acres (including rights-of-way and access tracts) will be allowed, provided the county development and subdivision regulations are met.
- iii. The subdivision of a minimum ten-acre parcel into a maximum of four (4) parcels each having a minimum lot size of two and one-half (2½) acres (including rights-of-way and access tracts) will be allowed, provided the county development and subdivision regulations are met.
- iv. The subdivision of a minimum twenty-acre parcel into a maximum of five (5) parcels each having a minimum lot size of two and one-half (2½) acres (including rights-of-way and access tracts) will be allowed, provided the county development and subdivision regulations are met.
- v. The subdivision of a minimum thirty-acre parcel into a maximum of six (6) parcels each having a minimum lot size of two and one-half (2½) acres (including rights-of-way and access tracts) will be allowed, provided the county development and



subdivision regulations are met. No more than four (4) 2½-acre parcels may be created from the forty-acre parcel.

vi.

The subdivision of a forty-acre parcel into a maximum of seven (7) parcels each having a minimum lot size of two and one-half (2½) acres (including rights-of-way and access tracts) will be allowed, provided the county development and subdivision regulations are met. No more than four (4) 2½-acre parcels may be created from the forty-acre parcel.

(7)

*Dimension and area regulations:* Unless otherwise approved under the special provisions section of the Agricultural District, the dimension and area regulations for lots and structures are as follows:

(a)

*Lot area:*

i.

*Lot area:* The minimum lot area for a parcel created after January 1, 1990, shall be ten (10) acres (including rights-of-way and access tracts).

(b)

*Single-family dwelling not accessory to the principal agricultural use of the premises:*

i.

*Building height:* The maximum building height shall not exceed forty-five (45) feet.

ii.

*Lot widths:* The minimum lot width of the building line shall be one hundred fifty (150) feet.

iii.

*Front yard:* The minimum front yard requirement in the agricultural districts shall be seventy-five (75) feet. Along U.S. 19, S.R. 50, U.S. 41, U.S. 98, U.S. 301, C.R. 578, C.R. 485 and C.R. 50 front yard requirement shall be one hundred twenty-five (125) feet.

iv.

*Side yard:* The minimum side yard requirement shall be thirty-five (35) feet.

v.

*Rear yard:* The minimum rear yard requirement shall be fifty (50) feet.

vi.

*Lot frontage:* All lots shall front on a street for a minimum distance of one hundred (100) feet except on dead-end streets, where frontage shall be a minimum of fifty (50) feet.

vii.

*Lots on curves:* Lots on curves shall have a minimum street frontage of fifty (50) feet.

viii.

*Minimum living area:* The minimum living area of a dwelling shall be six hundred (600) square feet. For the purposes of this subsection, "minimum living area" shall mean the minimum floor area of a dwelling unit, exclusive of carports, breezeways, unenclosed porches or terraces. In accordance with the provisions of this subsection, the minimum living or floor area of a mobile

home will be six hundred (600) square feet, exclusive of all attachments, and no mobile home shall be permitted to be attached or detached in a manner that would be inconsistent with the original manufacturer's design standards. No mobile home shall have a length or width dimension less than twelve (12) feet, not including popouts and attachments. All mobile homes must be skirted within thirty (30) days from the issuance of the certificate of occupancy. The skirting shall constitute a visual screen of new material, or material in acceptable condition, consisting of aluminum, pressure-treated wood, masonry, or other acceptable material normally used for mobile home skirting and be placed around the entire perimeter of the mobile home and extending from the base of the mobile [home] to the ground.

Applicants applying for a building permit to place a used mobile home shall either provide proof of a current and valid inspection by the Department of Motor Vehicles or be inspected by the Hernando County Development Department prior to the issuance of a building permit to set the mobile home. The inspection will be in areas of fire safety, electrical, plumbing, mechanical and overall construction of the mobile home.

If the inspection of the mobile home determines that the unit is not repairable, no building permit shall be issued.

No applicant applying to place a mobile home shall perform any repair work or commence setup of the mobile home until a building permit has been secured.

Any deficiencies noted in the inspection report shall be corrected prior to the issuance of a certificate of occupancy.

Standards for used mobile home inspections will be adopted by resolution of the Hernando County Board of County Commissioners and will be consistent with state standards regulating used mobile homes.

(c)

*Single-family dwellings accessory to the principal permitted agricultural use of the premises:*

i.

*Building height:* The maximum building height shall not exceed forty-five (45) feet.

ii.

*Building setback:* The minimum front yard requirement shall be seventy-five (75) feet.

Along U.S. 19, S.R. 50, U.S. 41, U.S. 98, U.S. 301, C.R. 578, C.R. 485 and C.R. 50 front yard requirement shall be one hundred twenty-five (125) feet.

(d)

*Accessory buildings and structures directly or indirectly associated with the principal permitted agricultural use of the premises:*

i.

*Building height:* The maximum building height shall not exceed forty-five (45) feet.

ii.

*Building setback:* The minimum front yard requirement shall be seventy-five (75) feet.



All other yards shall be a minimum of thirty-five (35) feet. Along U.S. 19, S.R. 50, U.S. 41, U.S. 98, U.S. 301, C.R. 578, C.R. 485 and C.R. 50 front yard requirement shall be one hundred twenty-five (125) feet.

iii.

*Location:* All accessory buildings shall be located no closer to the front property line than the front yard requirement for the district. If a single-family dwelling is on or will be on the premises, the accessory building shall be no nearer than fifteen (15) feet to such dwelling.

iv.

Detached accessory structures which have impervious roof coverings shall meet the minimum yard requirement for accessory buildings in the district.

v.

Accessory buildings or structures five (5) feet or less in height, and smaller than forty (40) square feet in size shall not be required to obtain a zoning permit. Such buildings or structures must meet the minimum yard requirements for accessory buildings in the district.

vi.

There are no minimum yard standards for wellhouses as defined in this ordinance.

- Animal Specialty Establishments

- a. Animal boarding
- b. Animal husbandry activities
- c. Animal training facilities

- Aquaculture

- a. Fish
- b. Mollusks
- c. Crustaceans
- d. Aquatic plants
- e. Other aquatic life

- Farming and Farming Service Establishments

- a. Field crops (fruits, vegetables, grains, and nuts)
- b. Livestock including ostriches, emus and lamas
- c. Livestock products
- d. Poultry
- e. Dairies
- f. Aquaculture
- g. Packaging of field crops

- Fisheries

- a. Commercial fisheries
- b. Reserved
- c. Operation of fish hatcheries or fishing preserves

- Forestry and Forestry Service Establishments

- a. Operation of timber tracts, forest nurseries
- b. Reforestation services
- c. Gathering of gums, barks, maple sap, and other forest products
- d. Forest Management Activities

- Horticultural Specialty Farms

- a. Field crops (fruits, vegetables, grains, and nuts)
- b. Hydroponics
- c. Aquaponics
- d. Aeroponics

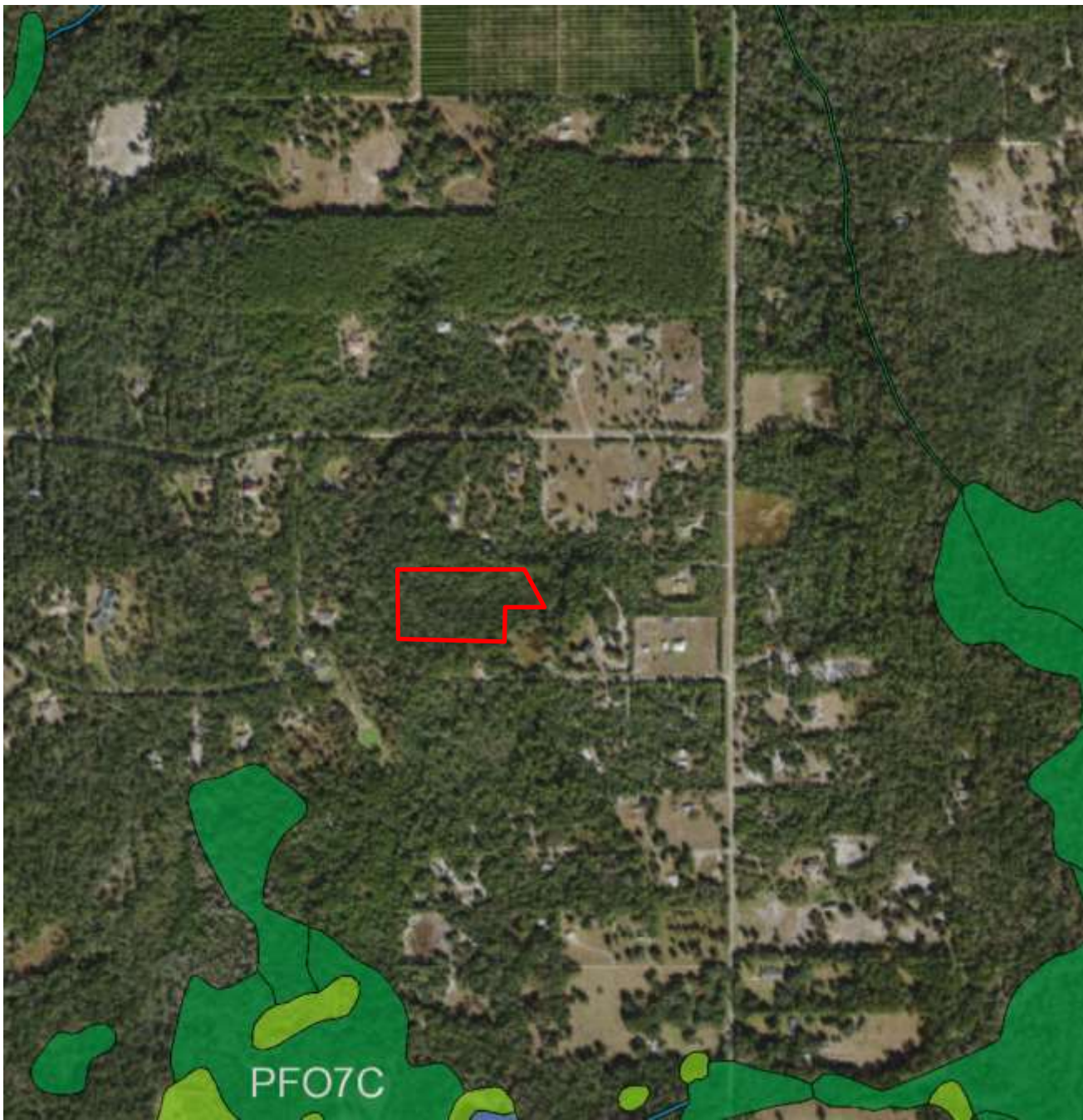
- Landscaping Service Establishments

- a. Horticultural services
- b. Cemetery upkeep
- c. Landscape gardening
- d. Tree planting

### Resource-Oriented Recreational Activities

- a. Hunting
- b. Fishing
- c. Canoeing/Kayaking
- d. Camping
- e. Hiking
- f. Nature Observation
- g. Natural Swimming Areas
- h. Picnicking
- i. Bicycling
- j. Horse-back riding

**APPENDIX J**  
**Wetlands Protection**



**Wetlands**

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

**Approximate  
Property Location**



Wetlands  
Wetland Resources

Not to Scale

Prepared By: GLE Associates, Inc.  
5405 Cypress Center Drive, Suite 110  
Tampa, Florida 33609 (813) 241-8350, fax: 241-8737



**Farrow to Finish Farm**  
Brooksville, FL

Drawn	JJR	Job No.	18000-19835
Checked	JKH	Figure	J-1
Date	9/14/2018		



04

[REDACTED]

---

**From:** John Burnett  
**Sent:** Thursday, May 17, 2018 8:23 AM  
**To:** [REDACTED]  
**Cc:** Clay Black  
**Subject:** RE: KEY# 34689 squirrel prairie  
**Attachments:** 351-00034689.jpg

Good morning [REDACTED]

This property is mostly clear of floodplain except for two small areas. A gully with a stream in the southeast corner of the lot and the edge of a low area (pit) on the westerly property line. Access to the site may have to cross the stream, which may have wetland associated with it. This may be a seepage slope which would need drainage improvements to create a driveway. An engineer should be consulted based on the data I have.

John A.H. Burnett, CFM.  
Stormwater Inspector,  
Hernando County Public Works, Stormwater Section.  
1525 East Jefferson St., Brooksville, FL 34601  
(352) 754-4062, Ex. 17005 [johnb@co.hernando.fl.us](mailto:johnb@co.hernando.fl.us)

## Deborah DeVars

---

**From:** Jeff Whealton  
**Sent:** Thursday, October 11, 2018 10:34 AM  
**To:** John Romeis  
**Subject:** RE: Aylesboro Court Pig Farm

Hey John...

As part of our AGSWM program which is essentially an exemption verification process that utilizes BMPs (Best Management Practices), it is. It is NOT a set in stone figure however as we look at the need for buffers on a case by case situation. And, to be statutorily exempt, you do not need a buffer, you simply just need to stay out of wetlands. Obviously someone would not want to put the end of a farm field row one inch from a wetland as you need tractor turn around space so it's usually easy to explain the importance of a buffer to the farmer.

Anyway... with specific reference to this situation, I would strongly encourage the farmer to implement buffers. But if she was conducting a routine farm operation outside of the AGSWM process, as long as she stayed out of the wetlands, we really wouldn't have a dog in the fight.

Feel free to give me a call if you want... its probably easier o flesh this out over the phone.

Thanks,  
Jeff

Jeff Whealton, PWS  
District Agricultural Team, Sr. Environmental Scientist  
Environmental Resource Permit Bureau  
Regulation Division  
Southwest Florida Water Management District  
Office: 813.985.7481/800.836.0797 x6119  
[Jeff.whealton@swfwmd.state.fl.us](mailto:Jeff.whealton@swfwmd.state.fl.us)



---

**From:** John Romeis <jromeis@gleassociates.com>  
**Sent:** Wednesday, October 10, 2018 8:57 AM  
**To:** Jeff Whealton <Jeff.Whealton@swfwmd.state.fl.us>  
**Subject:** FW: Aylesboro Court Pig Farm

Good Morning Jeff,

I am generating this Environmental Assessment for  
(see below for previous consultation info).

for the piece of Property on Aylesboro Court

stated that per SWFWMD, all of the seepage and wet areas at the site (primarily the eastern and southern boundary) should be offset be 50' from any agricultural operations.

Is that a standard recommendation for these type of activities? If you could clarify any further that would be great.

Please don't hesitate to contact me with any questions or comments.

Regards,

**John J. Romeis**

**Senior Project Manager**

**GLE Associates, Inc.**

Facilities & Environmental Consultants

5405 Cypress Center Drive, Suite 110

Tampa, Florida 33609

813.241.8350 x354 office | 813.241.8737 fax

888.453.4531 toll free | [www.gleassociates.com](http://www.gleassociates.com)

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**From:**

**Sent:** Tuesday, September 18, 2018 9:56 AM

**To:** John Romeis

**Subject:** Fwd: Aylesboro Court Pig Farm

Some SWFWMD communications

----- Forwarded message -----

From: **Jeff Whealton** <[Jeff.Whealton@swfwmd.state.fl.us](mailto:Jeff.Whealton@swfwmd.state.fl.us)>

Date: Thu, Apr 5, 2018 at 4:11 PM

Subject: RE: Aylesboro Court Pig Farm

To:

Cc: [1.11.1034818@ecmvmprod21.ad.swfwmd.net](mailto:1.11.1034818@ecmvmprod21.ad.swfwmd.net) <[1.11.1034818@ecmvmprod21.ad.swfwmd.net](mailto:1.11.1034818@ecmvmprod21.ad.swfwmd.net)>, Ken Griner <[Kenneth.Griner@swfwmd.state.fl.us](mailto:Kenneth.Griner@swfwmd.state.fl.us)>

That was a good graphic. Nicely done 😊

I'm attaching an aerial that shows our track of where we walked the other day. I think it pretty much went around the main part of that seepage wetland and of course over the creek.

As for if your plan is sufficient, I can't really say as I don't know what sort of impact the pigs will do to the ground in that area. I wish I could give you specifics but all I can say is that grazing animals in wetland areas happens all the time all over Florida, though probably not in situations where animals are confined to the

wetlands. Due to the slope here, I just think you'll have to be monitoring the site closely to prevent erosion and sedimentation damage.

Once you've closed on the property, get back with me and I'll get you set up with the NRCS.

Thanks,

Jeff

Ps... copying Ken Griner on this message as he will likely be the engineer to review the site with me in the future.

Jeff Whealton, PWS

District Agricultural Team, Sr. Environmental Scientist

Environmental Resource Permit Bureau

Regulation Division

Southwest Florida Water Management District

Office: 813.985.7481/800.836.0797 x6119

[Jeff.whealton@swfwmd.state.fl.us](mailto:Jeff.whealton@swfwmd.state.fl.us)



**From:**

**Sent:** Sunday, April 01, 2018 9:48 PM

**To:** Jeff Whealton <[Jeff.Whealton@swfwmd.state.fl.us](mailto:Jeff.Whealton@swfwmd.state.fl.us)>

**Subject:** Aylesboro Court Pig Farm

Jeff,

Thank you very much for meeting with me and evaluating the Aylesboro property. I've attached a preliminary paddock layout based on our conversations. There's a wide buffer for the active water, and I tried to layout the paddocks against the slope. I'm going to try to cross the wettest area in the easement with a bridge as you suggested.

Upon purchase, I'd like to begin the engineering process with NRCS before putting any cross-fencing or roads in.

Do you think this will be an acceptable approach to this site for my agricultural goals?

Thanks again,



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## Deborah DeVars

---

**From:** Garcia, Edgar W CIV USARMY CESAJ (US)  
**Sent:** Thursday, November 1, 2018 11:15 AM  
**To:** John Romeis  
**Cc:** Garcia, Edgar W CIV USARMY CESAJ (US)  
**Subject:** RE: [Non-DoD Source] Environmental Assessment 40 CFR 1500 & 7 CFR 799

Good Morning John,

The proposed work as described would part of a new farming, ranching operation. Therefore, would not be exempted from obtaining a Department of the Army Permit, if the project would affect waters of the United States.

The ranching and farming operation must be ongoing on the exact footprint to be exempt and completely fall under NRCS purview.

Have a wonderful day.

Respectfully,

Edgar W. Garcia  
Acting Chief  
Tampa Permits Section  
U.S. Army Corps of Engineers  
Jacksonville District  
Regulatory Division  
☎: (813) 769-7062 (Office)

-----Original Message-----

From: John Romeis [mailto:jromeis@gleassociates.com]  
Sent: Thursday, October 25, 2018 8:36 AM  
To: Garcia, Edgar W CIV USARMY CESAJ (US) <Edgar.W.Garcia@usace.army.mil>  
Subject: FW: [Non-DoD Source] Environmental Assessment 40 CFR 1500 & 7 CFR 799

Good Morning Edgar,

Just following up on the email I sent on October 15, 2018. Is there any additional you need from me in order to make a determination on the Property below?

Regards,

John J. Romeis  
Senior Project Manager  
GLE Associates, Inc.  
Facilities & Environmental Consultants  
5405 Cypress Center Drive, Suite 110  
Tampa, Florida 33609  
813.241.8350 x354 office | 813.241.8737 fax  
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-----Original Message-----

From: John Romeis [mailto:jromeis@gleassociates.com]

Sent: Monday, October 15, 2018 8:58 AM

To: 'Garcia, Edgar W CIV USARMY CESAJ (US)'

Subject: RE: [Non-DoD Source] Environmental Assessment 40 CFR 1500 & 7 CFR 799

Good Morning Edgar,

The purpose of the Proposed Action is to get approval for a loan to construct a small-scale swine farm on the site. Some specifics below.

1. North of the terminus of Aylesboro Court, Brooksville, FL (Latitude 28.484520, Longitude 82.356524, Elevation 54 meters) Unimproved Hammock zoned Agriculture.
2. Land is undeveloped, vacant and heavily wooded with a moderate slope to the south-southwest.
3. Proposed use requires removal of small brush along the property line and utility easement in order to install a perimeter fence. Based on a consultation with the Hernando County Zoning Department, the Property is exempt from a land clearing permit for agricultural proposed as long as the Majestic trees are preserved.
4. Pending financing and closing date, most of the work will be done during the summer to fall months over weekends. Work hours will likely be limited to dawn to dusk. Most work will be accomplished with the use of hand tools.
5. Per Hernando County Zoning, the Property is Zoned AG. The Property may be used as farm for raising and breeding swine on the Property. No additional zoning approval is required for animal specialty establishment uses. However, based up information on the Floodplain Justification Report by Applied Science and Hydro Solutions for Hernando County and the SWFWMD, a stream bed, floodplain, and possible wetlands were identified on the Property. Activities and development of these areas may be limited and possibly require additional permits and approval from local, state and federal agencies.
6. Proposed use falls below the stocking densities for Pastured Farrow to Finish operations as published by Penn State which determines 20 sows on 10 acres to be an acceptable stocking rate.
7. Based on an informal consultation with SWFWMD, offset of wetland and seepage areas is not required. However, the prospective operator has proposed to create a 50' buffer from these sensitive areas to ensure minimal disturbance within these areas. The SWFWMD encourages buffers for this very reason.
8. Hernando County parcel map (Parcel R13 123 19 0015 0000 0010) as Figure 3 (attached).

Based on information obtained from SWFWMD and Hernando County, there appears to be an intermittent seepage area on the southeast portion of the Property which can be seen on page 3 of the I-2 Flood Confirmation Letter. The owner has already agreed to offset operations from that seepage areas by 50'.

For the Environmental Assessment 40 CFR 1500 & 7 CFR 799 we are looking for a determination by the USACE on the intermittent seepage areas/any other potential wetlands on the Property.

Please let me know if you need any additional information or further clarification.

Regards,

John J. Romeis  
Senior Project Manager  
GLE Associates, Inc.  
Facilities & Environmental Consultants  
5405 Cypress Center Drive, Suite 110  
Tampa, Florida 33609  
813.241.8350 x354 office | 813.241.8737 fax  
888.453.4531 toll free | Blockedwww.gleassociates.com Client Success Since 1989.

The purpose of the Proposed Action is to get approval for a loan to construct a swine farm on the site.

-----Original Message-----

From: Garcia, Edgar W CIV USARMY CESAJ (US) [mailto:Edgar.W.Garcia@usace.army.mil]  
Sent: Monday, October 15, 2018 8:41 AM  
To: jromeis@gleassociates.com  
Subject: RE: [Non-DoD Source] Environmental Assessment 40 CFR 1500 & 7 CFR  
799

Dear Mr. Romeis,

Please provide a better description of the proposal, as well as Lat & Long, address, etc. to provide you with guidance on your question.

Respectfully,

Edgar W. Garcia  
Acting Chief  
Tampa Permits Section  
U.S. Army Corps of Engineers  
Jacksonville District  
Regulatory Division  
☎: (813) 769-7062 (Office)

-----Original Message-----

From: Tampa Reg

Sent: Friday, October 12, 2018 12:08 PM

To: Garcia, Edgar W CIV USARMY CESAJ (US) <Edgar.W.Garcia@usace.army.mil>

Subject: FW: [Non-DoD Source] Environmental Assessment 40 CFR 1500 & 7 CFR 799

Edgar,

Please see below. You may be able to give him a good answer.

Thanks!

