FINAL

WETLAND MITIGATION PLAN

Beane Property Wetland Mitigation Site
New Hanover County, North Carolina

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1.0 BASELINE INFORMATION

The Beane Property Wetland Mitigation Site (Site, Project) is located within US Geological Survey (USGS) Hydrologic Unit (HU) 03030007 and NC Division of Water Resources (DWR) Cape Fear sub-basin 03-06-23, just east of Island Creek and south of the Cape Fear River. The Site is situated within the Middle Atlantic Coastal Plain and Carolina Flatwoods Level III and Level IV US Environmental Protection Agency (USEPA) Ecoregions, respectively. The Site is located approximately 0.6 miles southwest of the New Hanover / Pender County line and State Road 1572 / 1336 (Sidbury Road) and 1.6 miles north of Scotts Hill (Figure 1).

The Site encompasses 312.9 acres under the ownership of the N.C. Department of Transportation (NCDOT). Of this total, approximately 3.9 acres are part of an easement held by the Piedmont Natural Gas Company, Inc. The remaining 309.0 acres will be described in this document and be used to provide mitigation for authorized jurisdictional impacts associated with R-3300 (Hampstead Bypass).

The Site is relatively flat with most of the current topography resulting from anthropogenic modification (roads, ditches, spoil piles, silviculture planting beds, etc.). Early aerial photographs indicate that intensive modifications took place between the late 1940s and mid-1950s (Figures 2 and 3). The Site is primarily used for intensive pine silviculture with the loblolly pine (*Pinus taeda*) being the dominant species planted across the Site. Subtle elevation differences exist between the existing wetlands and uplands found within the Site. Soil properties across the Site, coupled with lateral ditch effects, have the greatest impact on the presence of wetlands or uplands. Elevations across the Site range from 23 to 49 feet above mean sea level (msl). The existing topography and anthropogenic features for the Site are shown in Figure 4 using Quality Level 2 (QL2) Light Detection and Ranging (LiDAR) (NCDPS, 2019). The average precipitation for the nearby Wilmington Airport over the period from 1935 to 2018 (83-years) was 55.9 inches, with approximately 50 percent of the precipitation occurring between the months of June and September. Soils on the Site are generally poorly drained and sandy in texture. The Site primarily consists of planted loblolly pines with scattered remnants of natural vegetation combined with areas of cutover forest.

2.0 SITE SELECTION

The Site was first identified during field investigations related to the U-4571 (Military Cutoff) / R-3300 US 17 Corridor Study conducted between 2007 and 2010. The Site was considered for its potential to mitigate some of the roadway's proposed impacts due to its proximity to the proposed R-3300 corridor. During this initial period, only streams and wetlands associated with the proposed roadway corridors were delineated and verified. Additional field investigations were conducted in 2013 to delineate all streams or wetlands within the Site. To evaluate the Site for mitigation potential, an existing conditions assessment was performed in October and November 2014 to identify, map, and characterize soils, hydrology, biotic communities, and existing jurisdictional

features within the Site. Utilizing data obtained from wetland delineations, soil characterizations, hydrologic trespass modeling, and decade long field observations, along with feedback received from state and federal agencies, the Site showed strong mitigation potential.

3.0 SITE PROTECTION INSTRUMENT

NCDOT will manage the Site to prohibit all uses inconsistent with its status as a mitigation property, including any activity that would materially alter the biological integrity or functional and educational value of the Site, consistent with the approved Mitigation Plan. The purpose of the protection agreements will be to assure that future use of the Site will result in the protection, maintenance, and enhancement of functions described in the Mitigation Plan.

4.0 GOALS AND OBJECTIVES

The Site will provide many hydrological and ecological benefits due to its location near the headwaters of Island Creek, which drains directly to the Cape Fear River. The over-arching goal of the Project is to improve the overall quality of the non-riparian and riparian wetlands by restoring/enhancing the hydrology and vegetative conditions that have been altered over the last century. The removal and conversion of existing ditches, culverts, roads, and spoil piles into functional wetland areas will provide greater on-site water holding capacity that will promote denitrification and filtration. This will ultimately help attenuate flows and provide reductions in nutrients and sediment leaving the Site. The conversion of the existing pine plantations to native plant communities will also provide greater species diversity and long-term ecological benefits to both plants and animals that inhabit the Site. The proposed wetland mitigation Project will provide approximately 79 acres of wetland restoration, 78 acres of wetland enhancement, and 31 acres of wetland preservation. Project goals and associated objectives are summarized in Table 1.

Table 1. Goals and Objectives

Goals	Objectives
Restore hydrology and native species vegetation in altered wetlands	○ Remove ditches, roads and culverts within non-riparian and riparian wetlands, ○ Convert loblolly pine plantations to native plant communities, ○ Protect all restored wetlands with intact upland buffers,

Reduce nutrient and sediment inputs into nearby Island Creek	• Restore non-riparian and riparian wetlands plant communities to trap sediment and to facilitate increased uptakes of water and nutrient inputs, • Remove ditches, roads, and culverts allowing surface and sub-surface water to move naturally across the Site, • Improve the water storage capacity and residence time of surface flows by removing ditches, roads, and culverts, • Promote higher water table conditions, and thus denitrification, within the restored wetlands
Long-term protection	• The Site is owned by NCDOT in fee simple. Long-term protection will be through the NCDOT Stewardship Program.

4.1 Functional and Ecological Uplift

Of the impairments present on the site, past ditching, stream channelization, road construction, and intensive pine silvicultural activities are the most severe, resulting in extensive anthropogenic features, altered plant communities, increased nutrient and sediment loading, and loss of wetland function. Ecological uplift will come from removing anthropogenic features, restoring wetland connections, and establishing native plant communities. Restored and enhanced wetlands will: 1) provide increased water storage capacity and help attenuate large rainfall events (i.e., hurricanes); 2) Reduce stormwater runoff and sedimentation to FSH and FSI and ultimately Island Creek; 3) provide a natural plant community that is suited to the site conditions; and 4) provide a diversity of aquatic and terrestrial habitats appropriate for the ecoregion and landscape setting. Approximately 189 acres of wetlands will be restored, enhanced and/or protected as part of the project. Uplands comprising approximately 111 acres will also provide additional buffer to wetland and stream areas. Potentially jurisdictional stream channels and their streambanks (FSH and FSI) will remain unchanged and comprise 2.6 acres (3,647 linear feet). Over 75% (20.3 acres) of the anthropogenic features will be removed, leaving approximately 6.1 acres of acres of ditches, ditch banks, and roads within the project to provide site access and to maintain hydrologic connections entering and leaving the Site.

Site specific wetland mitigation goals and objectives have been developed using North Carolina Wetland Assessment Method (NC WAM) analyses of degraded and reference systems (NC WFAT 2016). This method rates functional metrics for wetlands as high, medium, or low based on field data collected on forms and transferred into a rating calculator. Using Boolean logic, the rating

calculator assigns a high, medium, or low value for each metric and overall function. Table 2 summarizes NC WAM model output for forested reference wetlands on the Site proposed for wetland preservation and a degraded wetland that represents most of the wetlands found on the Site.

Table 2. NC WAM Summary

NC WAM Sub-function Rating Summary	Ref. Wetland 1	Ref. Wetland 2	Ref. Wetland 3	Ref. Wetland A	Degraded Wetland
Wetland Type	Pine Flat	Pine Flat	Pine Savanna	Non-Riverine Swamp Forest	**Pine Flat** [A]
(1) HYDROLOGY	HIGH	HIGH	HIGH	HIGH	LOW - MED.
(2) Surface Storage & Retention	HIGH	HIGH	HIGH	HIGH	LOW - MED.
(2) Sub-surface Storage and Retention	HIGH	HIGH	HIGH	HIGH	LOW - MED.
(1) WATER QUALITY	HIGH	HIGH	HIGH	HIGH	LOW
(2) Pollution Change	HIGH	HIGH	HIGH	MEDIUM	LOW
(1) HABITAT	HIGH	MEDIUM	HIGH	HIGH	LOW
(2) Physical Structure	HIGH	MEDIUM	MEDIUM	HIGH	LOW - MED.
(2) Landscape Patch Structure	MEDIUM	MEDIUM	HIGH	LOW	LOW
(2) Vegetative Composition	NA	NA	HIGH	HIGH	NA
OVERALL	**HIGH**	**HIGH**	**HIGH**	**HIGH**	**LOW**

A – Degraded Pine Flats comprise over 70% of the existing wetlands.

Based on the above NC WAM analysis, in areas proposed for wetland restoration and enhancement, all metrics are being targeted for functional improvements. Table 3 provides an overview of the Sites wetland functional improvement objectives and the specific actions proposed to accomplish them.

Table 3. Wetland Work Plan Components and Functional Objectives

Functional Improvement Objectives	Proposed Actions
Hydrology	
Surface Storage and Retention	Removal of ditches, roads, and culverts to reestablish hydrology; establish natural plant communities through the planting of native forest vegetation.
Sub-surface Storage and Retention	
Water Quality	
Pollution Change	Conversion of pine silvicultural to native forest vegetation; Removal of ditches, roads, and culverts to allow water to move naturally across the Site, whereby reducing runoff and sedimentation in downstream waterbodies
Habitat	
Physical Structure	Establish native plant communities that connect to adjacent natural resources.
Landscape Patch Structure	
Vegetation Composition	

5.0 EXISTING CONDITIONS

5.1 Potentially Jurisdictional Features

Stream and wetland delineations conducted for the U-4571 / R-3300 US 17 Corridor Study were verified in 2010. To fully assess existing jurisdictional features on-site, additional wetland delineations were completed in August 2013; these delineations were never verified by the U.S. Army Corps of Engineers (USACE) or DWR. In the Fall of 2019, EPR reassessed the streams and wetlands within the Site to provide the most up-to-date information available and to have the delineated resources verified. Following the field assessment, a jurisdictional review package was prepared and submitted to USACE for the Site on February 13, 2020. A field meeting was held on February 26, 2020, to review the delineated resources with USACE, NCDOT, and EPR present. The submitted Preliminary Jurisdictional Determination (PJD) Package was updated following the February 26, 2020, field visit and following a final review by USACE on January 6, 2021. A determination letter (USACE Action ID – SAW-2007-01386) dated March 5, 2021, and a final version of the PJD package can be found in Appendix 1. Streams, wetlands, and a pond identified within the 312.9 acres of the Site are described in the following sections.

5.1.1 Potentially Jurisdictional Streams

Two potentially jurisdictional streams and seventeen tributaries were identified within the Site during field investigations (Table 4 and Figure 5). Field evaluations of flow status (intermittent or perennial) and quality of Site streams were conducted by CALYX (now NV5) biologists in

October and November 2014 and further reviewed by EPR staff in 2019 and 2020. These assessments were based on the DWR *Methodology for Identification of Intermittent and Perennial Streams and Their Origins* stream assessment protocols, Version 4.11.

Associated Waters and Classification

The NC Department of Environmental Quality (NCDEQ) assigns classifications of best usage to State Waters that indicate water quality and potential use as a resource. All three streams identified within the Project area flow into Island Creek. Island Creek carries a Class C designation, indicating that the stream supports aquatic life, fresh water uses, and secondary recreation. Island Creek is also classified as Swamp Waters (Sw), indicating a low velocity, and natural characteristics different from nearby streams. Island Creek is not located within the Site. There are no High-Quality Waters (HQW), Water Supply (WS), or Outstanding Water Resources (ORW) within or near the Site.

Table 4. Potentially Jurisdictional Streams and Tributaries

Stream Name	Length (lf)	Water Types
Tributary 2	954	NRPW
Tributary 4	3,391	NRPW
Tributary 5	364	NRPW
Tributary 7	934	NRPW
Tributary 10	1,088	NRPW
Tributary 11	3,589	NRPW
Tributary 12	1,662	NRPW
Tributary 13	1,938	NRPW
Tributary 14	646	NRPW
Tributary 15	964	NRPW
Tributary 16	1,946	NRPW
Tributary 17	2,361	NRPW
Tributary 18	1,687	NRPW
Tributary 19	1,369	NRPW
Tributary 20	879	NRPW
Tributary 21	861	NRPW
Tributary - FSH	48	NRPW
FSH (Intermittent)	608	RPW
FSI (Perennial)	3,039	RPW
Total	**28,328**	

NRPW - Non-Relative Permanent Waters that flow directly or indirectly into Traditional Navigable Waters.
RPW - Relatively Permanent Waters that flow directly or indirectly into Traditional Navigable Waters.
lf = linear feet

5.1.2 Potentially Jurisdictional Wetlands

Currently, sixteen potentially jurisdictional wetlands are located within the Site, totaling approximately 110 acres (35%) of the Site's total area (Table 5 and Figure 5). These wetlands were identified and delineated using the 3-parameter approach outlined by the 1987 USACE Wetland Delineation Manual (Environmental Laboratory, 1987) and the Atlantic and Gulf Coastal Plain Region Regional Supplement to the USACE Wetland Delineation Manual, V2.0 (USACE, 2010). Additionally, lateral effect was utilized to determine the hydrologic drawdown and subsequent effects on wetlands adjacent to the extensive ditch network on the property. The Lateral Effect program developed by Phillips et al. 2015 was utilized to determine the lateral effect of the ditches at the Site. Approximately 126 acres of lateral effect was determined to be present for the Site and wetlands delineated wetlands within these lateral effect areas were removed as a part of the preliminary jurisdictional package (Appendix 1 and Figure 6).

Table 5. Potentially Jurisdictional Wetlands

Wetland Name	Total (ac)	Water Types	Cowardin Code	NC WAM Type	NC WAM Rating
FWC1	9.77	NRPWW	PFO1/4	Headwater Forest	Low
FWC2	18.95	NRPWW	PFO4	Pine Flat	Low
FWC3	0.88	NRPWW	PFO2	Non-Riverine Swamp Forest	Medium
FWC4	0.47	RPWWD	PFO1	Riverine Swamp Forest	Low
FWD	31.62	NRPWW	PFO4	Pine Flat	Low
FWF	6.29	NRPWW	PFO1/4	Pine Flat	Low
MWA	24.12	NRPWW	PSS4/PFO4	Pine Flat	Low
MWC1	2.87	NRPWW	PFO4	Pine Flat	Medium
MWC2	1.14	NRPWW	PFO1/4	Pocosin	Low
MWD	0.50	NRPWW	PFO1/4	Headwater Forest	Low
MWE	9.73	RPWWN	PFO4	Pine Savanna	Medium
MWF	2.52	NRPWW	PFO4	Pine Flat	Medium
MWG	0.25	RPWWN	PFO1	Headwater Forest	Low
MWI	0.10	NRPWW	PFO4	Pine Flat	Low
TWA	0.70	NRPWW	PFO1	Hardwood Flat	Low
TWB	0.15	NRPWW	PFO1	Non-Riverine Swamp Forest	Low
Total	**110.06**				

NRPWW – Wetlands adjacent to Non-Relatively Permanent Waters that flow directly or indirectly into Traditional Navigable Waters.
RPWWD – Wetlands directly abutting Relatively Permanent Waters that flow directly or indirectly into Traditional Navigable Waters.
RPWWN – Wetlands adjacent to but not directly abutting Relatively Permanent Waters that flow directly or indirectly into Traditional Navigable Waters.

5.1.3 Potentially Jurisdictional Ponds

Currently, only one pond was delineated within the Site, totaling approximately 0.04 acres (Table 6 and Figure 5). This pond is associated with Tributary 11.

Table 6. Potentially Jurisdictional Ponds

Pond Name	Total (ac)	Cowardin	Connection
PA	0.04	PUB2	Connection to Tributary 11
Total	**0.04**		

5.2 Vegetation

A variety of vegetation species have been encountered over numerous visits to the Site. The most common species found within the Site are listed below by their stratum.

Canopy cover across the Site consists primarily of loblolly pine, pond pine (*Pinus serotina*), sweetgum (*Liquidambar styraciflua*), swamp bay (*Persea palustris*), red maple (*Acer rubrum*), persimmon (*Diospyros virginiana*), water oak (*Quercus nigra*), black cherry (*Prunus serotina*), and longleaf pine (*Pinus palustris*).

The understory layer is comprised of a combination of saplings and shrubs consisting of wax myrtle (*Morella cerifera*), sweet pepperbush (*Clethra alnifolia*), beautyberry (*Callicarpa americana*), titi (*Cyrilla racemiflora*), loblolly bay (*Gordonia lasianthus*), multiflora rose (*Rosa multiflora*) and winged sumac (*Rhus copallinum*).

Herbaceous vegetation includes bracken fern (*Pteridium aquilinum*), royal fern (*Osmunda regalis*), cinnamon fern (*Osmundastrum cinnamomeum*), chalky bluestem (*Andropogon capillipes*), sensitive fern (*Onoclea sensibilis*), dog fennel (*Eupatorium capillifolium*), giant cane (*Arundinaria gigantea*), switchcane (*Arundinaria tecta*), and broomsedge (*Andropogon virginicus*). Vine species present include Carolina jessamine (*Gelsemium sempervirens*), laurel greenbrier (*Smilax laurifolia*), muscadine (*Vitis rotundifolia*), trumpet creeper (*Campsis radicans*), and Virginia creeper (*Parthenocissus quinquefolia*).

Invasive species identified at the Site primarily include multiflora rose and fescue. One Japanese climbing fern (*Lygodium japonicum*) plant was noted along Road 2 between Roads 4 and 5a.

5.3 Natural Communities

There are 10 primary biotic communites that have been identified within the Site (Table 7 and Figure 7). The names and description of the communities are derived from Schafale's *Guide to the Natural Communities of North Carolina, Fourth Approximation* (2012), and field observations of the reference communities. Because communities were initially described using Schafale and Weakley's *Classification of the Natural Communities of North Carolina, Third Approximation* (1990), a crosswalk to the 4th approximation is provided in Table 7. A description of each community classification is described below using the guidance of the natural community documents and/or field observations.

Table 7. Existing Natural Communities

3rd Approximation - Natural Community	4th Approximation – Natural Community	Coverage – acres (%)
Loblolly Pine Plantation [A]	Loblolly Pine Plantation [A]	143.9 (46.6)
Mesic Pine Flatwoods	Mesic Pine Savanna	82.4 (26.7)
Maintained/Disturbed [A]	Maintained/Disturbed [A]	29.1 (9.4)
Xeric Sandhill Scrub	Xeric Sandhill Scrub (Typic Subtype)	13.8 (4.5)
Pond Pine Woodland	Pond Pine Woodland (Typic Subtype)	10.3 (3.3)
Wet Pine Flatwoods	Wet Pine Flatwoods (Typic Subtype)	9.9 (3.2)
Pine Savanna	Sandy Pine Savanna (Typic Subtype)	9.7 (3.1)
Non-Riverine Wet Hardwood Forest (Disturbed Version)	Non-Riverine Wet Hardwood Forest (Oak Flat Subtype)	6.9 (2.2)
Non-Riverine Swamp Forest (Cypress-Gum Subtype)	Coastal Plain Depression Swamp (Mixed Subtype)	1.9 (0.6)
Coastal Plain Bottomland Hardwood (Blackwater Subtype)	Blackwater Bottomland Hardwoods	1.1 (0.4)
Totals		**309.0 (100)**

[A] – Not described by Schafale and Weakely (1990) or Schafale (2012), but described in section below.

Loblolly Pine Plantation:

The loblolly pine plantation or managed pine stand occurs across a wide range of Site conditions and covers almost half of the Site. The loblolly pines can be grown across the Site due to extensive hydrologic manipulation via ditching and bedding. Ditching controls the elevation of the water table and the addition of planting beds elevates the pines above this water table. The vegetation is dominated by loblolly pines with varying growth rates due to changes in hydrology across the Site. In areas where the hydrology is more suitable to the growth of loblolly pine, the trees are larger in both height and diameter and the tree canopy is completely closed, shading out mid- and understory vegetation. Wetter areas of this community generally contain stunted loblolly pines, such as those areas bounded by existing access roads 3a and 5b with no outlets. In these wetter conditions, the vegetation is generally thicker and contains species such as inkberry (*Ilex glabra*), gallberry (*Ilex coriacea*), swamp bay, loblolly bay, laurel greenbrier, chalky bluestem, sundews (*Drosera* spp.), and pitcher plants (*Sarracenia* spp.).

Mesic Pine Savanna:

This community occurs on mesic (non-wetland) sites of either flat or rolling Coastal Plain sediments. These sites are neither excessively drained nor have a significant seasonal high water table. These communities naturally experienced frequent low to moderate intensity surface fires which maintained a somewhat open canopy, open to sparse shrub layer, and vigorous herb layer. At the Site, Mesic Pine Flatwoods commonly occur on the breaks of interstream divides and are characterized by a closed to open canopy of longleaf pine, sometimes mixed with loblolly pine. The understory is sparse (in frequently burned sites) to dense (in unburned sites), and contains species such as southern red oak (*Quercus falcata*), water oak, post oak (*Quercus stellata*), blackjack oak (*Quercus marilandica*), mockernut hickory (*Carya tomentosa*), and sweetgum. A

low shrub layer of varying density is generally present, including species such as inkberry, gallberry, fetterbush (*Lyonia lucida*), sweet bay (*Magnolia virginiana*), swamp bay, giant cane, and creeping blueberry (*Vaccinium crassifolium*). The herb layer was generally dominated by wiregrass (*Aristida stricta*) in frequently burned areas, with bracken fern dominating elsewhere. Other typical herb species include broomsedge and switchgrass (*Panicum virgatum*).

Maintained/Disturbed:
Maintained/Disturbed areas are scattered throughout the Site in places where the vegetation is periodically mowed or the area is maintained and include access roads, ditches/ditchbanks, and fields. The vegetation in this community is comprised of low growing grasses and herbs, including fescue (*Festuca* spp.), clover (*Trifolium* spp.), wild onion (*Allium* spp.), broom sedge, and henbit (*Lamium amplexicaule*). However, along the ditches and ditchbanks, shrubs and trees are also present.

Xeric Sandhill Scrub (Typic Subtype):

This community consists of coarse, deep sands of ridge and swale systems, Carolina bay rims, and sandy uplands. These areas are the driest in the Coastal Plain. On the Site, the Xeric Sandhill Scrub community most commonly occurs on the sand ridge rims of pocosin-like wetlands. This community expressed an open canopy of longleaf pine, with an open-to-dense understory of turkey oak (*Quercus laevis*). Occasional sassafras (*Sassafrass albidum*) and persimmon were observed. A sparse low shrub layer consisting primarily of huckleberry (*Gaylussacia ursina*) and poison ivy (*Toxicodendron radicans*) is sometimes present. A sparse to moderately dense herb layer consists of species such as wiregrass and spikemoss (*Selaginella* spp.).

Pond Pine Woodland (Typic Subtype):

This community occurs on oligotrophic mineral soils or histosols in interstream flatlands or shallow swales. Pond pine woodlands almost always occur in wet soils, but may be persistent following hydrologic modifications. On the Beane site, this community type occurs in scattered sites of varying stand sizes. It often borders pocosin-like wetlands and young stands share many characteristics with both low and high pocosins. This community is best characterized by a canopy dominated by pond pine mixed with sometimes co-dominant loblolly bay, and with lesser amounts of sweet bay, red maple, longleaf pine, loblolly pine, and swamp bay. Shrub layers are generally dominated by inkberry, titi, and swamp bay with lesser amounts of black highbush blueberry (*Vaccinium fuscatum*), and small bayberry (*Morella caroliniensis*). At the Site, most pond pine woodlands have sparse herbaceous layers, but where they do occur, they are often dominated by sphagnum mosses (*Sphagnum* spp.) and switchcane. Laurel greenbrier is abundant in some stands.

Wet Pine Flatwoods (Typic Subtype):

This community occurs on seasonally wet to usually wet sites; typically on flat or nearly flat Coastal Plain sediments. Though seasonally saturated, this community may become quite dry for part of the year. On the Site, the Wet Pine Flatwoods community is most commonly found in

broad areas of interstream divides. The canopy of this community consists of longleaf, loblolly or pond pine, or a combination of the three. The understory is sometimes absent but often contains invading hardwoods. The shrub layer varies in density and contains species similar to those in the Mesic Pine Flatwoods community. The herb layer generally characterized by bushy bluestem (*Andropogon glomeratus*), cinnamon fern, and royal fern with scattered occurrences of wiregrass and bracken fern.

Sandy Pine Savanna (Typic Subtype):

This community occurs in wet flat areas where frequent fires have occurred or other conditions have encouraged sparse canopies dominated by longleaf pine. Occasionally the canopy is shared with less frequent occurrences of pond pine, swamp tupelo (*Nyssa biflora*) and red maple. The shrub layer can be dense in some areas, especially where fire suppression has occurred. Dominant shrubs consist of inkberry, and loblolly bay. Small bayberry, wax myrtle, and black highbush blueberry are infrequent components. Longleaf and pond pine saplings share the midstory. The herbaceous layer is rich and diverse, dominated by various graminoids such as purple bluestem (*A. glomeratus* var. *glaucopsis*) and little bluestem (*Schizachyrium scoparium*). Many carnivorous plants occur at the Site in this community type including yellow pitcher plant (*Sarracenia flava*), purple pitcher plant (*Sarracenia purpurea* var. *venosa*), pink sundew (*Drosera capillaris*), dwarf sundew (*Drosera brevifolia*), Venus flytrap (*Dionaea muscipula*) and various bladderworts (*Utricularia* spp.).

Non-Riverine Wet Hardwood Forest (Oak Flat Subtype):

This community type occurs on sites that have poorly drained clayey or mineral soils and have canopies dominated by various hydrophytic hardwoods such as sweetgum, red maple, and swamp tupelo. Other hardwoods such as tulip-poplar (*Liriodendron tulipifera*) and cherrybark oak (*Quercus pagoda*) occur less frequently. Often these sites occur as climax communities, rarely succeeding without natural or unnatural modifications. At the Site, much of the midstory is dominated by various age classes of the canopy species. Coastal doghobble (*Leucothoe axillaris*) and various staggerbush species (*Lyonia* spp.) often dominate the shrub layer. In some sites, the shrub layer can be quite dense and diverse. Herbaceous layer is often lacking but may include sedges (*Carex* spp.) and netted chain fern (*Woodwardia areolata*). Laurel greenbrier (*Smilax laurifolia*) and Carolina jessamine are frequent and dense components of the plant community.

Coastal Plain Depression Swamp (Mixed Subtype):

This community occurs on a small portion of the Site that is generally saturated to shallowly flooded throughout the year due to a high-water table. The community likely covered much greater portions of the Site, but these areas were probably logged due to the high demand for cypress lumber. The depressional nature of the community provides both a source and a storage area for water on the Site. Within the Site, the canopy is dominated by bald cypress (*Taxodium distichum*), swamp tupelo, and red maple. The understory was dense and was comprised primarily of swamp

bay, titi, and American holly (*Ilex opaca*). The shrub layer is also rather dense and mainly contains fetterbush, sweet pepperbush, and laurel greenbrier. The herb layer was limited due to the density of the understory and shrub layer; however, cinnamon fern and netted chain fern were noted within the community.

Blackwater Bottomland Hardwoods:

This community type occurs along areas of seasonal flooding, especially where sandy alluvial deposits accumulate, creating slightly raised topographical relief. This community type is infrequent at the Site and only a small remnant remains near the western portion of the Site. Dominant canopy species include laurel oak (*Quercus laurifolia*), sweetgum, and willow oak (*Quercus phellos*). The shrub layer can be incredibly dense and diverse. Inkberry, coastal doghobble, staggerbushes, and sweet pepperbush are often dominant species. The herbaceous layer is generally lacking, but in instances where it does occur, it often contains various sedges (*Carex* spp.) and netted chain fern. Vines such as laurel greenbrier and Carolina jessamine create dense tangles.

5.4 Soils

The US Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) identifies eight soil map units as occurring within the Site (Soil Survey Staff, 2019). The most common soil within the Site is the Murville series, accounting for more than 50% of the Site area. Hydric soil map units account for approximately 97% of the Site, with a wide range of hydric status ratings. A description of the soils located within the Site are described in Table 8 and shown on Figure 8.

Table 8. Soil Map Units

Symbol	Soil Map Unit	Drainage Class	Hydric Status (Rating) [A]	Coverage (ac)	Coverage (%)
Mu	Murville fine sand	Very poorly	Hydric (66 to 99%)	158.5	51.3
Se	Seagate fine sand	Somewhat poorly	Hydric (1 to 32%)	60.0	19.4
Pn	Pantego loam	Very poorly	Hydric (66 to 99%)	25.1	8.1
Le	Leon sand	Poorly	Hydric (66 to 99%)	19.9	6.5
St	Stallings fine sand	Somewhat poorly	Hydric (1 to 32%)	18.1	5.9
JO	Johnston soils	Very poorly	Hydric (66 to 99%)	16.4	5.3
Wr	Wrightsboro fine sandy loam	Moderately well	Non-Hydric	9.0	2.9
Be	Baymeade fine sand	Well	Hydric (1 to 32%)	2.0	0.6
			Total	**309.0**	**~100.0**

[A] – Hydric status corresponds to the NRCS hydric soil rating (Soil Survey Staff, 2019).

5.5 Threatened and Endangered Species Assessment

The US Fish and Wildlife Service's (USFWS) website updated June 17, 2021, identifies 16 federally protected species for New Hanover County (Table 9). A brief description of each species' habitat requirements follows, along with the Biological Conclusion rendered based on

survey results in the study area. Habitat requirements for each species are based on the current best available information from referenced literature and/or the USFWS.

Table 9. Federally Protected Species That May Occur on the Site

Scientific Name	Common Name	Federal Status	Habitat Present	Biological Conclusion
Alligator mississippiensis	American alligator	T (S/A)	Yes	Not Required
Amaranthus pumilus	Seabeach amaranth	T	No	No Effect
Calidris canutus rufa	Red knot	T	No	No Effect
Caretta caretta	Loggerhead sea turtle	T	No	No Effect
Carex lutea	Golden sedge	E	Yes	MA-NLAA
Charadrius melodus	Piping plover	T	No	No Effect
Chelonia mydas	Green sea turtle	T	No	No Effect
Dermochelys coriacea	Leatherback sea turtle	E	No	No Effect
Eretmochelys imbricata	Hawksbill(=carey) sea turtle	E	No	No Effect
Laterallus jamaicensis ssp. jamaicensis	Eastern Black rail	T	No	No Effect
Lepidochelys kempii	Kemp's (=Atlantic) ridley sea turtle	E	No	No Effect
Lysimachia asperulaefolia	Rough-leaved loosestrife	E	Yes	MA-NLAA
Myotis septentrionalis	Northern long-eared Bat	T	Yes	MA-LAA
Picoides borealis	Red-cockaded woodpecker	E	Yes	MA-NLAA
Thalictrum cooleyi	Cooley's meadowrue	E	Yes	MA-NLAA
Trichechus manatus	West Indian Manatee	E	No	No Effect

E – Endangered, T – Threatened, T (S/A) – Threatened by Similarity of Appearance, MA-LAA – May Affect – Likely to Adversely Affect, MA-NLAA – May Affect – Not Likely to Adversely Affect.

5.5.1 American Alligator

USFWS Recommended Survey Window: Year-round (only warm days in winter)
Biological Conclusion: Not Required

Species listed as Threatened due to Similarity of Appearance do not require Section 7 consultation with the USFWS. Suitable aquatic habitat for American alligator in the form of canals (e.g. ditches) does exist within the Site. However, review of North Carolina Natural Heritage Program (NCNHP) records in July 2021 indicates no known American alligator occurrences within 1.0 mile of the Site.

5.5.2 Golden Sedge

USFWS Recommended Survey Window: Mid-April – Mid June
Biological Conclusion: May Affect – Not Likely to Adversely Affect

Suitable habitat for golden sedge consisting of the ecotone between pine savanna and adjacent wet hardwood or hardwood/conifer forest exists within the Site. However, NV5 biologists surveyed for the species on June 10, 2021, and no individuals were observed. A review of NCNHP records in July 2021 indicates no known golden sedge occurrences within 1.0 mile of the Site.

5.5.3 Black Rail

USFWS Recommended Survey Window: April 1-June 30
Biological Conclusion: No Effect

The eastern black rail is one of the four recognized subspecies of black rail and is the only subspecies that occurs along the Atlantic coast of the United States. Habitats used by the eastern black rail along the southern Atlantic coast includes impounded and unimpounded marshes, which can be tidally or non-tidally influenced and range in salinity from salt to fresh. Nests may be built within the marsh or along the edge and hidden within dense vegetation. Black rails are extremely secretive and seldom seen. While some vocalizations occur at dusk, they are often only heard calling at night, when they vocalize at all. Eastern black rails are year-round residents in North Carolina. No suitable habitat for black rail is present within the Project study area. A review of NCNHP records in July 2021 indicates no known eastern black rail occurrences within 1.0 mile of the Site.

5.5.4 Rough-Leaved Loosestrife

USFWS Recommended Survey Window: Mid May – September
Biological Conclusion: May Affect – Not Likely to Adversely Affect

Suitable habitat for rough-leaved loosestrife in the form of ecotones or edges between longleaf pine uplands and pond pine pocosins, in dense shrub and vine growth and shallow organic soils overlaying sand (spodosolic soils) exists within the Site. However, NV5 biologists surveyed for the species on June 10, 2021, and no individuals were observed. A review of NCNHP records in July 2021 indicates no known rough-leaved loosestrife occurrences within 1.0 mile of the Site.