Adelyn

-----Original Message-----

From: John Romeis [mailto:jromeis@gleassociates.com]

Sent: Friday, October 12, 2018 11:01 AM

To: Tampa Reg <TampaReg@usace.army.mil>

Cc: corpsjaxreg-nj <corpsjaxreg-nj@usace.army.mil>

Subject: [Non-DoD Source] Environmental Assessment 40 CFR 1500 & 7 CFR 799

To whom it may concern,

I am putting to together an Environmental Assessment on a 7-acre parcel located on Aylesboro Court in Brooksville, FL. This site is proposed to be a small scale swine farm. There is evidence of some intermittent seeps on the site.

As part of the assessment it appears I am required to get a wetland determination from USACE or NRCS. See the excerpt below from the report

NRCS or USACE completed a review, and performed determinations and delineations of areas meeting the three (3) mandatory criteria of wetlands in accordance with the procedures of the U.S. Army Corp of Engineers (USACE) 1987 Wetland Delineation Manual (Y-87-1) and supplements to determine the absence, presence, and extent of wetlands and waters of the United States relative to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899.

How long does this process take? To whom do I speak to about getting this process moving?

Please don't hesitate to contact me.

Regards,

John J. Romeis

Senior Project Manager

GLE Associates, Inc.

Facilities & Environmental Consultants

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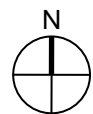


**APPENDIX K**  
**Soils**



Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Astatula fine sand, 0 to 5 percent slopes	1.9	31.2%
19	Electra variant fine sand, 0 to 5 percent slopes	0.6	10.2%
43	Pomelo fine sand, 0 to 5 percent slopes	3.5	58.6%
<b>Totals for Area of Interest :</b>		<b>5.9</b>	<b>100.0%</b>

**Approximate  
Property Location**



**Soils**  
NRCS Soil Survey

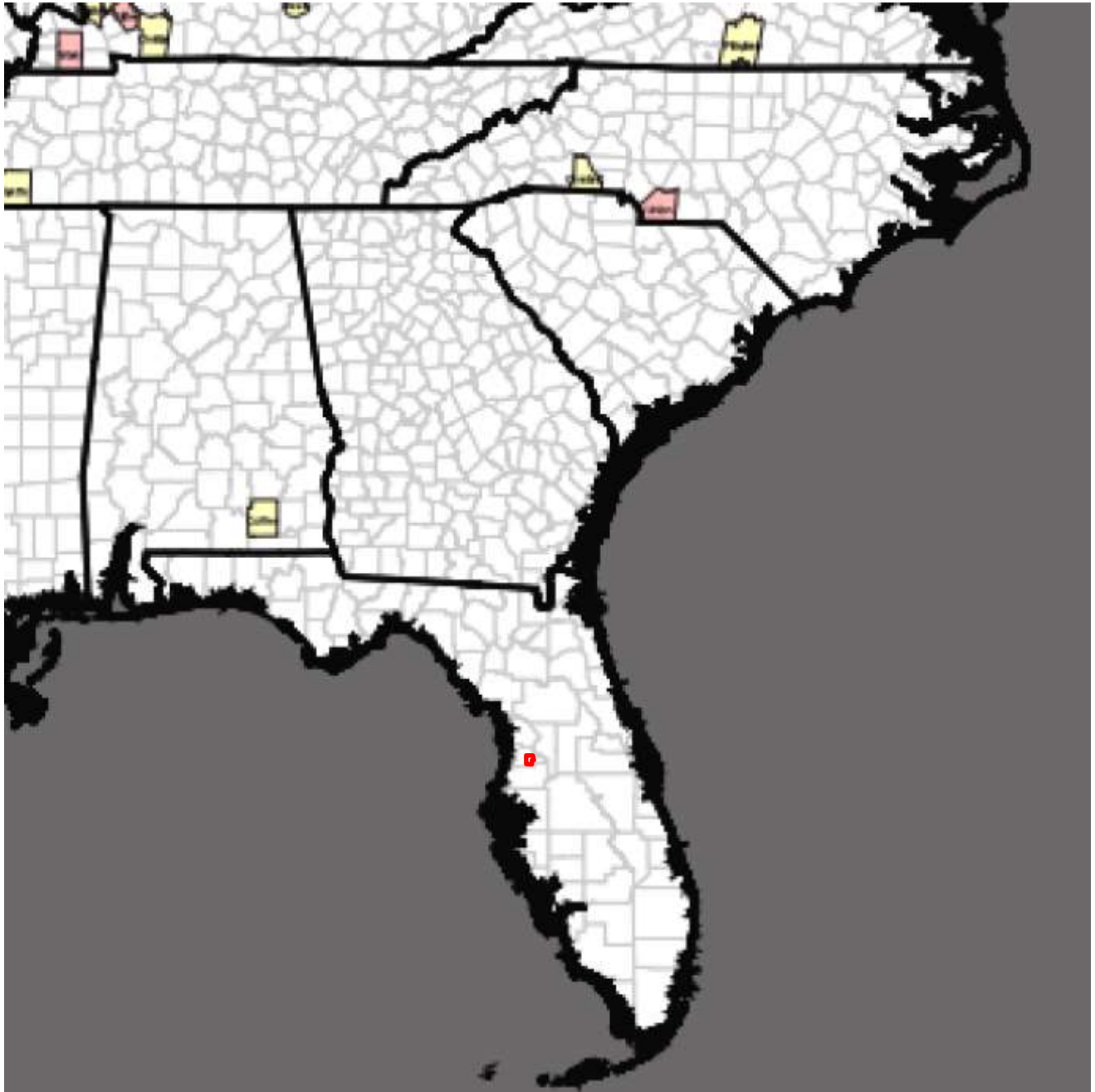
**Not to Scale**

Prepared By: GLE Associates, Inc.  
5405 Cypress Center Drive, Suite 110  
Tampa, Florida 33609 (813) 241-8350, fax: 241-8737



**Farrow to Finish Farm**  
Brooksville, FL

Drawn JJR	Job No. 18000-19835
Checked JKH	Figure
Date 9/14/2018	K-1



**Approximate  
Property Location**



**Soils**  
HEL Soil Map

**Not to Scale**

Prepared By: GLE Associates, Inc.  
5405 Cypress Center Drive, Suite 110  
Tampa, Florida 33609 (813) 241-8350, fax: 241-8737



<b>Farrow to Finish Farm</b> Brooksville, FL	
Drawn JJR	Job No. 18000-19835
Checked JKH	Figure
Date 9/14/2018	K-2

## Deborah DeVars

---

**From:**  
**Sent:** Tuesday, September 18, 2018 9:56 AM  
**To:** John Romeis  
**Subject:** Fwd: Aylesboro Court Pig Farm  
**Attachments:** sv track.jpg

Some SWFWMD communications

----- Forwarded message -----

**From:** Jeff Whealton <[Jeff.Whealton@swfwmd.state.fl.us](mailto:Jeff.Whealton@swfwmd.state.fl.us)>  
**Date:** Thu, Apr 5, 2018 at 4:11 PM  
**Subject:** RE: Aylesboro Court Pig Farm  
**To:**  
**Cc:** [1.11.1034818@ecmvmprod21.ad.swfwmd.net](mailto:1.11.1034818@ecmvmprod21.ad.swfwmd.net) <[1.11.1034818@ecmvmprod21.ad.swfwmd.net](mailto:1.11.1034818@ecmvmprod21.ad.swfwmd.net)>, Ken Griner <[Kenneth.Griner@swfwmd.state.fl.us](mailto:Kenneth.Griner@swfwmd.state.fl.us)>

That was a good graphic. Nicely done 😊

I'm attaching an aerial that shows our track of where we walked the other day. I think it pretty much went around the main part of that seepage wetland and of course over the creek.

As for if your plan is sufficient, I can't really say as I don't know what sort of impact the pigs will do to the ground in that area. I wish I could give you specifics but all I can say is that grazing animals in wetland areas happens all the time all over Florida, though probably not in situations where animals are confined to the wetlands. Due to the slope here, I just think you'll have to be monitoring the site closely to prevent erosion and sedimentation damage.

Once you've closed on the property, get back with me and I'll get you set up with the NRCS.

Thanks,

Jeff

Ps... copying Ken Griner on this message as he will likely be the engineer to review the site with me in the future.

Jeff Whealton, PWS

District Agricultural Team, Sr. Environmental Scientist

Environmental Resource Permit Bureau

Regulation Division

Southwest Florida Water Management District

Office: 813.985.7481/800.836.0797 x6119

[Jeff.whealton@swfwmd.state.fl.us](mailto:Jeff.whealton@swfwmd.state.fl.us)



**From:**

**Sent:** Sunday, April 01, 2018 9:48 PM

**To:** Jeff Whealton <[Jeff.Whealton@swfwmd.state.fl.us](mailto:Jeff.Whealton@swfwmd.state.fl.us)>

**Subject:** Aylesboro Court Pig Farm

Jeff,



Thank you very much for meeting with me and evaluating the Aylesboro property. I've attached a preliminary paddock layout based on our conversations. There's a wide buffer for the active water, and I tried to layout the paddocks against the slope. I'm going to try to cross the wettest area in the easement with a bridge as you suggested.

Upon purchase, I'd like to begin the engineering process with NRCS before putting any cross-fencing or roads in.

Do you think this will be an acceptable approach to this site for my agricultural goals?

Thanks again,



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**APPENDIX L**  
**Water Quality**

---

United States  
Department of  
Agriculture

Natural  
Resources  
Conservation  
Service

---

**Part 651**  
**Agricultural Waste Management Field  
Handbook**

---

**Chapter 4**

---

**Agricultural Waste  
Characteristics**

Issued March 2008

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# Acknowledgments

---

Chapter 4 was originally prepared and printed in 1992 under the direction of **James N. Krider** (retired), national environmental engineer, Soil Conservation Service (SCS), now Natural Resources Conservation Service (NRCS), Washington, DC. **James D. Rickman** (retired), environmental engineer, NRCS, Fort Worth, Texas, provided day-to-day coordination in the development of the handbook. Authors for chapter 4 included **Clyde Barth** (retired), Clemson University, Clemson, South Carolina; **Timothy Powers** (retired), environmental engineer, NRCS, Nashville, Tennessee; and **James Rickman**.

This version was prepared under the direction of **Noller Herbert**, director, Conservation Engineering Division, NRCS, Washington, DC. Revisions to the chapter were provided by **Donald Stettler** (retired), environmental engineer, NRCS, Portland, Oregon; **Charles Zuller**, environmental engineer, West National Technology Support Center, Portland, Oregon; and **Darren Hickman**, environmental engineer, Central National Technology Support Center, Fort Worth, Texas. It was finalized under the guidance of **Darren Hickman**, national environmental engineer, Conservation Engineering Division, Washington, DC.





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<b>Contents:</b>	<b>651.0400 Introduction</b>	<b>4-1</b>
	(a) Purpose and scope.....	4-1
	(b) Variations and ranges of data values.....	4-2
	<b>651.0401 Definitions of waste characterization terms</b>	<b>4-2</b>
	<b>651.0402 Units of measure</b>	<b>4-8</b>
	<b>651.0403 Animal waste characteristics</b>	<b>4-9</b>
	(a) “As excreted” manure.....	4-9
	(b) Common management modifications.....	4-11
	(c) Dairy.....	4-12
	(d) Beef.....	4-15
	(e) Swine.....	4-17
	(f) Poultry.....	4-19
	(g) Veal.....	4-22
	(h) Sheep.....	4-22
	(i) Horse.....	4-22
	(j) Rabbit.....	4-23
	<b>651.0404 Manure as transferred for utilization</b>	<b>4-23</b>
	<b>651.0405 Other wastes</b>	<b>4-26</b>
	(a) Residential waste.....	4-26
	(b) Food wastes and wastewater.....	4-26
	(c) Silage leachate.....	4-29
	<b>651.0406 References</b>	<b>4-32</b>

---

<b>Table 4-1</b>	Definitions and descriptions of waste characterization terms	4-3
<b>Table 4-2</b>	Factors for determining nutrient equivalency	4-9
<b>Table 4-3</b>	Unit weights of common bedding materials	4-11
<b>Table 4-4</b>	Daily bedding requirements for dairy cattle	4-11
<b>Table 4-5</b>	Dairy manure characterization—as excreted	4-13
<b>Table 4-6</b>	Dairy water use for various operations	4-14
<b>Table 4-7</b>	Dairy waste characterization—milking center	4-14
<b>Table 4-8</b>	Beef waste characterization—as excreted	4-15
<b>Table 4-9</b>	Nitrogen content of cattle feedlot runoff	4-16
<b>Table 4-10</b>	Swine waste characterization—as excreted	4-17
<b>Table 4-11</b>	Poultry waste characterization—as excreted	4-19
<b>Table 4-12</b>	Veal waste characterization—as excreted	4-22
<b>Table 4-13</b>	Lamb waste characterization—as excreted	4-22
<b>Table 4-14</b>	Horse waste characterization—as excreted	4-22
<b>Table 4-15</b>	Rabbit waste characterization—as excreted	4-23
<b>Table 4-16</b>	Manure as transferred for utilization	4-24
<b>Table 4-17</b>	Human waste characterization—as excreted	4-26
<b>Table 4-18</b>	Residential waste characterization—household wastewater	4-26
<b>Table 4-19</b>	Municipal waste characterization—residential	4-27
<b>Table 4-20</b>	Dairy food processing waste characterization	4-27
<b>Table 4-21</b>	Dairy food waste characterization—processing wastewater	4-28
<b>Table 4-22</b>	Meat processing waste characterization—wastewater	4-28

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	<b>Table 4-23</b>	Meat processing waste characterization—wastewater sludge	4-29
	<b>Table 4-24</b>	Vegetable processing waste characterization—wastewater	4-29
	<b>Table 4-25</b>	Fruit and vegetable waste characterization—solid waste	4-30
	<b>Table 4-26</b>	Typical range of nutrient concentrations in silage leachate	4-31
	<b>Table 4-27</b>	Leachate production based on percent dry matter of silage	4-31
<hr/>			
<b>Figures</b>	<b>Figure 4-1</b>	Mass balance approach used for developing table values for beef cattle, swine, and poultry	4-1



## 651.0400 Introduction

### (a) Purpose and scope

Wastes and residues described in this chapter are of an organic nature and agricultural origin. Other by-products of nonagricultural origin that may be managed within the agricultural sector are also included. This chapter provides information for estimating characteristics of livestock and poultry manure and other agricultural residuals. The information provided is useful for the planning and design of agricultural waste management system (AWMS) components including:

- storage function components such as ponds and tanks
- treatment function components such as lagoons and composting
- utilization function components such as land application

The information may also be useful in formulating the environmental impact of manure and other agricultural wastes.

This chapter includes table values for the typical characteristics of manure *as excreted* by livestock and poultry based on typical diets and animal performance levels in 2003. These typical values are most appropriate for use when:

- planning estimates are being made on a scale larger than a single farm such as county or regional estimate of nutrient excretion
- a rough estimate is needed for farm planning
- farm-specific information of animal performance and feed intake is not available

Much of the as excreted data included in the tables of this chapter were developed using equations that are now available for predicting manure content, primarily nitrogen and phosphorus, dry matter, and, depending upon species, other potential characteristics for beef, swine, and poultry excretion. The fundamental model (fig. 4-1) on which these equations are based is:

Nutrient excretion = Nutrient feed intake – Nutrient retention

Dry matter excretion = Feed dry matter intake  $\times$  (1 – dry matter digestibility) + Dry matter in urine

Of the total excreted solids, dry matter in urine typically contributes 10 to 20 percent of the volume.

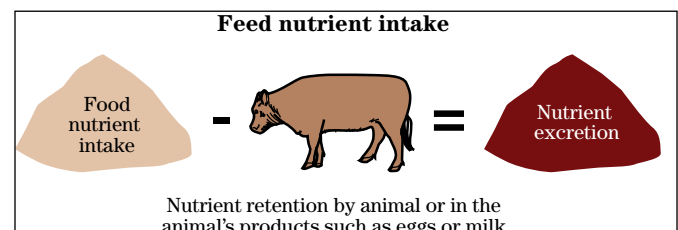
These equations allow an estimate of as excreted manure characteristics relevant to a wide range of dietary options and animal performance levels commonly observed in commercial production. Considered are factors related to the feed efficiency in animal performance and to feed intake including crude protein, phosphorus, and dry matter. A full presentation and description of these equations is beyond the scope of this chapter. They are, however, available in the American Society of Agricultural and Biological Engineers Standard D384.2. See <http://www.asabe.org/standards/index.html>.

For dairy and horses, regression analysis was performed on large data sets to determine appropriate equations.

In a number of situations, consideration should be given to using equations instead of the as excreted values presented in the tables of this chapter. Typical or average estimates of as excreted manure eventually become out-of-date due to changes in animal genetics, performance potential, feeding program strategies, and available feeds. If the timeliness of the data presented in this chapter becomes problematic, consideration should be given to computing values using equations. Other situations when use of equations should be considered are when:

- comprehensive nutrient management plans are being developed specific to a farm and its AWMS
- data is available for a livestock or poultry operation's feeding program and animal performance
- a feeding strategy or technology designed to reduce nutrient excretion is being used

**Figure 4-1** Mass balance approach used for developing table values for beef cattle, swine, and poultry





The chapter also provides table values for the typical characteristics of manure at transfer from housing or from storage and treatment facilities. These values are useful for long-term planning for utilization of manure and other wastes; but, they should not be used in determining a field-specific application rate.

### (b) Variations and ranges of data values

In most cases, a single value is presented for a specific waste characteristic. This value is presented as a reasonable value for facility design and equipment selection for situations where site-specific data are not available. Waste characteristics are subject to wide variation; both greater and lesser values than those presented can be expected. Therefore, much attention is given in this chapter to describing the reasons for data variation and to giving planners and designers a basis for seeking and establishing more appropriate values where justified by the situation.

Site-specific waste sampling, testing, and data collection are essential for the utilization function of an AWMS. Such sampling can result in greater certainty and confidence in amount of nutrients available. Care must be exercised to assure that samples are representative of the waste stream and arrive at the laboratory in a timely manner. Since manure and other waste products are in continual flux, it must also be kept in mind that the results from such testing are only valid for the time when the samples were taken.

## 651.0401 Definitions of waste characterization terms

Table 4–1 contains definitions and descriptions of waste characterization terms. It includes abbreviations, definitions, units of measurement, methods of measurement, and other considerations for the physical and chemical properties of manure, waste, and residue. The physical properties—weight (Wt), volume (Vol), moisture content (MC), total solids (TS), volatile solids (VS), fixed solids (FS), dissolved solids (DS), and suspended solids (SS)—are important to agricultural producers and facility planners and designers. They describe the amount and consistency of the material to be dealt with by equipment and in treatment and storage facilities. Of the chemical constituents, nitrogen (N), phosphorus (P), and potassium (K) are of great value to waste systems planners, producers, and designers. Land application of agricultural waste is the primary waste utilization procedure, and N, P, and K are the principal components considered in development of an agricultural waste management plan.

Volatile solids (VS) and 5-day Biochemical Oxygen Demand ( $BOD_5$ ) are used in the planning and design of certain biological treatment procedures.

Data on biological properties, such as numbers of specific micro-organisms, are not presented in this chapter. Micro-organisms are of concern as possible pollutants of ground and surface water, but they are not commonly used as a design factor for no-discharge waste management systems that use wastes on agricultural land.

When expressed in units of pounds per day or as a concentration, various solid fractions of manure, waste, or residue are often measured on a wet weight basis (% w.b.), a percentage of the “as is” or wet weight of the material. In some cases, however, data are recorded on a dry weight basis (% d.w.), a percentage of the dry weight of the material. The difference in these two values for a specific material is most likely very large. Nutrient and other chemical fractions of a waste material, expressed as a concentration, may be on a wet weight or dry weight basis, or expressed as pounds per 1,000 gallons of waste.

The term “agricultural waste” was coined by those who pioneered the technology. For them, the term seemed appropriate because it was generic and could be used in the context of the wide variety of materials under con-

**Table 4-1** Definitions and descriptions of waste characterization terms**Physical characteristics**

Term	Abbreviation	Units of measure	Definition	Method of measurement	Remarks
Weight	Wt	lb	Quantity or mass	Scale or balance	
Volume	Vol	ft <sup>3</sup> ; gal	Space occupied in cubic units	Place in or compare to container of known volume calculate from dimensions of containment facility	
Moisture content	MC	%	That part of a waste material removed by evaporation and oven drying at 217 °F (103 °C)	Evaporate free water on steam table and dry in oven at 217 °F for 24 hours or until constant weight	Moisture content (%) plus total solids (%) equals 100%
Total solids	TS	%, % w.b. <sup>1/</sup> ; % d.w. <sup>2/</sup>	Residue remaining after water is removed from waste material by evaporation; dry matter	Evaporate free water on steam table and dry in oven at 217 °F for 24 hours or until constant weight	Total of volatile and fixed solids; total of suspended and dissolved solids
Volatile solids	VS, TVS	%, % w.b. <sup>1/</sup> ; % d.w. <sup>2/</sup>	That part of total solids driven off as volatile (combustible) gases when heated to 1,112 °F (600 °C); organic matter	Place total solids residue in furnace at 1,112 °F for at least 1 hour	Volatile solids determined from difference of total and fixed solids
Fixed solids	FS, TFS	%, % w.b.; % d.w.	That part of total solids remaining after volatile gases driven off at 1,112 °F (600 °C); ash	Weight (mass) of residue after volatile solids have been removed as combustible gases when heated at 1,112 °F for at least 1 hr is determined	Fixed solids equal total solids minus volatile solids
Dissolved solids	DS, TDS	%, % w.b.; % d.w.	That part of total solids passing through the filter in a filtration procedure	Pass a measured quantity of waste material through 0.45 micron filter using appropriate procedure; evaporate filtrate and dry residue to constant weight at 217 °F	Total dissolved solids (TDS) may be further analyzed for volatile solids and fixed dissolved solids parts %
Suspended solids	SS, TSS	%, % w.b.; % d.w.	That part of total solids removed by a filtration procedure	May be determined by difference between total solids and dissolved solids	Total suspended solids may be further analyzed for volatile and fixed suspended solids parts

1/ % w.b. = percent wet basis

2/ % d.w. = percent dry weight basis

**Table 4-1** Definitions and descriptions of waste characterization terms—Continued**Chemical properties**

Term	Abbreviation	Units of measure	Definition	Method of measurement	Remarks
Ammoniacal nitrogen (total ammonia)		mg/L µg/L	Both NH <sub>3</sub> and NH <sub>4</sub> nitrogen compounds	Common laboratory procedure uses digestion, oxidation, and reduction to convert all or selected nitrogen forms to ammonium that is released and measured as ammonia	Volatile and mobile nutrients; may be a limiting nutrient in land spreading of wastes and in eutrophication. Recommended methods of manure analysis measures ammonium nitrogen (NH <sub>4</sub> -N)
Ammonia nitrogen	NH <sub>3</sub> -N	mg/L µg/L	A gaseous form of ammoniacal nitrogen		
Ammonium nitrogen	NH <sub>4</sub> -N	mg/L µg/L	The positively ionized (cation) form of ammoniacal nitrogen		Can become attached to the soil or used by plants or microbes
Total Kjeldahl nitrogen	TKN	mg/L µg/L	The sum of organic nitrogen and ammoniacal nitrogen	Digestion process which converts all organic nitrogen to ammonia	
Nitrate nitrogen	NO <sub>3</sub> -N	mg/L µg/L	The negatively ionized (anion) form of nitrogen that is highly mobile		Nitrogen in this form can be lost by denitrification, percolation, runoff, and plant microbial utilization
Total nitrogen	TN; N	%; lb	The summation of nitrogen from all the various nitrogen compounds		Macro-nutrient for plants
Phosphorus	TP, SRP P P <sub>2</sub> O <sub>5</sub>	mg mg/L lb lb	Total phosphorus (TP) is a measure of all the forms of phosphorus, dissolved or particulate, that is found in a sample. Soluble reactive phosphorus (SRP) is a measure of orthophosphate, the filterable (soluble, inorganic) fraction of phosphorus, the form directly taken up by plant cells. P is elemental phosphorus. P <sub>2</sub> O <sub>5</sub> is the fertilizer equivalent phosphorus	Laboratory procedure uses digestion and/or reduction to convert phosphorus to a colored complex; result measured by spectrophotometer or inductive coupled plasma	Critical in water pollution control; may be a limiting nutrient in eutrophication and in spreading of wastes
5-day Biochemical oxygen demand	BOD <sub>5</sub>	lb of O <sub>2</sub>		Extensive laboratory procedure of incubating waste sample in oxygenated water for 5 days and measuring amount of dissolved oxygen consumed	Standard test for measuring pollution potential of waste
Chemical oxygen demand	COD	lb of O <sub>2</sub>	Measure of oxygen consuming capacity of organic and some inorganic components of waste materials	Relatively rapid laboratory procedure using chemical oxidants and heat to fully oxidize organic components of waste	Estimate of total oxygen that could be consumed in oxidation of waste material

sideration. Now, the concern of many is that the word waste implies that the material is only suitable for disposal and as such, detracts from proper utilization. Even though another word or term might better convey the beneficial aspects, agricultural waste is so entrenched in the literature it would now be difficult to change. Further, a consensus replacement term that is appropriate in every context has not come to the forefront. It must be understood that it was neither the intent of those who initially developed the technology nor the authors of this chapter (with its continued use) to imply the materials being discussed are worthless and are only suitable for disposal. Rather, the materials are to be viewed as having value both monetarily and environmentally if properly managed, regardless of what they are called.

Wastes are often given descriptive names that reflect their moisture content such as liquid, slurry, semisolid and solid. Wastes that have a moisture content of 95 percent or more exhibit qualities very much like water are called liquid waste or liquid manure. Wastes that have moisture content of about 75 percent or less exhibit the properties of a solid and can be stacked and hold a definite angle of repose. These are called solid manure or solid waste. Wastes that are between about 75 and 95 percent moisture content (25 and 5 percent solids) are semiliquid (slurry) or semisolid (chapter 9). Because wastes are heterogeneous and inconsistent in their physical properties, the moisture content and range indicated above must be considered generalizations subject to variation and interpretation.

The terms “manure,” “waste,” and “residue” are sometimes used synonymously. In this chapter, manure refers to materials that have a high percentage of feces and urine. Other material that may or may not have significant feces, and urine is referred to as waste or a related term such as wastewater. The term *as excreted* refers to feces and urine prior to any changes due to dilution water addition, drying, volatilization, or other physical, chemical, or biological processes. Litter is a specific form of poultry waste that results from floor production of birds after an initial layer of a bedding material, such as wood shavings, is placed on the floor at the beginning of and perhaps during the production cycle.

Because of the high moisture content of as excreted manure and treated waste, their specific weight is very similar to that of water—62.4 pounds per cubic foot. Some manure and waste that have considerable solids content

can have a specific weight of as much as 105 percent that of water. Some dry wastes, such as litter, that have significant void space can have specific weight of much less than that of water. Assuming that wet and moist wastes weigh 60 to 65 pounds per cubic foot is a convenient and useful estimate for planning waste management systems.

Because moisture content of manure is transitory, most testing laboratories report results in terms of dry weight (d.w.). However, equipment is calibrated and storage structures sized based upon wet weight. As such, it is important to understand the relationship of wet basis (w.b.) and dry basis (d.w.).

When test data is reported in terms of its wet basis, the base is its hydrated weight.

$$\text{Percent wet basis} = \frac{\text{weight of constituent}}{\text{wet weight of sample}}$$

When test data is reported in terms of its dry weight, the base is its dry weight.

$$\text{Percent dry basis} = \frac{\text{weight of constituent}}{\text{dry weight of sample}}$$

Residue after oven drying the sample is the total solids. Since the dry weight is equal to the total solids, they are always 100 percent d.w.

The fixed solids are the nonorganic portion of the total solids. The weight of fixed solids is determined by a test that involves heating a sample of the waste to 1,112 °F. The fixed solids are the ash that remains after the material driven off by the heating is the volatile solids.

**Example 4-1**

*Given:* A laboratory sample of manure weighing 200 grams is oven dried. After oven drying, the sample weighs 50 grams. Following oven drying, the remaining 50 grams is heated to 1,112 °F. After this heating, 20 grams remain.

*Calculate:*

Moisture content (MC)

$$\begin{aligned} \text{MC} &= \text{wet weight} - \text{dry weight} \\ &= 200 \text{ grams} - 50 \text{ grams} \\ &= 150 \text{ grams} \end{aligned}$$

Percent moisture (%MC)

$$\begin{aligned} \% \text{MC} &= \frac{\text{MC}}{\text{wet weight}} \times 100 \\ &= \left( \frac{150 \text{ grams}}{200 \text{ grams}} \right) \times 100 \\ &= 75\% \end{aligned}$$

Percent total solids dry basis (%TS)

$$\begin{aligned} \% \text{TS w.b.} &= \left( \frac{\text{dry weight}}{\text{wet weight}} \right) \times 100 \\ &= \left( \frac{50 \text{ grams}}{200 \text{ grams}} \right) \times 100 \\ &= 25\% \end{aligned}$$

After the 50-gram dry sample (originally 200-gm wet sample) is heated to 1,112 °F, the sample now weighs 20 grams. Since the fixed solids are what remain, they are:

Percent fixed solids (%FS)

$$\begin{aligned} \text{FS} &= 20 \text{ grams} \\ \text{VS} &= \text{TS} - \text{FS} \\ &= 50 \text{ grams} - 20 \text{ grams} \\ &= 30 \text{ grams} \end{aligned}$$

Percent volatile solids both wet basis and dry weight basis. (% VS w.b. and % VS d.w.)

$$\begin{aligned} \% \text{VS d.w.} &= \frac{30 \text{ grams}}{50 \text{ grams}} \times 100 \\ &= 60\% \end{aligned}$$

Following are a number of relationships that may be used to evaluate the constituents of manure or other wastes.

$$\frac{\% \text{ dw}}{\% \text{ wb}} = \frac{(\text{oven dry weight of manure})}{(\text{weight of manure at excreted moisture content})}$$

$$\frac{\% \text{ wb}}{\% \text{ dw}} = \frac{(\text{weight of manure at excreted moisture content})}{(\text{oven dry weight of manure})}$$

$$\% \text{ dry matter} = \left( \frac{\text{dry weight}}{\text{wet weight}} \right) \times 100$$

$$\% \text{ moisture} = 100 - \% \text{ dry matter}$$

$$\% \text{ dry matter} = 100 - \% \text{ moisture}$$

$$\% \text{ w.b.} = \% \text{ d.w.} \times \left( \frac{(100 - \% \text{ moisture})}{100} \right)$$

$$\% \text{ d.w.} = \left( \frac{\% \text{ w.b.} \times 100}{100 - \% \text{ w.b.}} \right)$$

$$\text{weight of manure (wet)} = \frac{\text{weight of total} + \text{weight of solids (dry)}}{\text{moisture}}$$

Carbon is a component of all organic wastes. Quantifying it is important because of carbon's impact on soil quality and greenhouse gas emissions. Adding manure and other organic material to the soil improves the soil's structure and tilth and increases its nutrient storage capacity. As the soil sequesters the carbon in the manure, it reduces the emissions of carbon dioxide and methane into the air.

The carbon content of a material can be determined using the following equation if the material's volatile solids are known.

$$C = 0.55 \times \text{VS}$$

where:

C = carbon (% C d.w.)

VS = volatile solids (%VS d.w.)

**Example 4–2**

The testing laboratory reports that the manure's volatile solids on a dry weight basis are 60 percent. Compute the percentage d.w. carbon content of the sample.

$$\begin{aligned}\% \text{ C d.w.} &= 0.55 \times \% \text{ VS d.w.} \\ &= 0.55 \times 60 \\ &= 33.0 \% \text{ d.w.}\end{aligned}$$

The manure has a moisture content of 80 percent. Compute the percentage of carbon contained in the manure on a wet basis.

$$\begin{aligned}\% \text{ C w.b.} &= \% \text{ C d.w.} \times \frac{(100 - \% \text{ moisture})}{100} \\ &= 33.00 \times \frac{(100 \times 80)}{100} \\ &= 6.6\%\end{aligned}$$

Knowing the carbon to nitrogen ratio (C:N) can be important. For example, the C:N is an important aspect of the compost recipe (ch. 10). If the C:N is high, such as it might be in a manure containing organic bedding such as sawdust, the carbon can tie up nitrogen from the soil when land applied. The C:N can be determined using the following equation.

$$\text{C:N} = \frac{\text{C}}{\text{TN}}$$

where:

C:N = carbon to nitrogen ratio

C = carbon (%C d.w.)

TN = total nitrogen (%TN d.w.)

**Example 4–3**

Determine the C:N ratio for a manure that contains 2.1 percent d.w. of total nitrogen and a carbon content of 33.0 percent d.w.

$$\begin{aligned}\text{C:N} &= \frac{\text{C}}{\text{TN}} \\ &= \frac{33.0}{2.1} \\ &= 15.7 : 1\end{aligned}$$

The following are equations for converting nutrient levels reported on dry basis to a wet basis:

$$\text{nutrient level, wet basis} = \frac{\text{nutrient level, dry basis} \times (100 - \% \text{ moisture})}{100}$$

$$\text{nutrient level, wet basis} = \frac{\text{nutrient level, dry basis} \times \% \text{ dry matter total solids}}{100}$$

**Example 4–4**

A manure testing laboratory reports that the manure has a nitrogen content of 11.5 percent d.w. The manure sampled contained 85 percent moisture. Compute the pounds of nitrogen per ton of manure as it will be transferred for utilization.

$$\text{nutrient level, wet basis} = \frac{\text{nutrient level, dry basis} \times (100 - \% \text{ moisture})}{100}$$

$$\begin{aligned}&= \frac{11.5 \times (100 - 85)}{100} \\ &= 1.725\%\end{aligned}$$

$$\begin{aligned}\text{lb N/ton} &= 1 \text{ ton} \times 2,000 \text{ lb/ton} \times \frac{1.725}{100} \\ &= 34.5 \text{ lb/ton}\end{aligned}$$



## 651.0402 Units of measure

In this chapter, English units are used exclusively for weight, volume, and concentration data for manure, waste, and residue.

The table values for as excreted manure from livestock is expressed in three different formats. They are in terms of mass or volume per:

- day per 1,000 pounds of livestock live weight (lb/d/1000 lb)
- and
- finished animal (f.a.) for meat producing animals
- or
- day-animal (d-a) for other animals

Excreted manure table values are given in the NRCS traditional format of mass or volume per day per 1,000 pounds live weight for all livestock and poultry types and production groupings. The 1,000 pounds live weight or animal unit (AU) is often convenient because there is a commonality of expression, regardless of the species or weight of the individual species.

A 1,000-pound AU is 1,000 pounds of live weight, not an individual animal. For example, a 1,400-pound Holstein cow is 1.4 AU ( $1400/1000 = 1.4$ ). A 5-pound laying hen would be 0.005 AU ( $5/1000 = 0.005$ ). The challenge in using table values in this format is for young animals. Since these animals are gaining weight, an animal weight that is representative of the time period being considered must be determined.

As an alternative, table values for excreted manure from livestock and poultry being fed for an end result of meat production are given in terms of mass or volume per finished animal. The table values given in this format are the mass or volume for one animal's finishing period in the feeding facility. Manure production expressed in this manner eliminates the problems of determining a representative weight of the animal for its tenure at a facility. Breeding stock weight for beef or swine is not given in this format because the animal's weight is stable, and they are usually retained year-round.

Table values are also given in terms of mass or volume per day-animal for dairy animals, beef and swine breeding stock, and layer chickens. The young stock included

in the tables with this format, such as dairy calves and heifers, are expressed as mass or volume per day-animal that is representative for the span of time when they are in this age category.

Food processing waste is recorded in cubic feet per day ( $\text{ft}^3/\text{d}$ ), or the source is included such as cubic feet per 1,000 pounds of potatoes processed.

The concentration of various components in waste is commonly expressed on a milligram per liter (mg/L) basis or parts per million (ppm). One mg/L is milligrams of solute per liter of solution. One ppm is one part by weight of solute in one million parts by weight of solution. Therefore, mg/L equals ppm if a solution has a specific gravity equal to that of water (1,000,000 mg/L or 1 kg/L). Generally, substances in solution up to concentrations of about 7,000 mg/L do not materially change the specific gravity of the liquid, and mg/L and ppm are numerically interchangeable. Concentrations are sometimes expressed as mg/kg or mg/1,000g, which are the same as ppm.

Occasionally, the concentration is expressed in percent. A 1 percent concentration equals 10,000 ppm. Very low concentrations are sometimes expressed as micrograms per liter ( $\mu\text{g}/\text{L}$ ). A microgram is one millionth of a gram.

Various solid fractions of a manure, waste, or residue, when expressed in units of pounds per day or as a concentration, can be expressed either on a wet basis (% w.b.) or on a dry weight basis (% d.w.). The percent w.b. is the "as is" or wet weight of the material, and the d.w. is with the moisture removed. The difference in these two bases for a specific material is most likely very large. Nutrient and other chemical fractions of a waste material, expressed as a concentration, may be on a wet weight or dry weight basis, or expressed as pounds per 1,000 gallons of waste.

Amounts of the major nutrients, nitrogen (N), phosphorus (P), and potassium (K), are occasionally expressed in terms of the elemental nutrient form. However, laboratory analysis reports are more commonly expressing the nutrients in manure as a common fertilizer equivalent,  $\text{P}_2\text{O}_5$  for P and  $\text{K}_2\text{O}$  for K. When comparing the nutrient content of a manure, waste, or residue with commercial fertilizer, the conversion factors listed in table 4-2 should be used, and comparisons on the basis of similar elements, ions, and/or compounds should be made. Nitrogen is always expressed as the nitrogen form such as Total N,  $\text{NO}_3\text{-N}$ , and  $\text{NH}_4\text{-N}$ .

**Table 4-2** Factors for determining nutrient equivalency

Multiply	By	To get
NH <sub>3</sub>	0.824	N
NH <sub>4</sub>	0.778	N
NO <sub>3</sub>	0.226	N
N	1.216	NH <sub>3</sub>
N	1.285	NH <sub>4</sub>
N	4.425	NO <sub>3</sub>
PO <sub>4</sub>	0.326	P
P <sub>2</sub> O <sub>5</sub>	0.437	P
P	3.067	PO <sub>4</sub>
P	2.288	P <sub>2</sub> O <sub>5</sub>
K <sub>2</sub> O	0.830	K
K	1.205	K <sub>2</sub> O

## 651.0403 Animal waste characteristics

Whenever locally derived values for animal waste characteristics are available, those values should be given preference over the more general data used in this chapter.

### (a) As excreted manure

When compared to other types of manure data, the data given for as excreted manure characteristics is the most reliable. The properties of manure and other wastes will vary widely when modified by management actions. For example, manure that has been flushed, feedlot manure, and poultry litter will have material added and/or lost from the as excreted manure. Variations in other types of manure data in this chapter and other references result largely from additions/losses due to different management practices.

The primary concern of this chapter is livestock manure and waste produced in confinement and semiconfinement facilities. Not considered is manure produced by livestock and poultry on pasture or range. Manure produced in this manner is generally not collected for further management by transfer, storage, and treatment. As such, its management is significantly different than manure produced in confinement.

To determine the as excreted production of an animal using the table values given in units per day per 1,000 pounds livestock animal unit requires that a representative weight of the animal in question be determined. This approach is quite simple for mature animals that have reached their final weight. However, for feeder livestock and other immature livestock whose weight is changing daily, the challenge in using units of mass or volume/d/1,000 lb AU is to correctly determine the weight of the animal that is representative over the period of time being considered. For example, determining representative weight for an animal that has a beginning weight of 400 pounds and an ending weight of 800 pounds is much more complicated than merely averaging the two weights. Averaging in this manner does result in a conservative assumption. However, presentation of tabular data in units per finished animal eliminates this problem because a value is given for the animal's entire finishing period.

Facilities for meat-producing animals are rarely in full production 365 days per year due to uneven growth rates of animals, time required for facility cleaning after a group, and availability of animals for restocking a facility. Planning based on number of finished meat animals provides a more realistic planning estimate for annual manure volume and nutrient production.

The values given in the as excreted tables dairy, beef, swine, poultry, and equine were determined by one of the following two approaches.

- Use of a nutrient balance estimate of excretion that assumes feed intake minus animal retention equals excretion. This approach is used for all beef, swine, and poultry animal groups.
- Use of existing research data and regression analysis for dairy and equine.

Table values are estimated for dietary intake and animal performance levels common for livestock and poultry management in 2003 using the equations. Beef, poultry, and swine excretion characteristics are based on a calculation using equations that considers dietary nutrient intake minus animal nutrient retention using dietary and performance measurements typical for the industry at the time these data were published. Nutrient retention estimates followed common industry methodologies used for estimating animal nutrient requirements. Total nitrogen, total phosphorus, and dry matter excretion were estimated by these methods for all species. Available research data or models allowed additional excretion estimates for some species. Dry matter excretion is estimated to be a function of dry matter intake minus dry matter digestibility.

Dairy and equine manure characteristics were developed using existing research data and regression analysis to identify relationships between feeding programs, animal performance, and excretion. A regression analysis involves the study of relationships between variables.

For some values, particularly potassium, previously published excretion values were used instead of the equation methods used exclusively for nitrogen and phosphorus. As with most minerals, the amount of these nutrients (minerals) consumed can vary significantly due to regional differences. For example, some forages can be quite high in potassium because of high amounts of available potassium in the soil. In these situations, the amount of potassium consumed will be the major determinant in amount of potassium excreted. Development of modeling equations for estimating excretion of these

other minerals is warranted, but they are not available at this time. Until these models are available, consideration should be given to adjusting the table values to a greater value if nutrient consumptions are very high.

Where dietary intake and animal performance level based excretion estimates could not be made, current references were reviewed, including the 1992 version of the NRCS Agricultural Waste Management Field Handbook (AWMFH); the American Society of Agricultural Engineers Standard D384.2; Manure Production and Characteristics, March 2005; and Manure Characteristics in Midwest Plan Service Publication MWPS-18, Section 1.

The as excreted table values for veal and sheep are from the 1992 version of the AWMFH.

As previously stated, table values given in this chapter are based on common dietary intake for livestock and poultry. If feed rations are atypical, excreted values should be computed by use of equations or by other means to more closely reflect actual values of the operation under consideration rather than using the table values. For example, table values may not be appropriate when by-products from the ethanol industry are included in feed rations. The rapid growth of the ethanol industry primarily for production of oxygenated fuel and, to a much lesser extent, the alcohol beverage industry, has resulted in its by-products being available as a competitively priced feed ingredient for dairy, beef, and, to some extent, swine and poultry. Use of these ethanol products may increase both nitrogen and phosphorus in the excreted manure beyond the values given in the tables.

Another example of when the table values are not appropriate is when beef cattle are fed high forage diets. Since beef cattle are ruminants, they can utilize forages, which are generally lower in digestibility, as well as concentrates, which are generally higher in digestibility. Depending upon the stage of production, the roughage-to-concentrate ratio can vary tremendously. When poorly digestible forages (fiber) are fed as compared to concentrates, volumes of manure produced are much greater than the values given in the tables.

## (b) Common management modifications

How the manure is managed following excretion will often result in changes to its basic physical and chemical characteristics. These management actions include those related to wasted feed, wasted water, flush water,

precipitation/evaporation, bedding (litter), soil, and biological activity. Management following excretion can also result in drying. For example, manure excreted in feedlots in arid parts of the country can lose substantial moisture because of evaporation. Dust, hair, and feathers from the livestock and poultry can also add to manure, but only in limited amounts.

### (1) Wasted feed

Wasted feed can add nutrients and solids to the waste stream. Even though management can minimize the amount of feed wasted, a certain amount of feed that is presented to livestock and poultry will not be eaten. Correcting the excreted values to account for what could be considered normal wasted feed would usually be small compared to the range of values in the excreted manure that result from variations in diet intake and animal performance levels. However, if wasted feed appears to be excessive, the table values should be adjusted to account for it.

### (2) Wasted water

Wasted water must be expected and controlled. Excess moisture content and increased waste volume can hamper equipment operation and limit the capacity of manure handling and storage facilities. Faulty waterers and leaky distribution lines cause severe limitations. Excess water from foggers and misters used for cooling stock in hot weather may also need to be accounted for in system design.

### (3) Flush water

Flush water added to the waste stream will affect the consistency of the manure to the extent fresh water is added to the system. Using recycled water for flushing minimizes the amount of water added and needing to be managed.

### (4) Precipitation/evaporation

Precipitation and evaporation can impact the physical characteristics of manure significantly, depending on the region. In regions of high precipitation, the added water can impact the consistency of the manure unless management excludes it. Evaporation, on the other hand can reduce the amount of water in the manure. But again, management of the manure will determine its impact. For example, allowing a crust to form on a waste storage pond will reduce evaporation.

### (5) Bedding

Livestock producers use a wide range of bedding materials as influenced by availability, cost, and performance properties. Both organic and inorganic materials have been used successfully. Unit weights of materials commonly used for bedding dairy cattle are given in table 4-3.

Quantities of bedding materials used for dairy cattle are shown in table 4-4. The total weight of dairy manure and bedding is the sum of the weights of both parts. The total volume of dairy manure and bedding is the sum of the

**Table 4-3** Unit weights of common bedding materials <sup>1/</sup>

Material	Loose	Chopped
	-----lb/ft <sup>3</sup> -----	
Legume hay	4.3	6.5
Non legume hay	4.0	6.0
Straw	2.5	7.0
Wood shavings	9.0	
Sawdust	12	
Soil	75	
Sand	105	
Ground limestone	95	

1/ Adapted from the 1992 version of the AWMFH

**Table 4-4** Daily bedding requirements for dairy cattle <sup>1/</sup>

Material	Barn type		
	Stanchion stall	Free-stall	Loose housing
----- lb/d/1000 lb -----			
Loose hay or straw	5.4		9.3
Chopped hay or straw	5.7	2.7	11
Shavings or sawdust		3.1	
Sand, or limestone		35 <sup>2/</sup>	

1/ Adapted from the 1992 version of the AWMFH

2/ Table 13, Manure Characteristics, Midwest Planning Service Section 1.

manure volume plus half of the bedding volume. Only half of the bedding volume is used to compensate for the void space in bedding materials. Typically, broiler producers replace the bedding material after three to six batches or once or twice a year. The typical 20,000-bird house requires about 10 tons of wood shavings for a bedding depth of 3 to 4 inches.