5.5.5 Northern Long-eared Bat

USFWS Recommended Survey Window: June 1 – August 15
Biological Conclusion: May Affect – Likely to Adversely Affect

The USFWS has developed a programmatic biological opinion (PBO; signed 11/6/2020) in conjunction with the Federal Highway Administration (FHWA), the USACE, and NCDOT for the northern long-eared bat (NLEB) in eastern North Carolina. The PBO covers the entire NCDOT program in Divisions 1-8, including all NCDOT projects and activities. The programmatic

determination for NLEB for the NCDOT program is "May Affect, Likely to Adversely Affect". A review of NCNHP records in July 2021 indicates one northern long-eared bat occurrence (EO# 32126) in New Hanover County, but no specific location is given. The specimen was brought into the county lab for rabies testing in 1994. No other occurrences of northern long eared bat are reported within 1.0 mile of the Site.

5.5.6 Red-Cockaded Woodpecker

USFWS Recommended Survey Window: Year-Round; November – Early March (optimal)
Biological Conclusion: May Affect – Not Likely to Adversely Affect

Suitable RCW foraging and nesting/roosting habitat in the form of open, mature stands of longleaf pine exists within the Site. However, NV5 biologists surveyed for the species on June 10, 2021, and no individuals were observed. A review of NCNHP records in July 2021 indicates one historical RCW occurrence (EO# 18108) within 1.0 mile of the Site.

5.5.7 Cooley's Meadowrue

USFWS Recommended Survey Window: Mid-June – Early July
Biological Conclusion: May Affect – Not Likely to Adversely Affect

Suitable habitat for Cooley's meadowrue in the form of moist to wet grass-sedge bogs, wet-pine savannas over calcareous clays, and the edges of disturbed open habitats exists within the Project area. However, NV5 biologists surveyed for the species on June 10, 2021, and no individuals were observed. A review of NCNHP records in July 2021 indicates a known population of Cooley's meadowrue (EO# 27826) within 1.0 mile of the Site. This population was identified by Mulkey, Inc. (NV5) field biologists during the original field investigations.

5.5.8 Other Federally Listed Species

Nine of the federally listed species for New Hanover County require habitats with no possible occurrence within or near the Project area, and as such have been removed from consideration for this Mitigation Plan. These species include green sea turtle, hawksbills sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, loggerhead sea turtle, piping plover, red knot, West Indian manatee, and sea beach amaranth.

Biological Conclusion: No Effect

Suitable habitat for these species in the form of marine or estuarine bodies of water, beaches, or shoreline do not exist within the Project area. A review of NCNHP records in July 2021 indicates no known occurrence of any of these species within 1.0 mile of the Site.

5.6 Endangered Species Act Candidate Species

Following a review of the USFWS website on June 17, 2022, two federal candidate species were listed for New Hanover County, NC (USFWS, 2021):

·Magnificent ramshorn (*Planorbella magnifica*)

-11/16/2020, Citation 85 FR 73164 73179

·Monarch butterfly (*Danaus plexippus*)

-12/17/2020, Citation 85 FR 81813 81822

5.7 State Rare and Federal Species of Concern

A formal query of the NCNHP database was requested on November 10, 2020, for records of potential occurrence of rare species, important natural communities, natural areas, or conservation managed documented within a 1-mile radius of the Project boundary (NCNHP, 2020). The formal query shows the Sidbury Pine Savanna, a NCHNP Natural Area, abuts the Project boundary on its eastern and southeastern boundary.

Multiple plants of *Dionaea muscipula* (Venus flytrap) have been observed along the eastern boundary of the Site (Figure 9). These plants exist along an ecotone / access path that has been regularly maintained through mowing over the last decade (Barrett, 2021). The plant species is listed as State Threatened by the NCNHP (NCNHP, 2021).

5.8 Cultural Resources

The State Historic Preservation Office and Tribal Historic Preservation Office were contacted regarding the Site. A finding of no impact to historic resources, traditional cultural properties, sacred sites, or Native American archaeological sites was determined.

5.9 Existing Anthropogenic Features

The Site has been modified over the last century, with many man-made (anthropogenic) features remaining to the present-day. These anthropogenic features include ditches, culverts, unpaved access roads, and fields. An attempt has been made to quantify these features to show their relative presence across the Site prior to any restoration activities. Existing anthropogenic features cover approximately 26 acres, span over 8 miles and comprise around 8% of the Site. These features are shown on Figures 10, 10a, and 10b and are detailed in Table 10. These existing man-made features are described in greater detail below.

An existing network of ditches and culverts has existed on the Site since the mid-1950s. These ditches and culverts were constructed to facilitate timber production and to improve overall site drainage. The ditches, culverts and their embankments currently span approximately 25,024 linear feet (4.8 miles) and cover almost 17 acres. Site access is via a network of unpaved access roads spanning approximately 18,261 linear feet (3.5 miles) and covering over 7 acres of the Site. Some of these roads were likely constructed from spoil material excavated during the ditch construction. The main access into the Site off Sidbury Road (SR 1336) is along Farm Road; however, Farm Road is not located within the Site. More recent activities have included the addition of two small fields totaling approximately 2 acres. These fields are maintained as wildlife management and equipment storage areas. Photographs showing some of these features described above can be found in Appendix 2.

Table 10. Existing Anthropogenic Features

Features	Length (lf)	Existing Acres (%) [C]
Ditches / Ditch Banks [A]	24,610	16.8 (5.4)
Access Roads	18,261	7.4 (2.4)
Culverts	414	-- [B]
Fields	--	2.2 (0.7)
Totals	**43,285**	**26.4 (8.5)**

[A] – Only includes tributaries shown in Table 4 and not RPW's. [B] - Considered to be part of the unpaved roads footprint. [C] – Percentage of existing acres within entire Site (309.0 ac)

5.10 Hazardous Materials

During field visits covering more than a decade, only hunting stands, shooting targets, and scrap wood and metal have been observed across the Site. Based on field observations and limited research, no obvious sources of contamination are associated with the Site that may affect its use or development as a wetland mitigation site.

6.0 WETLAND MITIGATION STUDIES

The following sections describe work conducted to characterize the Site and to support the overall design.

6.1 Soil Investigations

Following a November 2014 site visit, the USACE recommended additional soil investigations to document the hydric soils potential across the Site. Soil profile information was collected and summarized for 52 locations within the Site. The soil profiles correlated very well with the existing wetland boundaries. Of the 52 soil profiles, 75% (39) were considered to meet hydric soil status, 17% (9) were determined to have non-hydric soils conditions, and 8% (4) had relict hydric soil

features, indicating the potential for restoration. The locations of these soil investigations are shown on Figure 11.

6.2 Drainage Ditches and Lateral Effects

The Site hydrology has been significantly altered because of ditching dating back to the late 1940s and early 1950s (Figures 2 and 3). These ditches result in a lateral drawdown effect on the surrounding wetlands, negatively influencing their overall wetland hydrology. The method used to determine lateral effect was developed by R.W. Skaggs and was used on the Site to estimate the distance of hydrologic influence of a drainage ditch though a wetland. This distance of influence is the width of the area immediately adjacent to the ditch that is drained or influenced to a degree that the water table is no longer within 1.0 foot of the surface. It was estimated that approximately 33% (54.3 acres) of on-site wetlands were affected by lateral effect and were removed from the final potentially jurisdictional wetlands list. A field review meeting conducted on November 19, 2014, with personnel from NCDOT, DWR, USACE, and CALYX confirmed that hydrology was absent within the lateral effect zones. Additional lateral effect was determined for the southern perimeter ditch in January 2021 following reviews by USACE. These additional lateral effects are included in the final jurisdictional determination letter in Appendix 1 and acreages shown in Table 5. Figure 6 shows the portion of the Site affected by the lateral effects.

6.3 Groundwater Monitoring Gauges

Fifteen subsurface monitoring gauges currently exist across the Site. Of this total, six gauges were established in existing wetland areas and another six were installed within reference wetland areas in May 2018. The remaining three gauges were installed within proposed wetland restoration areas in December 2018. These three areas are characteristic of the proposed wetland restoration across the Site since they contain soil and hydrologic characteristics that border on jurisdictional wetland status. A rain gauge was also installed during December 2018. A description of these gauges can be found in Table 11 and their locations are shown on Figure 12. Appendix 3 provides the graphical outputs of the annual groundwater and precipitation data for the Site. Soil profiles at each of the gauge locations were documented at the time of installation. These soil profiles are included in Appendix 3 alongside their respective monitoring gauge data. For the information contained in Table 11, it is assumed that the growing season length is February 28 – December 2 (277 Days).

Table 11. Pre-Construction Wetland Monitoring Gauges

Gauge	Location	(Year 1) Consecutive Growing Season Days Met (%) [A]	(Year 2) Consecutive Growing Season Days Met (%) [B]	(Year 3) Consecutive Growing Season Days Met (%) [C]
1	Existing Wetlands	20 (7.2)	23 (8.3)	30 (10.8)
2		48 (17.5)	59 (21.3)	77 (27.8)
3		52 (18.8)	65 (23.5)	109 (39.4)
4		27 (9.7)	60 (21.7)	77 (27.8)
5		65 (23.5)	64 (23.1)	107 (38.6)
6		68 (24.5)	67 (24.2)	Not working
7	Existing Uplands	0 (0) [D]	10 (3.6)	16 (5.8)
8		0 (0) [D]	23 (8.3)	31 (11.2)
9		0 (0) [D]	16 (5.8)	23 (8.3)
1-1	Reference (Edge)	35 (12.6)	25 (9.0)	44 (15.9)
1-2	Reference (Center)	47 (17.0)	30 (10.8)	53 (19.1)
2-1	Reference (Edge)	24 (8.7)	17 (6.1)	28 (10.1)
2-2	Reference (Center)	52 (18.8)	62 (22.4)	105 (37.9)
3-1	Reference (Edge)	28 (10.1)	27 (9.7)	38 (13.7)
3-2	Reference (Center)	50 (18.1)	58 (20.9)	77 (27.8)

[A] – Period shown is from May 2018 through December 2, 2018, unless specified. % = Percent of days in the growing season.
[B] – Period shown is from February 28, 2019 through December 2, 2019, unless specified. % = Percent of days in the growing season.
[C] – Period shown is from February 28, 2020 through December 2, 2020, unless specified. % = Percent of days in the growing season.
[D] – Gauges 7 – 9 were installed (12/19/18) after the 2018 growing season had ended. % = Percent of days in the growing season.

6.4 Surface Water Modeling

A 2D hydraulic model was developed using HEC-RAS v5.0.7 to evaluate existing flow paths, proposed flow paths, and hydrologic trespass. Watersheds were delineated using QL2 LiDAR data and observed conditions of the direction of flow in ditches throughout the Site.

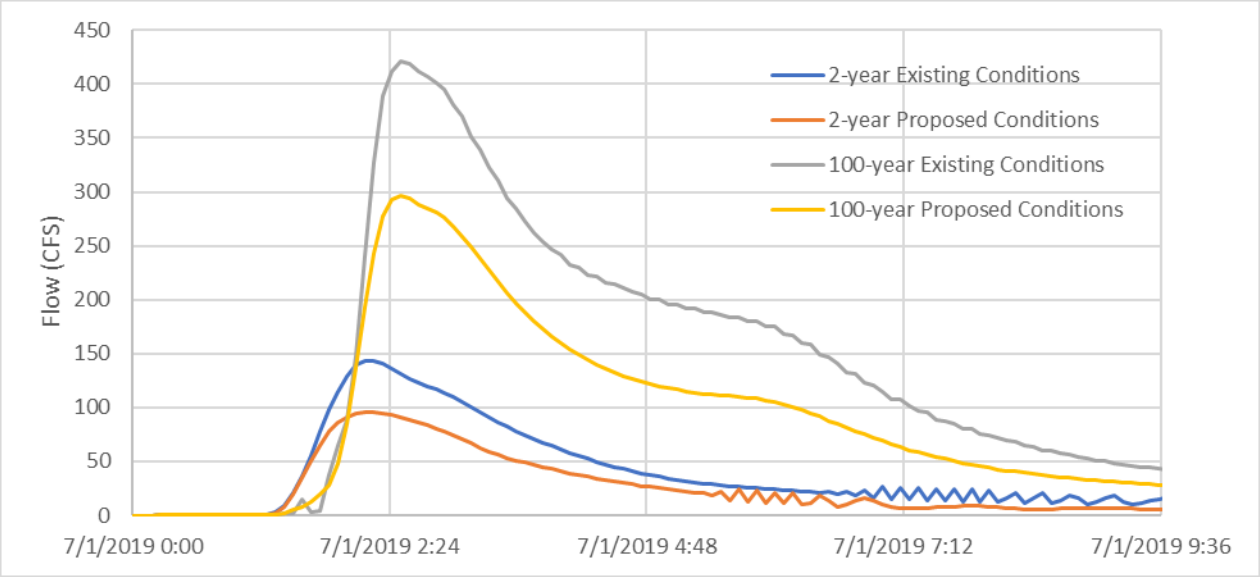
The model area covered the entire suspected watershed, noting that less information regarding flow direction and culverts is known on the surrounding properties. The locations of existing culverts throughout the Site were recorded and connections between ditches were input into the existing model terrain at culvert locations. The grid size was optimized to minimize instability at low flow and reduce model time, an 8 ft square grid was implemented with break lines along the existing ditches. Model results at all outlets exhibit some instability (e.g., pulsing) at low flows.

Precipitation data for the 2- and 100-year, 24-hour frequency events were obtained from the National Oceanic and Atmospheric Administration's (NOAA) Atlas 14, Volume 2, Version 3. Hyetographs were created using HEC-HMS and input as rain-on-grid over the entire model area. Water depth maps of model results for the maximum and last time step were created (Appendix 4). The model time step was optimized to minimize instability at low flow and reduce model time, a 30-second computation interval was used with 5-minute output intervals.

The existing conditions model shows the two main drainages off the site as FSI, flowing north, and FSH flowing west. The Site is divided into cells by the roads and ditches drain runoff to FSI

and FSH. The primary model boundary condition is along the western edge of the project area, downstream of the confluence of FSI and FSH. Smaller volumes of water leave the Site along Farm Road which runs along the northeastern edge of the project and are examined below in Section 6.4.1. Overall, the existing conditions model is consistent with the observed site conditions. Existing condition water depths are provided in Appendix 4.

The proposed terrain was created by altering the existing terrain to incorporate the highway construction and proposed activities, including road, ditch, and culvert removal. The same grid spacing, computation interval, and output intervals were used for the proposed model. Break lines were updated to follow the proposed highway, and remaining roads and ditches. Maps of the proposed condition water depths and the difference between proposed and existing conditions are provided in Appendix 4. The proposed highway will cut off the natural drainage path of FSH. This will leave the conditions to the west of the proposed highway slightly drier than the existing conditions. More water will be retained on Site, east of the proposed highway, with less water making it to the main downstream outlet (Graph 1). Following rain events, water will pond approximately 4 feet deep on the eastern side of the proposed highway in the FSH drainage without an outlet. This area, previously bounded by Roads 2, 3A, 4 and 5A, will be wetter than the existing conditions. Due to road and ditch removal, water that previously had no outlet east of Road 3A will drain to this 4-foot-deep ponded area. This will leave the area east of Road 3A slightly drier than the existing condition. The areas that are modeled to be drier than the existing conditions have been observed as considerably wet, and the drier modeled conditions are not anticipated to prevent performance standards from being met.

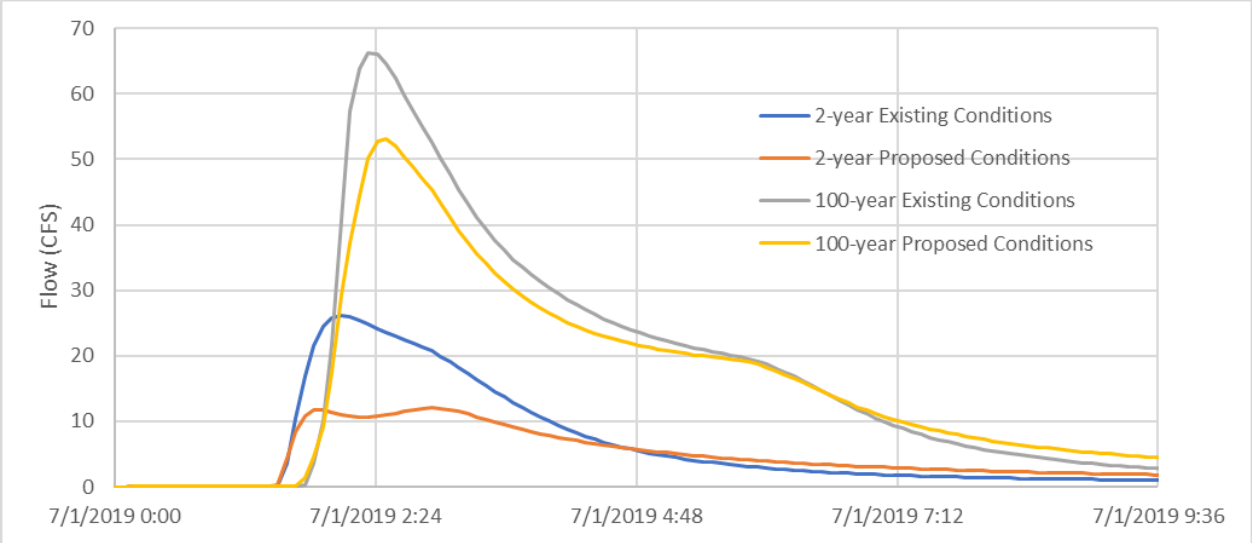


Graph 1. 100-year and 2-year Existing and Proposed Hydrographs for the FSI Model Boundary

6.4.1 Hydrologic Trespass

Hydrologic trespass was investigated as part of the design process. There were two primary areas along Farm Road where hydrologic trespass was investigated: at the intersections of Road 1 and Road 3A.

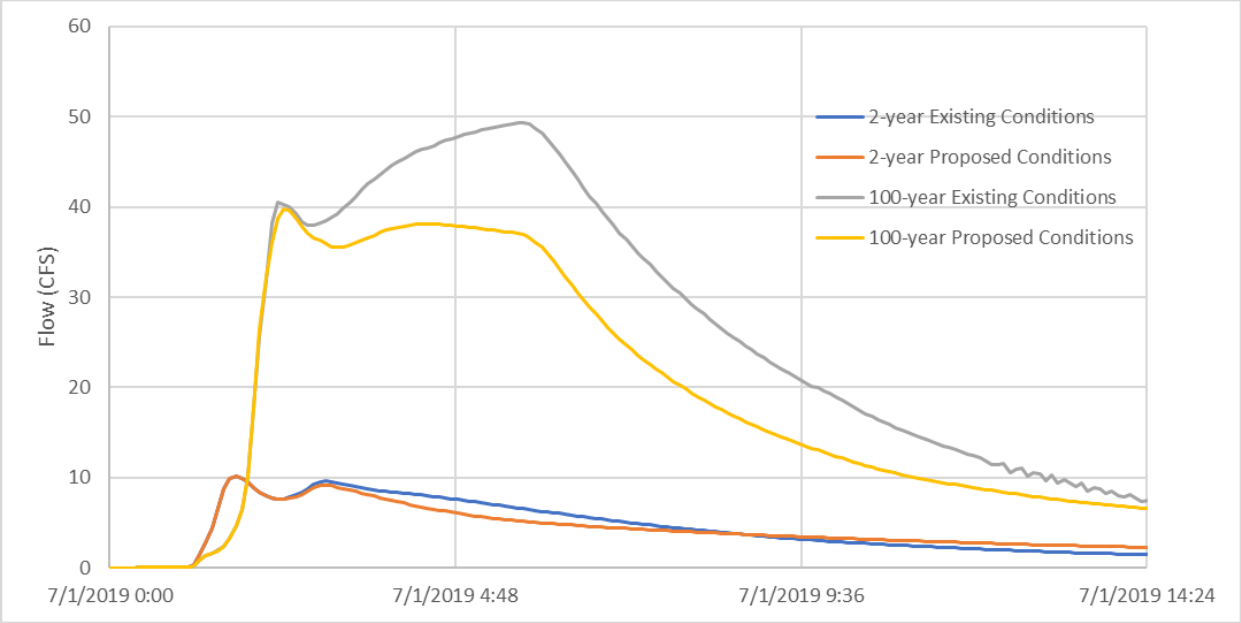
In the northern corner of the Site, at the intersection of Road 1 and Farm Road, there is a culvert connecting the ditches on either side of Farm Road. There is a model boundary condition showing the amount of water leaving the model area on the northwest end of the southern ditch along Farm Road. The model shows that the proposed work will decrease the peak discharge, as more water is held on-site; however, there are likely to be elevated flows within the ditch along the receding limb of a rain event (Graph 2). Examination of the ditches and connections in this area, show that conditions under Farm Road are largely unchanged as a result of the Project. The channel block within T4 is effective at eliminating the flow coming from the Site unless overtopped. There is increased flow coming from the Site along the south side of Farm Road. The water retained on-site is draining around this field. Due to the peak flow reduction and slow release of the water from elsewhere on the Site, the proposed work is not anticipated to result in hydrologic trespass.



Graph 2. 100-year and 2-year Existing and Proposed Hydrographs at the Intersection of Farm Road and Road 1

The second area examined for potential hydrologic trespass is the northeast corner, where there are multiple flow paths exiting the Site. There is the main natural drainage path that extends northeast from Road 3A, a reduction in flow leaving the Site during the 100-year event, and little change from existing condition during the 2-year event (Graph 3). The other, smaller drainages

(west of the primary drainage) exhibited minimal change from existing conditions. Similar to the other area of investigation, the proposed work is not anticipated to result in hydrologic trespass.



Graph 3. 100-year and 2-year Existing and Proposed Hydrographs at the Intersection of Farm Road and Road 3A

6.5 Reference Wetland Vegetation

Three on-site reference wetlands were identified and approved for study by NCDOT. These reference wetlands were characterized for soils and hydrology as previously described in Section 6.3. To characterize the existing vegetation within these reference wetlands, EPR and NV5 conducted vegetation surveys on February 4, 2020, in the centers of these wetlands. Additionally, one other wetland area was inventoried later due to its natural landform and presence of native species vegetation. This wetland area was first identified in 2007 during the R-3300 wetland delineations due to its concave landform, standing water, and large pond cypress that were present. Table 12 describes the natural communities that best characterize these wetlands as described by Schafale and Weakley (1990), Schafale (2012), and the NC WAM Wetland Type. Figure 13 shows the location of these wetlands.

Table 12. Reference Wetlands

Ref. Wetland	Location (Wetland)	NCNHP 3rd Approx.	NCNHP 4th Approx.	NCWAM	NC WAM Rating
1-2 (Center)	On-Site (MWC1)	Pond Pine Woodland	Pond Pine Woodland (Typic subtype)	Pine Flat	High
2-2 (Center)	On-Site (MWF)	Pond Pine Woodland	Pond Pine Woodland (Typic subtype)	Pine Flat	High
3-2 (Center)	R-3300 ROW	Pine Savanna	Sandy Pine Savanna (Typic subtype)	Pine Savanna	High
A- Pond Cypress / Gum	On-Site (FWC3)	Non-Riverine Swamp Forest	Coastal Plain Depression Swamp (Mixed Subtype)	Non-Riverine Swamp Forest	High

7.0 WETLAND MITIGATION PLAN

The Site is currently used for timber production and recreational hunting. Since the early 1950s this Site has been manipulated through site clearing, ditching, road construction, and pine silviculture resulting in the conversion of native plant communities and hydrology on the Site. A wetland mitigation plan design has been developed to restore, enhance, and preserve both the hydrologic and natural communities within the Site, where feasible. A description of the proposed treatments necessary to restore and enhance the Site are described below. The wetland design is shown on Figure 14.

7.1 Proposed Vegetation Treatments

Prior to any major hydrologic treatments (ditch and/or road removal), clearing and grubbing will occur in areas designated on the design plans. The Site conditions will be closely monitored following these treatments; if the existing vegetation conditions present a competition problem for re-planting, a vegetation management plan will be developed. This vegetation plan may include chemical or mechanical methods, but all treatments within the plan will be in accordance with all state and federal regulations. All work will be conducted by the NC Forest Service (NCFS) through coordination with NCDOT and other various consultants.

7.2 Proposed Hydrology Treatments

Mitigation construction activities will involve various treatments of hydrologic restoration, which will include removal, modification, and/or filling of existing ditch channels, removal of existing conveyance structures (culverts/pipes), removal and/or modifications of the Site road network, and the restoration of natural depressions. The silvicultural beds on the Site will not be removed, to prevent any further compaction of the Site by heavy equipment. The proposed hydrologic treatments will reduce the man-made features by over 75% on the Site. Table 13 lists the anthropogenic features that are proposed for removal and those that will remain following these

hydrologic treatments. Table 14 lists the existing culvert information for those found within the project area.

Table 13. Anthropogenic Features Remaining

Features	Removed Total (lf)	Removed Total (ac)	Remaining Total (lf)	Remaining Total ac (%) [C]
Ditches / Ditch Banks [A]	17,147	12.9	7,463	3.9 (1.3%)
Access Roads	12,317	5.2	5,944	2.2 (0.7%)
Culverts	414	-- [B]	0	-- [A]
Open Areas/Fields	--	2.2	--	0.0 (0.0%)
Totals	**29,878**	**20.3**	**13,407**	**6.1 (2.0%)**

[A] – Only includes tributaries shown in Table 4 and not RPW's. [B] - Considered to be part of the unpaved roads footprint.
[C] – Percentage of existing features remaining within entire Site (309.0 ac)

Table 14. Culvert Information

Size, Type, (Qty.)	Location	Existing Length (ft)	Culvert Status	Length Removed (ft)
48-in, CMP (2)	FSI @ Road 6	45.3	To-be-Removed	Entire Length
48-in, CMP (2)	FSI @ Road 3a	58.3		
60-in, CPP, (1)	FSI @ Road 3a	39.4		
24-in, CPP, (1)	T16/T17	40.1		
42-in, CMP, (1)	T19 @ Road 3a	28.8		
36-in, CMP, (1)	T17 @ Road 5a	28.3		
24-in, CPP, (1)	T13/T15 @ Roads 3a & 4	19.8		
24-in, CPP, (1)	T10/T13 @ Road 3a	39.4		
24-in, CPP, (1)	T10/T18	19.2		
24-in, CPP, (1)	T15/T17 @ Road 4	39.9		
18-in, CMP, (1)	T11/T20 @ Road 2	27.5		
12-in, CPP, (1)	T16/T20 @ Road 5a	28.2		
Total (14)		**413.8**		**413.8**

7.2.1 Ditch Removal

The removal of existing ditch channels and their associated ditch banks must be done in a specific sequence to allow conveyance of surface and groundwater across the Site. The construction sequence outlined in the design plans will determine the order in which ditches will be removed. Extensive spoil material areas were placed beside most of the ditch and road network during their original construction. Spoil material and excavated soil road material will be mixed and moved into the existing ditch channels until the approximate natural ground is achieved. Approximately 70% of the ditches and ditch banks will be removed to allow water to move naturally across the

Site. Ditches identified for removal, a typical drawing for ditch filling, and the construction sequence can be found in the design plans.

7.2.2 Road Removal

Specific roads such as Road 1 and a small portion of Road 3a will be left in place to facilitate access to the Site and to provide a buffer to the adjacent property. Over 65% of the existing road network will be removed to allow surface and groundwater to move naturally across the Site.

Road removal will consist of **4 Phases**:

Phase 1 - Ripping the road material with a bulldozer fitted with ripping teeth,

Phase 2 – Moving the ripped soil road material and adjacent spoil material into the adjacent ditches,

Phase 3 – Repeat of Phases 1 and 2 continuing to remove soil road material and filling ditches until they are at the approximate natural ground. Once the natural ground elevation is achieved in the ditches, the soil road material will be ripped to original depths of the ditches or as deep as is feasible.

Phase 4 – The original footprints of the road and the ditches will be final graded using adjacent spoil and existing soil material until the entire disturbed area is back to the approximate natural ground. This approximate natural ground will likely be found on the outer edge of the existing spoil material areas.

Roads that will be removed, a typical drawing for road removal, and the construction sequence can be found in the design plans.

7.2.3 Stream Plugs

Stream plugs will be placed in specific areas of the existing ditch network to ensure that flows are redirected into the Site. Ditch channels that abut the R-3300 ROW will receive stream plugs to prevent any damage to the roadway slopes. The location of the stream plugs is shown on the design plans. Stream plugs will average 100 feet in length.

7.2.4 Depressions

Nine depressions were identified (D1 – D9) across the Site using QL2 LiDAR. These areas were identified for two primary reasons. First, due to their lower elevations and concave nature, these areas were identified for the purposes of re-establishing the appropriate plant community following construction. Second, these areas provided an opportunity to increase water storage capacity across the Site through grading of specific depressions (D3, D6–D9) and removal of anthropogenic

features. Grading in these depressions is primarily to remove existing spoil pile areas or to connect two depressions that are currently separated by an existing road. All grading will be equal to or less than 12" (1-ft). Some overburden (spoil piles or roads) exist in some of the depressions and its removal may exceed 12" (1-ft) above the existing natural ground. The depressions will be comprised of wetland enhancement, restoration, and preservation areas that will comprise the Coastal Plain Depression Swamp plant community totaling 9.3 acres. Information related to the depressions and a depression typical can be found in the design plans.

7.2.5 Surface Water Conveyance

With the removal of roads and subsequent backfilling of ditches within the Site, water will be allowed to move naturally across the Site. No graded flow paths are utilized in the design. The residence time and storage capacity of the water on the Site should increase following the hydrologic treatments.

7.3 Target Plant Communities

Vegetative restoration within the Site is based on reference wetlands, professional knowledge of the region, and the availability of vegetative resources. Most of the wetland restoration, enhancement, and preservation activities are comprised of non-riparian wetlands with a small component of riparian wetlands. The location of the Site at an interstream divide coupled with flat topography and small watershed size does not allow for the formation of stream channels on most of the Site. Additionally, the conversion of anthropogenic features will create much wetter conditions due to increased water storage capacity on the Site. Therefore, the proposed target plant communities will be comprised of native species found mainly in non-riparian wetlands with a tolerance for wet to extremely wet conditions throughout the year. However, a small percentage of riparian wetlands are located on the western edge of the Site beside potentially jurisdictional streams (FSH and FSI). Approximately 158 acres of wetland plant communities will be established (planted) as part of the restoration and enhancement activities. Additionally, over 31 acres of wetland plant communities will be preserved. The remaining upland plant communities will be allowed to regenerate naturally following the removal of loblolly pine and will comprise approximately 111 acres.

No single species may account for more than 50% of the species proposed for planting in a particular plant community if substitutions are necessary. Vegetative plantings should be installed between December 1 and March 1 to coincide with the approximate dormant season at the Site.

The proposed target plant communities for this proposed wetland areas of the Site may include but are not limited to the following as described by Schafale (2012): Non-Riverine Wet Hardwood Forest (Oak Flat Subtype), Coastal Plain Depression Swamp (Mixed Subtype), and Blackwater

Bottomland Hardwoods. Native plant species that may be established across these proposed wetland plant communities are shown in Tables 15a-c. The location of the target plant communities is shown on Figure 15.

Table 15a. Zone 1 – Non-Riverine Wet Hardwood Forest - Oak Flat Subtype (148.6 acres)

Scientific Name	Common Name	Percent Planted	Wetland Indicator Status[1]	Trees Per Acre (Spacing)	No. of Trees
Gordonia lasianthus	Loblolly Bay	5.0%	FACW	680 (8' x 8')	5,052
Magnolia virginiana	Sweet Bay	5.0%	FACW		5,052
Nyssa biflora	Swamp Tupelo	15.0%	OBL		15,157
Persea palustris	Swamp Bay	5.0%	FACW		5,052
Quercus laurifolia	Laurel Oak	10.0%	FACW		10,105
Quercus lyrata	Overcup oak	15.0%	OBL		15,157
Quercus michauxii	Swamp Chestnut Oak	12.5%	FACW		12,631
Quercus nigra	Water Oak	5.0%	FAC		5,052
Quercus pagoda	Cherrybark Oak	10.0%	FACW		10,105
Quercus phellos	Willow Oak	10.0%	FACW		10,105
Taxodium distichum	Bald Cypress	7.5%	OBL		7.579
				Total	101,048

[1] - National Wetland Plant List, Version 3.4 (2018), Atlantic Gulf and Coastal Plain Region.

Table 15b. Zone 2 – Coastal Plain Depression Swamp - Mixed Subtype (8.6 acres)

Scientific Name	Common Name	Percent Planted	Wetland Indicator Status[1]	Trees Per Acre (Spacing)	No. of Trees
Chamaecyparis thyoides	Atlantic White Cedar	10.0%	OBL	680 (8' x 8')	585
Nyssa aquatica	Water Tupelo	15.0%	OBL		877
Nyssa biflora	Swamp Tupelo	25.0%	OBL		1,462
Taxodium ascendens	Pond Cypress	10.0%	OBL		585
Taxodium distichum	Bald Cypress	40.0%	OBL		2,339
				Total	5,848

[1] - National Wetland Plant List, Version 3.4 (2018), Atlantic Gulf and Coastal Plain Region.