### (6) Soil

Soil can also be added to manure after it is excreted. Its presence is most common on dairies and beef operations where cattle are confined in earthen feedlots or are pastured as a part of their routine. Dry soil adheres to the animals' bodies in limited amounts. Wet soil or mud adheres even more, and either falls off or is washed off at the dairy barn. Soil and other inorganic materials used for freestall base and bedding are also added to the manure. Soil or other inorganic materials commonly added to manure can result in a waste that has double the fixed solids content of as excreted dairy manure.

### (7) Biological activity

Biological activity can begin almost immediately after manure has been excreted. This activity, of course, changes both the physical and chemical aspects of the manure. The manure can be managed to either increase or decrease biological activity. For example, manure can be treated in a waste treatment lagoon for the specific purpose of providing the environment for biological activity to reduce the pollution potential of the manure. Another example is managing the manure so that urine and feces mixes. This mixing initiates biological activity that releases ammonia resulting in a decrease in the nitrogen content of the manure. Separating urine and feces will eliminate this nutrient loss.

## (c) Dairy

Manure characteristics for lactating and dry cows and for calves and heifers are listed in table 4-5.

Quantities of dairy manure vary widely from small cows to large cows and between cows at low production and high production levels. Dairy feeding systems and equipment often waste feed, which in most cases is added to the manure. Dairy cow stalls are often covered with bedding materials that improve animal comfort and cleanliness. Virtually all of the organic and inorganic bedding materials used for this purpose will eventually be pushed, kicked, and carried from the stalls and added to the manure. The characteristics of these bedding materials will blend with those of the manure. Quantities of

bedding materials added to cow stalls and resting areas are shown in table 4-4.

Dairy cattle excretion varies dramatically with milk production as illustrated in table 4-5. Higher producing herds will have higher feed intake and greater total manure and manure nutrient excretion. Recognition of herd milk production is critical to making reasonable estimates of manure excretion. Concentration of nutrients fed also varies significantly between herds. Farm management decisions on degree of addition of supplemental protein and minerals can have substantial impact on the quantity of nitrogen and phosphorus that must be addressed by a nutrient management plan. The equations should be used instead of the as excreted table values to reflect this variation.

Milking centers—The amount of water used by dairies ranges widely. Since the amount used will have a significant impact on the volume that must be managed, the preferred approach is to actually measure it. Table 4-6 provides a range of water usage for various operations. Table 4-7 gives typical characterization of milking center wastewater.

### Example 4-5

Estimate the daily production of volume manure and pounds of N, P, and K for 500 lactating Holstein cows with an average weight of 1,400 pounds and with an average milk production of 100 pounds per day.

Using table 4-5(a), for 500 Holstein lactating cows:

$$\begin{aligned} \text{Volume} &= 2.6 \text{ ft}^3/\text{d-a} \times 500 = 1,300 \text{ ft}^3/\text{d} \\ \text{N} &= 1.0 \text{ lb}/\text{d-a} \times 500 = 500 \text{ lb}/\text{d} \\ \text{P} &= 0.19 \text{ lb}/\text{d-a} \times 500 = 95 \text{ lb}/\text{d} \\ \text{K} &= 0.49 \text{ lb}/\text{d-a} \times 500 = 245 \text{ lb}/\text{d} \end{aligned}$$

Using table 4-5(b), for 500 Holstein lactating cows:

$$\begin{aligned} \text{Volume} &= 1.9 \text{ ft}^3/\text{d}/1000 \text{ lb AU} \times 500 \times \frac{1400}{1000} \\ &= 1,330 \text{ ft}^3/\text{d} \\ \text{N} &= 0.76 \text{ lb}/\text{d}/1000 \text{ lb AU} \times 500 \times \frac{1400}{1000} \\ &= 532 \text{ lb}/\text{d} \\ \text{P} &= 0.14 \text{ lb}/\text{d}/1000 \text{ lb AU} \times 500 \times \frac{1400}{1000} \\ &= 98 \text{ lb}/\text{d} \\ \text{K} &= 0.35 \text{ lb}/\text{d}/1000 \text{ lb AU} \times 500 \times \frac{1400}{1000} \\ &= 245 \text{ lb}/\text{d} \end{aligned}$$

**Table 4-5** Dairy manure characterization—as excreted(a) In units per day-animal <sup>1/</sup>

Components	Units	Lactating cow <sup>2/</sup> Milk production, lb/d				Milk-fed calf	Calf	Heifer	Dry cow <sup>2/</sup>
		50	75	100	125	125 lb	330 lb	970 lb	
Weight	lb/d-a	133	148	164	179		27	54	85
Volume	ft <sup>3</sup> /d-a	2.1	2.4	2.6	2.9		0.44	0.87	1.4
Moisture	% wet basis	87	87	87	87		83	83	87
Total solids	lb/d-a	17	19	21	23		3.0	8.3	11.0
VS <sup>3/</sup>	lb/d-a	14	16	18	20		3.0	7.1	9.3
BOD	lb/d-a	2.9						1.2	1.4
N	lb/d-a	0.90	0.97	1.04	1.11	0.017	0.14	0.26	0.50
P <sup>a</sup>	lb/d-a	0.15	0.17	0.19	0.21		0.02	0.04	0.07
K <sup>a</sup>	lb/d-a	0.41	0.45	0.49	0.52		0.04	0.11	0.16

1/ ASAE D384.2, March 2005

2/ Assumes 1,375 lb lactating cow and 1,660 lb dry cow. Excretion values for P and K not in bold are based on the assumption that intake is equal to excretion

3/ VS based on 85% of TS

(b) In units per day per 1,000 lb animal unit

Components	Units	Lactating cow milk production, lb/d				Milk-fed calf	Calf	Heifer	Dry cow
		50	75	100	125	125 lb	330 lb	970 lb	
Weight	lb/d/1000 lb AU	97	108	119	130		83	56	51
Volume	ft <sup>3</sup> /d/1000 lb AU	1.6	1.7	1.9	2.1		1.3	0.90	0.84
Moisture	% wet basis	87	87	87	87		83	83	87
Total solids	lb/d/1000 lb AU	12	14	15	17		9.2	8.5	6.6
VS	lb/d/1000 lb AU	9.2	11	12	13		7.7	7.3	5.6
BOD	lb/d/1000 lb AU	2.1						1.2	0.84
N	lb/d/1000 lb AU	0.66	0.71	0.76	0.81	0.11	0.42	0.27	0.30
P	lb/d/1000 lb AU	0.11	0.12	0.14	0.15		0.05	0.05	0.042
K	lb/d/1000 lb AU	0.30	0.33	0.35	0.38		0.11	0.12	0.10

(c) Jersey cows in units per day per 1,000-lb animal unit <sup>1/</sup>

Components	Units	Lactating cow milk production, lb/d		
		45	60	75
Weight	lb/d/1000 lb AU	116	130	144
Total solids	lb/d/1000 lb AU	15	17	19
N	lb/d/1000 lb AU	0.72	0.80	0.88
P	lb/d/1000 lb AU	0.12	0.13	0.15
K	lb/d/1000 lb AU	0.42	0.46	0.50

1/ Excretion values were determined using intake based equations. Although the intake-based equations were developed for Holsteins, Blake et al. (1986) and Kauffman and St-Pierre (2001) found similar dry matter digestibility between breeds. Excretion estimates were determined using average dry matter intakes for Jersey cows (NRC 2001). Nutrient excretion estimates were based on cow consuming a diet containing 17 percent CP, 0.38 percent P, and 1.5 percent K.



**Table 4-6** Dairy water use for various operations

(a) Milking center			(b) Alley flushing <sup>2/</sup>			
Operation		Water use	Alley slope (%)	Flow depth (in)	Flow rate (gpm) <sup>1/</sup>	Flush volume (gal) <sup>1/</sup>
Bulk Tank	Automatic	50–60 gal/wash	1.0	7.0	1,306	220
	Manual	30–40 gal/wash	1.5	5.0	933	156
Pipeline	In parlor	75–125 gal/wash	2.0	4.0	747	125
Pail milkers		30–40 gal/wash	2.5	3.4	635	106
Miscellaneous equipment		30 gal/d	3.0	3.0	560	94
Cow Preparation	Automatic	1–4.5 gal/wash/cow	1/ Per foot of alley width			
	Estimated avg.	2 gal/wash/cow	2/ Table adapted from the Midwest Plan Service Dairy Housing and Equipment Handbook, 2000			
	Manual	0.25–0.5 gal/wash/d				
Parlor floor						
	Cleaned with a hose	20–40 gal/milking				
	Flush	800–2100 gal/milking				
	Well water pre-cooler	2 gal/gal of milk cooled				
Milkhouse		10–20 gal/d				

**Table 4-7** Dairy waste characterization—milking center <sup>1/</sup>

Component	Units	Milking center <sup>2/</sup>			
		MH	MH+MP	MH+MP+HA <sup>3/</sup>	MH+MP+HA <sup>4/</sup>
Volume	ft <sup>3</sup> /d/1000 lb	0.22	0.60	1.4	1.6
Moisture	%	100	99	100	99
TS	% w.b.	0.28	0.60	0.30	1.5
VS	lb/1000 gal	13	35	18	100
FS	lb/1000 gal	11	15	6.7	25
COD	lb/1000 gal	25	42		
BOD	lb/1000 gal		8.4		
N	lb/1000 gal	0.72	1.7	1.0	7.5
P	lb/1000 gal	0.58	0.83	0.23	0.83
K	lb/1000 gal	1.5	2.5	0.57	3.3
C:N ratio		10	12	10	7.0

1/ Adapted from the 1992 version of the AWMFH

2/ MH–Milk house; MP–Milking parlor; HA–Holding area

3/ Holding area scraped and flushed—manure excluded

4/ Holding area scraped and flushed—manure included

**(d) Beef**

Table 4–8 lists characteristics of as excreted beef manure. Feedlot manure varies widely because of climate, type of feedlot surface, and management. Typical values for feedlot manure are given later in table 4–16. Nutrient loss from feedlot manure is highly influenced by management factors such as moisture control, animal density, and cleaning frequency. The type of feedlot surface, earthen or paved, has impacts, as well. The soil in unsurfaced beef feedlots is readily incorporated with the manure due the animal movement and cleaning operations. Surfaced feedlots produce more runoff than unsurfaced lots. Runoff water from beef feedlots also exhibits wide variations in nutrient content character (table 4–9).

Moisture content of beef feedlot manure drops significantly over time from its as excreted 90 percent to about 30 percent. If the feedlot surface is too dry, dust will become a problem. If it remains too wet, odor may become a concern. Feedlot surface moisture of 25 to 35 percent will generally minimize odor, fly, and dust problems. For characteristics of manure solids from a beef feedlot, see table 4–16.

Nitrogen loss from feedlots can be by runoff, leaching, and ammonia volatilization. As much as 50 percent of the nitrogen deposited on feedlots may be lost as am-

monia. The major source of ammonia is urea from urine, which can easily be converted to ammonia (NH<sub>3</sub>), a gas. Urea may account for 40 percent to more than 50 percent of nitrogen excreted in manure; therefore, it has a potential for rapid loss. The volatilization of nitrogen as ammonia depends on temperature, moisture content, pH, air movement, and other factors. Ammonia is soluble in water, which could be a potential threat if feedlot runoff comes in contact with surface or ground water.

Once excreted, phosphorus is fairly stable. The usual path of phosphorus loss is through runoff. As such, feedlot runoff control measures will reduce the environmental impact of phosphorus.

Feeding of by-products from the food and corn processing industries is becoming common in beef cattle production. Use of distillers grains from the production of ethanol is growing rapidly in regions with significant corn production. Cattle diets commonly contain 20 percent distillers grains on a dry matter basis and 40 percent inclusion is becoming increasingly common. The distillers by-product contains a concentrated source of both protein and phosphorus. Use of these by-products can typically results in higher intakes of protein and phosphorus, resulting in higher excretion of nitrogen and phosphorus (table 4–8). Nutrient management plans will need to reflect the impact of by-product feeding.

**Table 4–8** Beef waste characterization—as excreted

(a) Cow and growing calf in units per day-animal <sup>1/</sup>

Components	Units	Beef cow in confinement	Growing calf confined 450–750 lb
Weight	lb/d-a	125	50
Volume	ft <sup>3</sup> /d-a	2.0	0.8
Moisture	% w.b.	88	88
TS	lb/d-a	15	6.0
VS	lb/d-a	13	5.0
BOD	lb/d-a	3.0	1.1
N	lb/d-a	0.42	0.29
P	lb/d-a	0.097	0.055
K	lb/d-a	0.30	0.19

1/ Beef cow values are representative of animals during nonlactating period and first 6 months of gestation

(b) Cow and growing calf in units per day per 1,000 lb animal unit <sup>1/</sup>

Components	Units	Beef cow in confinement <sup>2/</sup>	Growing calf confined 450–750 lb <sup>3/</sup>
Weight	lb/d/1000 lb AU	104	77
Volume	ft <sup>3</sup> /d/1000 lb AU	1.7	1.2
Moisture	% w.b.	88	88
TS	lb/d/1000 lb AU	13	9.2
VS	lb/d/1000 lb AU	11	7.7
BOD	lb/d/1000 lb AU	2.5	1.7
N	lb/d/1000 lb AU	0.35	0.45
P	lb/d/1000 lb AU	0.08	0.08
K	lb/d/1000 lb AU	0.25	0.29

1/ Beef cow values are representative of animals during nonlactating period and first 6 months of gestation

2/ Equals table 4–8a value x (1000 lb/1200 lb wt.)

3/ Equals table 4–8a value x (1000 lb/650 lb avg. wt.)

**Table 4–8** Beef waste characterization—as excreted—Continued(c) Finishing cattle excretion in units per finished animal <sup>1/</sup>

Components	Units	Finishing cattle			
		Corn, no supplemental P	Corn with supplemental P	Corn with 25% wet distillers grains	Corn with 30% wet corn gluten feed
Weight	lb/f.a.	9,800	9,800		
Volume	ft <sup>3</sup> /f.a.	160	160		
Moisture	% w.b.	92	92		
TS	lb/f.a.	780	780		
VS	lb/f.a.	640	640		
BOD	lb/f.a.	150	150		
N	lb/f.a.	53	53	75	66
P	lb/f.a.	6.6	8.3	10	11
K	lb/f.a.	38	38		

<sup>1/</sup> Assumes a 983 lb finishing animal fed for 153 days(d) Finishing cattle in units per day per 1,000 lb animal unit <sup>1/</sup>

Components	Units	Finishing cattle			
		Corn, no supplemental P	Corn with supplemental P	Corn with 25% wet distillers grains	Corn with 30% wet corn gluten feed
Weight	lb/d/1000 lb AU	65	65		
Volume	ft <sup>3</sup> /d/1000 lb AU	1.1	1.1		
Moisture	% w.b.	92	92		
TS	lb/d/1000 lb AU	5.2	5.2		
VS	lb/d/1000 lb AU	4.3	4.3		
BOD	lb/d/1000 lb AU	1.0	1.0		
N	lb/d/1000 lb AU	0.36	0.36	0.50	0.44
P	lb/d/1000 lb AU	0.044	0.056	0.069	0.076
K	lb/d/1000 lb AU	0.25	0.25		

**Table 4–9** Nitrogen content of cattle feedlot runoff (Alexander and Margheim 1974) <sup>1/2</sup>

Annual rainfall	Below-average conditions <sup>3/</sup>	Average conditions <sup>4/</sup>	Above-average conditions <sup>5/</sup>
<25 in	360	110	60
25 to 35 in	60	30	15
>35 in	15	10	5

<sup>1/</sup> Adapted from the 1992 version of the AWMFH<sup>2/</sup> Applies to waste storage ponds that trap rainfall runoff from uncovered, unpaved feedlots. Cattle feeding areas make up 90 percent or more of the drainage area. Similar estimates were not made for phosphorus and potassium. Phosphorus content of the runoff will vary inversely with the amount of solids retained on the lot or in settling facilities.<sup>3/</sup> No settling facilities are between the feedlot and pond, or the facilities are ineffective. Feedlot topography and other characteristics are conducive to high solids transport or cause a long contact time between runoff and feedlot surface. High cattle density—more than 250 head per acre.<sup>4/</sup> Sediment traps, low gradient channels, or natural conditions that remove appreciable amounts of solids from runoff. Average runoff and solids transport characteristics. Average cattle density—125 to 250 head per acre.<sup>5/</sup> Highly effective solids removal measures such as vegetated filter strips or settling basins that drain liquid waste through a pipe to storage pond. Low cattle density—less than 120 head per acre.

**(e) Swine**

Swine waste and waste management systems have been widely studied, and much has been reported on swine manure properties. Table 4–10 lists characteristics of as

excreted swine manure from feeding and breeding stock. Breeding stock manure characteristics, also shown in table 4–10, are subject to less variation than those for growing animals.

**Table 4–10** Swine waste characterization—as excreted(a) Mature swine in units per day-animal <sup>1/</sup>

Components	Units	Sow		Boar 440 lb
		Gestating 440 lb	Lactating 423 lb	
Weight	lb/d-a	11	25	8.4
Volume	ft <sup>3</sup> /d-a	0.18	0.41	0.13
Moisture	% w.b.	90	90	90
TS	lb/d-a	1.1	2.5	0.84
VS	lb/d-a	1.0	2.3	0.75
BOD	lb/d-a	0.37	0.84	0.29
N	lb/d-a	0.071	0.19	0.061
P	lb/d-a	0.020	0.055	0.021
K	lb/d-a	0.048	0.12	0.039

1/ Table 1.b, ASAE D384.2, March 2005

(b) Immature swine in units of per finished animal

Components	Units	Nursery pig	Grow to finish
		27.5 lb	154 lb
Weight	lb/f.a	87	1200
Volume	ft <sup>3</sup> /f.a.	1.4	20
Moisture	% w.b.	90	90
TS	lb/f.a.	10	120
VS	lb/f.a.	8.7	99
BOD	lb/f.a.	3.4	38
N	lb/f.a.	0.91	10
P	lb/f.a.	0.15	1.7
K	lb/f.a.	0.35	4.4

(c) Mature swine in units per day per 1,000 lb animal unit

Components	Units	Sow		Boar <sup>3/</sup>
		Gestating <sup>1/</sup>	Lactating <sup>2/</sup>	
Weight	lb/d-1000 AU	25	59	19
Volume	lb/d-1000 AU	0.41	0.97	0.30
Moisture	% w.b.	90	90	90
TS	lb/d-1000 AU	2.5	5.9	1.9
VS	lb/d-1000 AU	2.3	5.4	1.7
BOD	lb/d-1000 AU	0.84	2.0	0.66
N	lb/d-1000 AU	0.16	0.45	0.14
P	lb/d-1000 AU	0.05	0.13	0.05
K	lb/d-1000 AU	0.11	0.28	0.09

1/ Table 4–10(a) value × (1000 lb/440 lb avg. wt.)

2/ Table 4–10(a) value × (1000 lb/423 lb avg. wt.)

3/ Table 4–10(a) value × (1000 lb/440 lb avg. wt.)

(d) Immature swine in units of per day per 1,000 lb animal unit

Components	Units	Nursery <sup>1/</sup>	Grow to finish <sup>2/</sup>
		Weight	lb/d/1000 lb AU
Volume	ft <sup>3</sup> /d/1000 lb AU	1.4	1.1
Moisture	% w.b.	90	90
TS	lb/d/1000 lb AU	10	6.5
VS	lb/d/1000 lb AU	8.8	5.4
BOD	lb/d/1000 lb AU	3.4	2.1
N	lb/d/1000 lb AU	0.92	0.54
P	lb/d/1000 lb AU	0.15	0.09
K	lb/d/1000 lb AU	0.35	0.24

1/ Table 4–10(c) value × (1000 lb/27.5 lb avg. wt.)/36 days fed

2/ Table 4–10(c) value × (1000 lb/154 lb avg. wt.)/120 days fed

**Example 4–6**

Estimate the total volatile and fixed solids produced daily in the manure of a grow-to-finish pig with an average weight of 154 pounds with a 120-day feeding period.

From table 4–10(b), in terms of mass per finished animal, read TS = 120 lb per finished animal and VS = 99 lb per finished animal.

To calculate the daily total solid production per day, divide the per finished animal VS value by the tenure of the animal in the feeding period.

$$\text{lb VS/d} = \frac{99}{120} = 0.82 \text{ lb VS/d}$$

To calculate FS daily production, the fixed solids per finished animal must be first determined.

$$\begin{aligned} \text{FS} &= \text{TS} - \text{VS} \\ &= 120 - 99 \\ &= 21 \text{ lb} \end{aligned}$$

The daily FS production is calculated by dividing the per finished animal FS production by the animal's tenure in the feeding period.

$$\text{lb FS/d} = \frac{21}{120} = 0.18 \text{ lb FS/d}$$

**Example 4–7**

Estimate the average daily volatile solids production in the manure of 1,000 grow-to-finish pigs with an average weight of 154 pounds over the 120 days feeding period.

Using table 4–10(b), select

$$\text{VS} = 99.00 \text{ lb/f.a.}$$

$$\begin{aligned} \text{VS production for 1,000 animals} &= \\ 99.00 \text{ lb/f.a.} \times 1000 \text{ f.a.} &= 99,000 \text{ lb} \\ \text{VS daily production} &= 99,000 \text{ lb}/120 \text{ d} = 825 \text{ lb/d} \end{aligned}$$

Using table 4–10d, select

$$\text{VS} = 5.4 \text{ lb/d}/1000 \text{ lb AU}$$

$$\begin{aligned} \text{VS lb/d} &= 5.36 \text{ lb/d}/1000 \text{ AU} \times 1000 \text{ animals} \times 154 \text{ lb/animal} \\ &= 832 \text{ lb/d} \end{aligned}$$

**(f) Poultry**

Because of the high degree of industry integration, standardized rations, and complete confinement, layer and broiler manure characteristics vary less than those of other species. Turkey production is approaching the same status. Table 4–11 presents waste characteristics for as excreted poultry manure.

Table 4–16 lists data for poultry flocks that use a litter (floor) system. Bedding materials, whether wood, crop, or other residue, are largely organic matter that has little nutrient component. Litter moisture in a well-managed house generally is in the range of 25 to 35 percent. Higher moisture levels in the litter result in greater weight and reduced mass concentration of nitrogen.

Most broiler houses are now cleaned out one or two times a year. Growers generally have five or six flocks

of broilers each year, and it is fairly common to take the “cake” out after each flock. The cake generally consists of the surface crust and wet spots that have clumped together. About 1 or 2 inches of new bedding is placed on the floor before the next flock.

When a grower manages for a more frequent, complete cleanout, the data in table 4–16 will require adjustment. The birds still produce the same amount of N, P, and K per day. However, the density and moisture content of the litter is different with a more frequent cleanout. The nutrient concentrations may also be lower since there is less time for the nutrients to accumulate, and the ratio of bedding to manure may be higher. A further complication is that nitrogen is lost to the atmosphere during storage while fresh manure is being continually deposited. This can create significant variations based on litter management.