Table 15c. Zone 3 – Blackwater Bottomland Hardwoods (0.5 acres)

Scientific Name	Common Name	Percent Planted	Wetland Indicator Status[1]	Trees Per Acre (Spacing)	No. of Trees
Chamaecyparis thyoides	Atlantic White Cedar	7.5%	OBL	680 (8' x 8')	23
Cyrilla racemiflora	Titi	5.0%	FACW		15
Gordonia lasianthus	Loblolly Bay	5.0%	FACW		15
Magnolia virginiana	Sweet Bay	5.0%	FACW		15
Nyssa biflora	Swamp Tupelo	15.0%	OBL		46
Persea palustris	Swamp Bay	5.0%	FACW		15
Quercus laurifolia	Laurel Oak	10.0%	FACW		31
Quercus lyrata	Overcup oak	15.0%	OBL		46
Quercus michauxii	Swamp Chestnut Oak	12.5%	FACW		39
Quercus pagoda	Cherrybark Oak	10.0%	FACW		31
Quercus phellos	Willow Oak	7.5%	FACW		31
				Total	309

[1] - National Wetland Plant List, Version 3.4 (2018), Atlantic Gulf and Coastal Plain Region.

7.3.1 Invasive Species Management

During construction, the invasive vegetation species will be controlled using mechanical methods. During the monitoring period, the Site will be reviewed during the monitoring gauge downloads and other site visits. Invasive species issues or occurrences will be documented and summarized annually in the monitoring report.

If immediate attention is necessary, invasive plant species shall be controlled by mechanical and/or chemical methods. Any vegetation control requiring herbicide application will be performed in accordance with NC Department of Agriculture (NCDA) rules and regulations and the herbicide label.

Invasive species will be managed and controlled using a combination of chemical and/or mechanical methods to ensure that all invasive species shall comprise less than 5% of the total easement acreage. Management and control will continue throughout the project until this percentage is achieved.

7.4 Potential Climate Change Effects

Although the potential of increased precipitation frequency and intensity may suggest overall wetter conditions, leading to a higher water table, the aim of a wetland mitigation site **is** to raise/restore the water table. Hydraulic analysis within the mitigation plan indicates that under proposed restoration conditions, peak flows are reduced, and offsite water release is slowed. The hydraulic conductivity of surficial soils, the underlying surficial aquifer, and Castle Hayne Aquifer is high in northern New Hanover County (CFPUA, 2013; USGS, 2014). High hydraulic

conductivities, shallow aquifers, and nearby local dependence on those aquifers, make the Beane property a unique restoration opportunity. The slowing of offsite water release also potentially offers flood mitigation benefits.

The Beane Property Wetland Mitigation Site is consistent with the findings and objectives for the state of North Carolina as outlined in the North Carolina Climate Risk and Resilience Plan (NCCRARP; June 2020). The NCCRARP acknowledges that it is ***likely*** that annual total precipitation for North Carolina will increase and that it is ***very likely*** that extreme precipitation frequency and intensity in North Carolina will increase due to increases in atmospheric water vapor content. As identified in the NCCRARP, a critical resilience strategy to address this climate change stressor is to *"Preserve and restore wetlands and natural areas alongside rivers and streams".* The Beane property is in an area specifically identified in the NCCRARP with potential to both reduce flood risk and improve water quality with community resilience benefit

8.0 PERFORMANCE STANDARDS

Following the Wilmington District (District) Stream and Wetland Compensatory Mitigation Update from the USACE dated October 24, 2016, the specific goals for vegetative and hydrologic success are outlined below:

The Site will be monitored for seven (7) years post-construction, unless the District, in consultation with the USACE, agrees that monitoring may be terminated early.

8.1 Wetland Vegetation

The required performance criteria for planted vegetation, per USACE Guidance are summarized below:

1. Within planted portions of the Site, a minimum of 320 stems per acre must be present at Year 3, a minimum of 260 stems per acre must be present at Year 5, and a minimum of 210 stems per acres must be present at Year 7.
2. Only planted stems shall count toward success for Criteria No. 1. Volunteer species within the plot from the planting list in the approved Mitigation Plan shall be noted. All volunteer species shall be documented separately and not combined with the planted stems in the monitoring report. Trees in each plot must average 7 feet in height at Year 5 and 10 feet in height at Year 7.
3. If any species exhibits greater than 50% mortality, the species will be replanted, or an acceptable replacement species be planted in its place.
4. No single volunteer species shall comprise more than 50% of the total composition at each year monitoring event. During Year 3 & Year 5, no single volunteer species, comprising

over 50% of the total composition, may be more than twice the heigh of the planted trees. If this occurs, remedial action, as approved by the Corps and agencies, may be required.
5. Vegetation must be planted, and plots established, at least 180 days prior to the initiation of the first year of monitoring.
6. Permanent plots will be randomly located throughout the planted portion of the Site.

8.2 Wetland Hydrology

All restored wetland areas within the project easement are proposed to have consistent monitoring and success criteria, including appropriate wetland hydroperiod and vegetation indicative of a jurisdictional wetland as defined by the USACE guidelines. Since the majority of the Site is comprised of Murville soils, the lower range of its hydroperiod (12-16%) will be used as the minimum hydroperiod for the Site. The required hydrologic performance criteria per USACE Guidance are summarized below:

1. A minimum hydroperiod of 12% will be applied to all wetland restoration areas.

2. The hydroperiod for restoration/enhancement areas shall be compared to the reference site data (saturation or inundation depth, duration, and frequency) only during abnormal rainfall years to determine site success for that year.

3. Areas that do not exhibit sufficient hydroperiod and/or hydric soil indicators will not be added to the wetland units upon the completion of the monitoring period.

9.0 MONITORING REQUIREMENTS

The monitoring plan for the Site will follow the guidance outlined in the *US Army Corps of Engineers – Wilmington District Public Notice: Notification of Issuance of Guidance for Compensatory Stream and Wetland Mitigation Conducted for Wilmington District* (October 24, 2016). Monitoring data collected on the Site will include plant survival analyses and hydrologic data. All annual monitoring reports will be prepared in accordance with RGL No. 08-03.

Annual monitoring will be conducted for a period of 7 years, unless the USACE, in consultation with the resource agencies, agrees that monitoring may be terminated early. Early closure will only be provided through written approval from the USACE in consultation with the resource agencies. Annual monitoring reports will be submitted to the USACE no later than January 31st of the year following the monitoring.

9.1 Wetland Vegetation Monitoring

Vegetation monitoring will evaluate the establishment of planted vegetation across the Site. In addition to planted species, all volunteer and invasive species identified within the permanent vegetation plots shall be noted in each monitoring year's report. Permanent vegetation monitoring

plots shall be installed and make up 2% of the planted acreage. The planted acreage includes the wetland enhancement and restoration areas and totals approximately 158.4 acres. Monitored parameters, methods, schedule/frequency, and number of permanent vegetation plots and their extent are summarized in Table 16. The proposed locations of permanent vegetation plots are shown in Figure 16.

Table 16. Vegetation Monitoring Summary.

Parameter	Method	Schedule/ Frequency	Number / Extent	Data Collected
Vegetation establishment and vigor	Permanent vegetation plots, 0.02-acre in size (minimum)	As-built, Years 1, 2, 3, 4, 5, 6 & 7 Between July 1st and leaf drop	64 permanent plots (0.05-ac) 1 permanent plot (0.02-ac) Randomly located across the wetland enhancement and restoration areas	Species for planted, volunteer or invasive stems if present in each plot

9.2 Wetland Hydrology Monitoring

Groundwater monitoring gauges will be installed to take measurements after hydrological modifications are performed at the Site. Hydrological samplng will continue throughout the growing season at intervals necessary to satisfy the 12% success criteria within the wetland restoration and enhancement areas (USEPA, 1990).

Growing Season

Growing season was investigated for the Site using multiple sources including the Wilmington International Airport WETS data (1935 – 2018), Wilmington 7N WETS data (1971 - 2000) and the New Hanover Soil Survey (USDA-NRCS, 1977; 2019). Growing season data from the Wilmington Aiport and the New Hanover Soil Survey closely corresponded. Using the WETS data for the Wilmington International Airport (1935- 2018), the growing season was determined to be February 28 to December 2. Monitored parameters, methods, schedule/frequency, and extent are summarized in Table 17, The proposed locations for the groundwater gauges are shown on Figure 17.

Table 17. Wetland Hydrology Monitoring Summary.

Parameter	Method	Schedule/ Frequency	Number / Extent	Data Collected
Wetland Restoration	Groundwater gauges: Rain gauges	Continuous recording through each growing season	30 gauges spread across the wetland restoration areas	Groundwater and rain data for each monitoring period
Wetland Enhancement			6 gauges spread across the wetland enhancement areas	
Wetland Preservation			4 gauges in wetland preservation areas	

10.0 ADAPTIVE MANAGEMENT PLAN

In the event the mitigation site or a specific component of the mitigation site fails to achieve the necessary performance standards as specified in the approved mitigation plan, NCDOT will notify the resource agencies to develop contingency and remedial plans.

11.0 LONG TERM ADAPTIVE MANAGEMENT PLAN

The Site will be managed by the NCDOT according to the Site plans and other documents. If unforeseen issues arise that affect the management of the Site, any remediation will be addressed by NCDOT in coordination with the resource agencies.

12.0 GEOGRAPHIC SERVICE AREA

The proposed wetland mitigation units will be used for on-site mitigation for the R-3300 Project.

13.0 MAINTENANCE PLAN

The Site will be held by NCDOT and placed in the EAU mitigation geodatabase. Once monitoring is completed and the Site is closed out, it will be placed in the NCDOT Stewardship Program for long term maintenance and protection.

If an appropriate third-party recipient is identified in the future, then the transfer of the property will include a conservation easement or other measure to protect the natural features and mitigation value of the Site in perpetuity.

14.0 DETERMINATION OF UNITS

Mitigation units presented in Table 18 are projections based on mitigation design. Upon completion of site construction, the project components and unit data will be adjusted, if necessary to be consistent with the wetland mitigation units determined and approved by the USACE for the Site.

Table 18. Wetland Asset Table.

Asset	Type	Acreage	Wetland Mitigation Type	Mitigation Ratio	Mitigation Units	Notes / Comments
Area 1	Non-Riparian, Non-Riverine	70.59	Restoration	1:1	70.59	
Area 2	Riparian, Riverine	0.44	Restoration		0.44	FWC4 (Area along FSH and FSI)
Depressions	Non-Riparian, Non-Riverine	8.08	Restoration		8.08	D1 – D9
FWC2	Non-Riparian, Non-Riverine	22.63	Enhancement	2:1	11.32	
FWD	Non-Riparian, Non-Riverine	31.62	Enhancement		15.81	
MWA	Non-Riparian, Non-Riverine	24.12	Enhancement		12.06	
MWG	Non-Riparian, Non-Riverine	0.04	Enhancement		0.02	
MWI	Non-Riparian, Non-Riverine	0.10	Enhancement		0.05	
FWC1/3	Non-Riparian, Non-Riverine	0.88	Preservation	10:1	0.09	Existing Pond Cypress Area
FWC1/3	Non-Riparian, Non-Riverine	6.09	Preservation	10:1	0.61	
FWC4	Riparian, Riverine	0.47	Preservation		0.05	
FWF	Non-Riparian, Non-Riverine	6.29	Preservation		0.63	
MWC1/MWC2	Non-Riparian, Non-Riverine	4.00	Preservation		0.40	
MWD	Non-Riparian, Non-Riverine	0.50	Preservation		0.05	
MWE	Non-Riparian, Non-Riverine	9.73	Preservation		0.97	
MWF	Non-Riparian, Non-Riverine	2.52	Preservation		0.25	
MWG	Non-Riparian, Non-Riverine	0.21	Preservation		0.02	
TWA	Non-Riparian, Non-Riverine	0.70	Preservation		0.07	
TWB	Non-Riparian, Non-Riverine	0.15	Preservation		0.02	
	Total Acreage	**189.16**		**Total WMUs**	**121.53**	

15.0 FINANCIAL ASSURANCES

The Site will be managed by NCDOT with its own distinct cost center number within the NCDOT budgeting and financial tracking system. Therefore, all accounting for revenues, contract encumbrances, fund transfers, and expenses will be performed and reported independent from other capital budget or operating budget accounting.

16.0 REFERENCES

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Figures

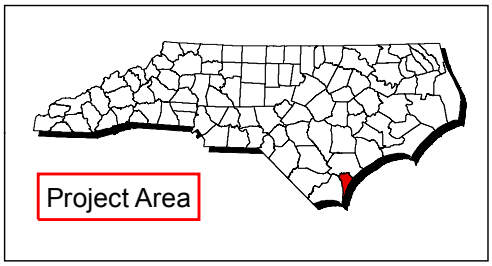


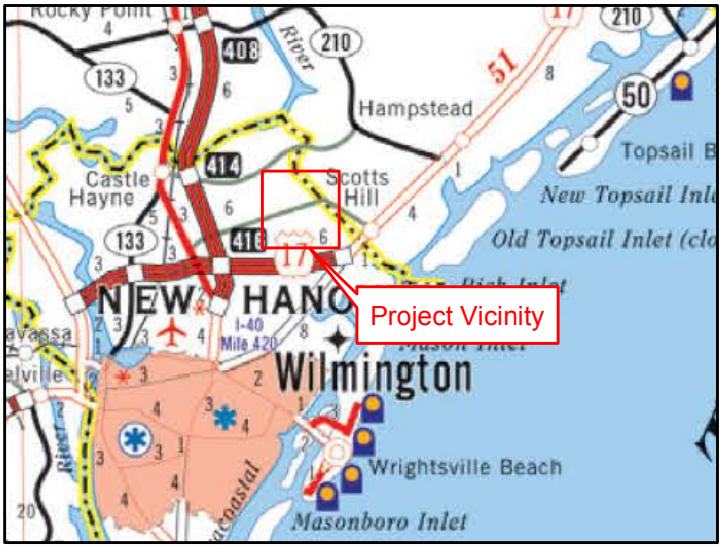
Figure 1

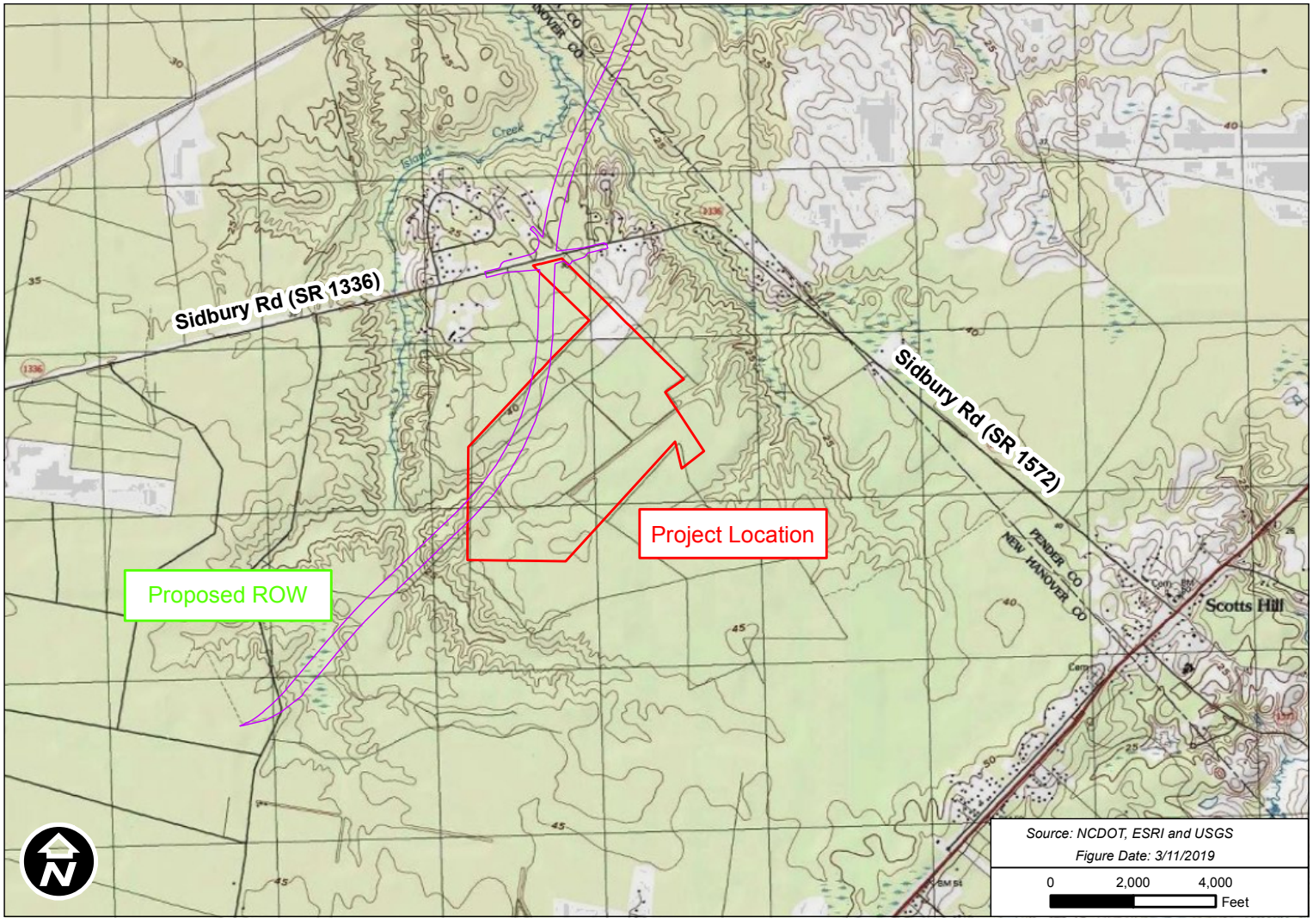
Project Vicinity

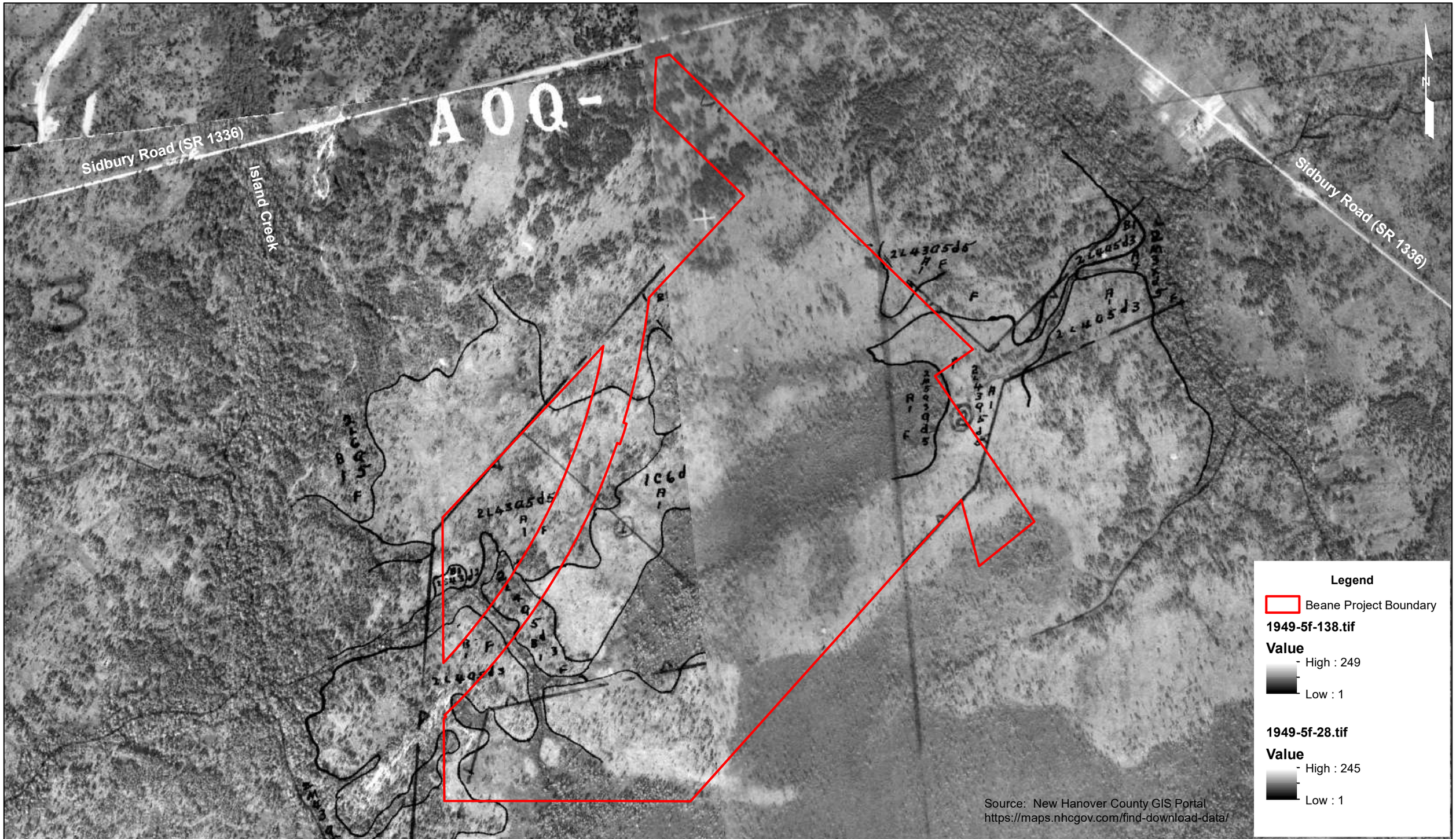
Beane Property

New Hanover County, North Carolina

North Carolina
Department of Transportation







1 inch = 700 feet

0 350 700 1,400 2,100 Feet

Beane Wetland Mitigation Site

1949 Aerial Photography Map

New Hanover County, NC

Figure 2

1 inch = 700 feet

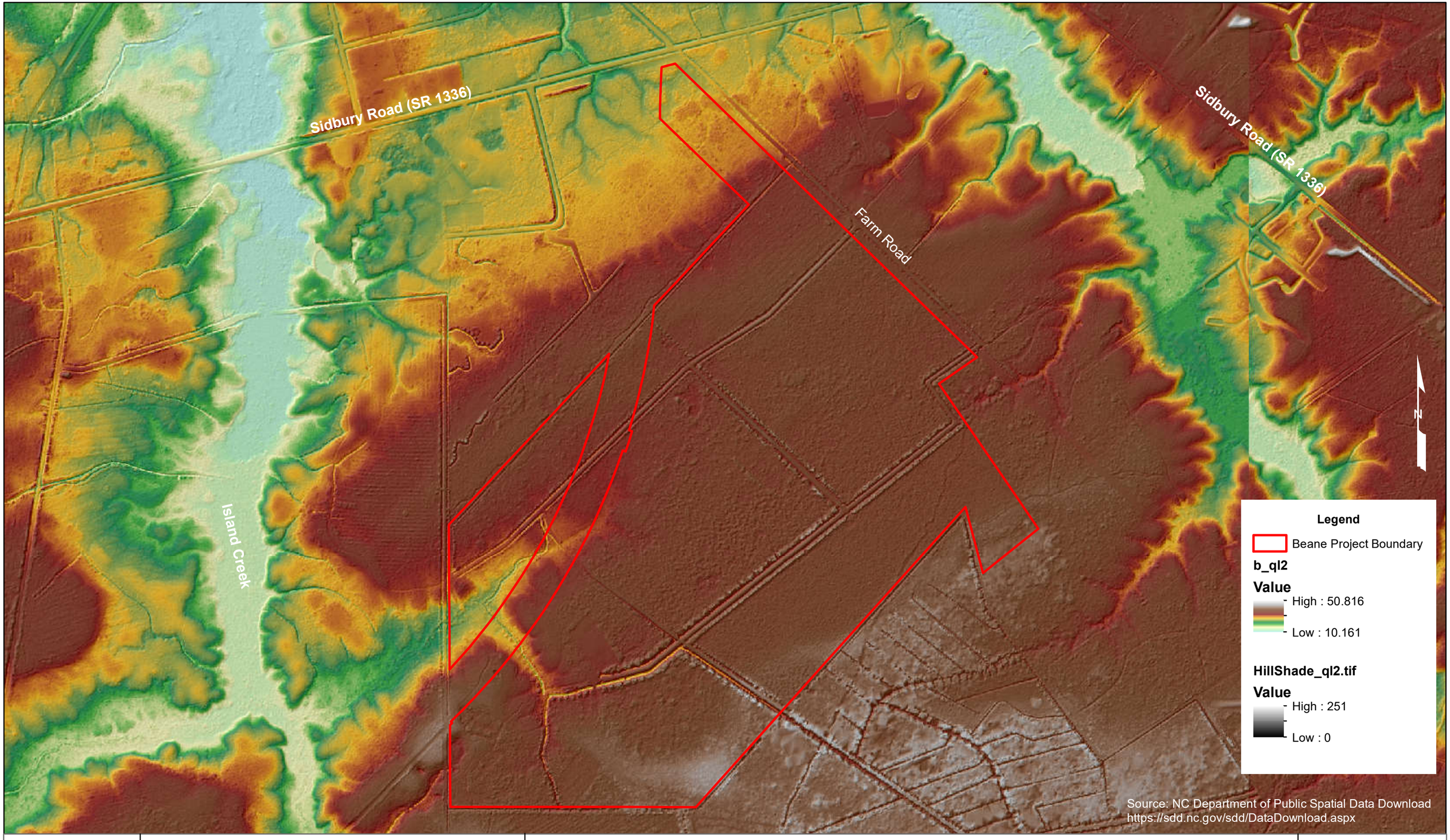
0 350 700 1,400 2,100 Feet

Beane Wetland Mitigation Site

1956 Aerial Photography Map

New Hanover County, NC

Figure 3



1 inch = 700 feet

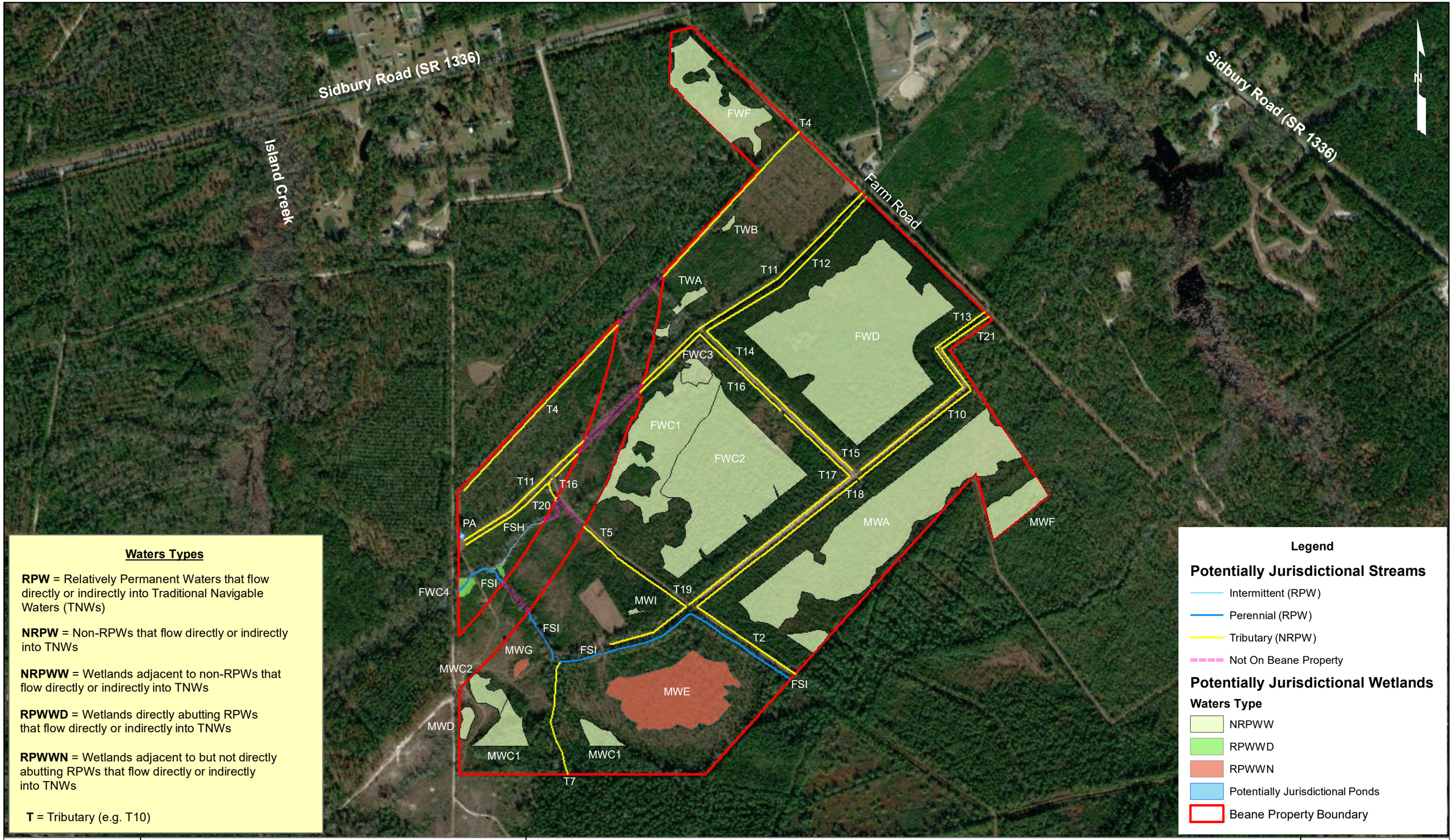
0 350 700 1,400 2,100 Feet

Beane Wetland Mitigation Site

QL2 LiDAR Map

New Hanover County, NC

Figure 4



1 inch = 700 feet

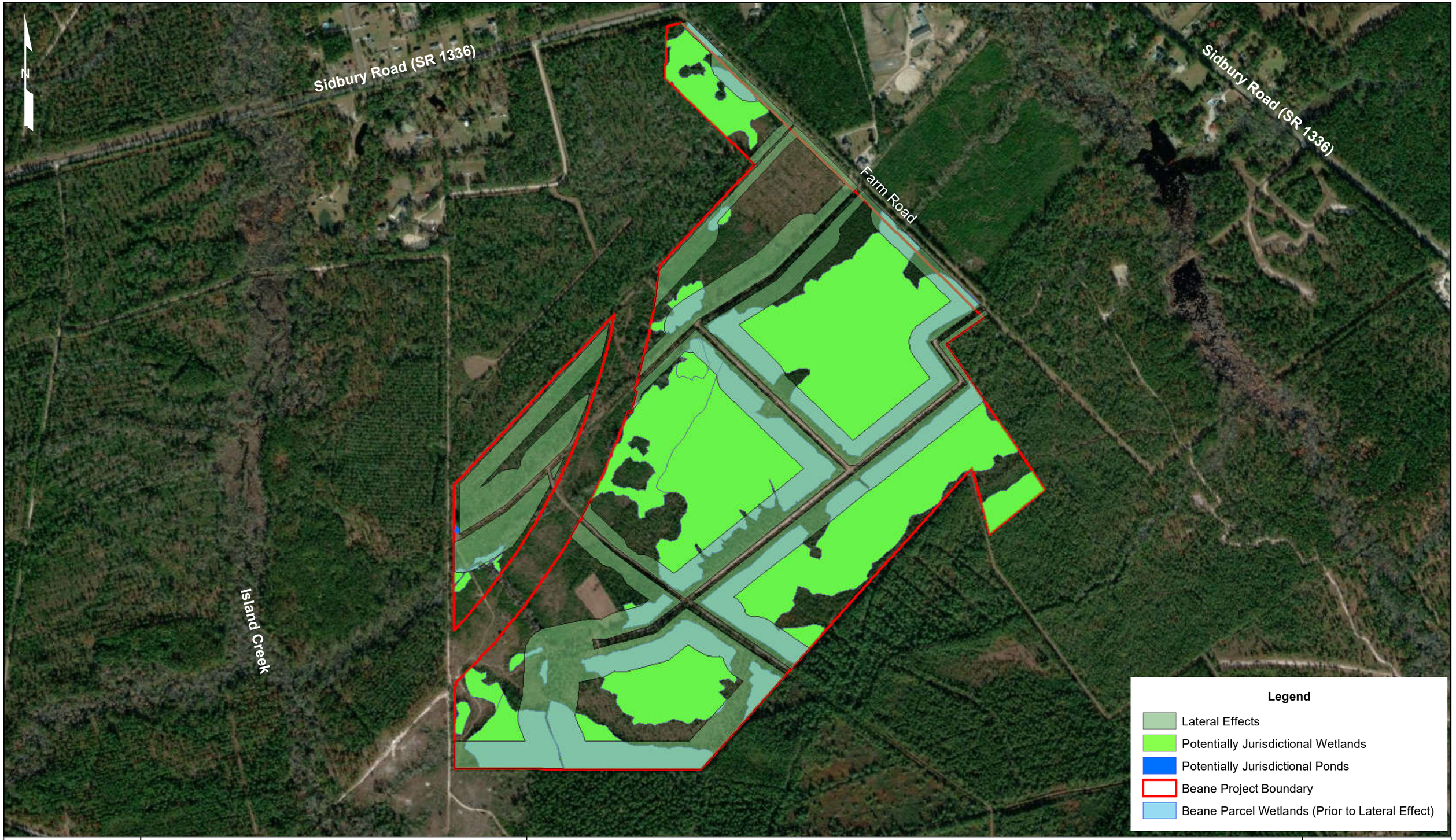
0 350 700 1,400 2,100 Feet

Beane Wetland Mitigation Site

Potentially Jurisdictional Features Map

New Hanover County, NC

Figure 5



1 inch = 700 feet

0 350 700 1,400 2,100 Feet

Beane Wetland Mitigation Site

Lateral Effect Map

New Hanover County, NC

Figure 6

Sidbury Road (SR 1336)

Island Creek

Farm Road

Sidbury Road (SR 1336)

N

Legend

Natural Communities - 4th Approximation

- Blackwater Bottomland Hardwoods
- Coastal Plain Depression Swamp (Mixed Subtype)
- Loblolly Pine Plantation
- Maintained/Disturbed
- Mesic Pine Savanna
- Non-Riverine Wet Hardwood Forest (Oak Flat Subtype)
- Pond Pine Woodland (Typic Subtype)
- Sandy Pine Savanna (Typic Subtype)
- Wet Pine Flatwoods (Typic Subtype)
- Xeric Sandhill Scrub (Typic Subtype)
- Beane Project Boundary

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

1 inch = 700 feet

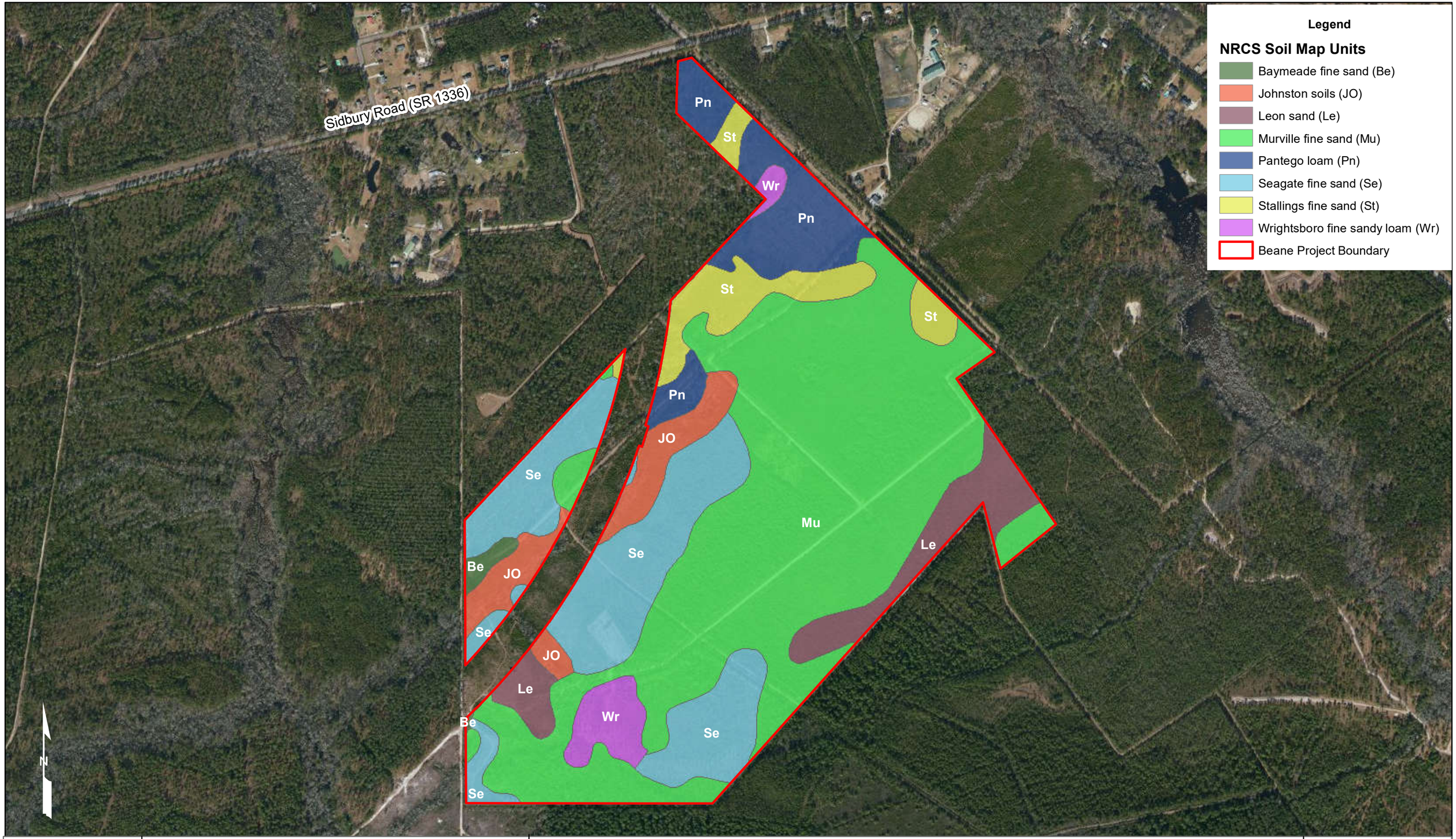
0 350 700 1,400 2,100 Feet

Beane Wetland Mitigation Site

Natural Communities Map

New Hanover County, NC

Figure 7



1 inch = 700 feet

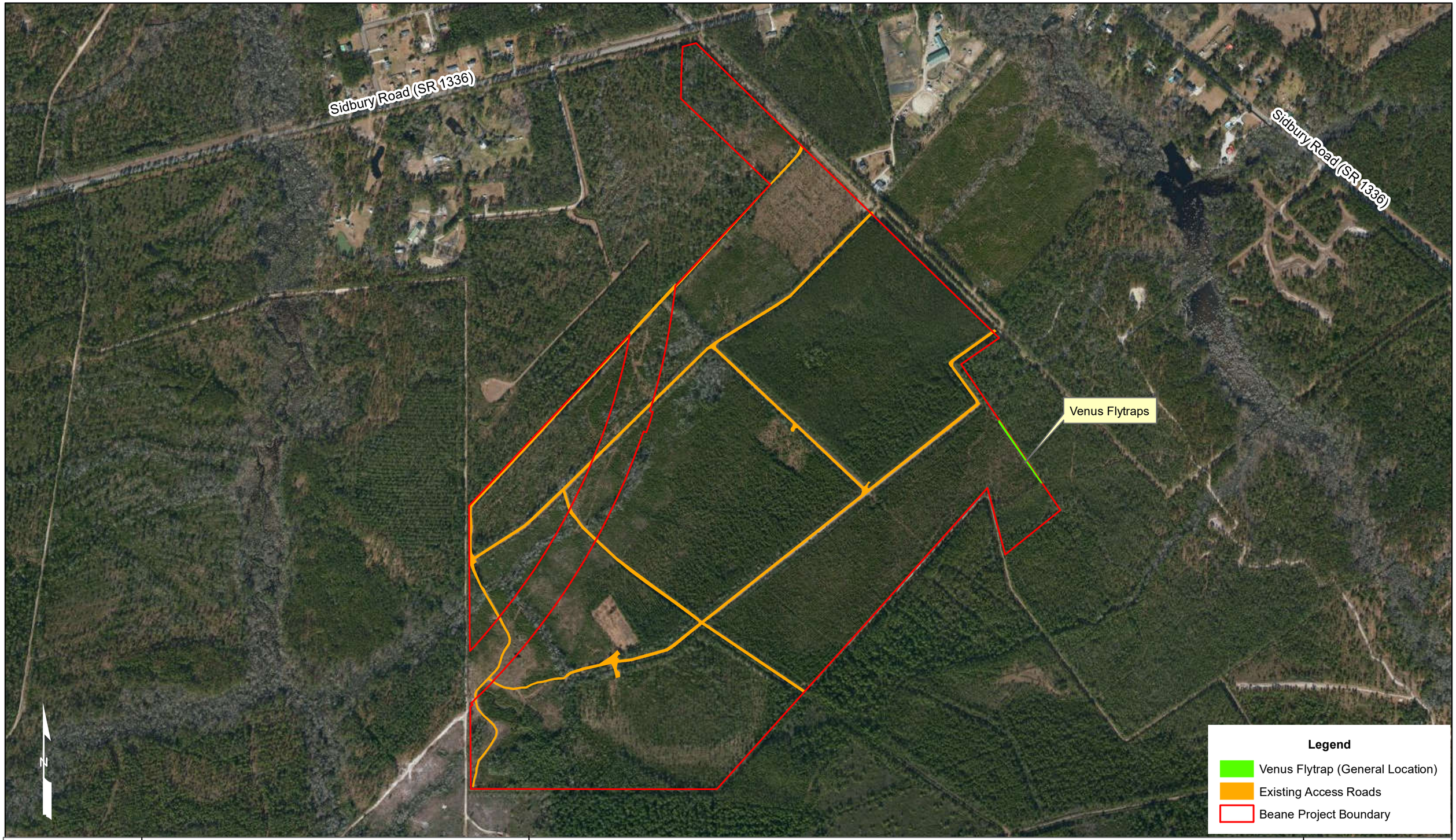
0 350 700 1,400 2,100 Feet

Beane Wetland Mitigation Site

Soils Map

New Hanover County, NC

Figure 8



1 inch = 700 feet

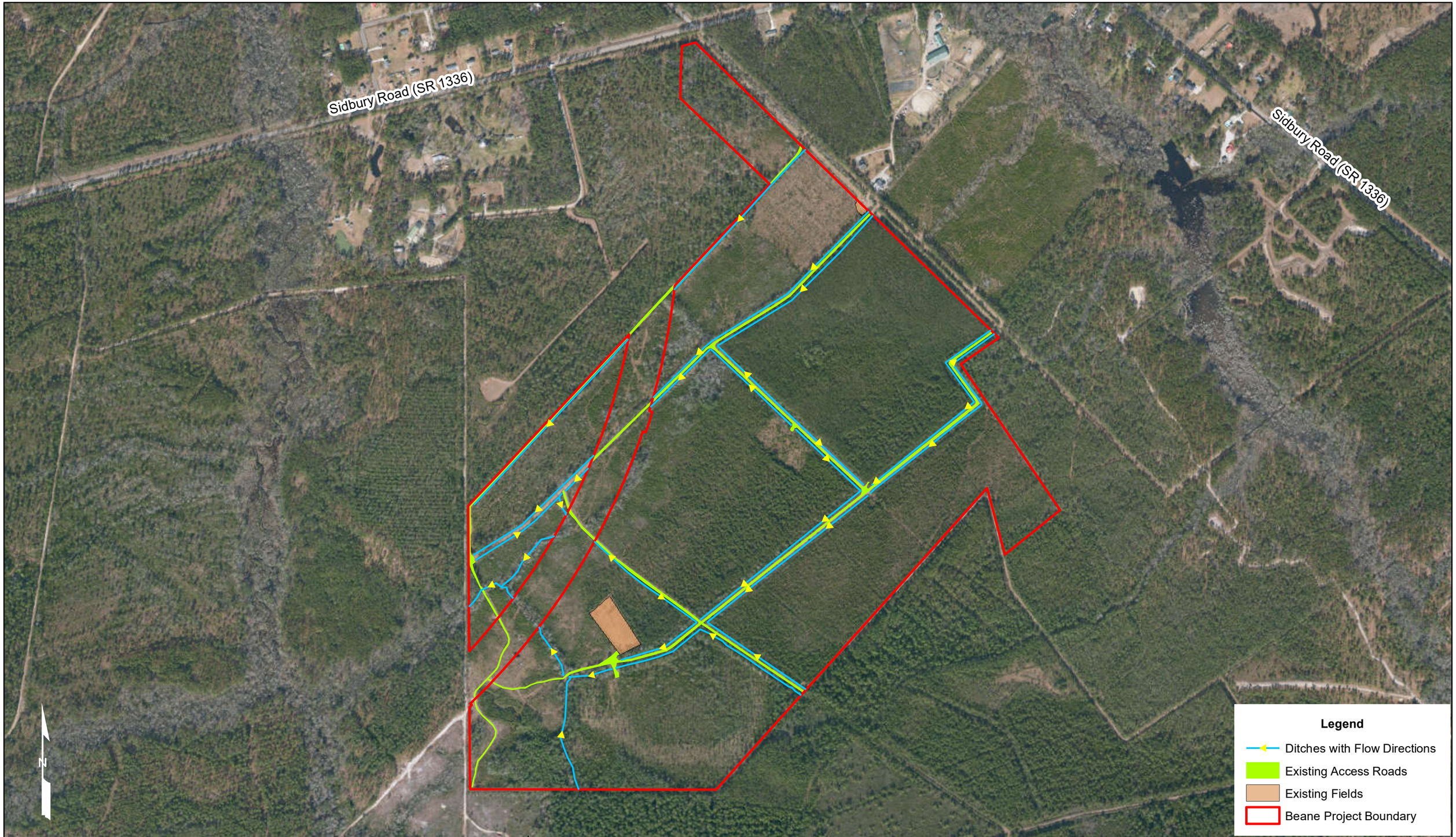
0 350 700 1,400 2,100 Feet

Beane Wetland Mitigation Site

State Listed Species Map

New Hanover County, NC

Figure 9



1 inch = 700 feet

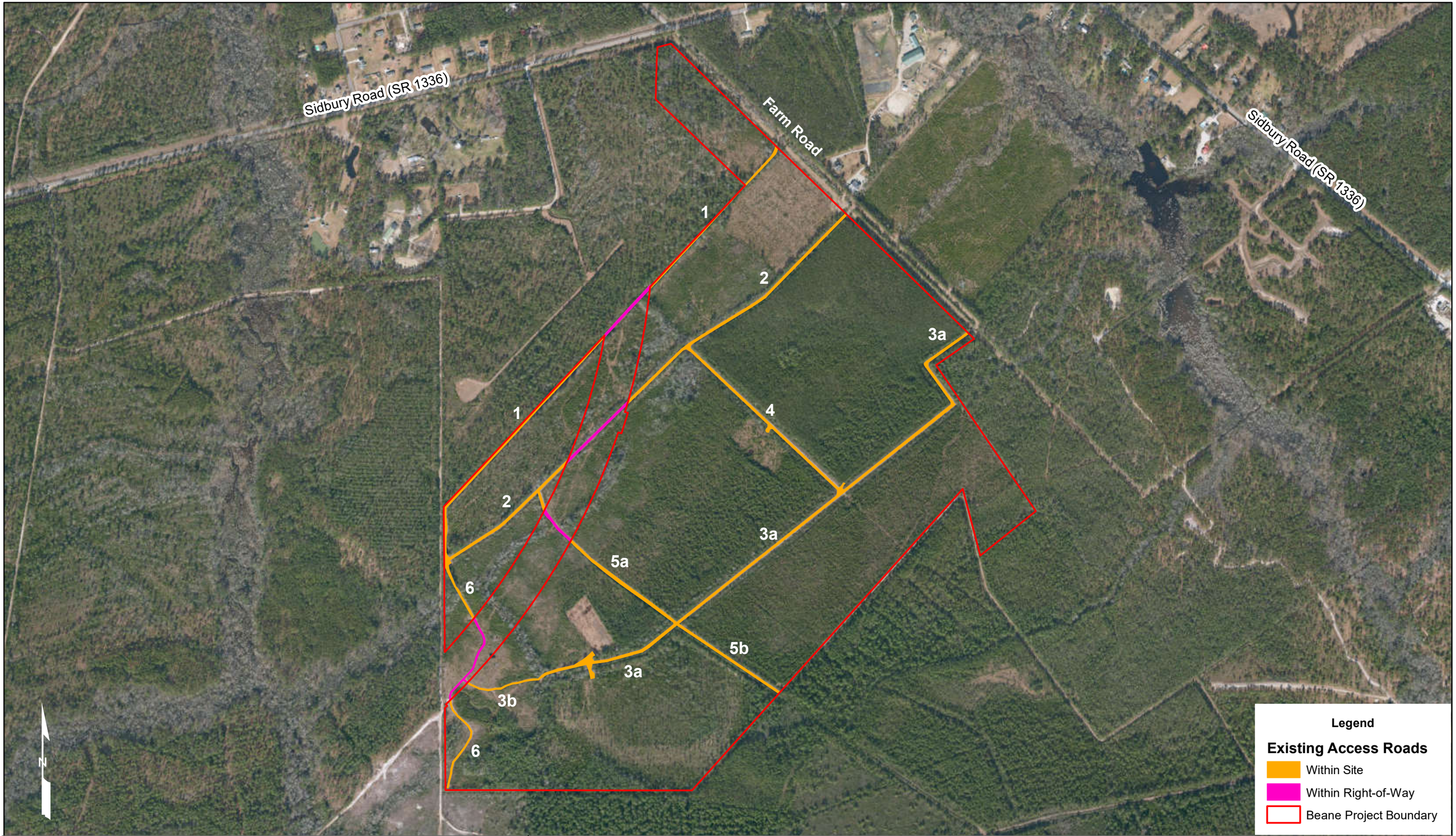
0 350 700 1,400 2,100 Feet

Beane Wetland Mitigation Site

Existing Anthropogenic Features Overview Map

New Hanover County, NC

Figure 10



1 inch = 700 feet

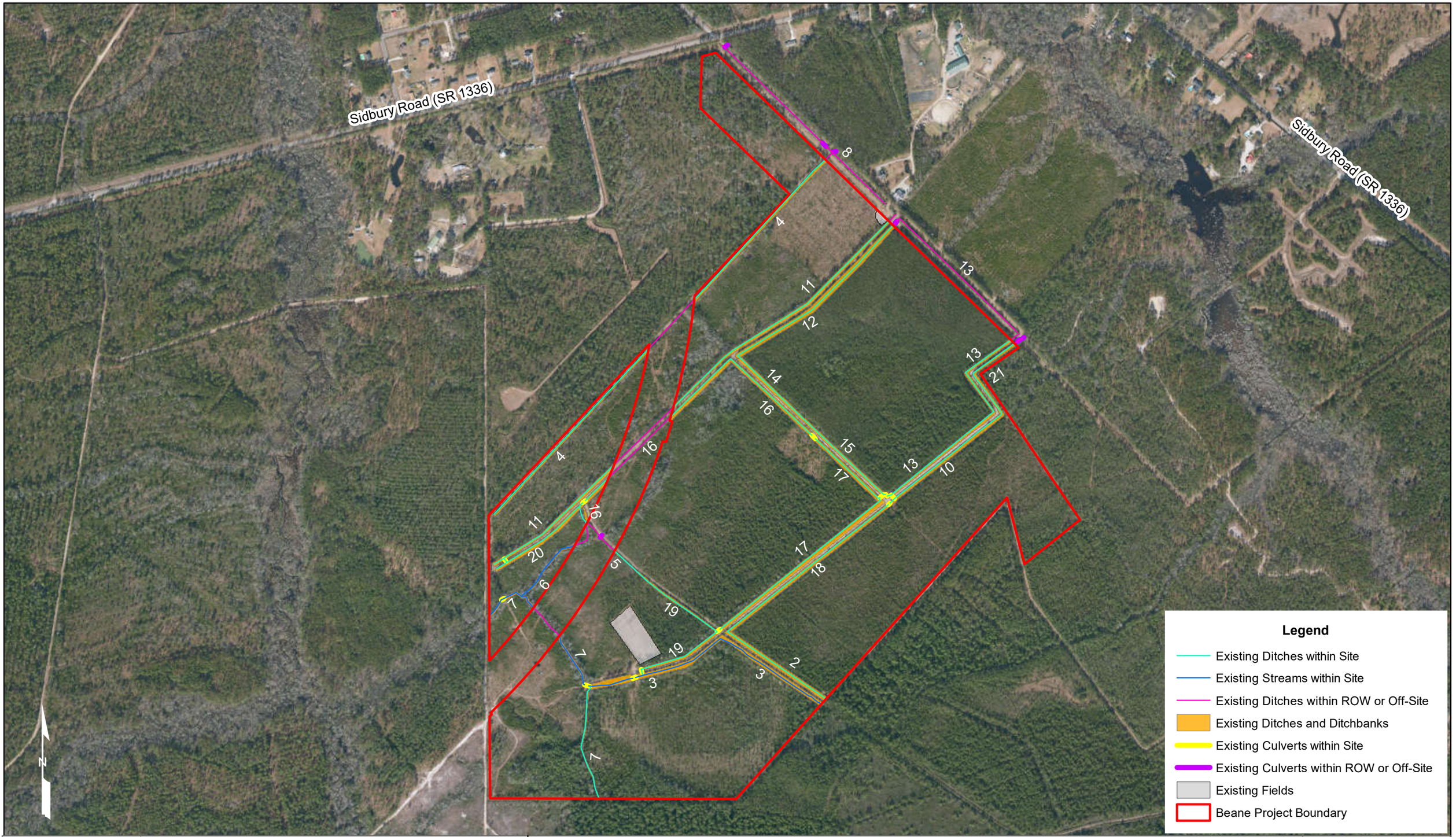
0 350 700 1,400 2,100 Feet

Beane Wetland Mitigation Site

Existing Road Network Map

New Hanover County, NC

Figure 10a



1 inch = 700 feet

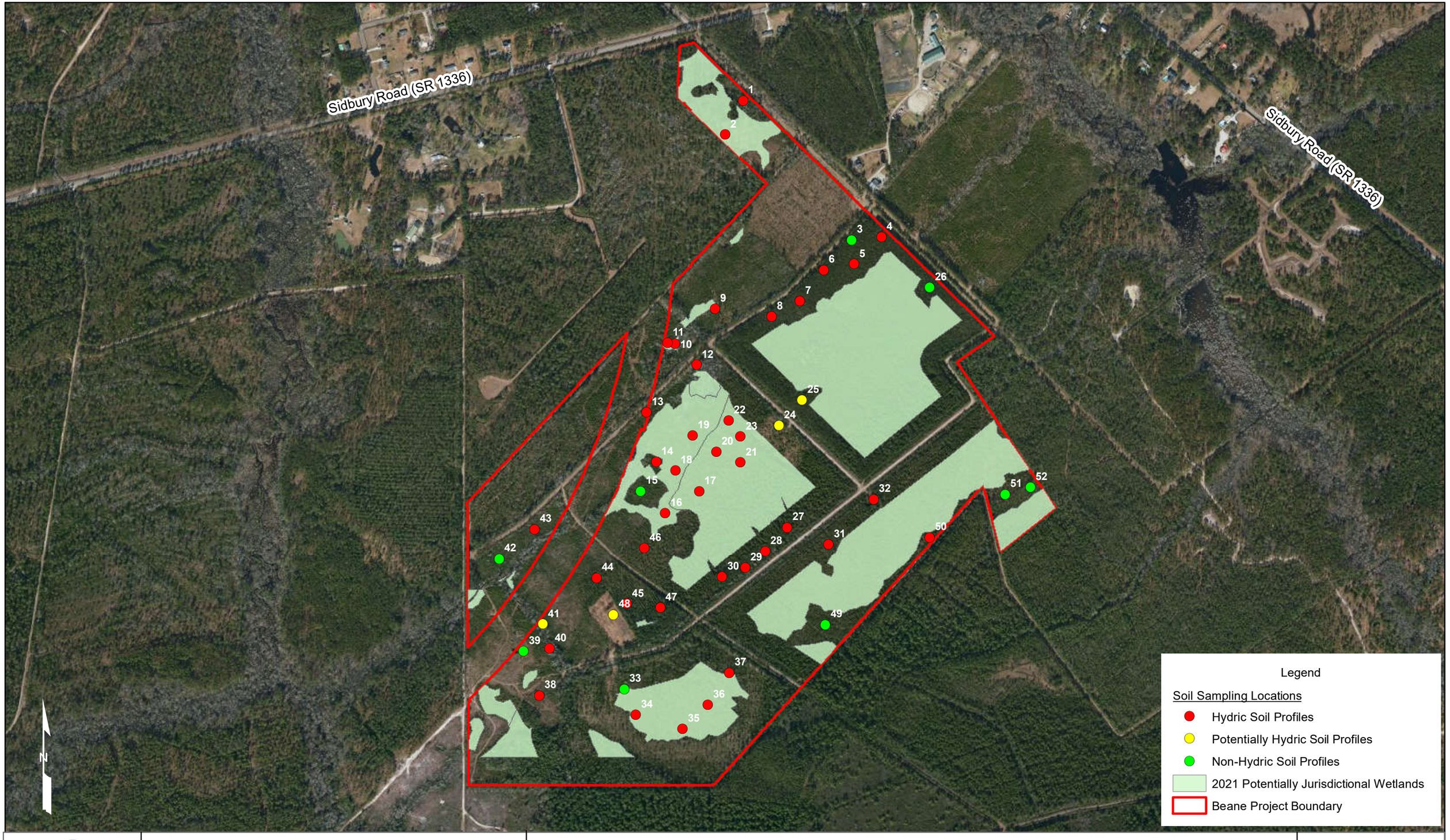
0 350 700 1,400 2,100 Feet

Beane Wetland Mitigation Site

Existing Ditch Network Map

New Hanover County, NC

Figure 10b



1 inch = 700 feet

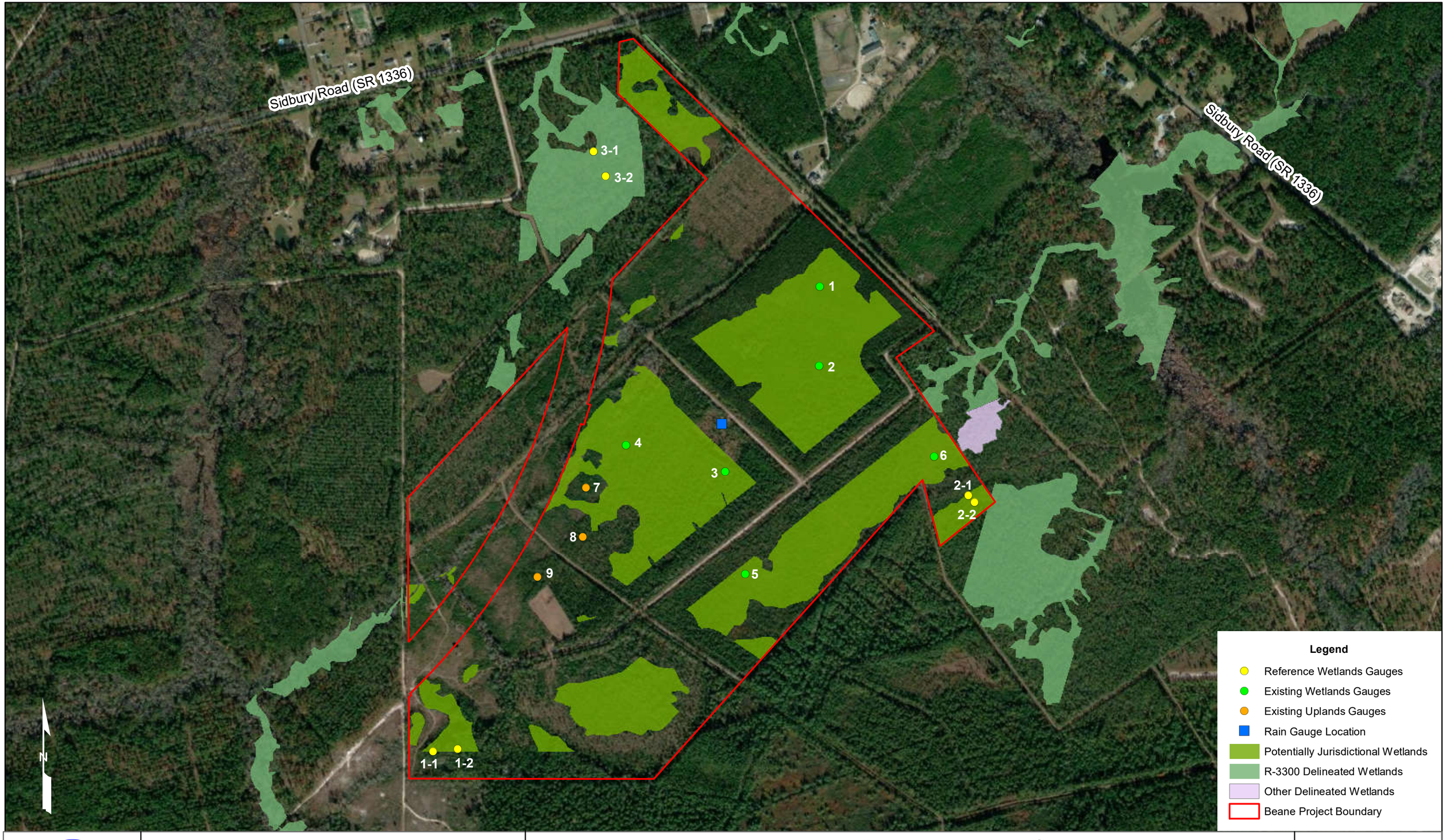
0 350 700 1,400 2,100 Feet

Beane Wetland Mitigation Site

2015 Hydric Soils Investigations

New Hanover County, NC

Figure 11



1 inch = 700 feet

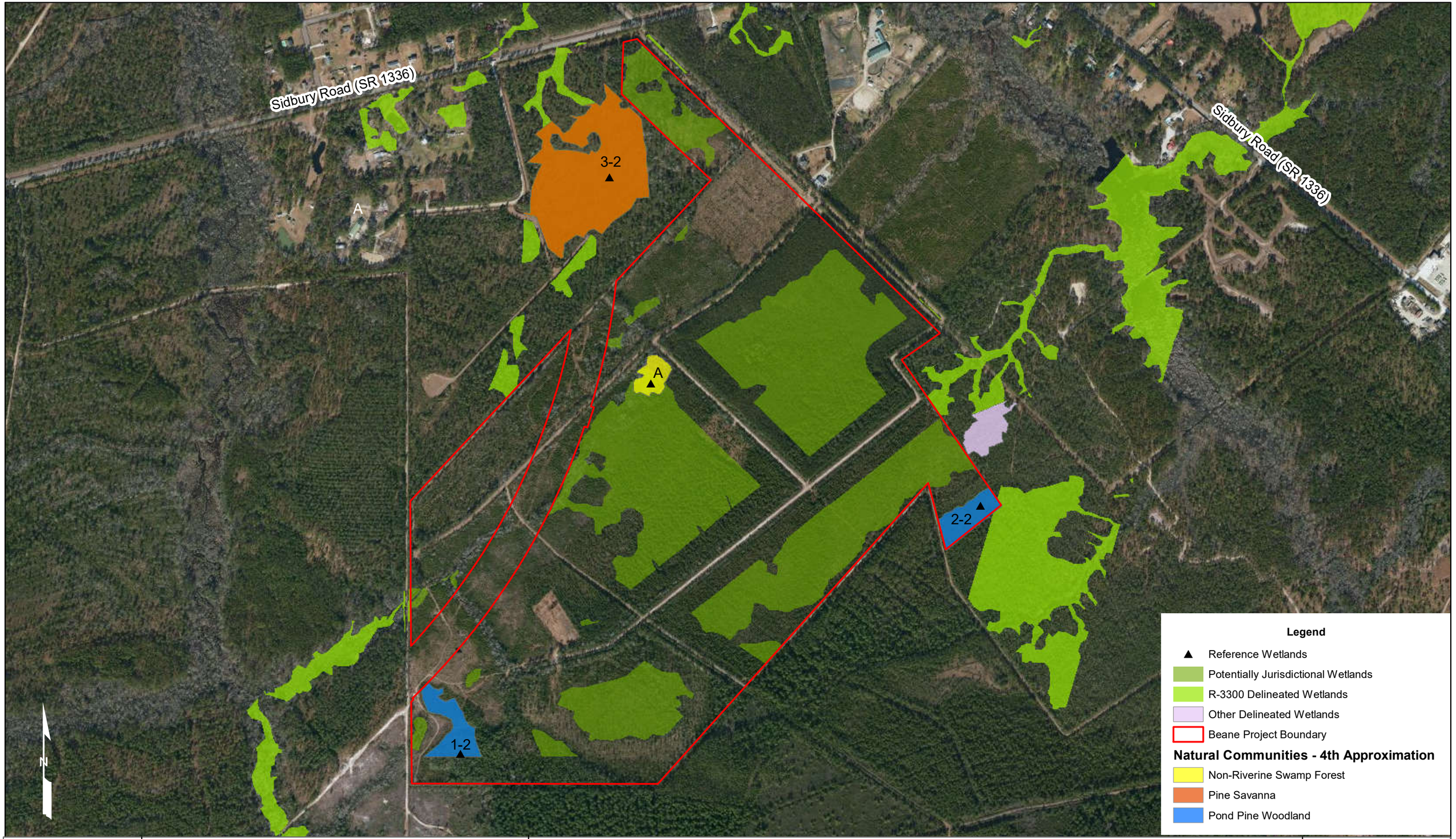
0 350 700 1,400 2,100 Feet

Beane Wetland Mitigation Site

Existing Wetland Monitoring Gauge Locations Map

New Hanover County, NC

Figure 12



1 inch = 700 feet

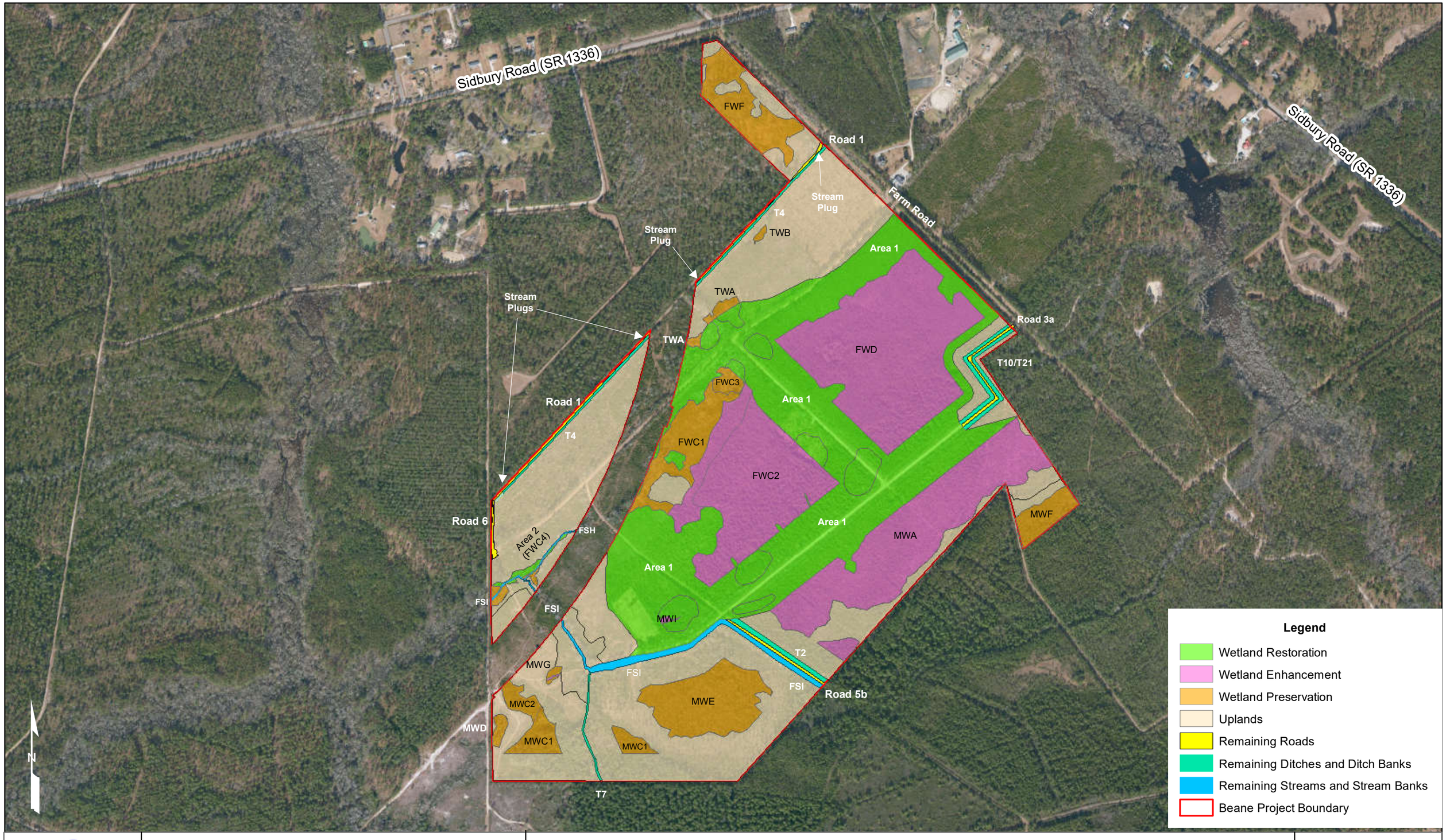
0 350 700 1,400 2,100 Feet

Beane Wetland Mitigation Site

Reference Wetlands Map

New Hanover County, NC

Figure 13



1 inch = 700 feet

0 350 700 1,400 2,100 Feet

Beane Wetland Mitigation Site

Wetland Design Map

New Hanover County, NC

Figure 14

Sidbury Road (SR 1336)