**Table 4–11** Poultry waste characterization—as excreted

(a) Layer waste characterization in units of per day animal <sup>1/</sup>

Components	Units	Layers
Weight	lb/d-a	0.19
Volume	ft <sup>3</sup> /d-a	0.0031
Moisture	% w.b.	75
TS	lb/d-a	0.049
VS	lb/d-a	0.036
BOD	lb/d-a	0.011
N	lb/d-a	0.0035
P	lb/d-a	0.0011
K	lb/d-a	0.0013

<sup>1/</sup> Table 12(a) ASAE D384.2, March 2005

(b) Layer in units of per day per 1,000 lb animal unit

Components	Units	Layers <sup>1/</sup>
Weight	lb/d/1000 lb AU	57
Volume	ft <sup>3</sup> /d/1000 lb AU	0.93
Moisture	% w.b.	75
TS	lb/d/1000 lb AU	15
VS	lb/d/1000 lb AU	11
BOD	lb/d/1000 lb AU	3.3
N	lb/d/1000 lb AU	1.1
P	lb/d/1000 lb AU	0.33
K	lb/d/1000 lb AU	0.39

<sup>1/</sup> Table 4–11(a) value × (1000 lb/3 lb avg. wt.) × (0.90)



**Table 4–11** Poultry waste characterization—as excreted—Continued(c) Meat production poultry in units per finished animal <sup>1/</sup>

Components	Units	Broiler	Turkey (toms)	Turkey (hens)	Duck
Weight	lb/f.a.	11	78	38	14
Volume	ft <sup>3</sup> /f.a.	0.17	1.3	0.61	0.23
Moisture	% w.b.	74	74	74	74
TS	lb/f.a.	2.8	20	9.8	3.7
VS	lb/f.a.	2.1	16	7.8	2.2
BOD	lb/f.a.	0.66	5.2	2.4	0.61
N	lb/f.a.	0.12	1.2	0.57	0.14
P	lb/f.a.	0.035	0.36	0.16	0.048
K	lb/f.a.	0.068	0.57	0.25	0.068

<sup>1/</sup> Table 12(a) ASAE D384.2, March 2005

(d) Meat production poultry in units per day per 1,000 lb animal unit

Components	Units	Broiler <sup>1/</sup>	Turkey (toms) <sup>2/</sup>	Turkey (hens) <sup>3/</sup>	Duck <sup>4/</sup>
Weight	lb/d/1000 lb AU	88	34	48	102
Volume	ft <sup>3</sup> /d/1000 lb AU	1.4	0.57	0.77	1.7
Moisture	% w.b.	74	74	74	74
TS	lb/d/1000 lb AU	22	8.8	12	27
VS	lb/d/1000 lb AU	17	7.1	9.8	16
BOD	lb/d/1000 lb AU	5.3	2.3	3.0	4.5
N	lb/d/1000 lb AU	0.96	0.53	0.72	1
P	lb/d/1000 lb AU	0.28	0.16	0.20	0.35
K	lb/d/1000 lb AU	0.54	0.25	0.31	0.50

<sup>1/</sup> Table 4–11(c) value × (1000 lb / 2.6 lb avg. wt.) / 48 days on feed<sup>2/</sup> Table 4–11(c) value × (1000 lb / 17.03 lb avg. wt.) / 133 days on feed<sup>3/</sup> Table 4–11(c) value × (1000 lb / 7.57 lb avg. wt.) / 105 days on feed<sup>4/</sup> Table 4–11(c) value × (1000 lb / 3.51 lb avg. wt.) / 39 days on feed

**Example 4–8**

Determine the volume of litter and the amount N, P, and K produced for a 20,000-bird broiler house for six flocks between cleanouts. Assume the house is initially bedded with 10 tons of sawdust and that it is top-dressed with 5 tons between each flock.

Using table 4–11(c), select for broilers

$$\begin{aligned}\text{Volume} &= 0.17 \text{ ft}^3/\text{f.a.} \\ \text{N} &= 0.12 \text{ lb/f.a.} \\ \text{P} &= 0.035 \text{ lb/f.a.} \\ \text{K} &= 0.068 \text{ lb/f.a.}\end{aligned}$$

For six 20,000-bird flocks the excreted amounts are:

$$\text{Volume} = 0.17 \text{ ft}^3/\text{f.a.} \times 6 \text{ flocks} \times 20,000 \text{ f.a./flock} = 20,400 \text{ ft}^3$$

$$\text{N} = 0.12 \text{ lb/f.a.} \times 6 \text{ flocks} \times 20,000 \text{ f.a./flock} = 14,400 \text{ lb}$$

$$\text{P} = 0.035 \text{ lb/fa} \times 6 \text{ flocks} \times 20,000 \text{ fa/flock} = 4,200 \text{ lb}$$

$$\text{K} = 0.068 \text{ lb/f.a.} \times 6 \text{ flocks} \times 20,000 \text{ f.a./flock} = 8,160 \text{ lb}$$

The sawdust used does not add nutrients, but it adds to the volume of the litter.

From table 4–3, select for sawdust 12 lb/ft<sup>3</sup>

$$\begin{aligned}\text{Volume of sawdust placed} &= \\ (10 \text{ tons} + 5 \text{ top-dressings} \times 5 \text{ ton each}) & \\ &= 35 \text{ tons} \\ (35 \text{ tons} \times 2000 \text{ lb/ton}) / 12 \text{ lb/ft}^3 &= 5,833 \text{ ft}^3\end{aligned}$$

As a rule of thumb, the volume of the sawdust will be reduced by approximately half due to volatilization of carbon, removal of cake, and consolidation and filling of voids with poultry excrement.

$$\begin{aligned}\text{Volume of sawdust added to manure} &= \\ 5,833 \text{ ft}^3 \times 0.5 &= 2,916 \text{ ft}^3\end{aligned}$$

$$\begin{aligned}\text{Total volume of litter} &= \\ \text{excreted volume} + \text{volume of sawdust} &= \\ 20,400 \text{ ft}^3 + 2,916 \text{ ft}^3 &= 23,317 \text{ ft}^3\end{aligned}$$

Layer lagoon sludge is much denser than pullet lagoon sludge because of its high grit or limestone content. Layer lagoon sludge accumulates at the rate of about 0.0294 cubic foot per pound of total solids added to the lagoon, and pullet lagoon sludge accumulates at the rate of 0.0454 cubic foot per pound total solids. This is equivalent to about 0.6 cubic foot per layer and 0.3 cubic foot per pullet annually.

**(g) Veal**

Data on manure characteristics from veal production are shown in table 4–12. Sanitation in veal production is an extremely important factor, and waste management facilities should be planned for handling as much as 3 gallons of wash water per day per calf.

**(h) Sheep**

As excreted manure characteristics for sheep are limited to those for the feeder lamb (table 4–13). In some cases, bedding may be a significant component of sheep waste.

**Table 4–12** Veal waste characterization—as excreted <sup>1/</sup>

Component	Units	Veal feeder
Weight	lb/d/1000 lb AU	60
Volume	ft <sup>3</sup> /d/1000 lb AU	0.96
Moisture	%	98
TS	% w.b.	2.5
	lb/d/1000 lb AU	1.5
VS	lb/d/1000 lb AU	0.85
FS	lb/d/1000 lb AU	0.65
COD	lb/d/1000 lb AU	1.5
BOD <sub>5</sub>	lb/d/1000 lb AU	0.37
N	lb/d/1000 lb AU	0.20
P	lb/d/1000 lb AU	0.03
K	lb/d/1000 lb AU	0.25
C:N ratio		2.0

<sup>1/</sup> Adapted from the 1992 version of the AWMFH

**(i) Horse**

Table 4–14 lists characteristics of as excreted horse manure. Because large amounts of bedding are used in the stables of most horses, qualities and quantities of wastes from these stables generally are dominated by the kind and volume of bedding used.

Table 4–14 values apply to horses 18 months of age or older that are not pregnant or lactating. The representative number applies to 1,100-pound horses, and the range represents horses from 880 to 1,320 pounds. Sedentary would apply to horses not receiving any imposed ex-

**Table 4–13** Lamb waste characterization—as excreted <sup>1/</sup>

Component	Units	Lamb
Weight	lb/d/1000 lb AU	40
Volume	ft <sup>3</sup> /d/1000 lb AU	0.63
Moisture	%	75
TS	% w.b.	25
	lb/d/1000 lb AU	10
VS	lb/d/1000 lb AU	8.3
FS	lb/d/1000 lb AU	1.8
COD	lb/d/1000 lb AU	11
BOD <sub>5</sub>	lb/d/1000 lb AU	1.0
N	lb/d/1000 lb AU	0.45
P	lb/d/1000 lb AU	0.07
K	lb/d/1000 lb AU	0.30
C:N ratio		10

<sup>1/</sup> Adapted from the 1992 version of the AWMFH

**Table 4–14** Horse waste characterization—as excreted

(a) Horse in units/day-animal

Components	Units	Sedentary (1,100 lb)	Exercised (1,100) lb
Weight	lb/d-a	56	57
Volume	ft <sup>3</sup> /d-a	0.90	0.92
Moisture	% w.b.	85	85
TS	lb/d-a	8.4	8.6
VS	lb/d-a	6.6	6.8
BOD	lb/d-a	1.1	1.1
N	lb/d-a	0.20	0.34
P	lb/d-a	0.029	0.073
K	lb/d-a	0.060	0.21

(b) Horse in units/d/1,000 lb animal unit

Components	Units	Sedentary <sup>1/</sup>	Exercised <sup>1/</sup>
Weight	lb/d/1000 lb AU	51	52
Volume	ft <sup>3</sup> /d/1000 lb AU	0.82	0.84
Moisture	% w.b.	85	85
TS	lb/d/1000 lb AU	7.6	7.8
VS	lb/d/1000 lb AU	6.0	6.2
BOD	lb/d/1000 lb AU	1.0	1.0
N	lb/d/1000 lb AU	0.18	0.31
P	lb/d/1000 lb AU	0.026	0.066
K	lb/d/1000 lb AU	0.05	0.19

<sup>1/</sup> Table 4–14(a) value × (1000 lb/1100 lb avg. wt.)

ercise. Dietary inputs are based on minimum nutrient requirements specified in Nutrient Requirements of Horses (NRCS 1989). Intense represents horses used for competitive activities such as racing. Dietary inputs are based on a survey of race horse feeding practices (Gallagher et al. 1992) and typical feed compositions (forage=50% alfalfa, 50% timothy; concentrate = 30% oats, 70% mixed performance horse concentrate).

### (j) Rabbit

Some properties of rabbit manure are listed in table 4–15. The properties refer only to the feces; no urine has been included. Reliable information on daily production of rabbit manure, feces, or urine is not available.

**Table 4–15** Rabbit waste characterization—as excreted <sup>1/</sup>

Components	Units	Rabbit
VS	% d.b.	0.86
FS	% d.b.	0.14
COD	% d.b.	1.0
N	% d.b.	0.03
P	% d.b.	0.02
K	% d.b.	0.03
C:N ratio		16

<sup>1/</sup> Adapted from the 1992 version of the AWMFH

## 651.0404 Manure as transferred for utilization

Many physical, chemical, and biological processes can alter manure characteristics from its original as-excreted form. The as transferred for utilization production and characteristics values reported in table 4–16 allow for common modifications to excreted manure resulting from water addition or removal, bedding addition, and/or treatment processes. These estimates may be helpful for individual farm long-term planning prior to any samples being available and for planning estimates addressing regional issues. Whenever possible, site-specific samples or other more localized estimates should be used in lieu of national tabular estimates. To use table 4–16 to develop individual year nutrient management plans for defining field-specific application rates would be a misuse of the data. Where site-specific data are unavailable, this table may provide initial estimates for planning purposes until site-specific values are available. Chapter 11 of this handbook also presents another method of calculating as transferred for utilization values. The nutrient accounting methodology presented in chapter 11 adjusts as excreted nutrient values utilizing nutrient loss factors based on the type of management system in place.

**Table 4–16** Manure as transferred for utilization(a) Values <sup>1/</sup>

	Mass (lb/hd/d)	Moisture (% wb)	TS (% wb)	VS (% TS)	TKN (% wb)	NH <sub>3</sub> -N (% wb)	P (% wb)	K (% wb)
<b>Beef</b>								
Earthen lot	17	33	67	30	1.2	0.10	0.50	1.3
<b>Poultry</b>								
Leghorn pullets	No data	65	40		2.1	0.85	1.0	1.1
Leghorn hen	0.066	59	40		1.9	0.88	1.2	1.3
Broiler litter	0.044	31	70	70	3.7	0.75	0.60	1.4
Turkey litter	0.24	30			2.2		0.33	1.2
<b>Dairy</b>								
Scraped earthen lots	77	54	46		0.70		0.25	0.67
Scraped concrete lots	88	72	25		0.53		0.13	0.40
Lagoon effluent	234	98	2	52	0.073	0.08	0.016	0.11
Slurry (liquid)	148	92	8	66	0.30	0.14	0.13	0.40
<b>Equine</b>								
Solid manure								
Residential	71	43	65	26	0.76		0.24	0.99
Commercial	101							
<b>Swine</b>								
Finisher-Slurry, wet-dry feeders	6.6–8.8	91	9.0		0.70	0.50	0.21	0.24
Slurry storage- dry feeders	9.9	94	6.1		0.47	0.34	0.18	0.24
Flush building	35	98	2.0		0.20	0.14	0.07	0.17
Agitated solids and water		98	2.2		0.10	0.05	0.06	0.06
Lagoon surface water		99.6	0.40		0.06	0.04	0.02	0.07
Lagoon sludge		90	10		0.26	0.07	0.25	0.07

1/ Adapted from ASAE D384.2, table 19

**Table 4-16** Manure as transferred for utilization—Continued

(b) Expressed as 1,000-lb animal units

Type of production	Mass in lb/AU/d, wet basis	Moisture, % wet basis <sup>2,3</sup>	Total solids % wet basis <sup>3</sup>	Total solids, lb/AU/d	Volatile solids, % of TS	Volatile solids, lb/AU/d	Total Kjeldahl Nitrogen, % wet basis	Total Kjeldahl Nitrogen, in lb/AU/d <sup>3/</sup>	NH <sub>3</sub> -N % wet basis	NH <sub>3</sub> -N lb/AU/d	P % wet basis	P lb/AU/d	K % wet basis	K lb/AU/d
Beef earthen lot	17	33%	67%	11	30.2%	3.4	1.18%	0.20	0.10%	0.017	0.50%	0.084	1.25%	0.21
Poultry leghorn hen	17	59%	40%	6.6			1.85%	0.31	0.88%	0.15	1.21%	0.20	1.31%	0.22
Poultry broiler litter	17	31%	70%	12	70.0%	8.3	3.73%	0.63	0.75%	0.13	0.60%	0.10	1.37%	0.23
Poultry turkey litter	23 <sup>1/</sup>	30%					2.18%	0.51			0.33%	0.077	1.23%	0.29
Dairy scraped earthen lots	57	54%	46%	26			0.70%	0.40			0.25%	0.14	0.67%	0.38
Dairy scraped concrete lots	65	72%	25%	16			0.53%	0.34			0.13%	0.084	0.40%	0.26
Dairy lagoon effluent	171	98%	2%	3.4	52.0%	1.8	0.07%	0.12	0.08%	0.14	0.02%	0.034	0.11%	0.19
Dairy slurry (liquid)	108	92%	8%	8.7	66.0%	5.7	0.30%	0.32	0.14%	0.15	0.13%	0.14	0.40%	0.43
Equine solid manure	64	43%	65%	42	26.3%	11	0.76%	0.49			0.24%	0.15	0.99%	0.64
Swine finisher, slurry w/ wet/dry feeders	50	91%	9%	4.5			0.70%	0.35	0.50%	0.25	0.21%	0.11	0.24%	0.12
Swine slurry storage w/ dry feeders (sows)	23	94%	6%	1.4			0.47%	0.11	0.34%	0.077	0.18%	0.041	0.24%	0.054
Swine flush building (sows)	80	98%	2%	1.6			0.20%	0.16	0.14%	0.11	0.07%	0.056	0.17%	0.14

1/ Assuming raising an equal number of tom and hen turkeys

2/ Assuming moisture is equivalent to water, and whatever is not water is dry matter [TS+YS]

3/ Percent moisture plus percent TS can add up to more than 100% because solids estimates do not include solids in urine

4/ TKN includes ammonia N plus organic N. If the manure storage is aerobic, there would also be nitrate N



## 651.0405 Other wastes

### (a) Residential waste

NRCS is seldom called on to provide assistance to municipalities; however, the information provided here may be useful in area-wide planning. Rural residential waste components are identified in tables 4–17 and 4–18. Table 4–17 lists the characteristics of human excrement. Household wastewater (table 4–18) can be categorized as graywater (no sanitary wastes included) and blackwater (sanitary wastewater). In most cases, a composite of both of these components will be treated in a septic tank. The liquid effluent from the septic tank generally is treated in a soil absorption field.

Municipal wastewater of residential origin is usually categorized into raw (untreated) and treated types (table 4–19). Secondary (biological) treatment is common for wastewater that is to be applied to agricultural land. Municipal wastewater sludge may also be in the raw, untreated form or in the treated (digested) form. Municipal compost is usually based on dewatered, digested sludge and refuse, but can contain other waste materials, as well.

**Table 4–17** Human waste characterization—as excreted <sup>1/</sup>

Component	Units	Adult
Weight	lb/d/1000 lb	30
Volume	ft <sup>3</sup> /d/1000 lb	0.55
Moisture	%	89
TS	% w.b.	11
	lb/d/1000 lb	3.3
VS	lb/d/1000 lb	1.9
FS	lb/d/1000 lb	1.4
COD	lb/d/1000 lb	3.0
BOD <sub>5</sub>	lb/d/1000 lb	1.3
N	lb/d/1000 lb	0.20
P	lb/d/1000 lb	0.02
K	lb/d/1000 lb	0.07

<sup>1/</sup> Adapted from the 1992 version of the AWMFH

Liquid and solid wastes of residential origin generally are not a source of toxic materials. Some industrial waste, however, may contain toxic components requiring careful handling and controlled distribution. Planning of land application systems for industrial waste must include thorough analyses of the waste materials.

### (b) Food wastes and wastewater

Food processing can result in considerable quantities of solid waste and wastewater. Processing of some fruits and vegetables results in more than 50 percent waste. Many of these wastes, however, can be used in by-product recovery procedures, and not all of the waste must be sent to disposal facilities. Food processing wastewater may be a dilute material that has a low concentration of some of the components of the raw product. On the other hand, solid waste from food processing may contain a high percentage of the raw product and exhibit characteristics of that raw product.

Tables 4–20 and 4–21 present characteristics of wastewater and sludge from the processing of milk and milk products.

Characteristics of wastewater and sludge from the meat and poultry processing industries are listed in tables 4–22 and 4–23.

**Table 4–18** Residential waste characterization—household wastewater <sup>1/</sup>

Component	Units	Graywater	Composite <sup>2/</sup>	Septage
Volume	ft <sup>3</sup> /d/1000 lb of people	27	38	35
Moisture	%	99.92	99.65	99.75
TS	% w.b.	0.08	0.35	0.25
	lb/d/1000 lb of people	1.3	7.7	5.5
VS	% w.b.	0.024	0.20	0.14
FS	lb/d/1000 lb	0.056	0.15	0.11
N	lb/d/1000 lb	0.0012	0.007	0.0075
NH <sub>4</sub> -N	lb/d/1000 lb			0.0018
P	lb/d/1000 lb	0.0004	0.003	0.0019
K	lb/d/1000 lb		0.003	0.0025

<sup>1/</sup> Adapted from 1992 version of the AWMFH

<sup>2/</sup> Graywater plus blackwater

**Table 4–19** Municipal waste characterization—residential<sup>1/</sup>

Component	Units	Wastewater		Sludge		Compost <sup>2/</sup>
		Raw	Secondary	Raw	Digested	
Volume	ft <sup>3</sup> /d/1000 lb of people	90	85			
Moisture	%	99.95	99.95			40
TS	% w.b.	0.05 <sup>3/</sup>	0.05 <sup>4/</sup>	4.0	4.0	60
VS	"	0.035		3.0	2.1	
FS	"	0.015		1.0	0.90	
COD	"	0.045				
BOD <sub>5</sub>	"	0.020	0.0025			
N	"	0.003	0.002	0.32	0.15	0.78
NH <sub>4</sub> -N	"		0.001		0.08	
P	"	0.001	0.001	0.036	0.067	0.20
K	"	0.001	0.0012		0.010	0.17

**Table 4–20** Dairy food processing waste characterization<sup>1/</sup>

Product/operation	Wastewater	
	Weight lb/lb milk processed	BOD <sub>5</sub> lb/1000 lb milk received
Bulk milk handling	6.1	1.0
Milk processing	4.9	5.2
Butter	4.9	1.5
Cheese	2.1	1.8
Condensed milk	1.9	4.5
Milk powder	2.8	3.9
Milk, ice cream, and cottage cheese	2.5	6.4
Cottage cheese	6.0	34
Ice cream	2.8	5.8
Milk and cottage cheese	1.8	3.5
Mixed products	1.8	2.5

1/ Adapted from 1992 version of the AWMFH

**Table 4-21** Dairy food waste characterization—processing wastewater<sup>1/</sup>

Component	Units	Industry wide	-----Whey-----		Cheese wastewater sludge
			Sweet cheese	Acid cheese	
Moisture	%	98	93	93	98
TS	% w.b.	2.4	6.9	6.6	2.5
VS	% w.b.	1.5	6.4	6.0	
FS	% w.b.	0.91	0.55	0.60	
COD	% w.b.		1.3		
BOD5	% w.b.	2.0			
N	% w.b.	0.077	7.5		0.18
P	% w.b.	0.050			0.12
K	% w.b.	0.067			0.05

1/ Adapted from 1992 version of the AWMFH

**Table 4-22** Meat processing waste characterization—wastewater<sup>1/</sup>

Component	Units	Red meat			Poultry <sup>5/</sup>	Broiler <sup>6/</sup>
		Harvesting <sup>2/</sup>	Packing <sup>3/</sup>	Processing <sup>4/</sup>		
Volume	gal/1000 lb <sup>7/</sup>	700	1,000	1,300	2,500	
Moisture	%					95
TS	% w.b.					5.0
	lb/1000 lb	4.7	8.7	2.7	6.0	
VS	lb/1000 lb					4.3
FS	lb/1000 lb					0.65
BOD <sup>5</sup>	lb/1000 lb	5.8	12	5.7	8.5	
N	lb/1000 lb					0.30
P	lb/1000 lb					0.084
K	lb/1000 lb					0.012

1/ Adapted from 1992 version of the AWMFH

2/ Harvesting—Euthanizing and preparing the carcass for processing

3/ Packing—Euthanizing, preparing the carcass for processing, and processing

4/ Processing—Sectioning carcass into retail cuts, grinding, packaging

5/ Quantities per 1,000 lb product

6/ All values % w.b.

7/ Per 1,000 lb live weight harvested

Table 4–22 presents data on raw wastewater discharges from red meat and poultry processing plants. Table 4–23 describes various sludges. Dissolved air flotation sludge is a raw sludge resulting from a separation procedure that incorporates dissolved air in the wastewater. The data on wastewater sludge is for sludge from secondary treatment of wastewater from meat processing.

Table 4–24 presents raw wastewater qualities for several common vegetable crops on the basis of the amount of the fresh product processed. Characteristics of solid fruit and vegetable wastes, such as might be collected at packing houses and processing plants, are listed in table 4–25.