Farm Road

Sidbury Road (SR 1336)

N

Legend

Target Plant Community (Planting Areas)

- Zone 1 - Non-Riverine Wet Hdwd Forest (Oak Flat Subtype)
- Zone 2 - Coastal Plain Depression Swamp (Mixed Subtype)
- Zone 3 - Blackwater Bottomland Hardwoods

Naturally Regenerated Areas (No Planting)

- Wetland Preservation
- Uplands

Remaining Streams, Ditches, and Roads

- Remaining Ditches and Ditch Banks
- Remaining Streams and Stream Banks
- Remaining Roads
- Beane Project Boundary

1 inch = 700 feet

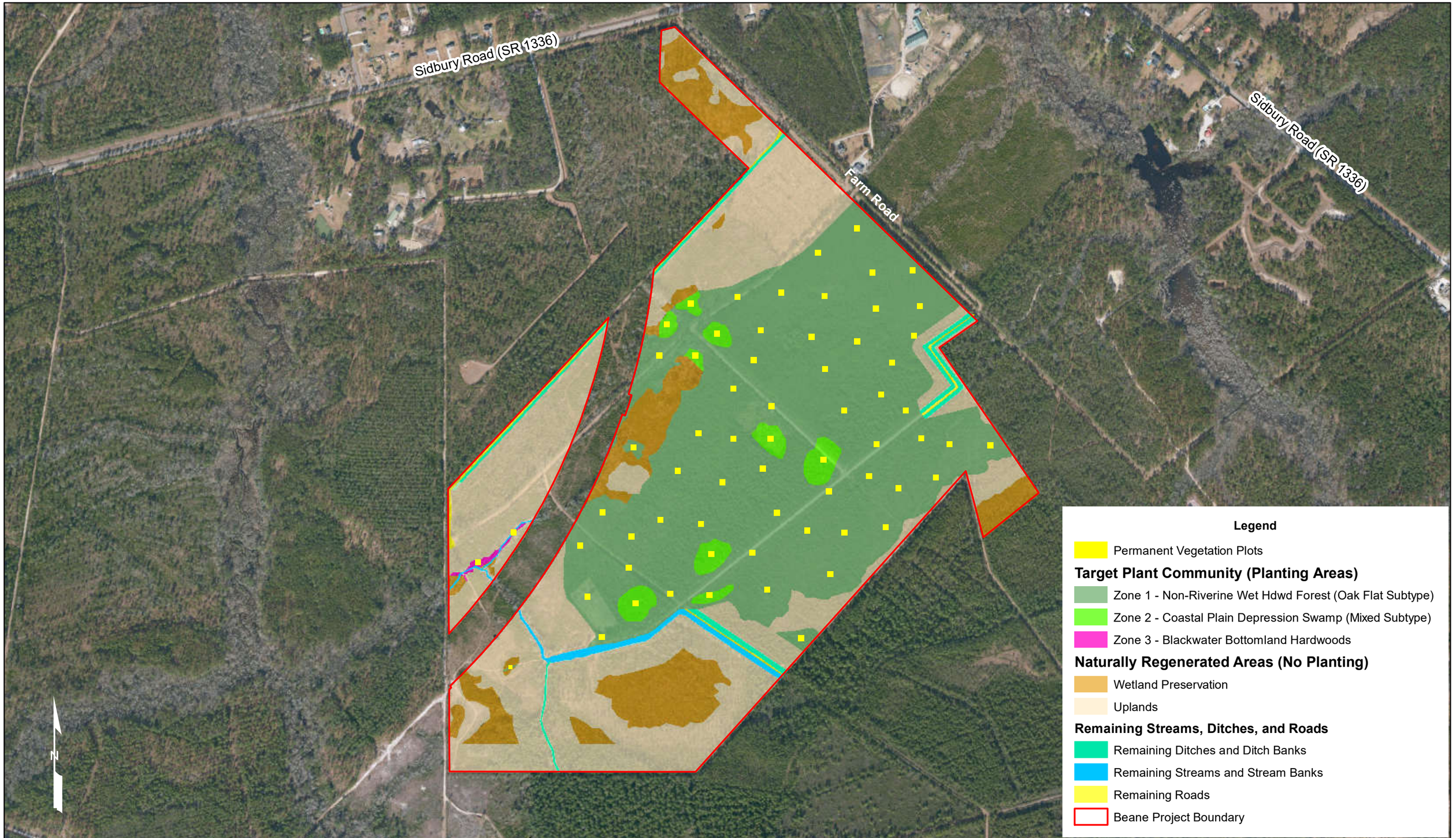
0 350 700 1,400 2,100 Feet

Beane Property Wetland Mitigation Site

Target Plant Communities Map

New Hanover County, NC

Figure 15



1 inch = 700 feet

0 350 700 1,400 2,100 Feet

Beane Property Wetland Mitigation Site

Vegetation Monitoring Plan Map

New Hanover County, NC

Figure 16

Sidbury Road (SR 1336)

Farm Road

Sidbury Road (SR 1336)

N

Legend

- Wetland Monitoring Gauges
- Rain Gauge Location

Target Plant Community (Planting Areas)

- Zone 1 - Non-Riverine Wet Hdwd Forest (Oak Flat Subtype)
- Zone 2 - Coastal Plain Depression Swamp (Mixed Subtype)
- Zone 3 - Blackwater Bottomland Hardwoods

Naturally Regenerated Areas (No Planting)

- Wetland Preservation
- Uplands

Remaining Streams, Ditches, and Roads

- Remaining Ditches and Ditch Banks
- Remaining Streams and Stream Banks
- Remaining Roads
- Beane Project Boundary

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

1 inch = 700 feet

0 350 700 1,400 2,100 Feet

Beane Property Wetland Mitigation Site

Hydrology Monitoring Plan Map

New Hanover County, NC

Figure 17

Appendix 1

Preliminary Jurisdictional Resource Information

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action Id. **SAW-2007-01386** County: **New Hanover** U.S.G.S. Quad: **NC- Scotts Hill**

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Requestor: **NCDOT**
Phil Harris
Address: **1546 Mail Service Center**
Raleigh, NC 27699
E-mail: **pharris@ncdot.gov**

Size (acres) **313**
Nearest Waterway **Island Creek**
USGS HUC **03030007**
Nearest Town **Wilmington**
River Basin **Cape Fear**
Coordinates Latitude: **34.330834**
Longitude: **-77.805065**

Location description: **The project area (known as the Beane property) is located along Farm Road which is accessed off Sidbury Road north of Wilmington near the New Hanover/Pender County Line.**

Indicate Which of the Following Apply:

A. Preliminary Determination

☒ There appear to be **waters, including wetlands** on the above described project area/property, that may be subject to Section 404 of the Clean Water Act (CWA)(33 USC § 1344) and/or Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403). The **waters, including wetlands** have been delineated, and the delineation has been verified by the Corps to be sufficiently accurate and reliable. The approximate boundaries of these waters are shown on the enclosed delineation map dated **2/23/2021**. Therefore this preliminary jurisdiction determination may be used in the permit evaluation process, including determining compensatory mitigation. For purposes of computation of impacts, compensatory mitigation requirements, and other resource protection measures, a permit decision made on the basis of a preliminary JD will treat all waters and wetlands that would be affected in any way by the permitted activity on the site as if they are jurisdictional waters of the U.S. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331). However, you may request an approved JD, which is an appealable action, by contacting the Corps district for further instruction.

☐ There appear to be **waters, including wetlands** on the above described project area/property, that may be subject to Section 404 of the Clean Water Act (CWA)(33 USC § 1344) and/or Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403). However, since the **waters, including wetlands** have not been properly delineated, this preliminary jurisdiction determination may not be used in the permit evaluation process. Without a verified wetland delineation, this preliminary determination is merely an effective presumption of CWA/RHA jurisdiction over all of the **waters, including wetlands** at the project area, which is not sufficiently accurate and reliable to support an enforceable permit decision. We recommend that you have the **waters, including wetlands** on your project area/property delineated. As the Corps may not be able to accomplish this wetland delineation in a timely manner, you may wish to obtain a consultant to conduct a delineation that can be verified by the Corps.

B. Approved Determination

☐ There are Navigable Waters of the United States within the above described project area/property subject to the permit requirements of Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403) and Section 404 of the Clean Water Act (CWA)(33 USC § 1344). Unless there is a change in law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

☐ There are **waters, including wetlands**on the above described project area/property subject to the permit requirements of Section 404 of the Clean Water Act (CWA) (33 USC § 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

☐We recommend you have the **waters, including wetlands** on your project area/property delineated. As the Corps may not be able to accomplish this wetland delineation in a timely manner, you may wish to obtain a consultant to conduct a delineation that can be verified by the Corps.

☐The **waters, including wetlands** on your project area/property have been delineated and the delineation has been verified by the Corps. The approximate boundaries of these waters are shown on the enclosed delineation map dated **DATE**. We strongly suggest you have this delineation surveyed. Upon completion, this survey should be reviewed and verified by the Corps. Once

verified, this survey will provide an accurate depiction of all areas subject to CWA jurisdiction on your property which, provided there is no change in the law or our published regulations, may be relied upon for a period not to exceed five years.

☐ The **waters, including wetlands** have been delineated and surveyed and are accurately depicted on the plat signed by the Corps Regulatory Official identified below on **DATE**. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

☐ There are no waters of the U.S., to include wetlands, present on the above described project area/property which are subject to the permit requirements of Section 404 of the Clean Water Act (33 USC 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

☐ The property is located in one of the 20 Coastal Counties subject to regulation under the Coastal Area Management Act (CAMA). You should contact the Division of Coastal Management in **Morehead City, NC, at (252) 808-2808** to determine their requirements.

Placement of dredged or fill material within waters of the US, including wetlands, without a Department of the Army permit may constitute a violation of Section 301 of the Clean Water Act (33 USC § 1311). Placement of dredged or fill material, construction or placement of structures, or work within navigable waters of the United States without a Department of the Army permit may constitute a violation of Sections 9 and/or 10 of the Rivers and Harbors Act (33 USC § 401 and/or 403). If you have any questions regarding this determination and/or the Corps regulatory program, please contact **Brad Shaver at 910-251-4611 or brad.e.shaver@usace.army.mil**.

C. Basis For Determination: Basis For Determination: See the preliminary jurisdictional determination form dated 03/05/2021.

D. Remarks: The site was field verified on 2/26/2020 and has been visited several times between that initial visit and the issuance date of this PJD.

E. Attention USDA Program Participants

This delineation/determination has been conducted to identify the limits of Corps' Clean Water Act jurisdiction for the particular site identified in this request. The delineation/determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA Program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.

F. Appeals Information **(This information applies only to approved jurisdictional determinations as indicated in B. above)**

This correspondence constitutes an approved jurisdictional determination for the above described site. If you object to this determination, you may request an administrative appeal under Corps regulations at 33 CFR Part 331. Enclosed you will find a Notification of Appeal Process (NAP) fact sheet and request for appeal (RFA) form. If you request to appeal this determination you must submit a completed RFA form to the following address:

US Army Corps of Engineers
South Atlantic Division
Attn: Phillip Shannin, Review Officer
60 Forsyth Street SW, Room 10M15
Atlanta, Georgia 30303-8801

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR part 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by **Not applicable**.
It is not necessary to submit an RFA form to the Division Office if you do not object to the determination in this correspondence.

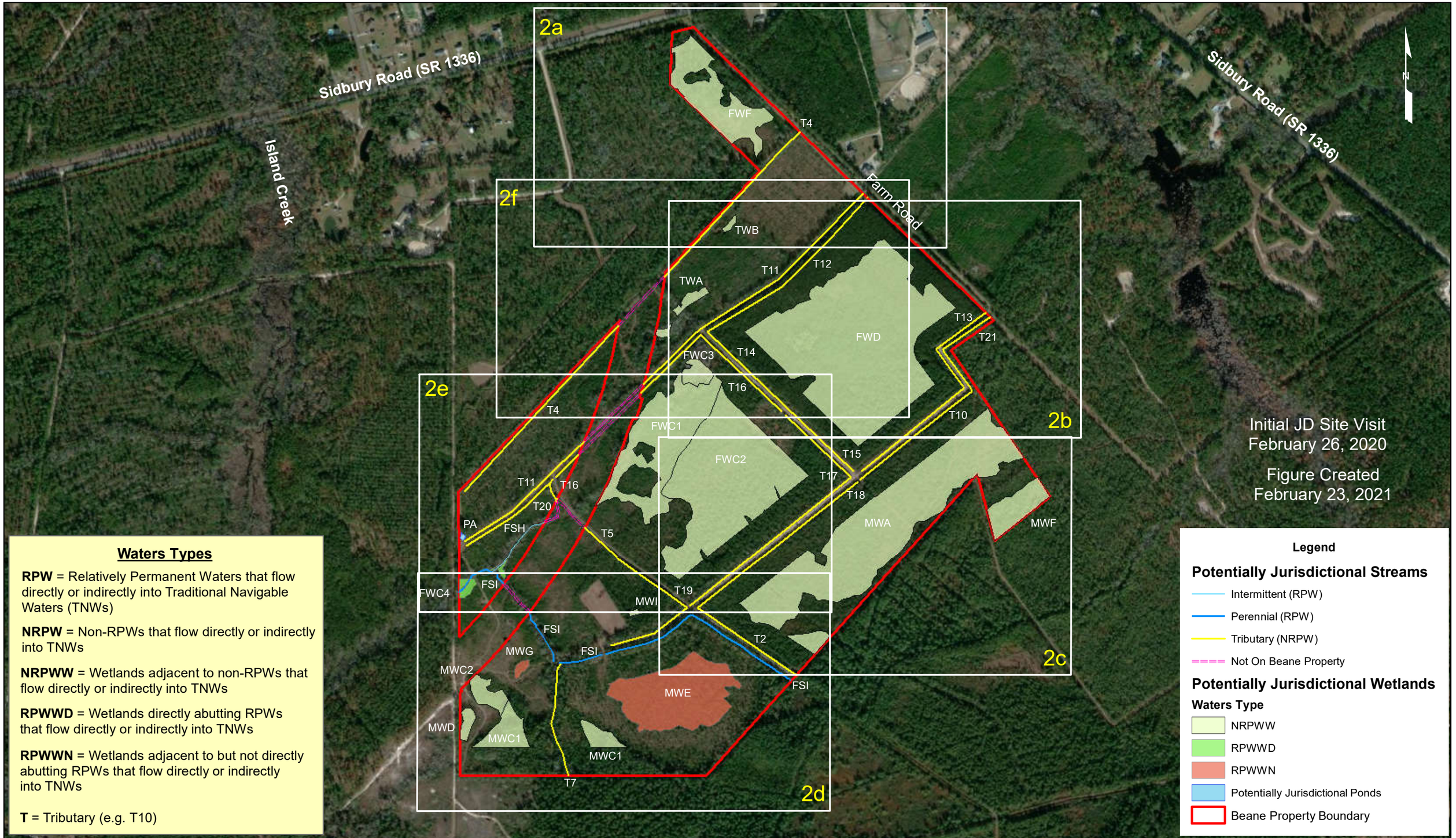
Corps Regulatory Official: _____ Brad E Shaver Digitally signed by Brad Shaver Date: 2021.03.05 11:18:04 -05'00'

Date of JD: **03/05/2021** Expiration Date of JD: **Not applicable**

SAW-2007-01386
The Wilmington District is committed to providing the highest level of support to the public. To help us ensure we continue to do so, please complete the Customer Satisfaction Survey located at http://corpsmapu.usace.army.mil/cm_apex/f?p=136:4:0

Copy furnished(electronic):

NCDOT-Div 3 attn: Mason Herndon
NCDEQ-DWR attn: Joanne Steenhuis
EPR attn: Thomas Barrett
NCDOT attn: Brad Chilton



Waters Types

RPW = Relatively Permanent Waters that flow directly or indirectly into Traditional Navigable Waters (TNWs)

NRPW = Non-RPWs that flow directly or indirectly into TNWs

NRPWW = Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs

RPWWD = Wetlands directly abutting RPWs that flow directly or indirectly into TNWs

RPWWN = Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs

T = Tributary (e.g. T10)

Legend

Potentially Jurisdictional Streams

- Intermittent (RPW)
- Perennial (RPW)
- Tributary (NRPW)
- Not On Beane Property

Potentially Jurisdictional Wetlands

Waters Type

- NRPWW
- RPWWD
- RPWWN
- Potentially Jurisdictional Ponds
- Beane Property Boundary

1 inch = 700 feet

0 350 700 1,400 2,100 Feet

Beane Property

Potentially Jurisdictional Features - Index / Overview Map

New Hanover County, NC

Figure 1a

TABLE OF AQUATIC RESOURCES IN REVIEW AREA WHICH "MAY BE" SUBJECT TO REGULATORY JURISDICTION.

Site Number	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated amount of aquatic resources in review area (acreage and linear feet, if applicable	Type of aquatic resources (i.e., wetland vs. non-wetland waters)	Geographic authority to which the aquatic resource "may be" subject (i.e., Section 404 or Section 10/404)
Tributary 2	34.327100	-77.804703	954	Non-wetland	Section 404
Tributary 4	34.333853	-77.808251	3,391	Non-wetland	Section 404
Tributary 5	34.329304	-77.808518	364	Non-wetland	Section 404
Tributary 7	34.325427	-77.809884	934	Non-wetland	Section 404
Tributary 10	34.331633	-77.800104	1,088	Non-wetland	Section 404
Tributary 11	34.333824	-77.806053	3,589	Non-wetland	Section 404
Tributary 12	34.335113	-77.803379	1,662	Non-wetland	Section 404
Tributary 13	34.332449	-77.799119	1,938	Non-wetland	Section 404
Tributary 14	34.333283	-77.804880	646	Non-wetland	Section 404
Tributary 15	34.331739	-77.802971	964	Non-wetland	Section 404
Tributary 16	34.333695	-77.806012	1,946	Non-wetland	Section 404
Tributary 17	34.329892	-77.803132	2,361	Non-wetland	Section 404
Tributary 18	34.329267	-77.803788	1,687	Non-wetland	Section 404
Tributary 19	34.327834	-77.806303	1,369	Non-wetland	Section 404
Tributary 20	34.329892	-77.810865	879	Non-wetland	Section 404
Tributary 21	34.333522	-77.799307	861	Non-wetland	Section 404
FSH-Tributary	34.330298	-77.809717	48	Non-wetland	Section 404
FSH	34.329315	-77.810772	608	Non-wetland	Section 404
FSI	34.327012	-77.807723	3,039	Non-wetland	Section 404
PA	34.329484	-77.812190	0.04	Non-wetland	Section 404
FWC1	34.331545	-77.806850	9.77	Wetland	Section 404
FWC2	34.330606	-77.805218	18.95	Wetland	Section 404
FWC3	34.333002	-77.805943	0.88	Wetland	Section 404
FWC4	34.328473	-77.811841	0.47	Wetland	Section 404
FWD	34.333658	-77.801671	31.62	Wetland	Section 404
FWF	34.339064	-77.805359	6.29	Wetland	Section 404
MWA	34.329552	-77.801117	24.12	Wetland	Section 404
MWC1	34.325142	-77.810260	2.87	Wetland	Section 404
MWC2	34.326024	-77.811569	1.14	Wetland	Section 404
MWD	34.325392	-77.812129	0.50	Wetland	Section 404
MWE	34.325946	-77.806574	9.73	Wetland	Section 404
MWF	34.329984	-77.797542	2.52	Wetland	Section 404
MWG	34.326584	-77.810678	0.25	Wetland	Section 404
MWI	34.327766	-77.807626	0.10	Wetland	Section 404
TWA	34.334421	-77.806278	0.70	Wetland	Section 404
TWB	34.336259	-77.805017	0.15	Wetland	Section 404

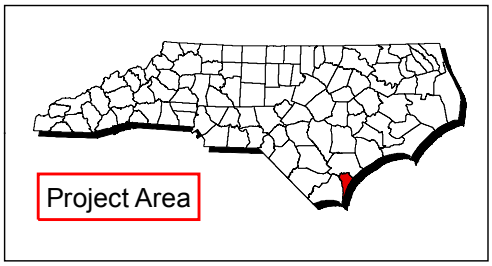


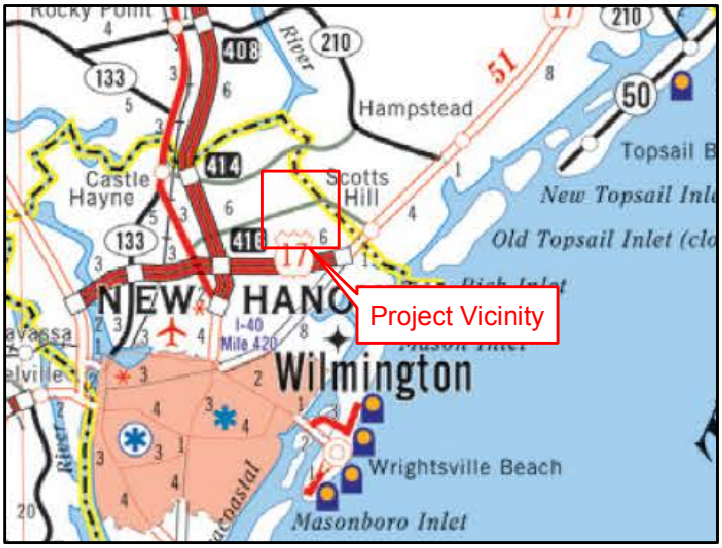
Figure 1

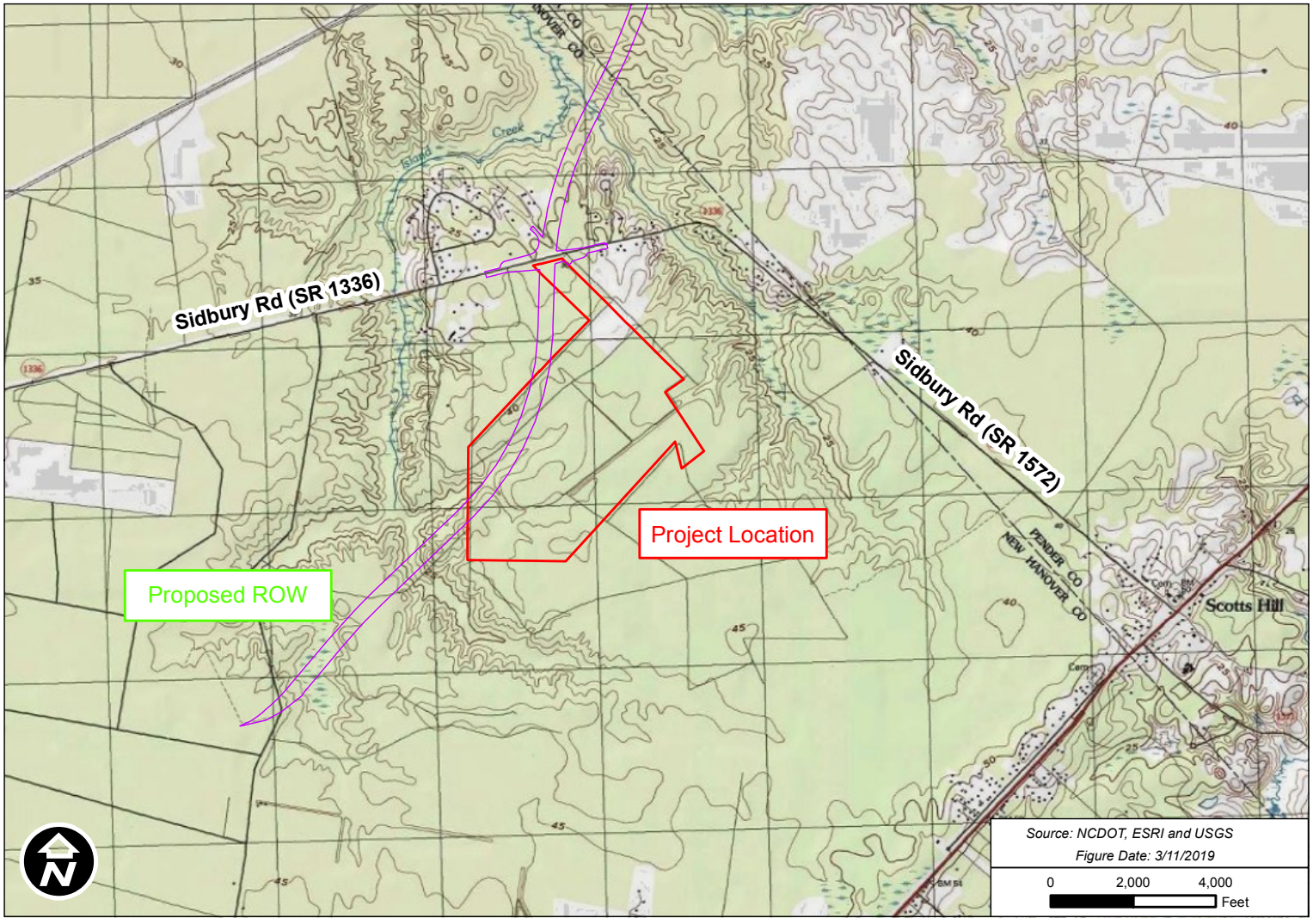
Project Vicinity

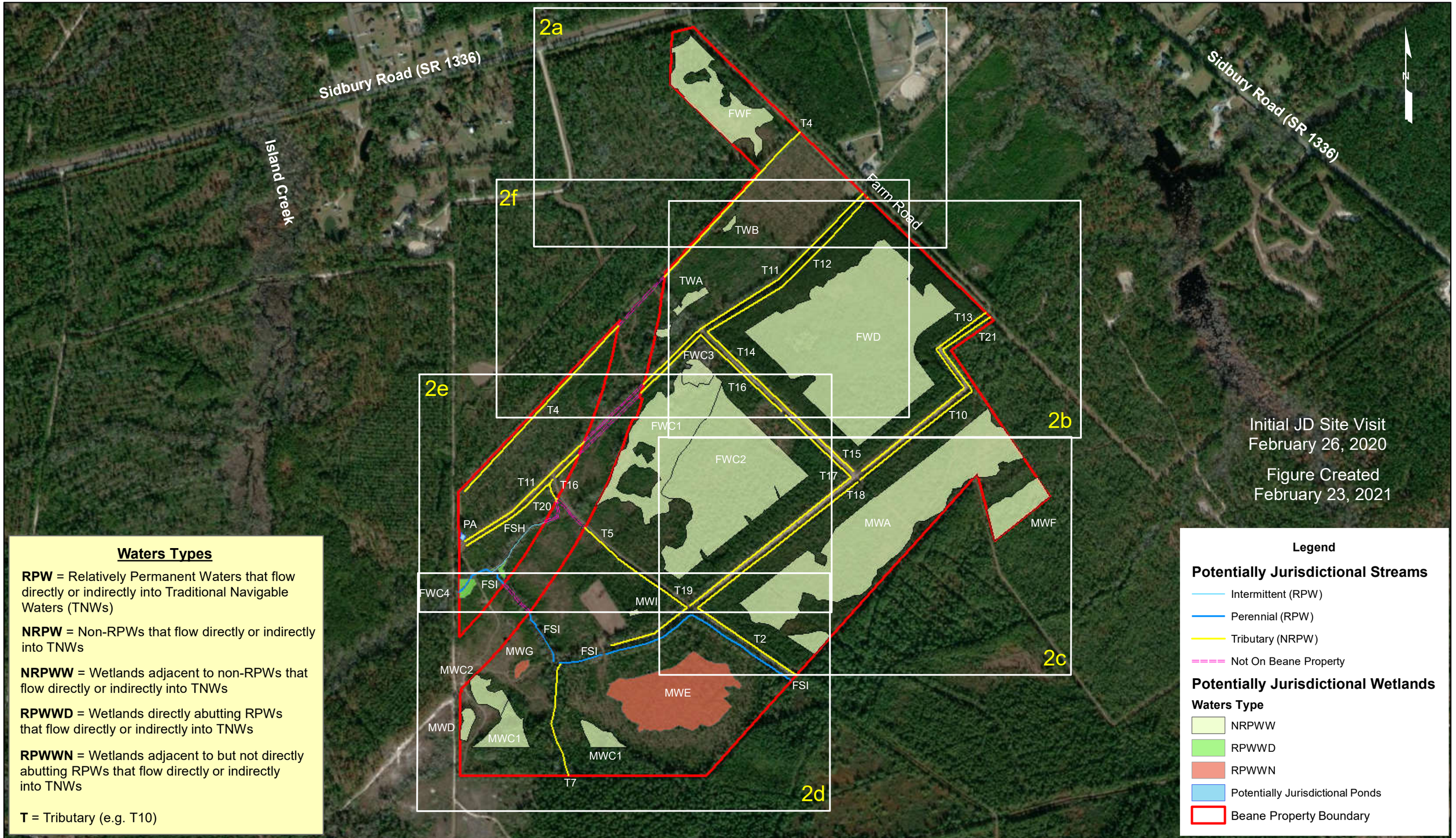
Beane Property

New Hanover County, North Carolina

North Carolina
Department of Transportation







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Legend

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- Intermittent (RPW)
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- Tributary (NRPW)
- Not On Beane Property

Potentially Jurisdictional Wetlands

Waters Type

- NRPWW
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- Potentially Jurisdictional Ponds
- Beane Property Boundary