### (c) Silage leachate

Silage leachate, a liquid by-product resulting from silage production typically from whole corn plants or sorghums, that drains from the storage unit must be considered in the planning and design of an AWMS. Silage is a forage-type livestock feed that is produced by fermentation at relatively high moisture contents and stored in airtight conditions. Oxygen depletion of surface water is the major environmental concern associated with silage leachate because of its high biological oxygen demand. This oxygen depletion is exacerbated because silage is usually produced in the late summer and early fall when streams are already low in total dissolved oxygen due to

**Table 4–23** Meat processing waste characterization—wastewater sludge<sup>1/</sup>

Component	Units	Dissolved air flotation sludge			Wastewater sludge
		Poultry	Swine	Cattle	
Moisture	%	94	93	95	96
TS	% w.b.	5.8	7.5	5.5	4.0
VS	% w.b.	4.8	5.9	4.4	3.4
FS	% w.b.	1.0	1.6	1.1	0.60
COD	% w.b.	7.8			
N	% w.b.	0.41	0.53	0.40	0.20
NH <sub>4</sub> -N	% w.b.	0.17			
P	% w.b.	0.12			0.04

1/ Adapted from the 1992 version of the AWMFH

**Table 4–24** Vegetable processing waste characterization—wastewater<sup>1/</sup>

Component	Units	Cut bean	French-style bean	Pea	Potato	Tomato
Volume	ft <sup>3</sup> /d/1000				270 <sup>3/</sup>	
TS	lb/1000 lb <sup>2/</sup>	15	43	39	53 <sup>4/</sup>	130
VS	lb/1000 lb <sup>2/</sup>	9	29	20	50 <sup>4/</sup>	
FS	lb/1000 lb <sup>2/</sup>	6	14	19	3 <sup>4/</sup>	
COD	lb/1000 lb <sup>2/</sup>	14	35	37	71 <sup>5/</sup>	96
BOD <sub>5</sub>	lb/1000 lb <sup>2/</sup>	7	17	21	32	55

1/ Adapted from 1992 version of the AWMFH

2/ lb/1000 lb raw product

3/ ft<sup>3</sup>/lb processed

4/ Total suspended solids

5/ Percent of TSS

**Table 4–25** Fruit and vegetable waste characterization—solid waste<sup>1/</sup>

Fruit/vegetable	Moisture content	Total solids	Volatile solids	Fixed solids	N	P	K
Banana, fresh	84	16	14	2.1	0.53		
Broccoli, leaf	87	14			0.30		
Cabbage, leaf	90	9.6	8.6	1.0	0.14	0.034	
Cabbage core	90	10			0.38		
Carrot, top	84	16	14	2.4	0.42	0.03	
Carrot root	87	13	11	1.3	0.25	0.04	
Cassava, root	68	32	31	1.3	1.7	0.039	
Corn, sweet, top	80	20	19	1.2	0.7		
Kale, top	88	12	9.7	1.9	0.22	0.06	
Lettuce, top	95	5.4	4.5	0.9	0.05	0.027	
Onion top, mature	8.6	91	85	6.7	1.4	0.02	
Orange, flesh	87	13	12	0.6	0.26		
Orange pulp	84	16	15	1.0	0.24		
Parsnip, root	76	24			0.47		
Potato, top, mature	13	87	72	16	1.2		
Potato tuber					1.6	0.25	1.9
Pumpkin, flesh	91	8.7	7.9	0.8	0.12	0.037	
Rhubarb, leaf	89	11			0.20		
Rutabaga, top	90	10			0.35		
Rutabaga root	90	11			0.20		
Spinach, stems	94	6.5			0.07		
Tomato, fresh	94	5.8	5.2	0.6	0.15	0.03	0.30
Tomato, solid waste	89	11	10	0.9	0.22	0.044	0.089
Turnip, top	92	7.8				0.20	
Turnip root	91				0.34		

1/ Adapted from the 1992 version of the AWMFH

seasonally high temperatures and low flow rates. Since 20 to 25 percent of the total nitrogen in silage leachate is in the form of nitrate, it also has the potential of being a ground water contaminant.

Generally, the amount of leachate produced is directly influenced by the moisture content of the forage ensiled and the degree of compaction to which the forage is subjected. Silage leachate is typically 95 percent water. It has a pH that can range from 5.5 to 3.6. Table 4–26 lists the range for typical nutrient concentrations in silage leachate.

The range of uncertainty in nutrient content reflects the differences that can occur from year to year and from site to site. Management decisions based on these nutrient concentrations should also consider the associated volumes of leachate that are usually relatively small. In most instances, a practical design and plan for environmental containment should be based on a reasonably high concentration assumption. Operation and manage-

ment decisions should be based on the results of timely sampling and testing at a specific site.

The factors that influence leachate production from silage include the degree to which the silage crop has been chopped and the amount of pressure applied to the leachate in the silo, but the greatest single factor is the percent of dry matter in the silage. The peak rate of silage leachate production has been measured with silage at 18 percent moisture as 0.5 cubic feet per ton of silage per day. The peak time of leachate production will usually be from 3 to 5 days following ensilage. Leachate production as a function of percent dry matter is given in table 4–27.

This variation in production can make a significant difference in the planning and design of systems to manage this effluent. The actual production rate used for a specific design should be a reasonable conservative estimate that is based on these numbers, local data, and the experience of the managers of the silos.

**Table 4–26** Typical range of nutrient concentrations in silage leachate<sup>1/</sup>

Constituent	Concentration lb/ft <sup>3</sup>
Total nitrogen	0.09–0.27
Phosphorus	0.02–0.04
Potassium	0.21–0.32

<sup>1/</sup> Adapted from Stewart and McCullough

**Table 4–27** Leachate production based on percent dry matter of silage<sup>1/</sup>

Dry matter content of silage %	Leachate produced of silage gal/ton
<15	100–50
15–20	50–30
20–25	30–5
>25	5–0

<sup>1/</sup> Adapted from Stewart and McCullough

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**651.0406 References**

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## Deborah DeVars

---

**From:**  
**Sent:** Thursday, August 30, 2018 11:22 AM  
**To:** jromeis@gleassociates.com  
**Subject:** Fwd: Swine Farm EA  
**Attachments:** Chapter4.pdf; manure calculations per AWMFH 2008.xlsx

----- Forwarded message -----

**From:**  
**Date:** Tue, Jul 17, 2018, 5:06 PM  
**Subject:** Fwd: Swine Farm EA  
**To:** <[amy.roller@fl.usda.gov](mailto:amy.roller@fl.usda.gov)>, Carrasco, Catalina - FSA, Bushnell, FL <[catalina.carrasco@fl.usda.gov](mailto:catalina.carrasco@fl.usda.gov)>

Ha Nguyen got back with me today and suggested a document that may be helpful on the manure calculations. It is attached herein.

Please note that on 4-9 (651.0403 Animal waste characteristics), the document states that: "The primary concern of this chapter is livestock manure and waste produced in **Confinement and Semi-confinement facilities. Not considered is manure produced by livestock and poultry on pasture or range. Manure produced in this manner is generally not collected for further management by transfer, storage, and treatment.** As such, its management is significantly different than manure produced in confinement"

That said, I have reproduced the table in excel and done a comparative analysis to the cattle table. The waste is very similar in content with a higher moisture component that occurs in swine in confinement settings. My pig's poo looks more like dog poop with a larger diameter.

Hope this helps. Ha's contact information is also below.

----- Forwarded message -----

**From:** Nguyen, Ha - NRCS, Gainesville, FL <[ha.nguyen@fl.usda.gov](mailto:ha.nguyen@fl.usda.gov)>  
**Date:** Tue, Jul 17, 2018 at 9:53 AM  
**Subject:** RE: Swine Farm EA  
**To:**  
**Cc:** Strenth, Jason - NRCS, Gainesville, FL <[Jason.Strenth@fl.usda.gov](mailto:Jason.Strenth@fl.usda.gov)>, Harvey, Anthony - NRCS, Gainesville, FL <[Tony.Harvey@fl.usda.gov](mailto:Tony.Harvey@fl.usda.gov)>

Hello

I have glanced through page 17 of your document and recommend that you refer to the Agricultural Waste Management Field Handbook Chapter 4 (page 4-17) as a guide in your calculations. Regarding the agronomic application rates, I would recommend you call the local IFAS extension office (<http://sfyl.ifas.ufl.edu/herando/>). They can assist in providing the applicable rates to use.

Thanks Ha

Ha Nguyen

2614 NW 43rd Street

Gainesville, Florida 32606

PH: 352-338-9509

Cell: 352-672-1548

**From:**

**Sent:** Friday, July 06, 2018 2:42 PM

**To:** Nguyen, Ha - NRCS, Gainesville, FL <[ha.nguyen@fl.usda.gov](mailto:ha.nguyen@fl.usda.gov)>

**Subject:** Fwd: Swine Farm EA

----- Forwarded message -----

From:

Date: Fri, Jul 6, 2018 at 12:08 PM

Subject: Swine Farm EA

To: <[han.nguyen@fl.usda.gov](mailto:han.nguyen@fl.usda.gov)>

Attached herein is the EA as I've prepared it. The supporting documents will come as a separate email due to size. The document the FSA is adhering to is available at

[https://www.fsa.usda.gov/Internet/FSA\\_File/1-eq\\_r03\\_a01.pdf](https://www.fsa.usda.gov/Internet/FSA_File/1-eq_r03_a01.pdf)

Of particular concern is Pg. 17. I may or may not have done those calculations correctly.

Thank you very much for your time and consideration on this.

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## Deborah DeVars

---

**From:** Jeff Whealton  
**Sent:** Thursday, October 11, 2018 10:34 AM  
**To:** John Romeis  
**Subject:** RE: Aylesboro Court Pig Farm

Hey John...

As part of our AGSWM program which is essentially an exemption verification process that utilizes BMPs (Best Management Practices), it is. It is NOT a set in stone figure however as we look at the need for buffers on a case by case situation. And, to be statutorily exempt, you do not need a buffer, you simply just need to stay out of wetlands. Obviously someone would not want to put the end of a farm field row one inch from a wetland as you need tractor turn around space so it's usually easy to explain the importance of a buffer to the farmer.

Anyway... with specific reference to this situation, I would strongly encourage the farmer to implement buffers. But if she was conducting a routine farm operation outside of the AGSWM process, as long as she stayed out of the wetlands, we really wouldn't have a dog in the fight.

Feel free to give me a call if you want... its probably easier o flesh this out over the phone.

Thanks,  
Jeff

Jeff Whealton, PWS  
District Agricultural Team, Sr. Environmental Scientist  
Environmental Resource Permit Bureau  
Regulation Division  
Southwest Florida Water Management District  
Office: 813.985.7481/800.836.0797 x6119  
[Jeff.whealton@swfwmd.state.fl.us](mailto:Jeff.whealton@swfwmd.state.fl.us)



---

**From:** John Romeis <jromeis@gleassociates.com>  
**Sent:** Wednesday, October 10, 2018 8:57 AM  
**To:** Jeff Whealton <Jeff.Whealton@swfwmd.state.fl.us>  
**Subject:** FW: Aylesboro Court Pig Farm

Good Morning Jeff,

I am generating this Environmental Assessment for  
(see below for previous consultation info).

for the piece of Property on Aylesboro Court

stated that per SWFWMD, all of the seepage and wet areas at the site (primarily the eastern and southern boundary) should be offset be 50' from any agricultural operations.

Is that a standard recommendation for these type of activities? If you could clarify any further that would be great.

Please don't hesitate to contact me with any questions or comments.

Regards,

**John J. Romeis**

**Senior Project Manager**

**GLE Associates, Inc.**

Facilities & Environmental Consultants

5405 Cypress Center Drive, Suite 110

Tampa, Florida 33609

813.241.8350 x354 office | 813.241.8737 fax

888.453.4531 toll free | [www.gleassociates.com](http://www.gleassociates.com)

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**From:**

**Sent:** Tuesday, September 18, 2018 9:56 AM

**To:** John Romeis

**Subject:** Fwd: Aylesboro Court Pig Farm

Some SWFWMD communications

----- Forwarded message -----

From: **Jeff Whealton** <[Jeff.Whealton@swfwmd.state.fl.us](mailto:Jeff.Whealton@swfwmd.state.fl.us)>

Date: Thu, Apr 5, 2018 at 4:11 PM

Subject: RE: Aylesboro Court Pig Farm

To:

Cc: [1.11.1034818@ecmvmprod21.ad.swfwmd.net](mailto:1.11.1034818@ecmvmprod21.ad.swfwmd.net) <[1.11.1034818@ecmvmprod21.ad.swfwmd.net](mailto:1.11.1034818@ecmvmprod21.ad.swfwmd.net)>, Ken Griner <[Kenneth.Griner@swfwmd.state.fl.us](mailto:Kenneth.Griner@swfwmd.state.fl.us)>

That was a good graphic. Nicely done 😊

I'm attaching an aerial that shows our track of where we walked the other day. I think it pretty much went around the main part of that seepage wetland and of course over the creek.

As for if your plan is sufficient, I can't really say as I don't know what sort of impact the pigs will do to the ground in that area. I wish I could give you specifics but all I can say is that grazing animals in wetland areas happens all the time all over Florida, though probably not in situations where animals are confined to the

wetlands. Due to the slope here, I just think you'll have to be monitoring the site closely to prevent erosion and sedimentation damage.

Once you've closed on the property, get back with me and I'll get you set up with the NRCS.

Thanks,

Jeff

Ps... copying Ken Griner on this message as he will likely be the engineer to review the site with me in the future.

Jeff Whealton, PWS

District Agricultural Team, Sr. Environmental Scientist

Environmental Resource Permit Bureau

Regulation Division

Southwest Florida Water Management District

Office: 813.985.7481/800.836.0797 x6119

[Jeff.whealton@swfwmd.state.fl.us](mailto:Jeff.whealton@swfwmd.state.fl.us)



**From:**

**Sent:** Sunday, April 01, 2018 9:48 PM

**To:** Jeff Whealton <[Jeff.Whealton@swfwmd.state.fl.us](mailto:Jeff.Whealton@swfwmd.state.fl.us)>

**Subject:** Aylesboro Court Pig Farm

Jeff,

Thank you very much for meeting with me and evaluating the Aylesboro property. I've attached a preliminary paddock layout based on our conversations. There's a wide buffer for the active water, and I tried to layout the paddocks against the slope. I'm going to try to cross the wettest area in the easement with a bridge as you suggested.

Upon purchase, I'd like to begin the engineering process with NRCS before putting any cross-fencing or roads in.

Do you think this will be an acceptable approach to this site for my agricultural goals?

Thanks again,



Virus-free. [www.avast.com](http://www.avast.com)



Mature Swine in units per day per 1,000 lb animal unit				
Components	Units	3 - Gestating	1 - Lactating	1 - Boar
Weight	lb/d-1000AU	22.5	17.7	5.7
Volume	lb/d-1000AU	0.369	0.291	0.09
Moisture	% w.b.	81	0.27	0.27
TS	lb/d-1000AU	2.25	1.77	0.57
VS	lb/d-1000AU	2.07	1.62	0.51
BOD	lb/d-1000AU	0.756	0.6	0.198
N	lb/d-1000AU	0.144	0.135	0.042
P	lb/d-1000AU	0.045	0.039	0.015
K	lb/d-1000AU	0.099	0.084	0.027
Immature wine in units of per day per 1,000 lb animal unit				
Components	Units	Nursery	Grow to Finish	
Weight	lb/d-1000AU	0.0352	260	
Volume	lb/d-1000AU	0.00164	4.4	
Moisture	% w.b.	0.036	360	
TS	lb/d-1000AU	0.004	26	
VS	lb/d-1000AU	0.01232	21.6	
BOD	lb/d-1000AU	0.00136	8.4	
N	lb/d-1000AU	0.000368	2.16	
P	lb/d-1000AU	0.00006	0.36	
K	lb/d-1000AU	0.00014	0.96	

Total per day for swine herd	
Weight	305.9
Volume	5.2
Moisture	441.6
TS	30.6
VS	25.8
BOD	10.0
N	2.5
P	0.5
K	1.2

Same AU load in cattle: Cow & Growing Calf in units per day per 1,000lb animal unit				
Components	Units	Beef cow in confinement	Growing calf confined	total per day
Weight	lb/d-1000AU	156	346.5	502.5
Volume	lb/d-1000AU	2.55	5.4	7.95
Moisture	% w.b.	132	396	528
TS	lb/d-1000AU	19.5	41.4	60.9
VS	lb/d-1000AU	16.5	34.65	51.15
BOD	lb/d-1000AU	3.75	7.65	11.4
N	lb/d-1000AU	0.525	2.025	2.55
P	lb/d-1000AU	0.12	0.36	0.48
K	lb/d-1000AU	0.375	1.305	1.68

## Cell Grazing:

August 2017: Before 1<sup>st</sup> pass. Natural vegetation with very white sandy soil, minimal vines, and dry leaf litter.



Area first grazed and disturbed in December 2017 (no photos available)

February 2018: Growth after 1<sup>st</sup> pass with the pigs. Back seeding with my fall mix iron clay peas, rye, oats, wheat, chicory, turnips, & beets. This mix fixes nitrogen, penetrates soil, and produces forage.



March 2018: 2<sup>nd</sup> pass cell grazing. Pigs are in 8x8 pens and moved daily.



Pigs eat the grains and till down stalks etc. that they don't eat. Their activity leaves the surface textured to limit erosion. They further add fertility with their manure and water.



April 2018: The area gets back seeded at the close of each week. Spring mix is: Iron Clay Peas, Soybeans, Alyse Clover (nitrogen fixers), Titricali (perennial predecessor to Corn), buckwheat (deep root grain), chia (oil seed with fast ground cover), and sunflowers (oil seed) for further nitrogen fixing and deeper roots and higher stalks to contribute greater bio mass for the next planting.



Fresh growth of the second back seeding. These plants will grow to roughly 30" in a 90 day rest cycle and be grazed again in July/August 2018.





3<sup>rd</sup> pass will be backseeded with a summer mix of Sorghum, Pigeon Peas, Chia, Iron Clay Peas, and grasses.

4<sup>th</sup> pass will be followed by leveling and seeding with grasses chosen by the landowner. Recommend a Pensacola based mix due to limited sun exposure.

Note: This particular area is being prepared for grazing horses on grasses. The pigs and back seeding is being used to prepare this soil for producing high quality grasses at the conclusion of 4 passes.

Paddock Recovery:

¼ acre paddock used for breeders & boar 6 months. Berm on contour is created by feeding activities to limit erosion.



Same Spring mix applied after hogs moved to alternate paddock. These will grow to 30" and be grazed and turned down by the pigs.





Trees and brush are valuable inclusions in my system of grazing. Logs limit activity in specific areas, branches are burned in paddocks to produce charcoal banks to be eaten by young pigs, and piled branches are a place for native plants, melons, and critters to thrive that can attract a pig that might get loose. This keeps them from getting too quickly interested in a neighbor's expensive lawn.





# AGRICULTURAL ALTERNATIVES

## Swine Production

While the trend in the swine industry continues toward larger farms, opportunities remain to make money by raising hogs in a part-time enterprise. Approximately 80 percent of Pennsylvania swine operations produce fewer than 100 head per year, and only 1 percent produce more than 1,000 head per year.

Technological change and vertical integration in the swine industry have resulted in fewer farms producing record amounts of pork. Currently, there are around 8,000 Northeast pork producers, who sell almost 1.3 million pigs valued at more than \$500 million annually.

### Marketing

You need to consider what marketing strategy you would like to pursue before beginning a swine production enterprise. The alternatives for marketing feeder pigs and slaughter hogs from small-scale or part-time farms include:

- Sale of feeder pigs to finishing pig producers
- Livestock auctions
- Graded feeder pig sales
- Slaughter hog sales to packer buying stations
- Direct sales to major packing plants
- Small packers/processors
- Specialty sales direct to consumers

#### Feeder Pig Marketing

All of these marketing options are available to feeder pig producers. One of the most popular options is marketing directly to producers who finish pigs. This option has advantages for both parties. First, the buyer and seller know the price and delivery conditions in advance. Second, the direct-sale option reduces animal stress and disease risk. Third, the direct-to-finisher transaction voids commissions associated with a livestock auction.



Marketing feeder pigs through a livestock auction, graded sale, or buying station is another common option. Before using these markets, you should know the desirable weights and lot sizes that garner the highest price.

#### Slaughter Hog Marketing

Buying stations and direct sales to a major packer are popular options for marketing slaughter hogs. In both cases, producers are quoted a price before the sale is finalized.

Small packers and processors are an additional market available to slaughter hog producers. They often pay a good price, but their plant capacity and number of customers restrict the number of hogs they buy.

An auction barn is another option for selling slaughter hogs. Producers often use this market because of its location and convenience. The disadvantage of marketing through an auction barn is that producers are at the mercy of the supply and demand for hogs at the local market on that day. Prices may be well below or well above the national price on any given day and the producer must take the highest bid price. Auction barns also charge a commission regardless of the final bid price.

Specialty markets represent another alternative for slaughter hog producers. A popular form of direct sale enables the consumer to buy directly from a producer. The consumer then contracts with a small packer for customized meat cutting and packaging.

In summary, choosing a market involves doing your homework. When comparing market alternatives, you must account for differences in price received, transportation expenses, shrink losses, selling costs, and convenience. A market 50 miles farther from the farm that offers a higher price may in fact produce less net revenue than selling locally at a lower price when all marketing costs are included. You must know your alternatives and stay current with price trends and market preferences.

## Three Enterprises and Characteristics

Three types of swine production enterprises are farrow-to-finish, farrow-to-feeder, and feeder-to-finish. No single blueprint exists for these systems. Designing a production system that will complement your resources and lifestyle is the most important component to determining the best production system for you.

To determine which enterprise will work best in your situation, you must first consider the following:

- Amount of capital, labor, and land available
- Level of management and marketing skill needed
- Social and environmental implications associated with manure management

### Farrow-to-Finish

A farrow-to-finish enterprise involves breeding and farrowing sows, and feeding the offspring until they reach a market weight of about 280 pounds. The entire production period takes approximately 10 months, with 4 months for breeding and gestation and 6 months to raise the litter to market weight. Of the three systems, farrow-to-finish has the greatest long-run market potential and flexibility. This system also demands the most capital and labor, and requires a long-term commitment to the swine business. A small number of sows can fit into a crop operation nicely when farrowings are scheduled to avoid peak harvest times. With the current focus on animal welfare, most new farrow-to-finish operations are designed to hold gestating sows in pens rather than crates, which may increase the capital required for sow housing.

### Farrow-to-Feeder

A farrow-to-feeder enterprise involves breeding and farrowing sows and then selling the piglets to finishing operations when they weigh 30 to 60 pounds. Compared to a farrow-to-finish operation, this option decreases the need for facilities, operating capital, and the amount of feed and manure handled. It also provides a good foundation for

increasing the number of sows or expanding into a farrow-to-finish operation. The biggest drawback of this system is that producers, especially those with small herds, are at the mercy of a volatile feeder pig market. This may require farrowing sows in groups to increase the number of pigs available during periods of high demand.