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0 350 700 1,400 2,100 Feet

Beane Property

Potentially Jurisdictional Features - Index / Overview Map

New Hanover County, NC

Figure 1a

1 inch = 700 feet

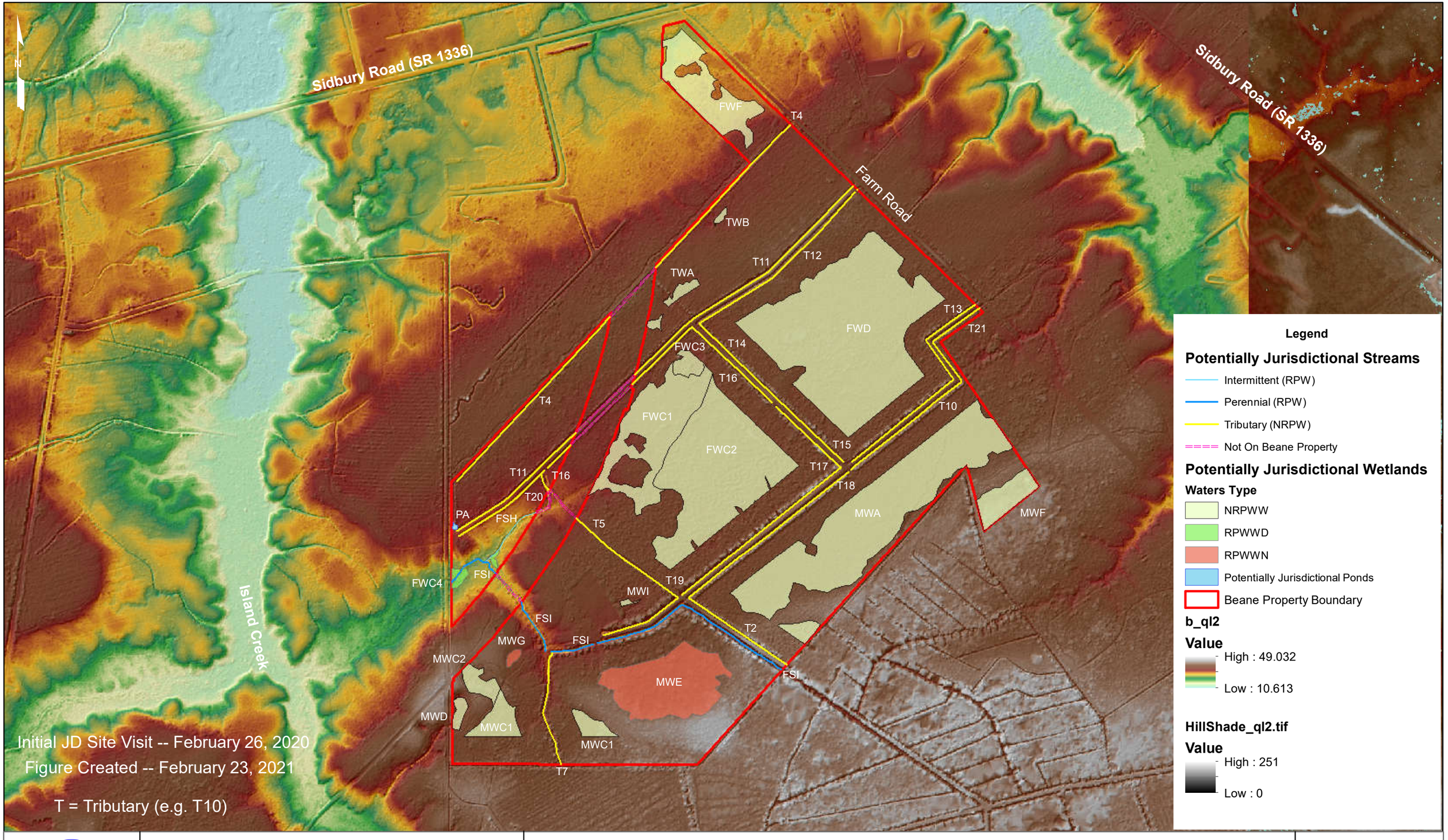
0 350 700 1,400 2,100 Feet

Beane Property

Potentially Jurisdictional Features - Overview Map

New Hanover County, NC

Figure 2



1 inch = 700 feet

0 350 700 1,400 2,100 Feet

Beane Property

Potentially Jurisdictional Features - Overview Map

New Hanover County, NC

Figure 2

1 inch = 200 feet

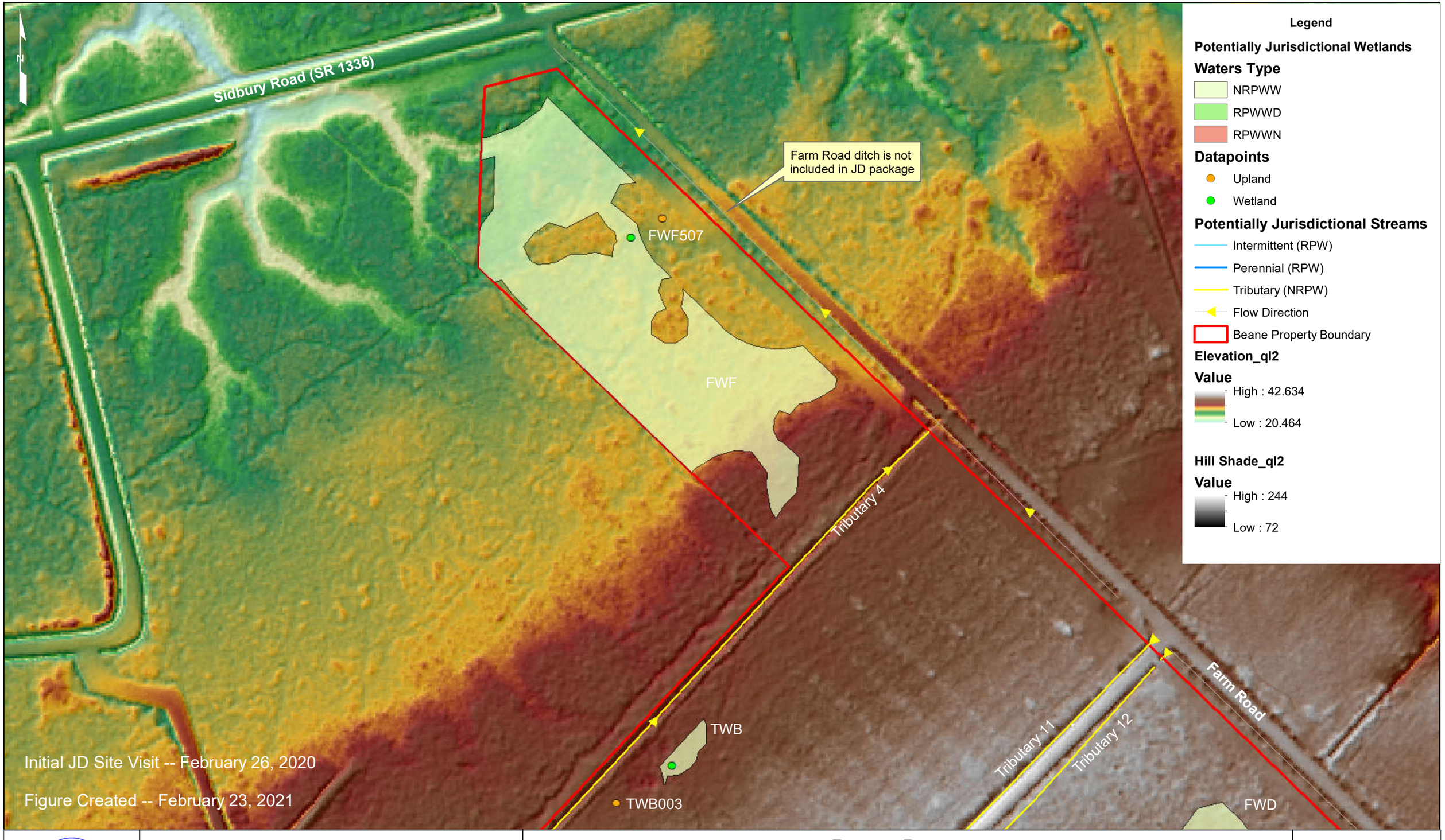
0 100 200 400 600 Feet

Beane Property

Potentially Jurisdictional Features Map

New Hanover County, NC

Figure 2a



1 inch = 200 feet

0 100 200 400 600 Feet

Beane Property

Potentially Jurisdictional Features Map

New Hanover County, NC

Figure 2a

1 inch = 200 feet

0 100 200 400 600 Feet

Beane Property

Potentially Jurisdictional Features Map

New Hanover County, NC

Figure 2b

N

TWB

TWB003

Tributary 4

Tributary 11

Tributary 12

Farm Road

Farm Road ditch not included in the JD package

FWD950

TWA

TWA021

Tributary 11

Tributary 16

FWC722

Tributary 14

FWC724

FWC3

Tributary 16

Tributary 15

FWC1

FWC702

Tributary 17

FWD030

FWC2

FWD

Tributary 13

Tributary 21

Tributary 13

Tributary 10

MWA

Initial JD Site Visit
February 26, 2020

Figure Created
February 23, 2021

Legend

Potentially Jurisdictional Wetlands

Waters Type

- NRPWW
- RPWWD
- RPWWN

Datapoints

- Upland
- Wetland

Potentially Jurisdictional Streams

- Intermittent (RPW)
- Perennial (RPW)
- Tributary (NRPW)
- Flow Direction
- Beane Property Boundary

Elevation_ql2

Value

- High : 44.729
- Low : 30.492

HillShade_ql2

Value

- High : 245
- Low : 56

1 inch = 200 feet

0 100 200 400 600 Feet

Beane Property

Potentially Jurisdictional Features Map

New Hanover County, NC

Figure

2b

1 inch = 200 feet

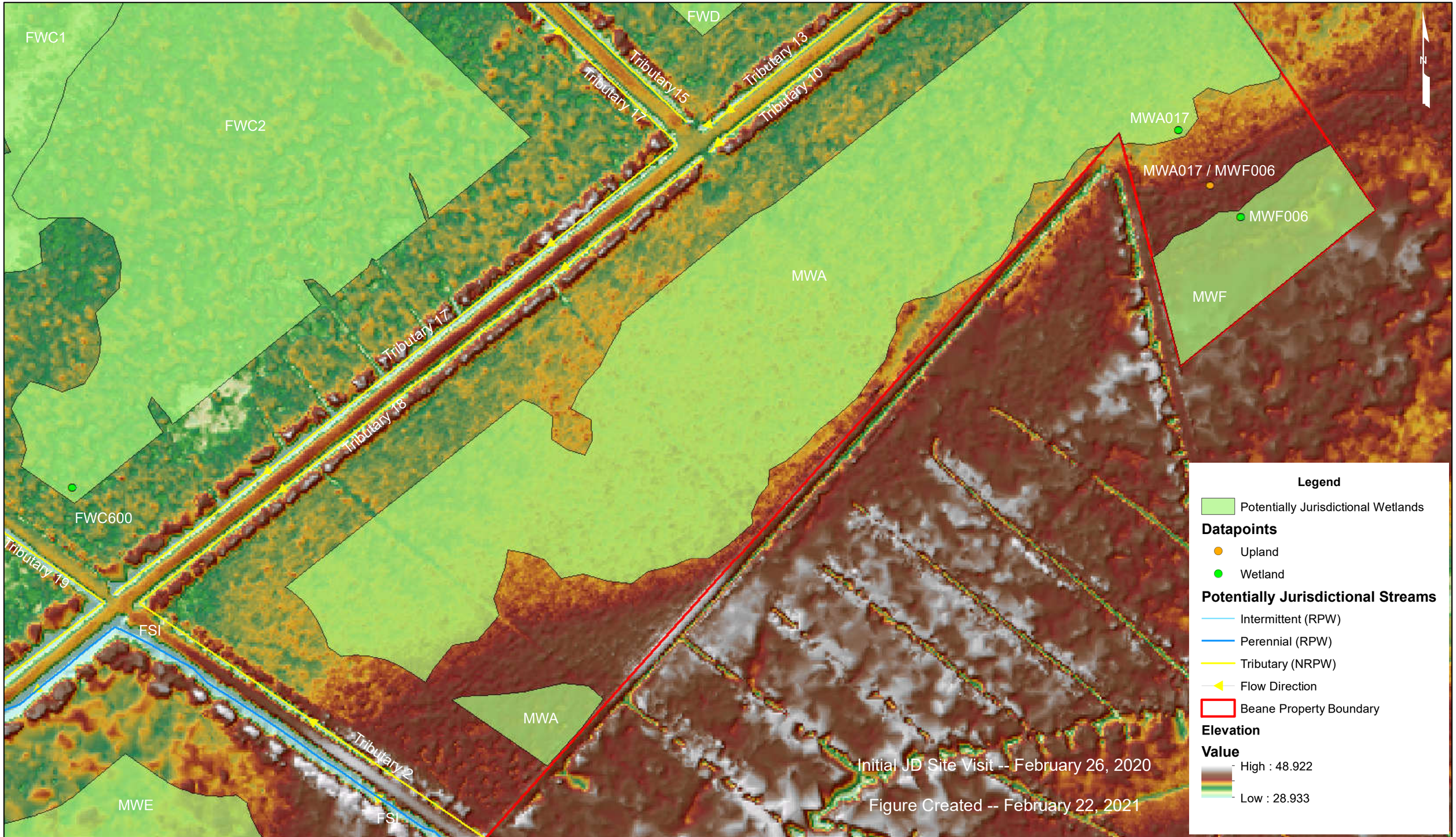
0 100 200 400 600 Feet

Beane Property

Potentially Jurisdictional Features Map

New Hanover County, NC

Figure 2c



1 inch = 200 feet

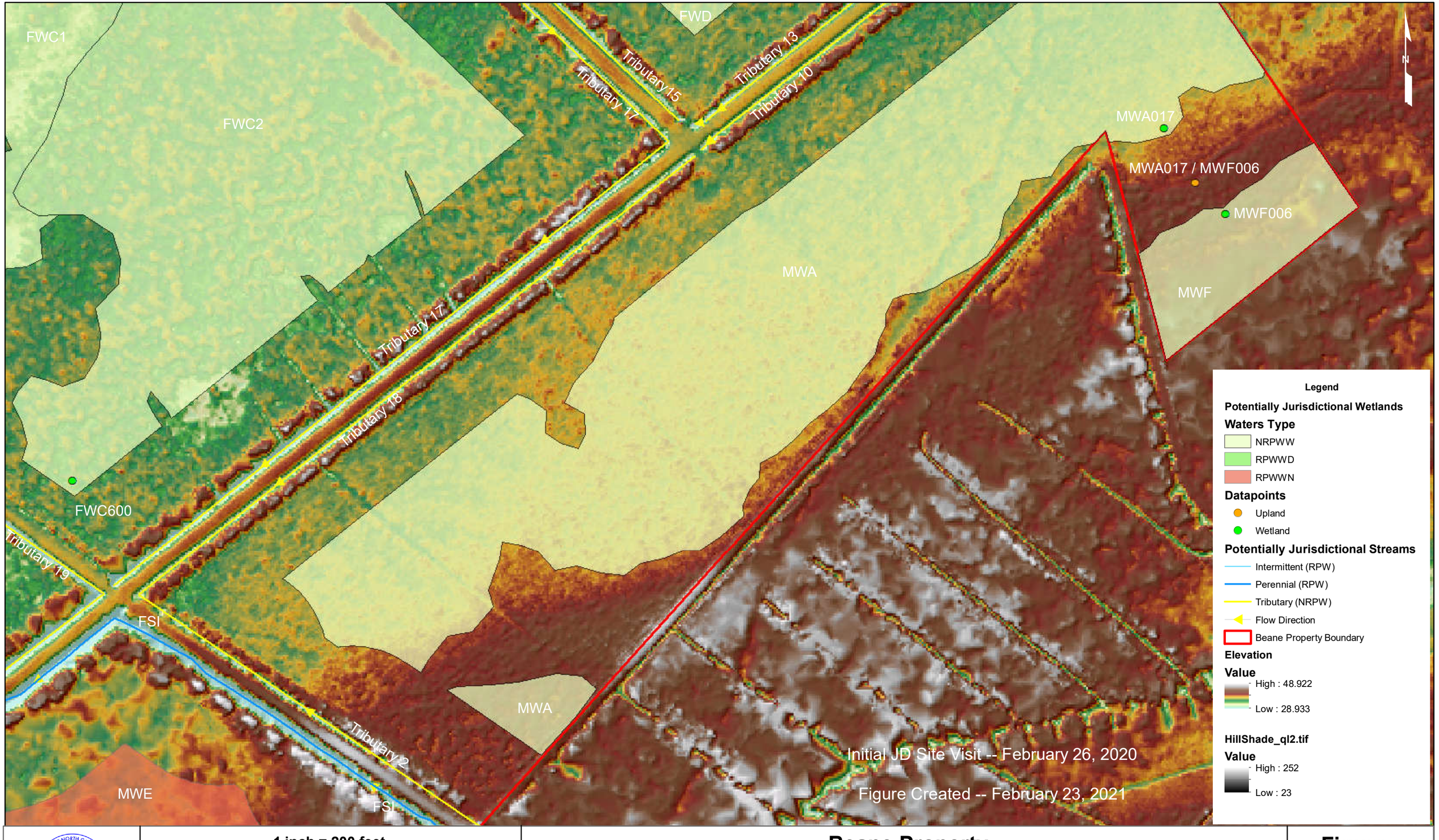
0 100 200 400 600 Feet

Beane Property

Potentially Jurisdictional Features Map

New Hanover County, NC

Figure 2c



1 inch = 200 feet

0 100 200 400 600 Feet

Beane Property

Potentially Jurisdictional Features Map

New Hanover County, NC

Figure 2c

1 inch = 200 feet

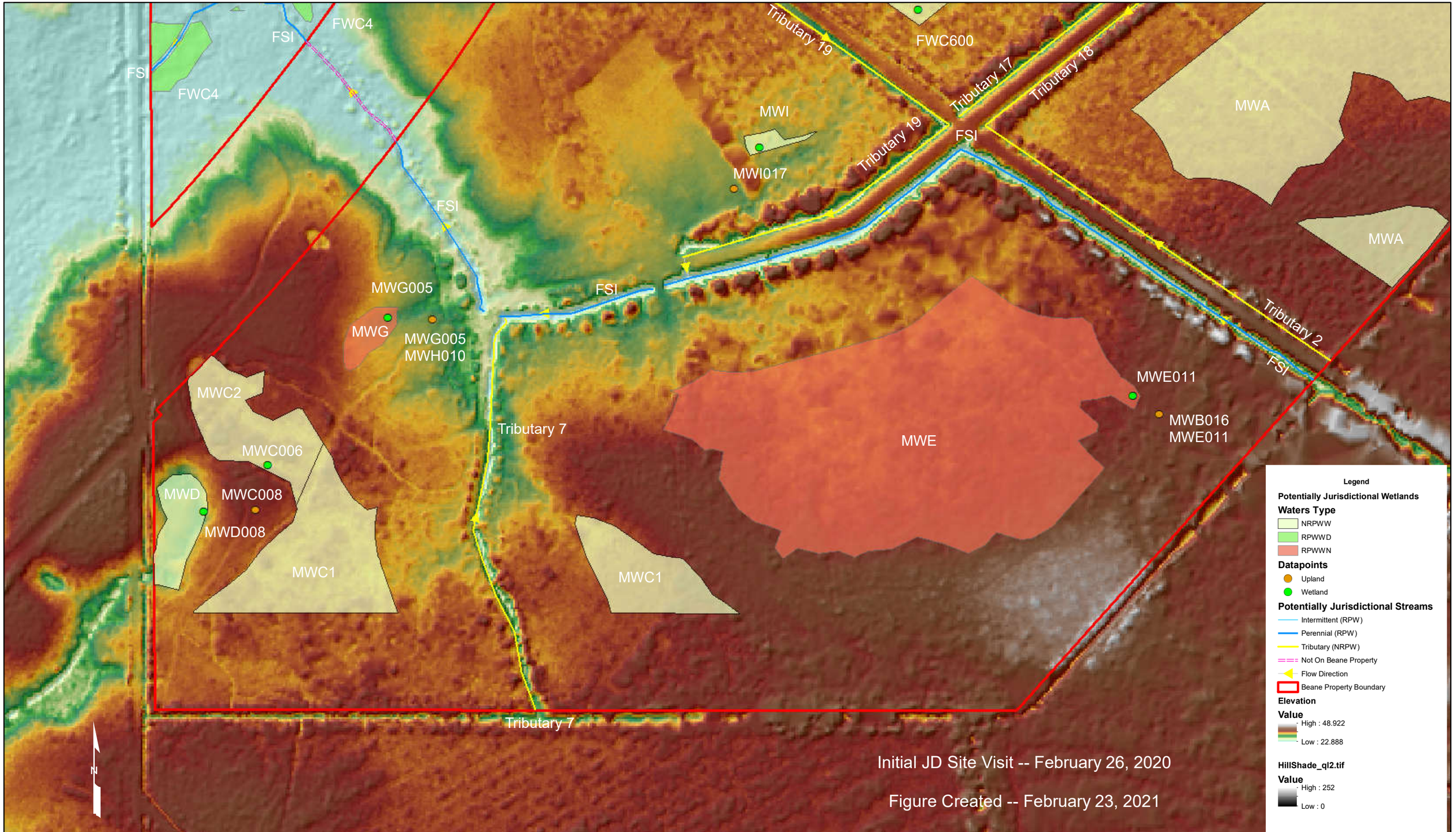
0 100 200 400 600 Feet

Beane Property

Potentially Jurisdictional Features Map

New Hanover County, NC

Figure 2d



1 inch = 200 feet

0 100 200 400 600 Feet

Beane Property

Potentially Jurisdictional Features Map

New Hanover County, NC

Figure 2d

Legend

Potentially Jurisdictional Wetlands

Waters Type

- NRPWW
- RPWWD
- RPWWN

Datapoints

- Upland
- Wetland

Potentially Jurisdictional Streams

- Intermittent (RPW)
- Perennial (RPW)
- Tributary (NRPW)
- Not On Beane Property
- Flow Direction
- Potentially Jurisdictional Ponds
- Beane Property Boundary

Initial JD Site Visit
February 26, 2020

Figure Created
February 23, 2021

N

Tributary 4
Tributary 11
Tributary 16
Tributary 16
Tributary 11
FSH-Tributary—
Tributary 20
PA
FSH
FWC
FWC4
FSI
FSI
FWC4
Tributary 5
FWC045
FWC045
FWC607
FWC600
Tributary 19
MWI
FWC3
FWC1
FWC2
Tributary 16
Tributary 15
Tributary 17
FWD030
FWC702
Tributary 17
Tributary 18
MWA
Tributary 2

1 inch = 200 feet

0 100 200 400 600 Feet

Beane Property

Potentially Jurisdictional Features Map

New Hanover County, NC

Figure

2e

Legend

Potentially Jurisdictional Wetlands

Waters Type
- NRPWW
- RPWWD
- RPWWN

Datapoints
- Upland
- Wetland

Potentially Jurisdictional Streams
- Intermittent (RPW)
- Perennial (RPW)
- Tributary (NRPW)
- Not On Beane Property
- Flow Direction

- Potentially Jurisdictional Ponds
- Beane Property Boundary

Elevation

Value
- High : 47.333
- Low : 22.888

HillShade_ql2.tif

Value
- High : 252
- Low : 0

Initial JD Site Visit
February 26, 2020

Figure Created
February 23, 2021

N

Tributary 4
Tributary 11
Tributary 16
Tributary 16
Tributary 11
FSH-Tributary
Tributary 20
PA
FSH
FWC
FWC4
FSI
FSI
FWC4
Tributary 5
FWC045
FWC607
FWC600
Tributary 19
MWI
FWC3
FWC1
FWC2
Tributary 16
Tributary 15
Tributary 17
FWD030
FWC702
Tributary 17
Tributary 18
MWA
Tributary 2

1 inch = 200 feet

0 100 200 400 600 Feet

Beane Property
Potentially Jurisdictional Features Map
New Hanover County, NC

Figure
2e

Initial JD Site Visit -- February 26, 2020
Figure Created -- February 23, 2021

Legend

Potentially Jurisdictional Wetlands

Waters Type

- NRPWW
- RPWWD
- RPWWN

Datapoints

- Upland
- Wetland

Potentially Jurisdictional Streams

- Intermittent (RPW)
- Perennial (RPW)
- Tributary (NRPW)
- Not On Beane Property
- Flow Direction
- Beane Property Boundary

TWB
TWB003
TWA
TWA021
FWC722
FWC724
FWC3
FWC1
FWC2
FWD
FWD030
Tributary 11
Tributary 12
Tributary 4
Tributary 16
Tributary 14
Tributary 15

N

1 inch = 200 feet

0 100 200 400 600 Feet

Beane Property

Potentially Jurisdictional Features Map

New Hanover County, NC

Figure

2f

Initial JD Site Visit -- February 26, 2020
Figure Created -- February 23, 2021

Legend

Potentially Jurisdictional Wetlands

Waters Type
- NRPWW
- RPWWD
- RPWWN

Datapoints
- Upland
- Wetland

Potentially Jurisdictional Streams
- Intermittent (RPW)
- Perennial (RPW)
- Tributary (NRPW)
- Not On Beane Property
- Flow Direction
- Beane Property Boundary

Elevation

Value
- High : 44.2
- Low : 25.57

HillShade_ql2.tif

Value
- High : 245
- Low : 52

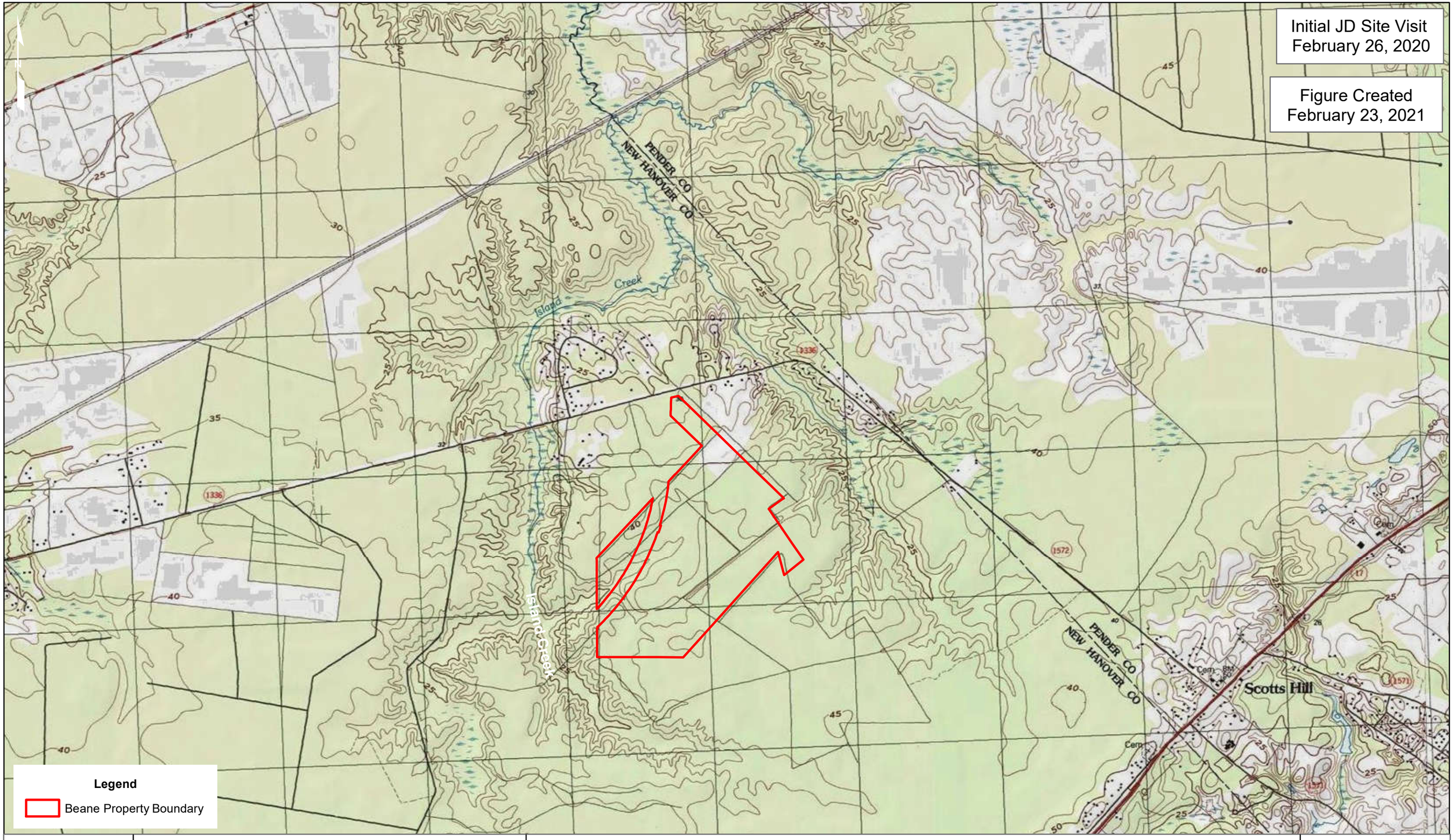
TWB
TWB003
TWA
TWA021
FWC722
FWC724
FWC3
FWC1
FWC2
FWD
FWD030
Tributary 11
Tributary 12
Tributary 4
Tributary 16
Tributary 14
Tributary 15
N

1 inch = 200 feet

0 100 200 400 600 Feet

Beane Property
Potentially Jurisdictional Features Map
New Hanover County, NC

Figure 2f



1 inch = 2,000 feet

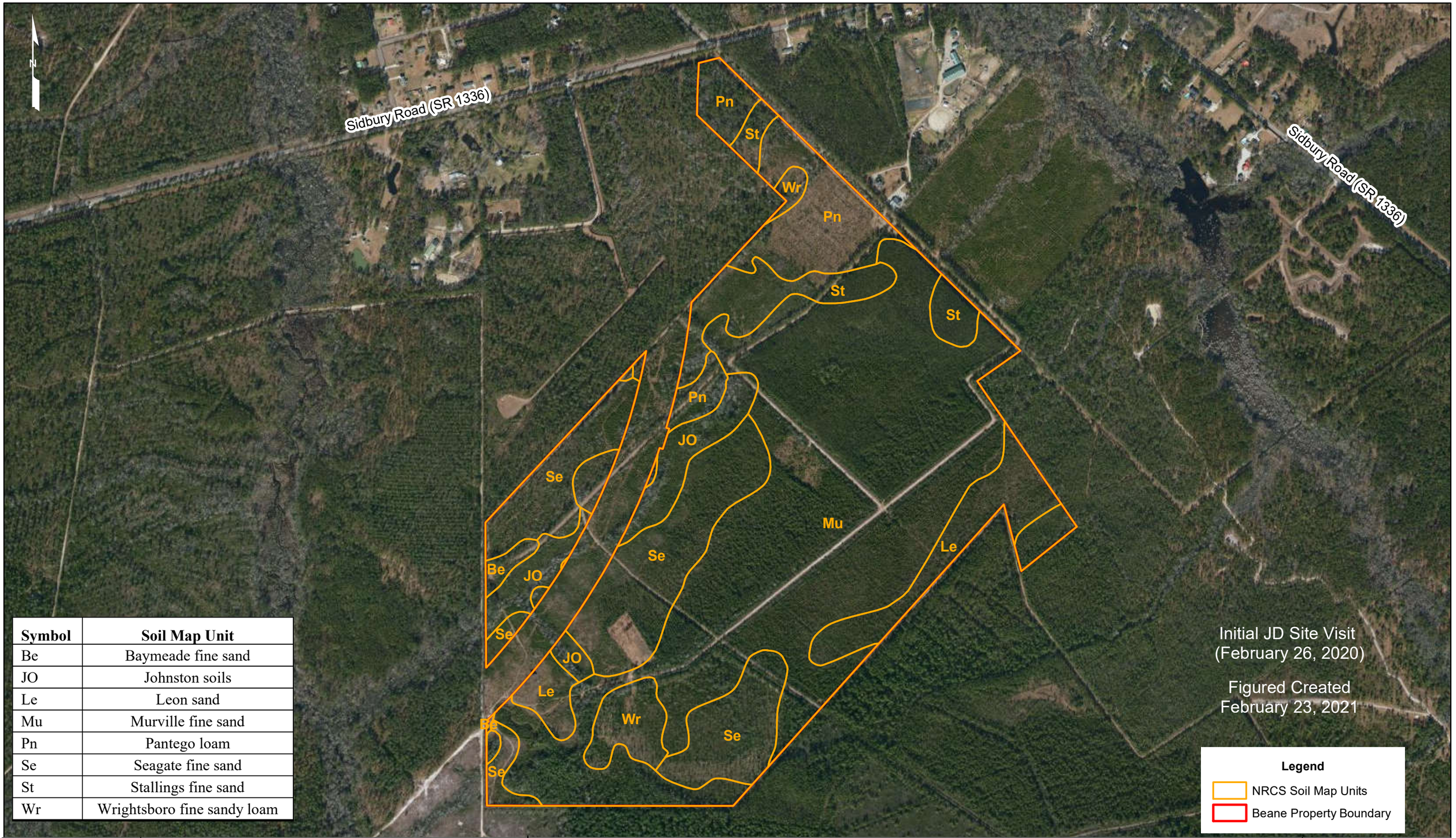
0 1,000 2,000 4,000 6,000 Feet

Beane Property

USGS Topographic Overview Map

New Hanover County, NC

Figure 3



Symbol	Soil Map Unit
Be	Baymeade fine sand
JO	Johnston soils
Le	Leon sand
Mu	Murville fine sand
Pn	Pantego loam
Se	Seagate fine sand
St	Stallings fine sand
Wr	Wrightsboro fine sandy loam

1 inch = 700 feet

0 350 700 1,400 2,100 Feet

Beane Property

NRCS Soils Map

New Hanover County, NC

Figure 4

N

Sidbury Road (SR 1336)

Sidbury Road (SR 1336)

Farm Road

Island Creek

FWF
T4
TWB
T11
T12
TWA
T13
FWD
T21
FWC3
T14
T16
T4
FWC1
T10
FWC2
T15
T11
T16
T17
T18
T20
PA
FSH
T5
MWA
MWF
FWC4
FSI
T19
MWI
FSI
T2
MWG
FSI
MWC2
FSI
MWE
MWD
MWC1
MWC1
T7

Initial JD Site Visit -- February 26, 2020

Figure Created -- February 23, 2021

T = Tributary (e.g. T10)

Legend

- NCWAM Dataforms

Potentially Jurisdictional Wetlands

NCWAM

- Hardwood Flat
- Headwater Forest
- Non-Riverine Swamp Forest
- Pine Flat
- Pine Savanna
- Pocosin
- Riverine Swamp Forest

Potentially Jurisdictional Streams

- Intermittent (RPW)
- Perennial (RPW)
- Tributary (NRPW)
- Not On Beane Property
- Potentially Jurisdictional Ponds
- Beane Property Boundary

1 inch = 700 feet

0 350 700 1,400 2,100 Feet

Beane Property

NCWAM Map

New Hanover County, NC

Figure 5

1 inch = 700 feet

0 350 700 1,400 2,100 Feet

Beane Property

Lateral Effects Map

New Hanover County, NC

Figure 6

Appendix 2

Photographic Log

Existing Road Network
(Beane Wetland Mitigation Site)

Photo 1. View looking southwest across the gas line easement along road #1 (July 2019).

Photo 2. View looking southwest along road #1 (July 2019).

Photo 3. View looking northwest along farm road from the intersection with road #2 (July 2019).

Photo 4. View looking southeast along farm road from the intersection with road #2 (July 2019).

Photo 5. View looking southwest along road #2 from the intersection with farm road (July 2019).

Photo 6. View looking northwest along farm road from the intersection with road #3a (July 2019).

Existing Road Network
(Beane Wetland Mitigation Site)

Photo 7. View looking northeast along road #2 from the intersection with road #4 (July 2019).

Photo 8. View looking southwest along road #2 from the intersection with road #4 (July 2019).

Photo 9. View looking southeast along road #4 from the intersection with road #2 (July 2019).

Photo 10. View looking northwest along road #4 from the intersection with road #3a (July 2019).

Photo 11. View looking northeast along road #3a from the intersection with road #4 (July 2019).

Photo 12. View looking southwest along road #3a from the intersection with road #4 (July 2019).

Existing Road Network
(Beane Wetland Mitigation Site)

Photo 13. View looking southwest along road #3a (July 2019).

Photo 14. View looking northwest along road #3a (July 2019).

Photo 15. View looking northeast along road #3a toward gas line and farm road (July 2019).

Photo 16. View looking northeast along road #3a from the intersection of road #'s 5A and 5B (July 2019).

Photo 17. View looking southwest along road #3a from the intersection of road #'s 5A and 5B (July 2019).

Photo 18. View looking northwest along road #5a toward proposed R-3300 right of way (July 2019).

Existing Road Network
(Beane Wetland Mitigation Site)

Photo 19. View looking southeast along road #5a toward intersection with road #3a (July 2019).

Photo 20. View looking northwest along road #5b toward intersection with road #3a (July 2019).

Photo 21. View looking southeast along road #5b toward edge of property boundary (July 2019).

Photo 22. View looking west southwest toward field entrance along road #3a (July 2019).

Existing Stream and Ditch Network
(Beane Wetland Mitigation Site)

Photo 1. View looking southwest on north side of road #5b (March 2019).

Photo 2. View looking south at tributary 4 at intersection of R-3300 right and road #1 (May 2021).

Photo 3. View looking northeast at tributary 4 at southwest edge of property along road #1 (May 2021).

Photo 4. View looking northwest along tributary 5 with road #5a on the right side of picture (March 2019).

Photo 5. View south of 42-inch culvert where it crosses under road #3a and enters Stream FSI (July 2019).

Photo 6. View looking north at Pond A that receives water from Tributary 4 and is bordered by road #6 and road #2 (May 2021).

Existing Stream and Ditch Network
(Beane Wetland Mitigation Site)

Photo 7. View looking southeast along Stream FSI on south side of road #5b (March 2019).

Photo 8. View looking northwest at 90° turn where Roads #5a and #5b come together (March 2019).

Photo 9. View looking south showing 2 – 48-inch culverts (damaged) at Stream FSI near Road #3a (May 2021).

Photo 10. View looking west toward 60-inch culvert near confluence with Stream FSI and Tributary 7. Car is parked along road#3a (March 2019).

Photo 11. View northeast along Stream FSI between 60-inch culvert and R-3300 Right of way (March 2019).

Photo 12. View looking northwest along Stream FSI showing 2 – 48-inch culverts (damaged) at Road #6 crossing near property line .

Existing Fields
(Beane Wetland Mitigation Site)

Photo 1. Panoramic View of Field #1 looking southwest from gas line easement (July 2019).

Photo 2. Panoramic View of Field #2 View looking northeast near entrance to field from Road #3a (March 2019).

Appendix 3

Wetland Monitoring Gauge Data

Beane Monitoring Gauge Locations

Legend

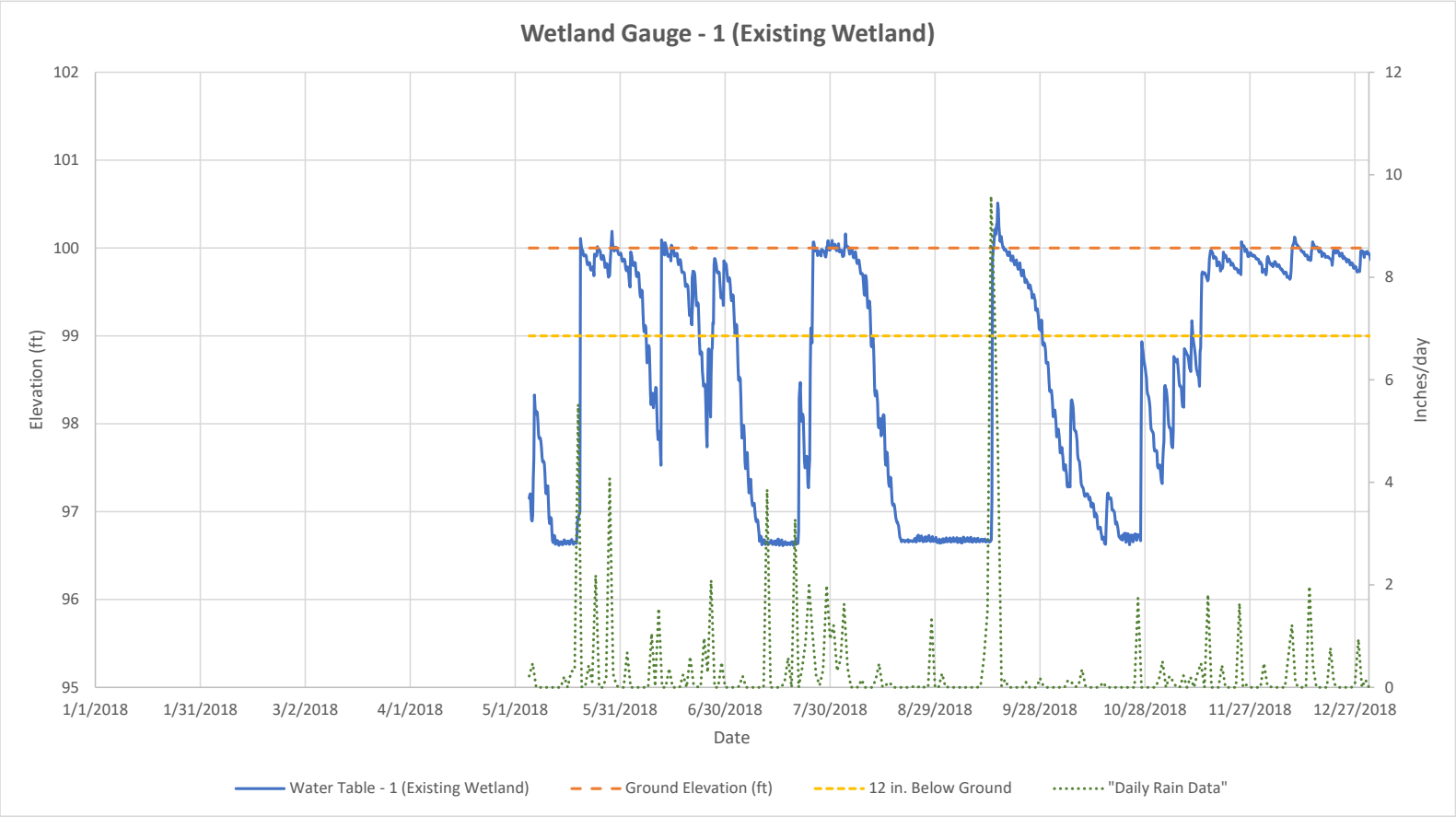
- Rain Gauge
- Reference Wetland Gauges
- Existing Wetland Gauges
- Existing Upland Gauges
- R-3300 Wetlands
- Potentially Jurisdicitional Wetlands
- Beane Project Boundary

3-1
3-2
1
2
4
3
7
8
9
5
6
2-1
2-2
1-1
1-2

N

0 300 600 1,200 1,800 2,400 Feet

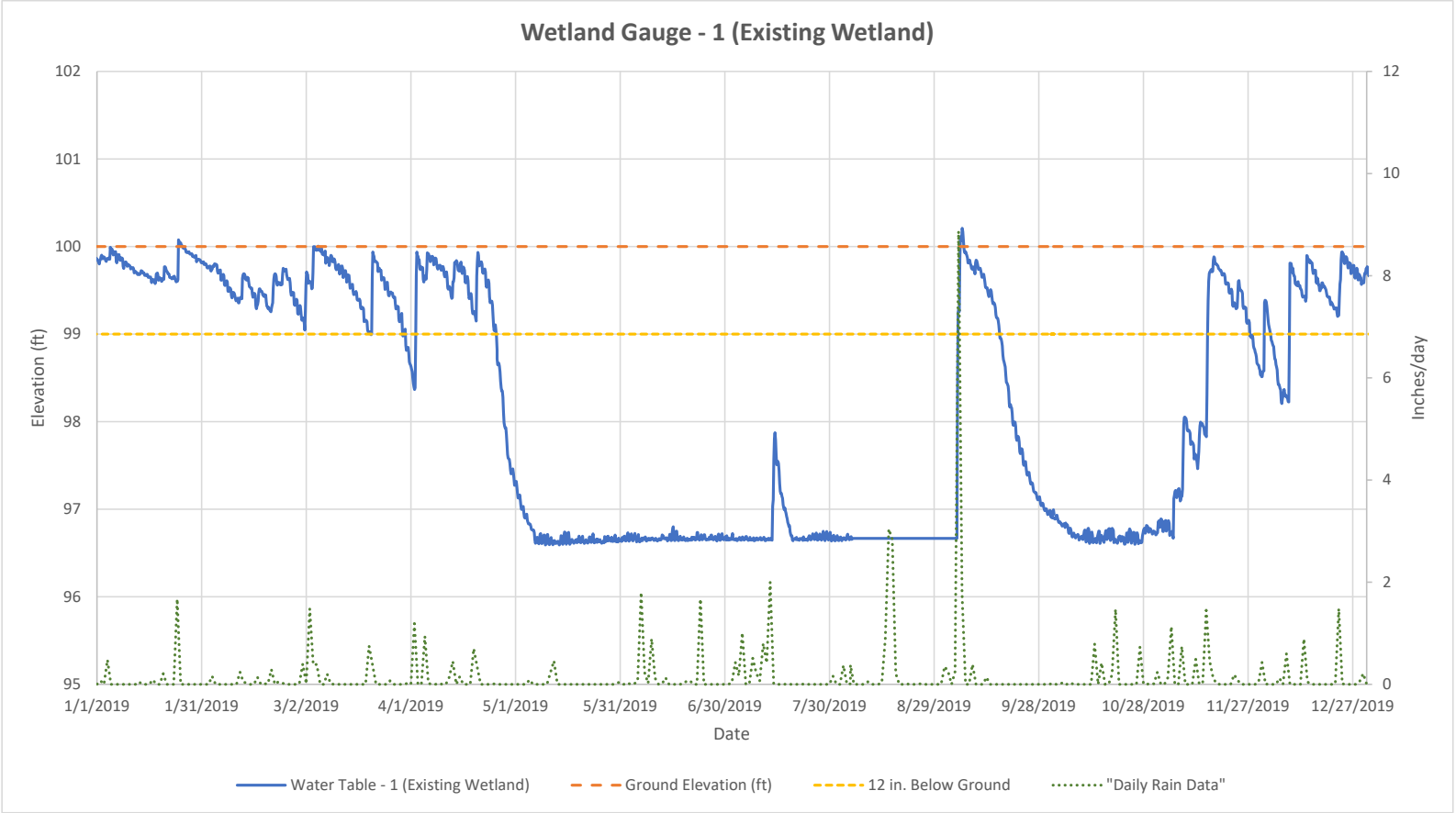
YEAR 1 (2018)



Site Info (Year 1)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	5/5/2018
End Date	12/31/2018
Total Days of Well Data	241.67
Water Table Criteria	-1

Growing Season Information (Year 1)		
Site		Beane Property
Gauge ID		1 (Existing Wetland)
Serial #		20331486
Growing Season Start Date		2/28
Growing Season End Date		12/2
Total Growing Season Days		277
NRCS Soil Series		Murville
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days within Growing Season		20.00
Percent of Growing Season		7.2%

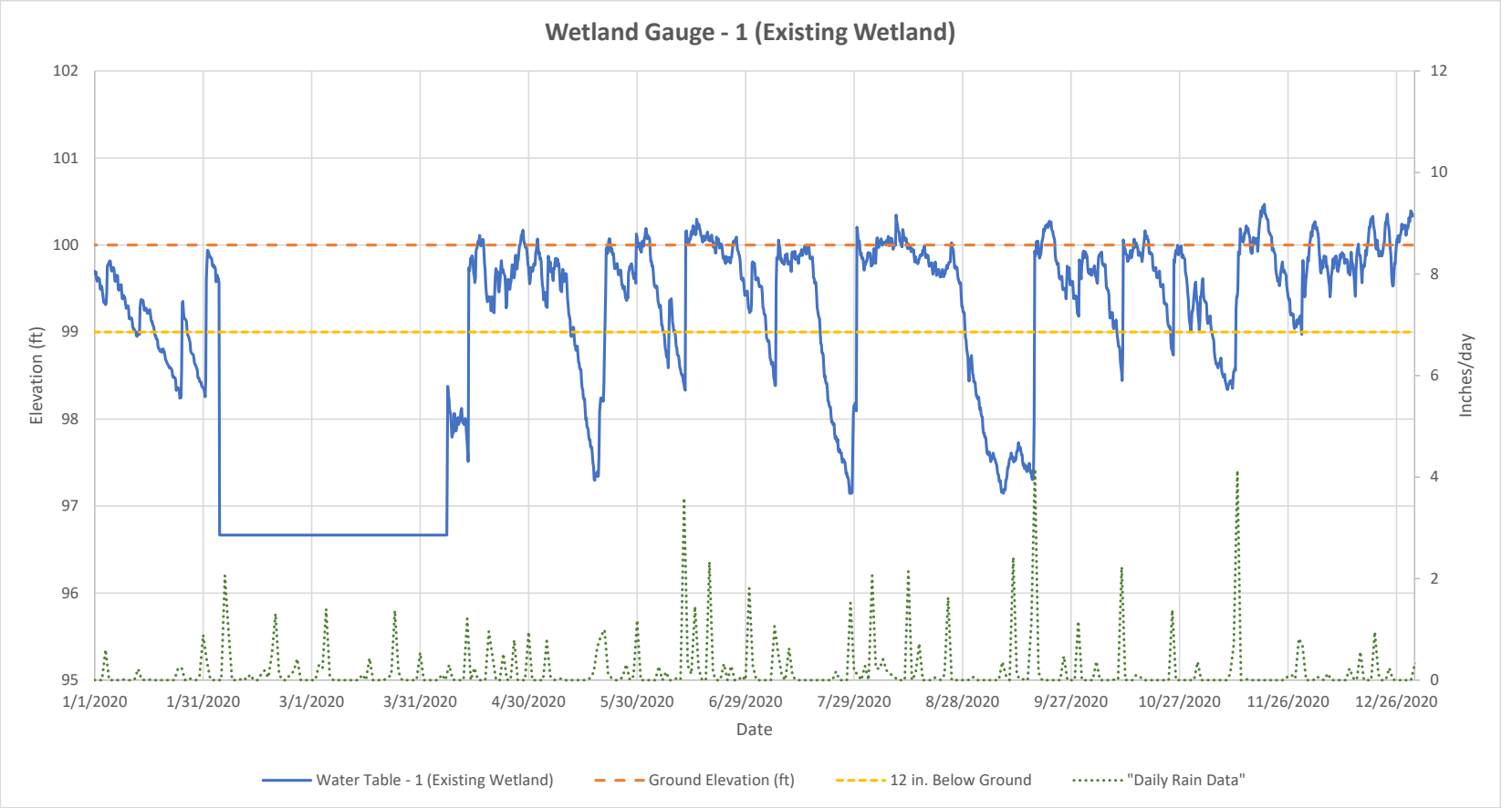
YEAR 2 (2019)



Site Info (Year 2)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	1/1/2019
End Date	12/31/2019
Total Days of Well Data	335.00
Water Table Criteria	-1

Growing Season Information (Year 2)		
Site		Beane Property
Gauge ID		1 (Existing Wetland)
Serial #		20331486
Growing Season Start Date		2/28
Growing Season End Date		12/2
Total Growing Season Days		277
NRCS Soil Series		Murville
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days within Growing Season		23.00
Percent of Growing Season		8.3%

YEAR 3 (2020)



Site Info (Year 3)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	1/1/2020
End Date	12/31/2020
Total Days of Well Data	301.50
Water Table Criteria	-1

Growing Season Information (Year 3)		
Site		Beane Property
Gauge ID		1 (Existing Wetland)
Serial #		20331486
Growing Season Start Date		2/28
Growing Season End Date		12/2
Total Growing Season Days		277
NRCS Soil Series		Murville
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days within Growing Season		30.00
Percent of Growing Season		10.8%

Soil Profile Description

Project/Site:	Beane Property (Groundwater Well Installations)	Sampling Date:	5/3/2018
Investigator(s):	Tom Barrett, Ecosystem Planning & Restoration	Sampling Point:	Existing Well 1
City/County:	Scotts Hill / Pender County, NC	County:	New Hanover
Soil Map Unit Name:	**Murville fine sand**	Lat: 34.335017	Long: -77.801229

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of incators

Depth	Matrix			Redox Features					
(inches)	Color (moist)		%	Color (moist)		%	Type[1]	Location	Texture	Remarks
0-4	10YR	2/1	100%						Loam	
4-16	10YR	2/1	100%						Sandy Loam	~90% masked sand grains, greasy feel, fine sand
16-34	7.5YR	4/1	100%						Sandy Loam	
34-41	7.5YR	5/2	80%	10YR	5/3	20%	C	M	Loamy Sand	
41-45	10YR	6/4	60%	10YR	6/6	40%	C	M	Loamy Sand	Fine sand
45-50	5R	8/1	80%	10YR	6/8	20%	C	M	Loamy Sand	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2] Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

1 **Dark Surface (S7) (LRR P, S, T, U)**
2
3
4

Indicators for Problematic Hydric Soils

1
2
3

Restrictive Layer (if observed):

Type:
Depth (inches):

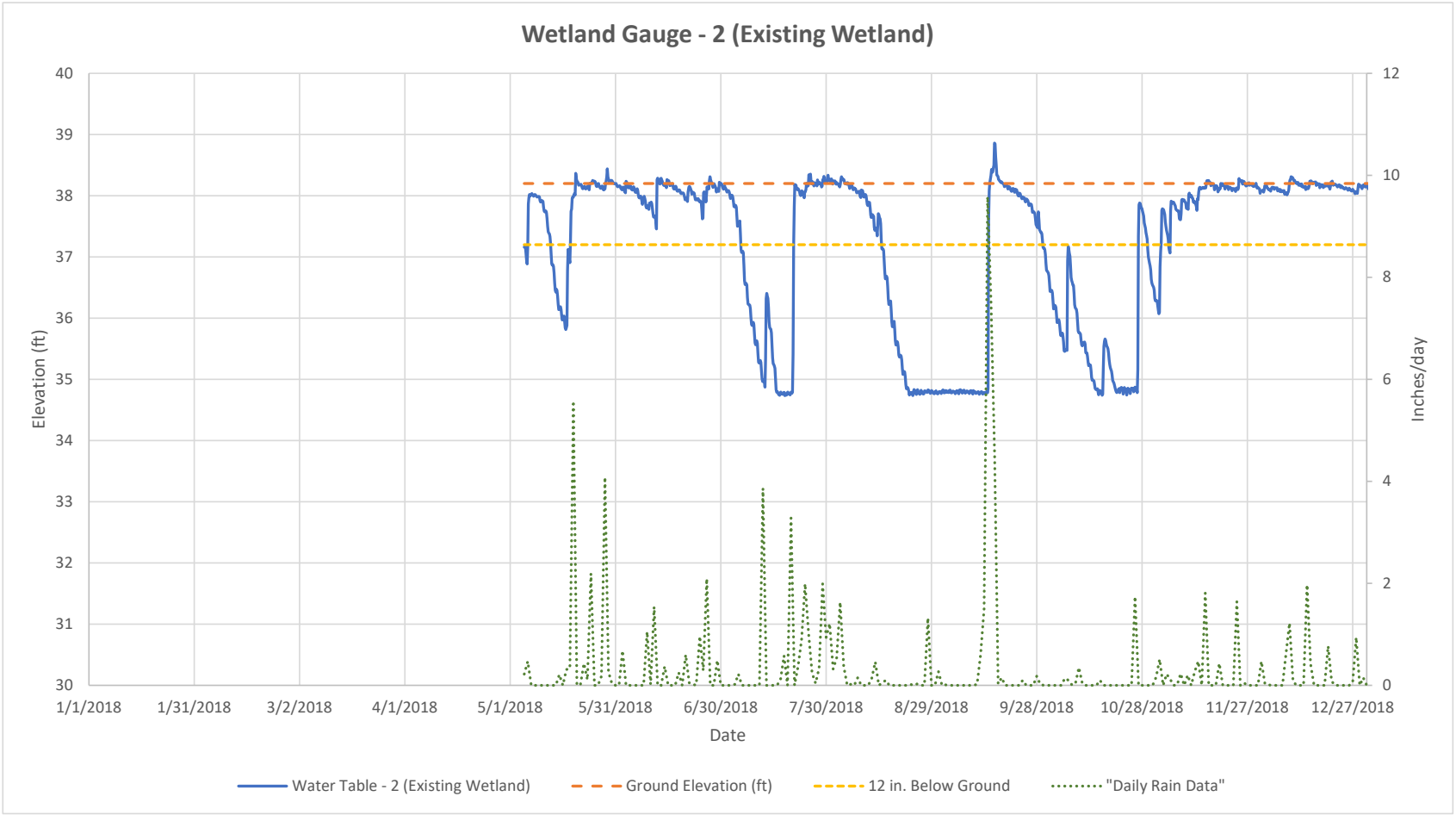
Hydric Soil Present? **Yes** X **No**

Remarks:

Notes:

Site is located off of Sidbury Road near Island Creek in Hanover County, NC.
MLRA 153A, LRR T

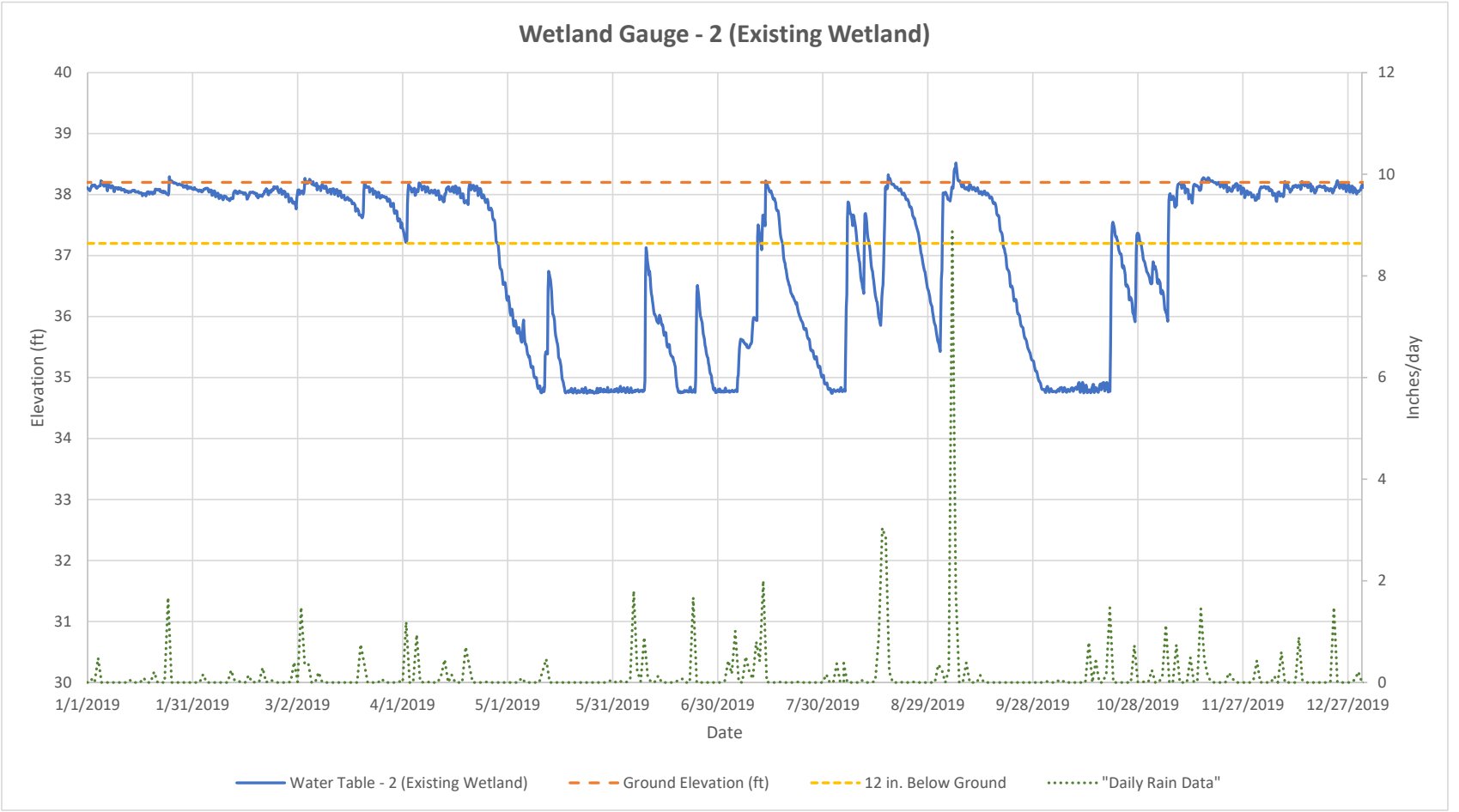
YEAR 1 (2018)



Site Info (Year 1)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	5/5/2018
End Date	12/31/2018
Total Days of Well Data	241.00
Water Table Criteria	-1

Growing Season Information (Year 1)		
Site		Beane Property
Gauge ID		2 (Existing Wetland)
Serial #		20331487
Growing Season Start Date		2/28
Growing Season End Date		12/2
Total Growing Season Days		277
NRCS Soil Series		Murville
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days within Growing Season		48.50
Percent of Growing Season		17.3%

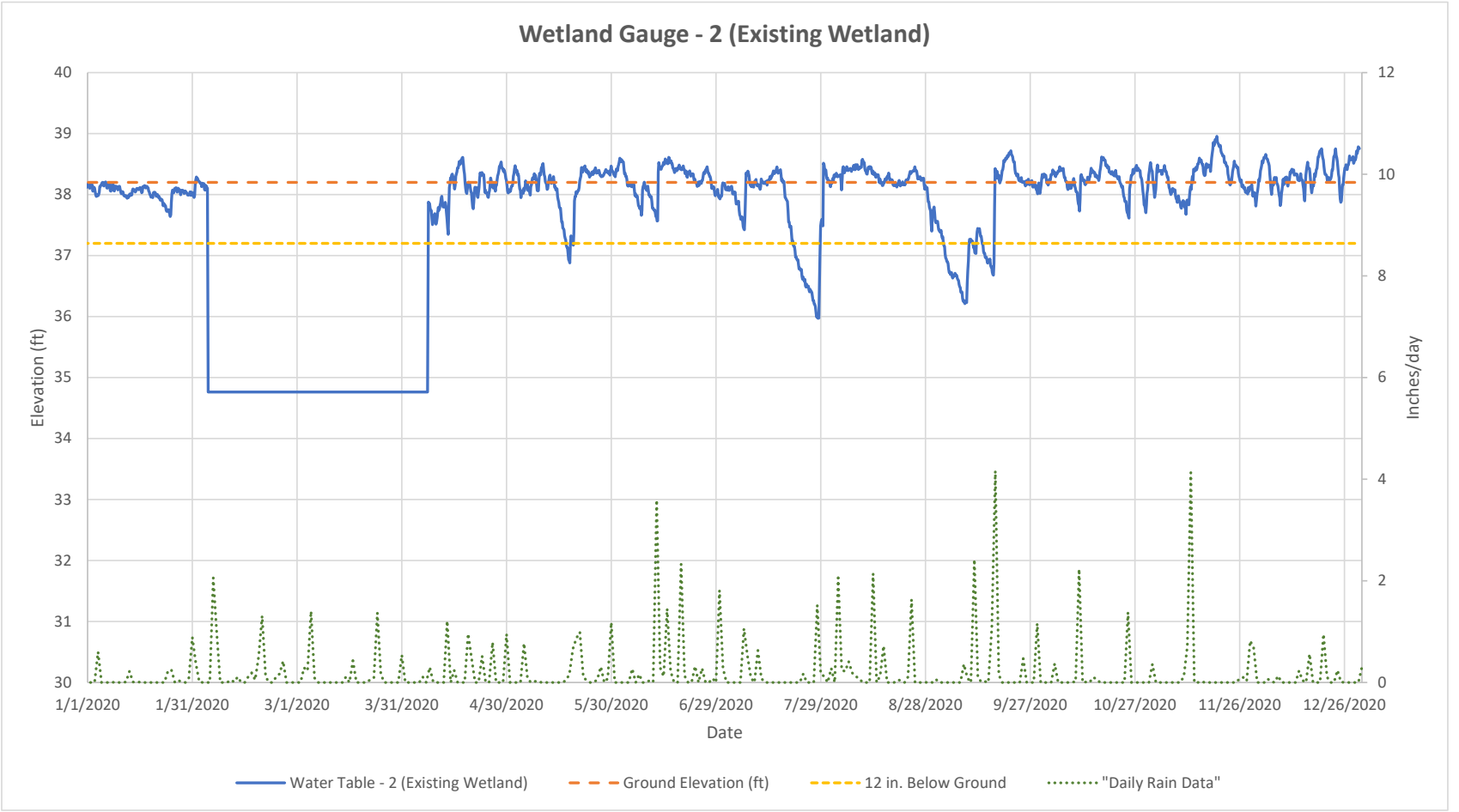
YEAR 2 (2019)



Site Info (Year 2)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	1/1/2019
End Date	12/31/2019
Total Days of Well Data	365.00
Water Table Criteria	-1

Growing Season Information (Year 2)		
Site		Beane Property
Gauge ID		2 (Existing Wetland)
Serial #		20331487
Growing Season Start Date		2/28
Growing Season End Date		12/2
Total Growing Season Days		277
NRCS Soil Series		Murville
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days withint Growing Season		59.33
Percent of Growing Season		21.3%

YEAR 3 (2020)



Site Info (Year 3)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	1/1/2020
End Date	12/31/2020
Total Days of Well Data	301.33
Water Table Criteria	-1

Growing Season Information (Year 3)		
Site		Beane Property
Gauge ID		2 (Existing Wetland)
Serial #		20331487
Growing Season Start Date		2/28
Growing Season End Date		12/2
Total Growing Season Days		277
NRCS Soil Series		Murville
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days withint Growing Season		77.33
Percent of Growing Season		27.8%

Soil Profile Description

Project/Site:	Beane Property (Groundwater Well Installations)	Sampling Date:	5/3/2018
Investigator(s):	Tom Barrett, Ecosystem Planning & Restoration	Sampling Point:	Existing Well 2
City/County:	Scotts Hill / Pender County, NC	County:	New Hanover
Soil Map Unit Name:	**Murville fine sand**	Lat: 34.333267	Long: -77.801269

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of incators

Depth	Matrix			Redox Features					
(inches)	Color (moist)		%	Color (moist)		%	Type[1]	Location	Texture	Remarks
0-6	10YR	2/1	100%						Loamy Sand	75 - 90% masked sand grains, fine sand
6-11	7.5YR	2.5/1	100%						Loamy Sand	
11-14	10YR	3/2	100%						Sandy Loam	
14-21	2.5Y	6/3	80%	2.5Y	6/4	20%			Sandy Loam	fine sand
21-27	7.5YR	5/2	80%	10YR	4/1	20%			Loamy Sand	
27-32	10YR	6/3	90%	10YR	5/4	10%			Loamy Sand	
32-36	10YR	6/3	70%	10YR	4/1	30%			Loamy Sand	
36-43	2.5Y	6/3	80%	10YR	3/1	20%			Loamy Sand	
43-50	10YR	6/6	100%						Loamy Sand	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2] Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

1 **Dark Surface (S7) (LRR P, S, T, U)**
2
3
4

Indicators for Problematic Hydric Soils

1
2
3

Restrictive Layer (if observed):

Type:
Depth (inches):