### Feeder-to-Finish

Most feeder-to-finish enterprises buy feeder pigs weighing 30 to 60 pounds and feed them to market weight. In many cases, existing facilities are adequate for this system. This system allows for minimum overhead, low labor requirements, and no long-term commitment. The feeder-to-finish operation offers an opportunity for a grain farmer to use homegrown feeds to finish pigs without having to manage breeding stock. The operation also may capitalize on the fertilizer value of the manure. Important points of concern are the source, health, and quality of purchased feeder pigs. Ideally, all feeder pigs should originate from a single farm to reduce potential herd health problems.

## Feeding

Feed is the major expense of any swine production system. In general, a farrow-to-finish operation will spend 75 percent of its total expenses on feed, compared to 50 percent for farrow-to-feeder operations, and 65 percent for feeder-to-finish operations.

Example swine diets are presented in Table 1, but they will vary depending on your management program, feed quality, and the condition of the animals. A summary of production inputs and manure output for different types of swine enterprise is listed in Table 2.

Growing your own grain, making bulk purchases of additional ingredients, and using your own grinder and mixer (or hiring the work done in some situations) are effective ways to lower feed costs. However, adequate storage for large quantities of feed ingredients is necessary.

One major consideration in planning a swine enterprise is how to get feed to the pigs. Ideally, animals in farrowing, gestation, and nursery units should be hand-fed and those in the growing-finishing units could get their feed from automatic augers.

## Watering

Quality of the water source is a very important health consideration in swine production. City or well water is preferred. Caution must be used when using spring water due to surface contaminants that can lead to health problems. Pond water should be avoided.

Getting water to the pigs is generally simple. Water lines running into the barn should be buried or properly insulated to prevent winter freezing. Automatic nipple waterers are best when set at proper flow rates. Bowl-type waterers are acceptable, but they are difficult to keep clean and often

**Table 1. Example swine diets for various stages of swine production.**

	PHASE (QUANTITIES LISTED ARE POUNDS PER PHASE PER SOW)				
	NURSERY/STARTER	GROWER	FINISHER	GESTATION	LACTATION
Corn	1,400	1,500	1,600	1,200	1,500
Soybean meal	550	450	350	250	450
Oats	—	—	—	500	—
Minerals	50	50	50	60	50
Totals	2,000	2,000	2,000	2,000	2,000

**Table 2. Expected weekly feed, labor, water, and manure management requirements for different types of swine enterprises.**

ITEM	FARROW-TO-FINISH (20 SOWS)	FARROW-TO-FEEDER (20 SOWS)	FEEDER-TO-FINISH (100 HOGS)
Feed (pounds/week)	5,800	1,200	4,500
Feed (\$/week)*	385	120	265
Labor (hour/week)	16	11	5
Water (gallons/week)	2,100	700	1,400
Manure output (cubic feet/week)	370	100	160
Manure output (gallons/week)	2,000	725	1,200

\*Feed cost can vary tremendously depending on local and national grain markets.

**Table 3. Water requirements for swine by size of animal.**

ITEM	SIZE OF ANIMAL				SOW AND BOAR	LACTATING SOW
	12–30 POUNDS	30–75 POUNDS	75–100 POUNDS	100–240 POUNDS		
Intake (quarts/day/head)	1	2	5	6	8	10

lead to water wastage. Remember that all the water put into the building must eventually be hauled out as waste. Water requirements for swine are provided in Table 3.

## Manure Handling

Waste management often requires more labor than most part-time producers anticipate. How you get the manure out of the pens, out of the buildings, and onto the fields must be thoroughly planned before bringing any number of pigs onto your property. When handling manure, be considerate of your neighbors and be sure your practices comply with local, state, and federal guidelines and regulations. The expected quantities of manure from each of the three production systems are listed above in Table 2.

## Bedding

The need for bedding will depend on the facility. The use of straw in a cold, drafty barn will minimize the need for an elaborate ventilation system, but it will require more labor. Shavings may be used, but they can be quite costly. Sawdust should be avoided because of the potential for transmission of swine tuberculosis.

## Health

Most part-time swine producers have minimal problems with herd health. Some important aspects of maintaining herd health include:

- Purchasing breeding stock or feeder pigs from a disease-free source
- Keeping the facilities clean and maintaining adequate ventilation
- Establishing a herd health program (in conjunction with a veterinarian)
- Avoiding visits to other swine farms to reduce the risk of disease transfer

The elements of a herd health plan usually include provisions for:

- Reducing the risk of new disease introduced by herd additions or visitors
- Maintaining sanitation
- Treating or avoiding parasites
- Preventing and controlling respiratory, reproductive, and diarrheal diseases

If these guidelines are followed, most herd health problems

can be avoided and they should require only a small investment in time and money.

## Pastured Pork Production

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In recent years there has been increasing interest among small-scale hog producers in using pasture as a feed source. Hogs can utilize pasture, but not as efficiently as ruminants. Research has shown that fiber digestibility improves as the hog matures. Ideally, pasture needs to be used at an early stage of maturity while the energy content is at its highest and fiber is at its lowest. There are both advantages and disadvantages associated with using pasture for hogs.

Advantages:

- Outdoor, pasture-oriented production systems open up potential niche market opportunities.
- Hogs can benefit from the activity and exercise associated with foraging.

Disadvantages:

- Excessive rooting behavior can result in soil erosion issues.
- Hogs can escape from pastures. Hogs escaping from farms has been identified as one of the causes of the growing feral hog problem in many parts of the United States.
- Internal parasite issues can be severe on poorly managed pasture systems.
- Light-skinned hogs can suffer sunburn while grazing.
- Managing pasture takes much time and commitment to make it successful.

### Feeding Hogs on Pasture

If you decide to use pasture on your farm, you need to be committed to managing the pasture plants and grazing. Pastures can be made up of either perennial or annual plants. A perennial pasture is a long-term investment. It is important to try to prevent rooting damage to perennial pastures to maintain their long-term productivity. Annual pastures will need to be replanted each year. Tillage used to establish annuals can also be used to smooth out fields and reduce bacterial and parasite contamination. Reestablishment adds considerable cost to the use of pasture.

### Perennial Pasture Plant Species

Perennial legumes that were commonly used for hog pasture in the past include alfalfa, red clover, ladino white clover, alsike clover, and birdsfoot trefoil. The following are common perennial grass species that can be used for pasture: orchardgrass, Kentucky bluegrass, smooth brome grass, timothy, and perennial ryegrass. Consult the *Penn State Agronomy Guide* ([extension.psu.edu/agronomy-guide](http://extension.psu.edu/agronomy-guide)) for more information concerning pasture maintenance.

### Annual Pasture Plant Species

Common annual plant species that can be used for hogs include rapeseed, oats, wheat, barley, rye, triticale, sudan-grass, annual ryegrass, crimson clover, and soybean. Field corn was once commonly used as a “hog down” crop. This involved allowing the corn to mature and produce an ear of grain. Hogs were then turned into the field during the fall months to harvest the standing corn.

### Stocking Rates

Stocking rates depend largely on soil types, the plant species being grazed, and weather conditions. Producers can normally stock gestating sows at 4 to 6 sows per acre and growing hogs at 10 to 12 hogs per acre. Sows need to be fed 2 to 3 pounds of complete feed daily while on pasture. Growing hogs should have access to complete feed at all times while grazing. A complete feed typically consists of corn and soybean meal and is balanced for all nutritional needs of the class of hogs being fed. It can be used as the sole source of feed. Having a balanced ration available will also reduce rooting behavior.

## Environmental Regulations

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All agricultural operations in Pennsylvania, including small-scale and part-time farming enterprises, operate under the Pennsylvania Clean Streams Law. A specific part of this law is the Nutrient Management Act. Portions of the act will pertain to your operation if you are planning swine production on your farm. All operations are a potential source of surface water or groundwater pollution. Because of this possibility, you should contact your local Soil and Water Conservation District to determine what regulations may pertain to your operation. All Pennsylvania animal operations that generate manure are required to have a manure management plan, which is a simplified version of a nutrient management plan.

## Risk Management

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You may wish to consider several risk-management strategies for your operation. First, you should insure your facilities and equipment. This may be accomplished by consulting your insurance agent or broker. Second, you may want to protect the income from your swine operation with a crop insurance product called Livestock Gross Margin-Swine (LGM-Swine). This program provides protection against the loss of your gross margin (market value of livestock minus feed costs) by using futures prices to determine the expected gross margin and the actual gross margin. The LGM-Swine policy can be used to protect farrow-to-finish, feeder pig-to-finish, and segregated early weaned (SEW) operations. LGM-Swine is sold monthly and each insurance period is 6 months long and overlaps other insurance periods. Coverage begins 1 month after you buy a policy,

so coverage is available only for the last 5 months of the period. The insurance policy is continuous and renews automatically. You choose a deductible of from \$0 to \$20 (in \$2 increments) with this policy.

Third, you may want to insure the income for your entire operation through a crop insurance program called Whole Farm Revenue Protection (WFRP). To use WFRP you must have 5 years of Internal Revenue Service (IRS) Schedule F forms. If your business structure is either a C or an S corporation, the necessary information can be entered into a Schedule F for crop insurance purposes. You can then contact an agent who sells crop insurance and insure the income of your operation. For more on agricultural business insurance, see "Agricultural Alternatives: Agricultural Business Insurance." For more information concerning crop insurance, contact a crop insurance agent or check the Pennsylvania Crop Insurance Education website at [extension.psu.edu/business/crop-insurance](http://extension.psu.edu/business/crop-insurance).

### Initial Resource Requirements

#### *Farrow-to-Finish*

- Land: 10 acres
- Labor (per sow per year):
  - 25 hours × 20 sows = 500 hours
- Capital:
  - Livestock (per head):  
\$350 × 20 bred gilts = \$7,000
  - Existing buildings, equipment, fencing:  
\$20,000 to \$25,000

#### *Farrow-to-Feeder*

- Land: 5 acres
- Labor (per sow per year):
  - 25 hours × 20 sows = 500 hours
- Capital:
  - Livestock (per head):  
\$350 × 20 bred gilts = \$7,000
  - Existing buildings, equipment, fencing:  
\$15,000 to \$20,000

#### *Feeder-to-Finish*

- Land: 10 acres
- Labor (per head):
  - 0.5 hours × 30 pigs = 15 hours
- Capital:
  - Livestock (per pig):  
\$56.25 × 10 pigs = \$562.50
  - Existing buildings, equipment, fencing:  
\$10,000 to \$12,000

## Sample Budgets

The sample budgets included in this publication summarize costs and returns for swine production. Included in this publication are three sample budgets that summarize the costs and returns of farrow-to-finish, farrow-to-feeder, and feeder-to-finish enterprises. These budgets should help ensure that you include all costs and receipts in your calculations. Costs and returns are often difficult to estimate in budget preparation because they are numerous and variable. Think of these budgets as an approximation and make appropriate adjustments using the "your estimate" column to reflect your specific production conditions. More information on using livestock budgets can be found in "Agricultural Alternatives: Budgeting for Agricultural Decision Making."

## For More Information

### Publications

Harper, J. K., S. Cornelisse, L. F. Kime, and J. Hyde. "Agricultural Alternatives: Budgeting for Agricultural Decision Making." University Park: Penn State Extension, 2013.

*Penn State Agronomy Guide*. University Park: Penn State College of Agricultural Sciences.

### Center

U.S. Pork Center of Excellence  
[www.usporkcenter.org](http://www.usporkcenter.org)

### Periodicals

*Lancaster Farming*  
PO Box 609  
Ephrata, PA 17522  
[lancasterfarming.com](http://lancasterfarming.com)

*National Hog Farmer*  
7900 International Drive, Suite 650  
St. Paul, MN 55116  
[nationalhogfarmer.com](http://nationalhogfarmer.com)

*Pork Magazine*  
[www.porkmag.com](http://www.porkmag.com)

For more information concerning pastured pork, contact Tony Nye (Nye.1@osu.edu), extension educator, The Ohio State University.



### Sample Farrow-to-Finish Swine Budget

Twenty sows weaning nine pigs per litter at 28 days and 2.3 litters per sow per year and selling at a market weight of 280 pounds.

ITEM	QUANTITY USED/SOLD		UNIT	PRICE PER CWT. VALUE		PER HERD	YOUR ESTIMATE
<b>Receipts</b>							
Market hogs (5% death loss) <sup>1</sup>	393		head	\$168.00		\$66,024.00	
Cull sows <sup>2</sup>	8		head	\$148.75		\$1,190.00	
<b>Total receipts</b>						<b>\$67,214.00</b>	
<b>VARIABLE COSTS PIGS TO 280 POUNDS</b>	<b>AVERAGE POUNDS PER PIG</b>	<b>DAYS FED</b>	<b>COST PER POUND</b>				
Nursery/starter feed (3#/hd/d)	126	42	\$0.13			\$6,437.34	
Grower feed (5#/hd/d)	285	57	\$0.12			\$13,440.60	
Finisher feed (7#/hd/d)	455	65	\$0.11			\$19,669.65	
<b>Sows</b>							
Gestation feed (5.5#/hd/d)	1,653	301	\$0.12			\$3,967.20	
Lactation feed (15#/hd/d)	966	64	\$0.13			\$2,511.60	
<b>Total feed costs</b>						<b>\$46,026.39</b>	
<b>OTHER VARIABLE COSTS</b>	<b>QUANTITY</b>		<b>UNIT</b>	<b>COST</b>	<b>TIMES</b>	<b>TOTAL</b>	
Replacement gilts	8		gilts	\$200.00		\$1,600.00	
Vet. and medicine per sow	20		hog	\$20.00		\$400.00	
Artificial insemination per sow	100		units	\$20.00	2.3	\$4,600.00	
Electricity per month	40		sows	\$12.00		\$480.00	
Heating per month	40		sows	\$20.00		\$800.00	
Marketing/trucking	393		hog	\$10.00		\$3,930.00	
Truck and tractor per month	50		hours	\$20.00		\$1,000.00	
Labor	500		hour	\$13.00		\$6,500.00	
Interest on operating capital <sup>3</sup>				\$531.30		\$531.30	
<b>Total variable costs</b>						<b>\$61,267.69</b>	
<b>FIXED COSTS<sup>4</sup></b>							
Insurance, taxes, and repairs	20		sows	\$24.85		\$497.00	
Equipment <sup>5</sup>	20		sows	\$17.69		\$353.80	
Farrowing building <sup>6</sup>	20		sows	\$14.85		\$297.00	
Gestation building <sup>6</sup>	20		sows	\$26.40		\$528.00	
Nursery building <sup>6</sup>	20		sows	\$39.60		\$792.00	
Finisher building <sup>6</sup>	20		sows	\$19.80		\$396.00	
Interest on investment						\$983.99	
<b>Total fixed costs</b>						<b>\$2,863.80</b>	
<b>Total Costs</b>						<b>\$64,131.49</b>	

1. Number of 280 pound pigs raised per sow per year.

2. Based on culling 40% of sows per year at 425 pounds.

3. Calculated at 6% of average variable costs.

4. Fixed costs are based on a 20 sow herd and a 1% death loss.

5. Based on the equipment needed divided by 20 sows.

6. Building costs are based on remodeling existing buildings; new construction may cost considerably more.

You should monitor local markets and contact suppliers to determine current prices for all items contained in this sample budget.

FINISHED HOG PRICE	PRICE PER CWT.	VALUE PER HOG	GROSS MARGIN PER HOG	NET RETURN PER HOG
Low	\$55.00	\$154.00	(\$1.90)	(\$9.18)
Medium-Low	\$60.00	\$168.00	\$12.10	\$4.82
Medium	\$65.00	\$182.00	\$26.10	\$18.82
Medium-High	\$70.00	\$196.00	\$40.10	\$32.82
High	\$75.00	\$210.00	\$54.10	\$46.82
<b>Price needed to cover variable costs</b>		<b>\$55.68</b>		
<b>Price needed to break even</b>		<b>\$58.28</b>		

### Sample Farrow-to-Feeder Swine Budget

Twenty sows weaning nine pigs per litter at 28 days and 2.3 litters per sow per year at a market weight of 50 pounds.

ITEM	QUANTITY USED/SOLD		UNIT	PRICE/VALUE		PER HERD	YOUR ESTIMATE
<b>Receipts</b>							
Feeder pigs (2% death loss) <sup>1</sup>	406		head	\$65.00		\$26,390.00	
Cull sows <sup>2</sup>	8		head	\$148.75		\$1,190.00	
Total receipts						\$27,580.00	
<b>VARIABLE COSTS PIGS TO 50 POUNDS</b>	<b>AVERAGE POUNDS PER PIG</b>	<b>DAYS FED</b>	<b>COST PER POUND</b>				
Nursery/starter feed (3#/hd/d)	126	42	\$0.13			\$6,650.28	
Sows							
Gestation feed (5.5#/hd/d)	1,653	300.5	\$0.12			\$3,967.20	
Lactation feed (15#/hd/d)	966	64.5	\$0.13			\$2,511.60	
Total feed costs						\$13,129.08	
<b>OTHER VARIABLE COSTS</b>	<b>QUANTITY</b>		<b>UNIT</b>	<b>COST</b>	<b>TIMES</b>	<b>TOTAL</b>	
Replacement gilts	8		gilts	\$200.00		\$1,600.00	
Vet. and medicine /sow	20		sows	\$20.00		\$400.00	
Artificial insemination/sow	100		units	\$20.00	2.3	\$4,600.00	
Electricity/month	30		sows	\$12.00		\$360.00	
Heating/month	40		sows	\$20.00		\$800.00	
Marketing/trucking	406		hog	\$4.00		\$1,624.00	
Truck and tractor/month	50		hours	\$20.00		\$1,000.00	
Labor	500		hour	\$13.00		\$6,500.00	
Interest on operating capital <sup>3</sup>				\$458.52		\$458.52	
Total variable costs						\$25,871.60	
<b>FIXED COSTS<sup>4</sup></b>							
Insurance, taxes, and repairs	20		sows	\$18.85		\$377.00	
Equipment for sows <sup>5</sup>	20		sows	\$17.70		\$354.00	
Farrowing/nursery buildings <sup>6</sup>	20		sows	\$39.60		\$792.00	
Gestation building <sup>6</sup>	20		sows	\$19.80		\$396.00	
Interest on investment				\$746.39		\$746.39	
Total fixed costs						\$2,665.39	
Total Costs						\$28,536.99	

1. Number of 45 pound pigs raised minus 2% death loss.

2. Based on culling 40% of sows per year at 425 pounds.

3. Calculated at 6% of average variable costs.

4. Fixed costs are based on a 20 sow herd with a 0.5% death loss.

5. Based on the equipment needed divided by 20 sows.

6. Building costs are based on remodeling existing buildings; new construction may cost considerably more.

You should monitor local markets and contact suppliers to determine current prices for all items contained in this sample budget.

FEEDER PIG PRICE	PRICE PER PIG	GROSS MARGIN PER PIG	NET RETURN PER PIG
Low	\$50.00	\$(13.72)	\$(20.29)
Medium-Low	\$57.50	\$(6.22)	\$(12.79)
Medium	\$65.00	\$1.28	\$(5.29)
Medium-High	\$72.50	\$8.78	\$2.21
High	\$80.00	\$16.28	\$9.71
<b>Price needed to cover variable costs</b>	<b>\$63.72</b>		
<b>Price needed to break even</b>	<b>\$70.29</b>		



### Sample Feeder-to-Finish Swine Budget

Purchasing three groups of ten pigs at 45 pounds per year and selling at a market weight of 280 pounds. The estimated grower feed eaten per pound of live weight gain is 2.5 pounds and the estimated finisher feed eaten per pound of live weight gain is 2.8 pounds.

ITEM	QUANTITY SOLD		UNIT	VALUE PER HEAD	TOTAL	YOUR ESTIMATE
<b>Receipts</b>						
Market hogs (2% death loss)	29		cwt.	\$168.00	\$4,872.00	
<b>VARIABLE COSTS</b>						
Feeder pigs	30			\$56.25	\$1,687.50	
	<b>FEED CONSUMED</b>	<b>WEIGHT GAIN</b>	<b>FEED COST PER POUND</b>			
Grower feed (5#/hd/d)	263	105	\$0.12		\$915.24	
Finisher feed (7#/hd/d)	364	130	\$0.11		\$1,161.16	
<b>Total pig plus feed costs</b>					<b>\$3,763.90</b>	
<b>OTHER VARIABLE COSTS</b>						
	<b>QUANTITY</b>		<b>UNIT</b>	<b>COST</b>	<b>TOTAL</b>	
Vet. and medicine	29		hogs	\$3.00	\$87.00	
Electricity	29		hogs	\$0.75	\$21.75	
Supplies	29		hogs	\$0.40	\$11.60	
Marketing	29		hogs	\$10.00	\$290.00	
Truck and tractor	29		hogs	\$1.25	\$36.25	
Labor	14.5		hour	\$13.00	\$188.50	
Miscellaneous	29		hogs	\$0.60	\$17.40	
Interest on operating capital <sup>1</sup>				\$326.23	\$326.23	
<b>Total variable costs</b>					<b>\$4,742.63</b>	
<b>FIXED COSTS<sup>2</sup></b>						
Insurance, taxes, and repairs	29		hogs	\$6.52	\$189.08	
Building and equipment <sup>3</sup>	29		hogs	\$34.62	\$1,003.98	
Interest on investment				\$374.37	\$374.37	
<b>Total fixed costs</b>					<b>\$1,193.06</b>	
<b>Total Costs</b>					<b>\$5,935.69</b>	

1. Equals 4% x (120 days/365 days) x (cost of feeder pig/0.5 x all variable costs).
2. Fixed costs are based on purchasing 10 pigs per time and selling 9 pigs.
3. Overhead costs on facilities equal to annual payment required to repay amount in price column in 10 years at 6% interest, divided by three groups a year. You should monitor local markets and contact suppliers to determine current prices for all items contained in this sample budget.

FINISHED HOG PRICE	PRICE PER CWT.	INCOME PER HOG	GROSS MARGIN PER HOG	NET RETURN PER HOG
Low	\$55.00	\$154.00	(\$9.54)	(\$50.68)
Medium-Low	\$60.00	\$168.00	\$4.46	\$(36.68)
Medium	\$65.00	\$182.00	\$18.46	\$(22.68)
Medium-High	\$70.00	\$196.00	\$32.46	\$(8.68)
High	\$75.00	\$210.00	\$46.46	\$5.32
<b>Price needed to cover variable costs</b>		<b>\$58.41</b>		
<b>Price needed to break even</b>		<b>\$73.10</b>		

Prepared by Sarah K. Linneen, former professor of animal science; Robert Mikesell, senior instructor in animal science; Lynn F. Kime, senior extension associate in agricultural economics; and Jayson K. Harper, professor of agricultural economics.

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Where trade names appear, no discrimination is intended, and no endorsement by Penn State Extension is implied.

#### This publication is available in alternative media on request.

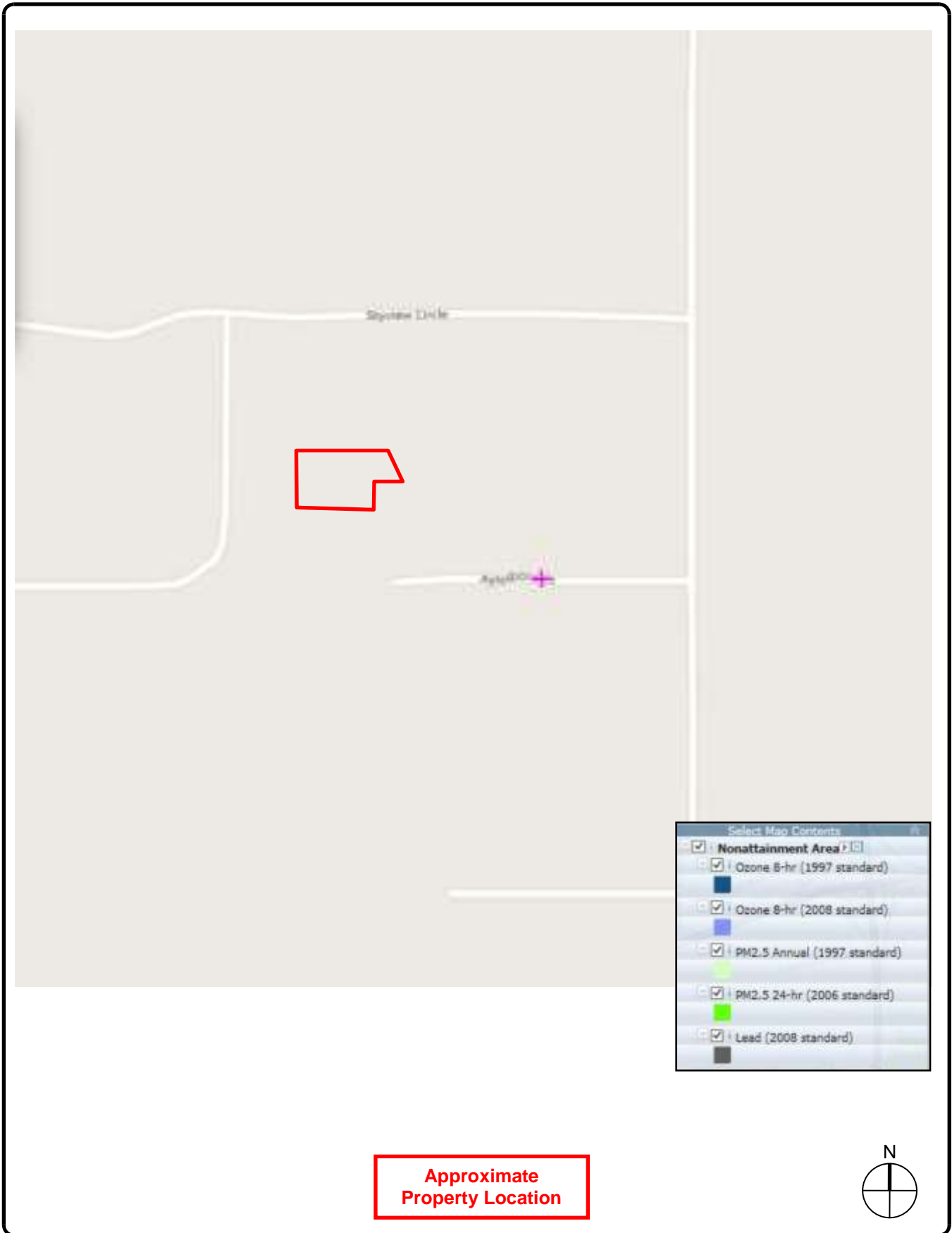
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Code UA261 09/16pod

**APPENDIX M**  
**Clean Air Act**



Air Monitoring Map  
Hernando County

Not to Scale

Prepared By: GLE Associates, Inc.  
5405 Cypress Center Drive, Suite 110  
Tampa, Florida 33609 (813) 241-8350, fax: 241-8737



Farrow to Finish Farm Brooksville, FL	
Drawn JJR	Job No. 18000-19835
Checked JKH	Figure
Date 9/14/2018	M-1

Find address or place **Basemap** Imagery Draw Erase Bookmarks Tools More Data

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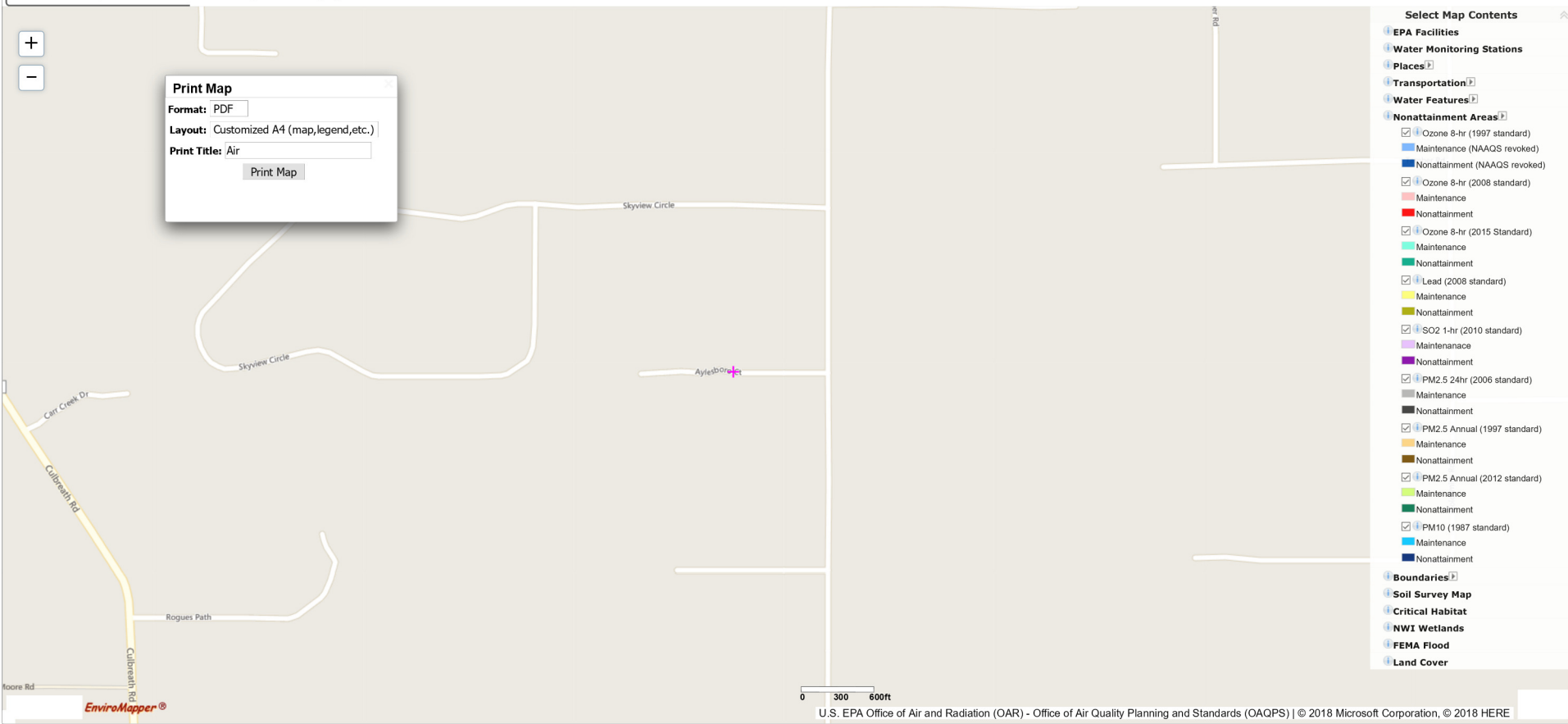
**Print Map**

Format: PDF

Layout: Customized A4 (map,legend,etc.)

Print Title: Air

Print Map



EnviroMapper®

U.S. EPA Office of Air and Radiation (OAR) - Office of Air Quality Planning and Standards (OAQPS) | © 2018 Microsoft Corporation, © 2018 HERE

**Select Map Contents**

- EPA Facilities
- Water Monitoring Stations
- Places
- Transportation
- Water Features
- Nonattainment Areas
  - Ozone 8-hr (1997 standard)
  - Maintenance (NAAQS revoked)
  - Nonattainment (NAAQS revoked)
  - Ozone 8-hr (2008 standard)
  - Maintenance
  - Nonattainment
  - Ozone 8-hr (2015 Standard)
  - Maintenance
  - Nonattainment
  - Lead (2008 standard)
  - Maintenance
  - Nonattainment
  - SO2 1-hr (2010 standard)
  - Maintenance
  - Nonattainment
  - PM2.5 24hr (2006 standard)
  - Maintenance
  - Nonattainment
  - PM2.5 Annual (1997 standard)
  - Maintenance
  - Nonattainment
  - PM2.5 Annual (2012 standard)
  - Maintenance
  - Nonattainment
  - PM10 (1987 standard)
  - Maintenance
  - Nonattainment
- Boundaries
- Soil Survey Map
- Critical Habitat
- NWI Wetlands
- FEMA Flood
- Land Cover



**APPENDIX N**  
**Noise Abatement**  
**No Documents Associated with this Appendix**

**APPENDIX O**  
**Important Land Resources**

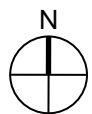




may not be valid at this scale.

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Astatula fine sand, 0 to 8 percent slopes	Not prime farmland	2.7	33.6%
19	Electra variant fine sand, 0 to 5 percent slopes	Not prime farmland	1.4	17.1%
43	Pomello fine sand, 0 to 5 percent slopes	Not prime farmland	3.8	48.4%
52	Wauchula fine sand, 0 to 5 percent slopes	Not prime farmland	0.1	0.8%
<b>Totals for Area of Interest</b>			<b>7.9</b>	<b>100.0%</b>

**Approximate  
Property Location**



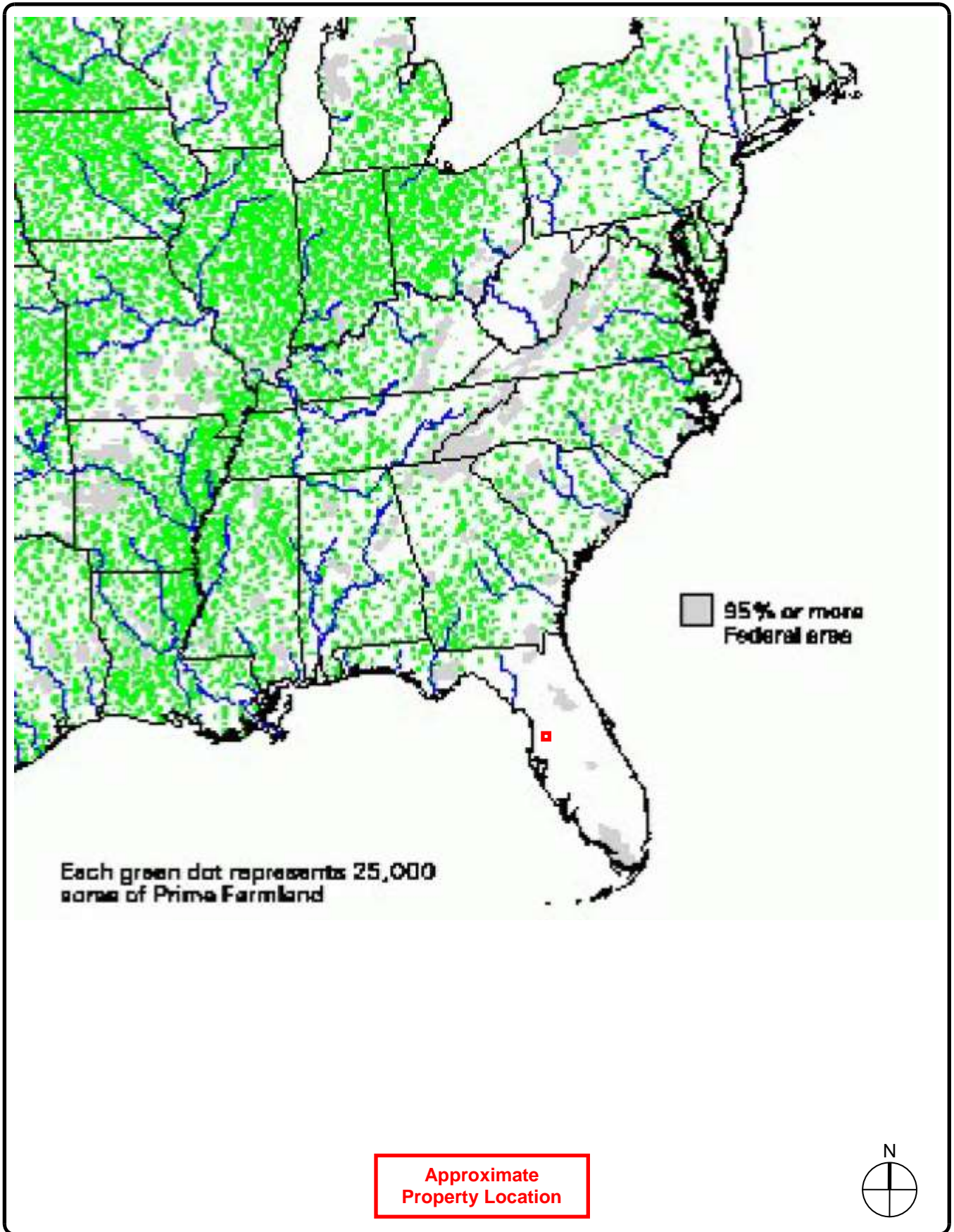
**Farmland Map**  
Hernando County

Not to Scale

Prepared By: GLE Associates, Inc.  
5405 Cypress Center Drive, Suite 110  
Tampa, Florida 33609 (813) 241-8350, fax: 241-8737



Farrow to Finish Farm Brooksville, FL	
Drawn JJR	Job No. 18000-19835
Checked JKH	Figure
Date 9/17/2018	0-1



Farmland Map  
Hernando County

Not to Scale

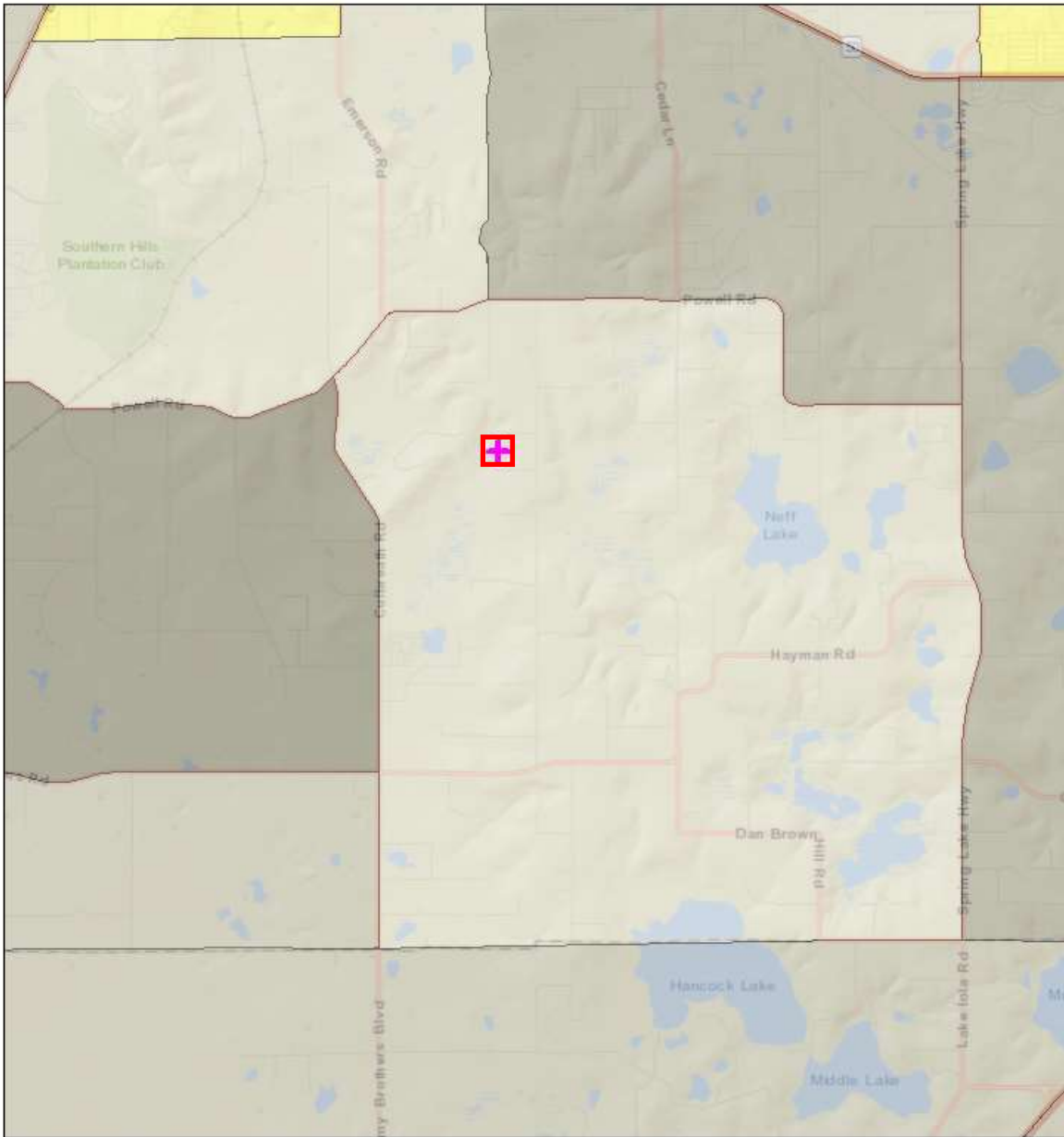
Prepared By: GLE Associates, Inc.  
5405 Cypress Center Drive, Suite 110  
Tampa, Florida 33609 (813) 241-8350, fax: 241-8737



Farrow to Finish Farm Brooksville, FL	
Drawn JJR	Job No. 18000-19835
Checked JKH	Figure
Date 9/17/2018	0-2

**APPENDIX P**  
**Environmental Justice**

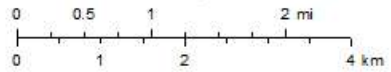
# Low Income



September 17, 2018

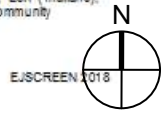
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- + Digitized Point
- EJSCREEN\_Indexes**
- Data not available
- Less than 50 percentile
- 50 -60 percentile
- 60 -70 percentile
- 70 -80 percentile
- 80 - 90 percentile
- 90 - 95 percentile
- 95 - 100 percentile



EPA OEI OEJ  
 Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

**Approximate  
Property Location**



Environmental Justice Map  
Low Income %

Not to Scale

Prepared By: GLE Associates, Inc.  
5405 Cypress Center Drive, Suite 110  
Tampa, Florida 33609 (813) 241-8350, fax: 241-8737

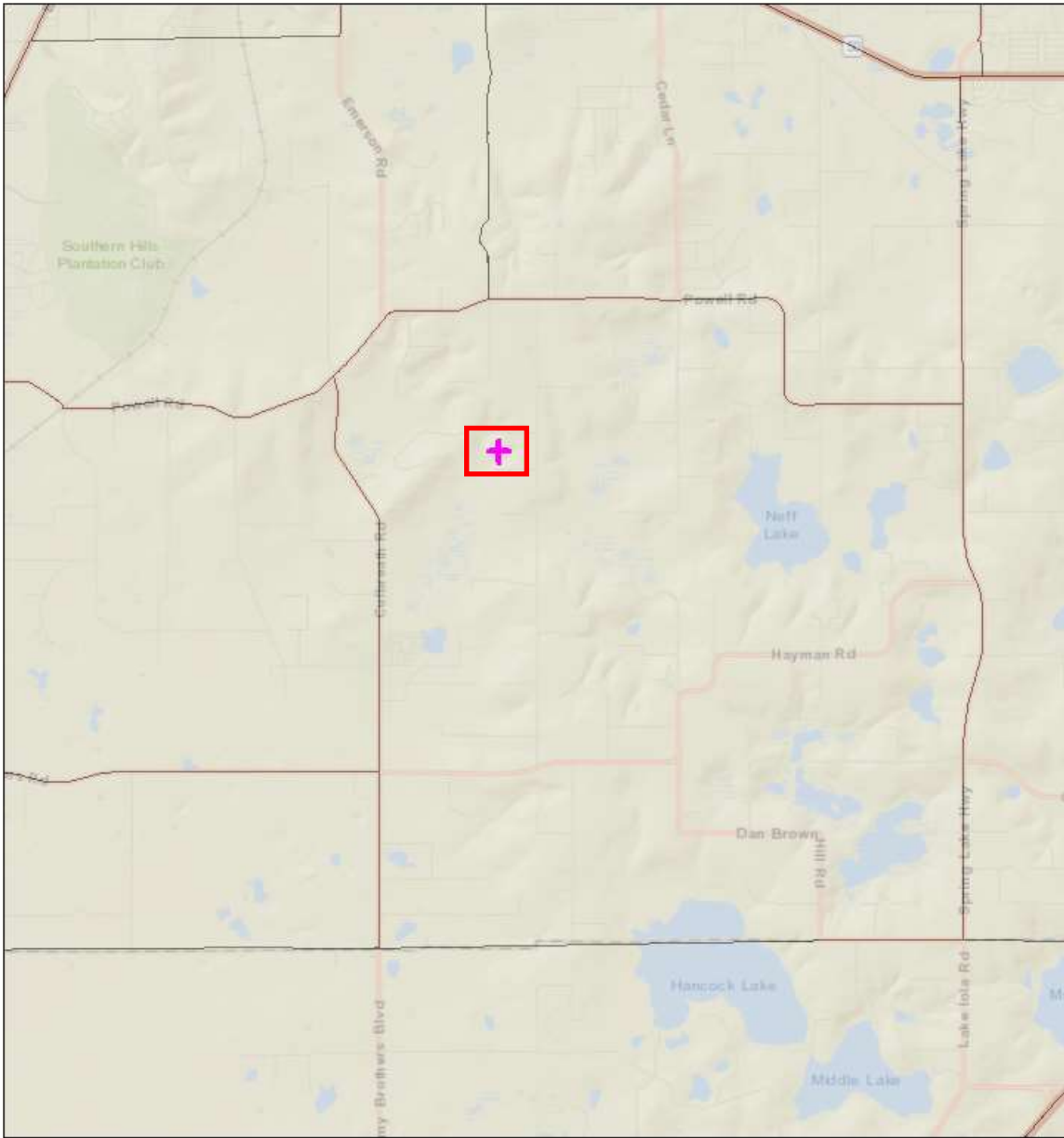


**Farrow to Finish Farm  
Brooksville, FL**

Drawn JJR	Job No. 18000-19835
Checked JKH	Figure
Date 9/17/2018	P-1

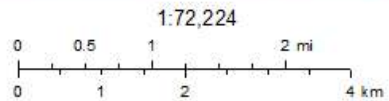


# Minority Maps



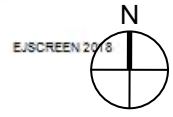
September 17, 2018

- + Digitized Point
- EJSCREEN\_Indexes**
- Data not available
- Less than 50 percentile
- 50 - 60 percentile
- 60 - 70 percentile
- 70 - 80 percentile
- 80 - 90 percentile
- 90 - 95 percentile
- 95 - 100 percentile



EPA OEI, OEJ  
 Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

Approximate  
Property Location



Environmental Justice Map  
 Minority Map %

Not to Scale

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**Farrow to Finish Farm**  
 Brooksville, FL

Drawn	JJR	18000-19835
Checked	JKH	Figure
Date	9/17/2018	
P-2		