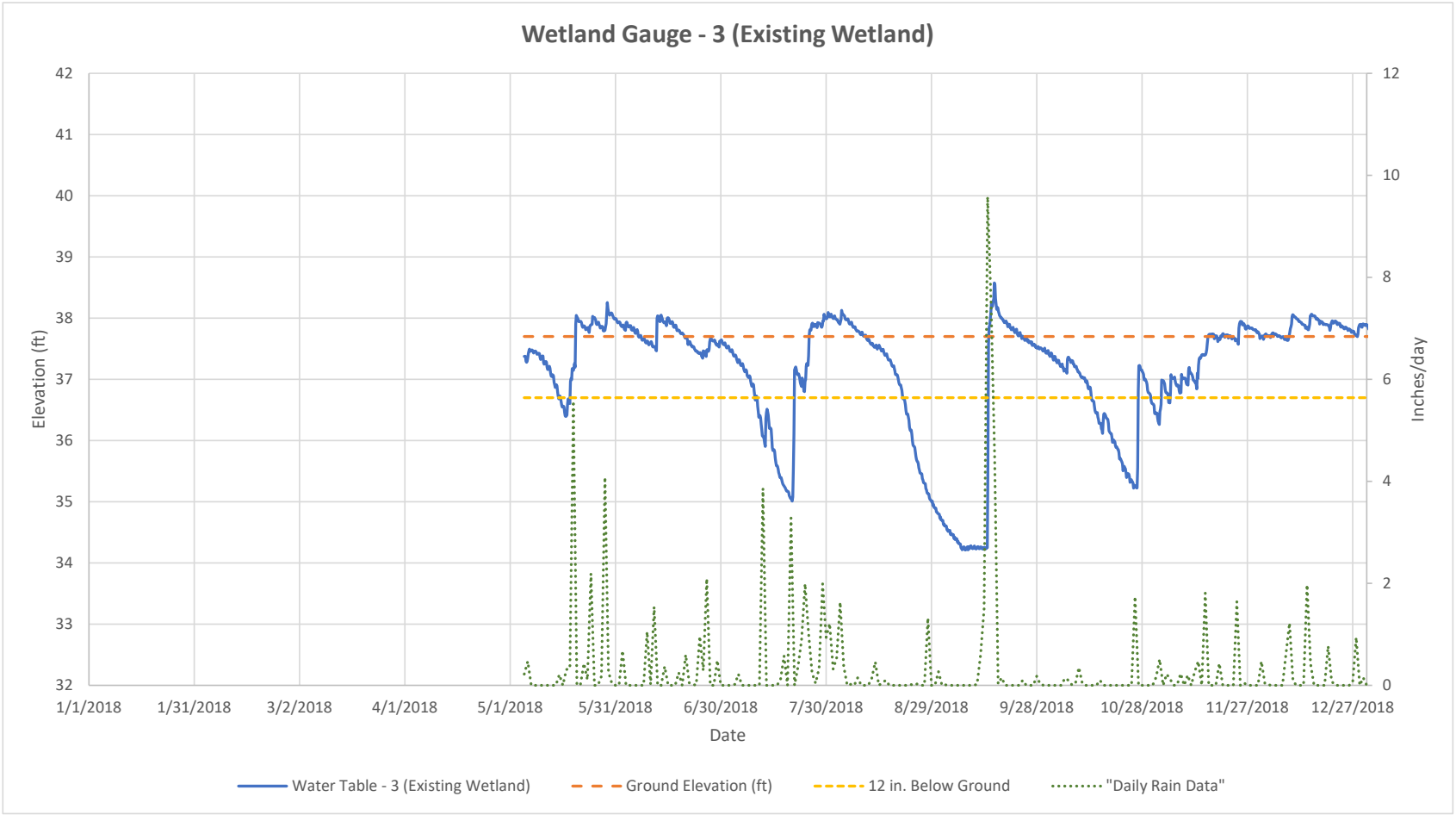
Hydric Soil Present? **Yes** X **No**

Remarks:

Notes:

Site is located off of Sidbury Road near Island Creek in Hanover County, NC.
MLRA 153A, LRR T

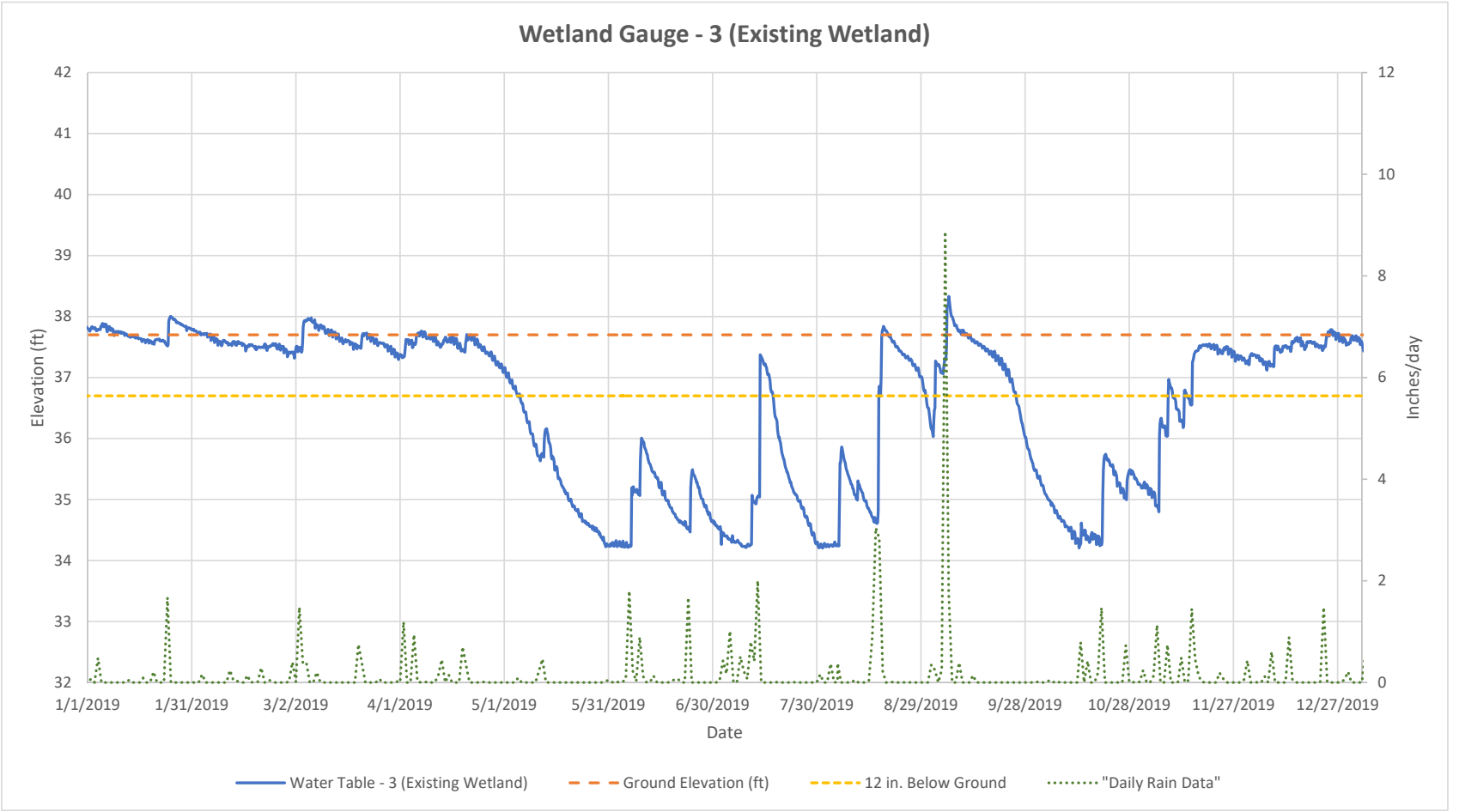
YEAR 1 (2018)



Site Info (Year 1)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	5/5/2018
End Date	12/31/2018
Total Days of Well Data	241.00
Water Table Criteria	-1

Growing Season Information (Year 1)		
Site		Beane Property
Gauge ID		3 (Existing Wetland)
Serial #		20331488
Growing Season Start Date		2/28
Growing Season End Date		12/2
Total Growing Season Days		277
NRCS Soil Series		Murville
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days w/in Current Growing Season		52.67
Percent of Growing Season		18.8%

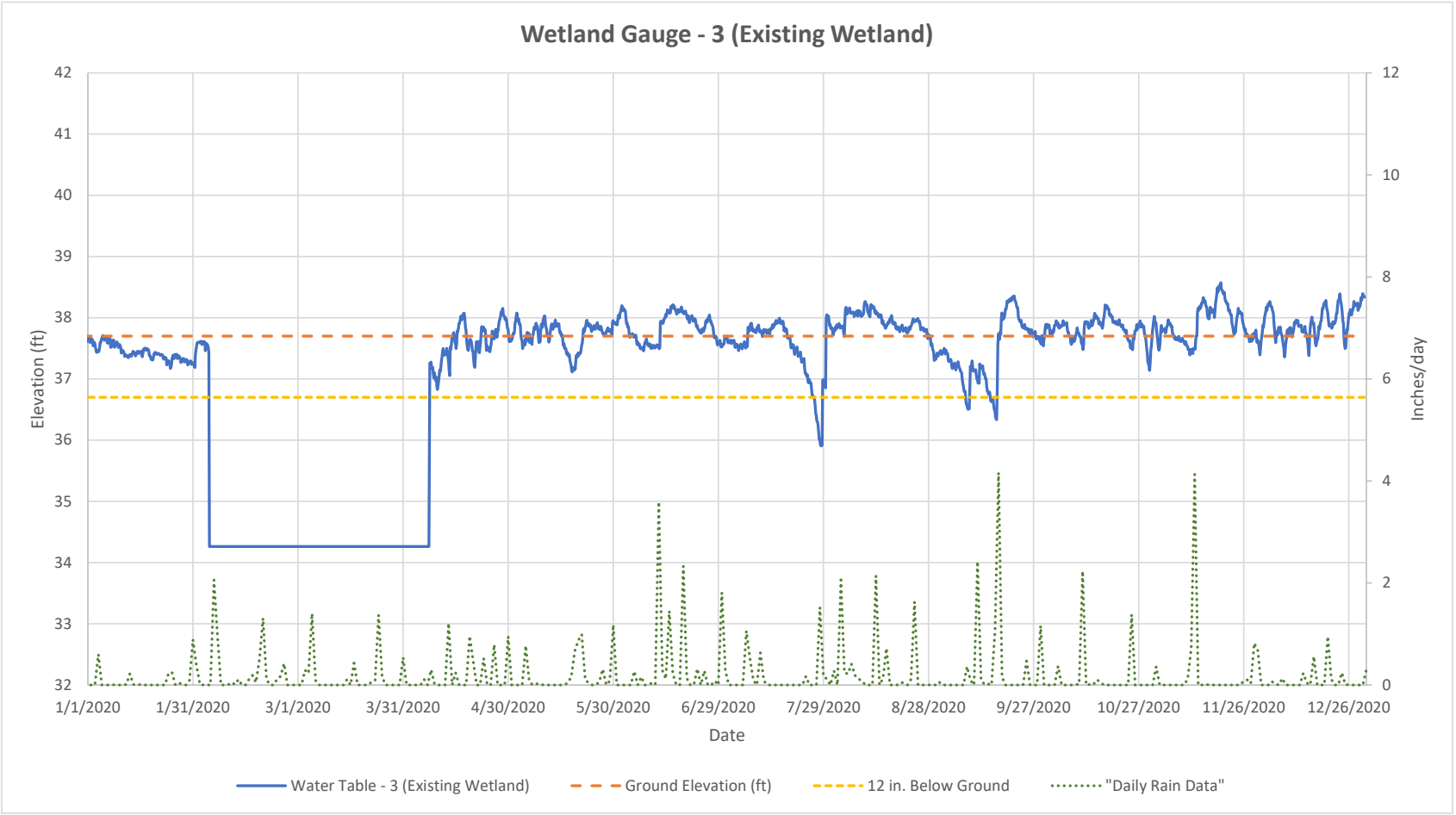
YEAR 2 (2019)



Site Info (Year 2)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	1/1/2019
End Date	12/31/2019
Total Days of Well Data	365.00
Water Table Criteria	-1

Growing Season Information (Year 2)		
Site		Beane Property
Gauge ID		3 (Existing Wetland)
Serial #		20331488
Growing Season Start Date		2/28
Growing Season End Date		12/2
Total Growing Season Days		277
NRCS Soil Series		Murville
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days w/in Current Growing Season		65.83
Percent of Growing Season		23.5%

YEAR 3 (2020)



Site Info (Year 3)	
Site	43159
Stream/Wetland	Wetland
Begin Date	1/1/2020
End Date	12/31/2020
Total Days of Well Data	301.67
Water Table Criteria	-1

Growing Season Information (Year 3)		
Site		Beane Property
Gauge ID		3 (Existing Wetland)
Serial #		20331488
Growing Season Start Date		2/28
Growing Season End Date		12/2
Total Growing Season Days		277
NRCS Soil Series		Murville
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days w/in Current Growing Season		109.83
Percent of Growing Season		39.4%

Soil Profile Description

Project/Site:	Beane Property (Groundwater Well Installations)	Sampling Date:	5/3/2018
Investigator(s):	Tom Barrett, Ecosystem Planning & Restoration	Sampling Point:	Existing Well 3
City/County:	Scotts Hill / Pender County, NC	County:	New Hanover
Soil Map Unit Name:	**Murville fine sand**	Lat: 34.330953	Long: -77.803808

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of incators

Depth	Matrix			Redox Features					
(inches)	Color (moist)		%	Color (moist)	%	Type[1]	Location	Texture	Remarks
0-2									0rganic Matter/Root Mat
2-12	10YR	2/1	100%					Sandy Loam	75 - 90% masked sand grains, fine sand
12-30	10YR	3/1	100%					Sandy Loam	
30-48	10YR	4/1	100%					Sandy Loam	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2] Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

1 **Dark Surface (S7) (LRR P, S, T, U)**
2
3
4

Indicators for Problematic Hydric Soils

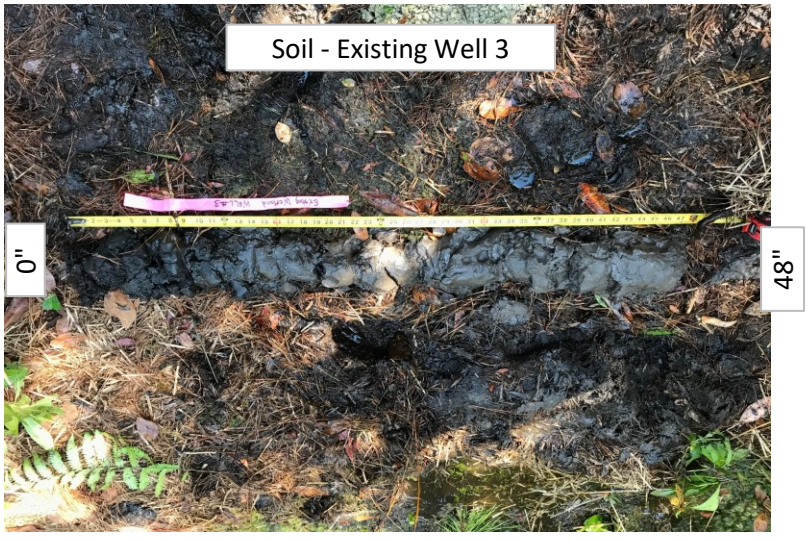
1
2
3

Restrictive Layer (if observed):

Type:
Depth (inches):

Hydric Soil Present? **Yes** X **No**

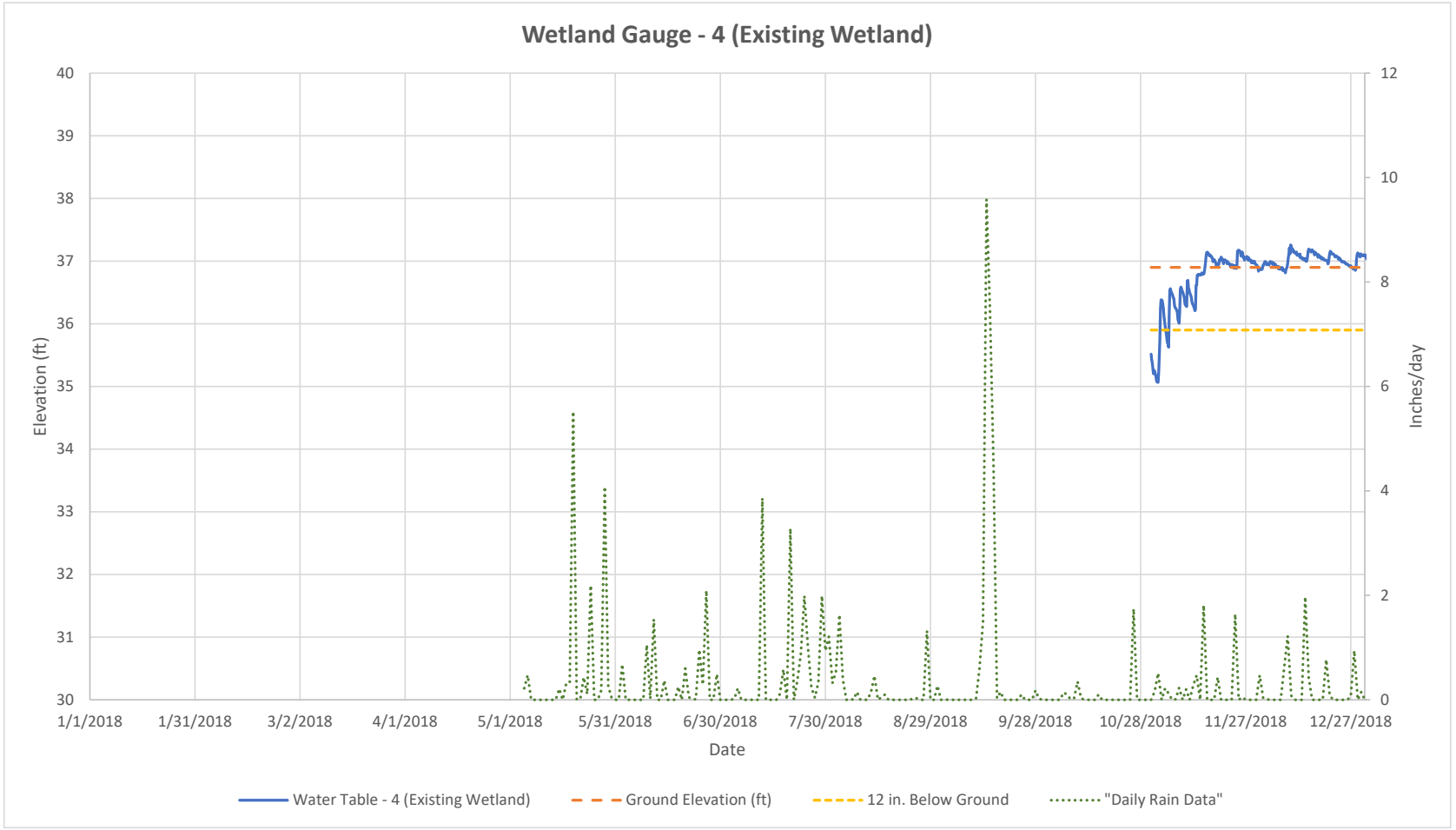
Remarks:



Notes:

Site is located off of Sidbury Road near Island Creek in Hanover County, NC.
MLRA 153A, LRR T

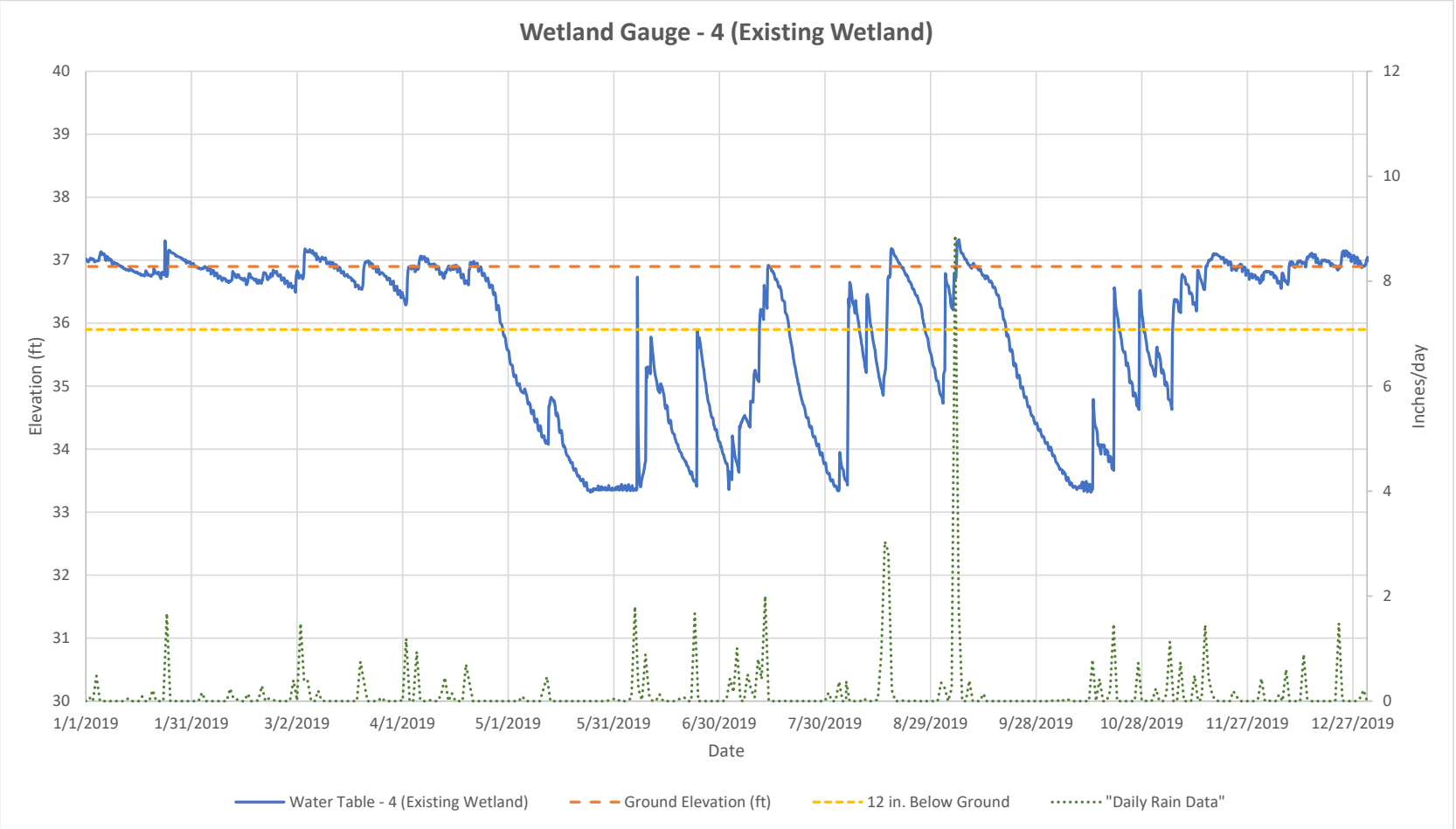
YEAR 1 (2018)



Site Info (Year 1)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	10/31/2018
End Date	12/31/2018
Total Days of Well Data	62.00
Water Table Criteria	-1

Growing Season Information (Year 1)		
Site		Beane Property
Gauge ID		4 (Existing Wetland)
Serial #		20234979
Growing Season Start Date		2/28
Growing Season End Date		12/2
Total Growing Season Days		277
NRCS Soil Series		Seagate
5.0%	Growing Season (Days)	14
12.5%	Growing Season (Days)	35
Total Consecutive Days within Growing Season		27.83
Percent of Growing Season		9.7%

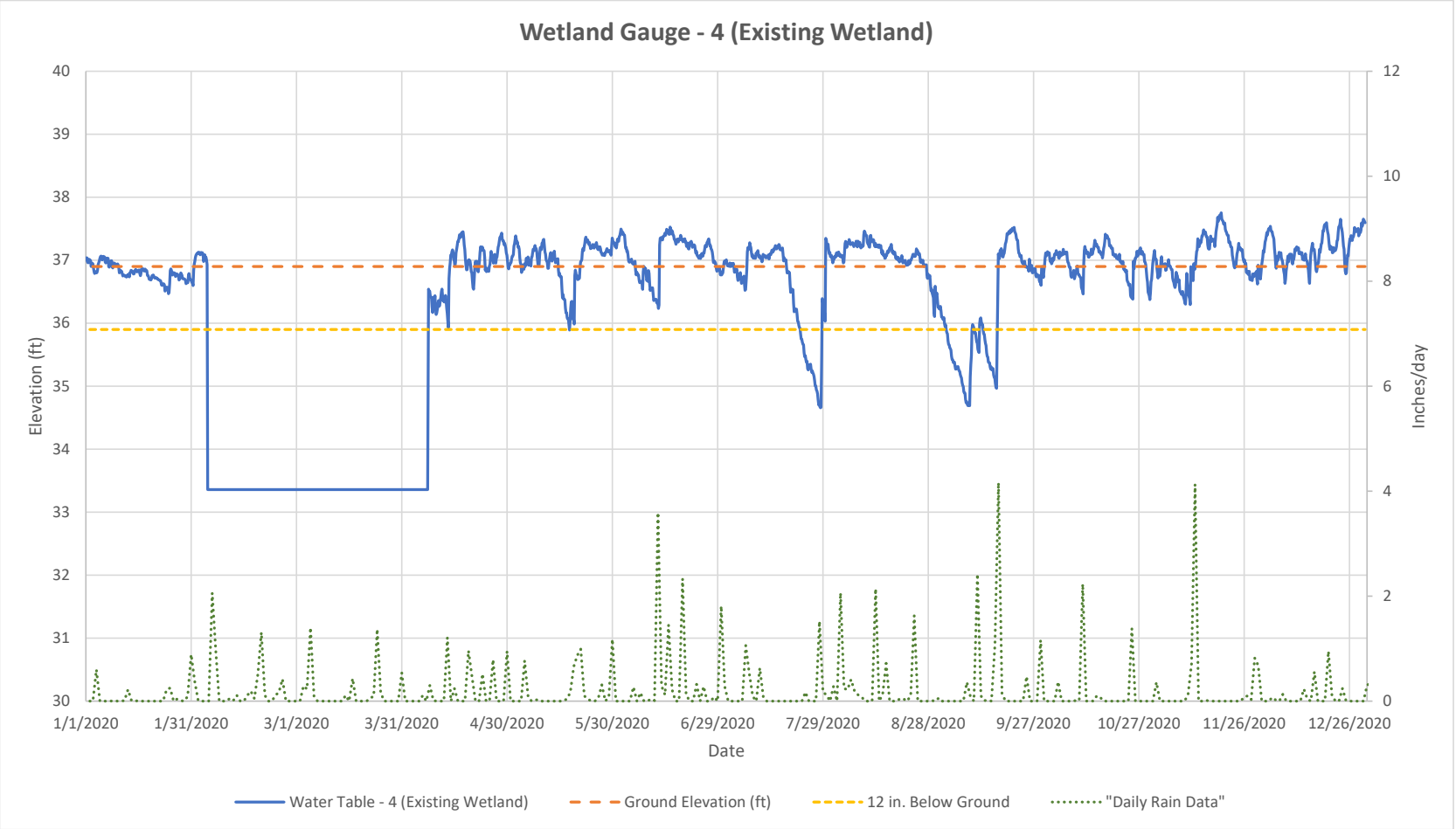
YEAR 2 (2019)



Site Info (Year 2)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	1/1/2019
End Date	12/31/2019
Total Days of Well Data	365.00
Water Table Criteria	-1

Growing Season Information (Year 2)		
Site		Beane Property
Gauge ID		4 (Existing Wetland)
Serial #		20234979
Growing Season Start Date		2/28
Growing Season End Date		12/2
Total Growing Season Days		277
NRCS Soil Series		Seagate
5.0%	Growing Season (Days)	14
12.5%	Growing Season (Days)	35
Total Consecutive Days within Growing Season		60.67
Percent of Growing Season		21.7%

YEAR 3 (2020)



Site Info (Year 3)	
Site	0
Stream/Wetland	Wetland
Begin Date	1/1/2020
End Date	12/31/2020
Total Days of Well Data	301.67
Water Table Criteria	-1

Growing Season Information (Year 3)		
Site		Beane Property
Gauge ID		4 (Existing Wetland)
Serial #		20234979
Growing Season Start Date		2/28
Growing Season End Date		12/2
Total Growing Season Days		277
NRCS Soil Series		Seagate
5.0%	Growing Season (Days)	14
12.5%	Growing Season (Days)	35
Total Consecutive Days within Growing Season		77.33
Percent of Growing Season		27.8%

Soil Profile Description

Project/Site:	Beane Property (Groundwater Well Installations)	Sampling Date:	5/3/2018
Investigator(s):	Tom Barrett, Ecosystem Planning & Restoration	Sampling Point:	Existing Well 4
City/County:	Scotts Hill / Pender County, NC	County:	New Hanover
Soil Map Unit Name:	**Seagate fine sand**	Lat: 34.331562	Long: -77.806441

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of incators

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Location	Texture	Remarks
0-1								0rganic Matter/Root Mat
1-6	10YR 2/1	100%					Loamy Sand	~75% Masked Sand Grains
6-8	10YR 3/1	100%					Loamy Sand	
8-11	10YR 2/1	100%					Sandy Loam	
11-14	7.5YR 4/2	100%					Sandy Loam	
14-20	7.5YR 4/1	60%	2.5Y 6/6	40%	C	M	Sandy Loam	
20-48	10YR 6/1	70%	2.5Y 7/3	15%			Sandy Loam	
			2.5Y 4/1	15%	C	M	Sandy Loam	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2] Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

1 **Dark Surface (S7) (LRR P, S, T, U)**
2
3
4

Indicators for Problematic Hydric Soils

1
2
3

Restrictive Layer (if observed):

Type:
Depth (inches):

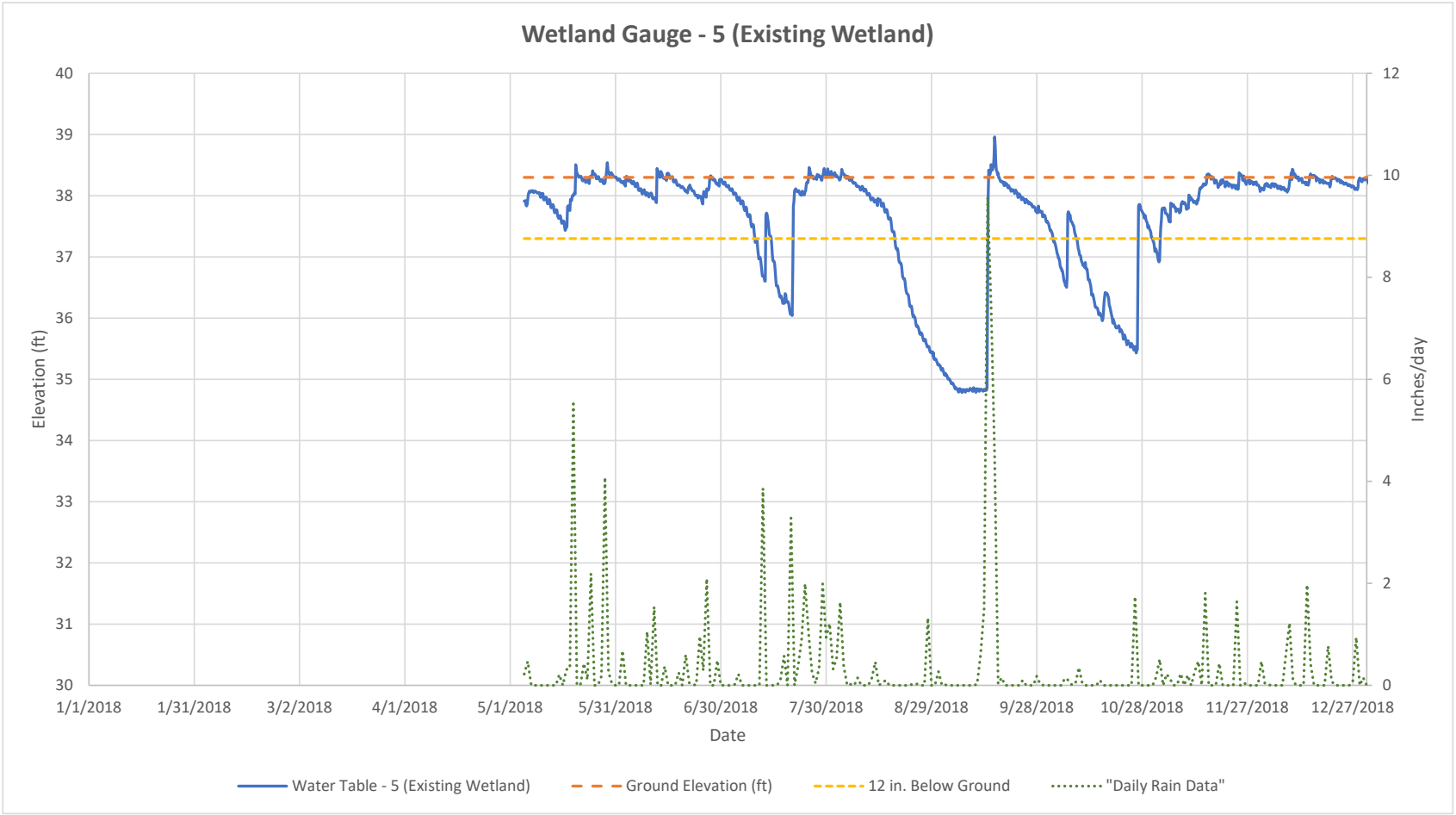
Hydric Soil Present? **Yes** X **No**

Remarks:

Notes:

Site is located off of Sidbury Road near Island Creek in Hanover County, NC.
MLRA 153A, LRR T

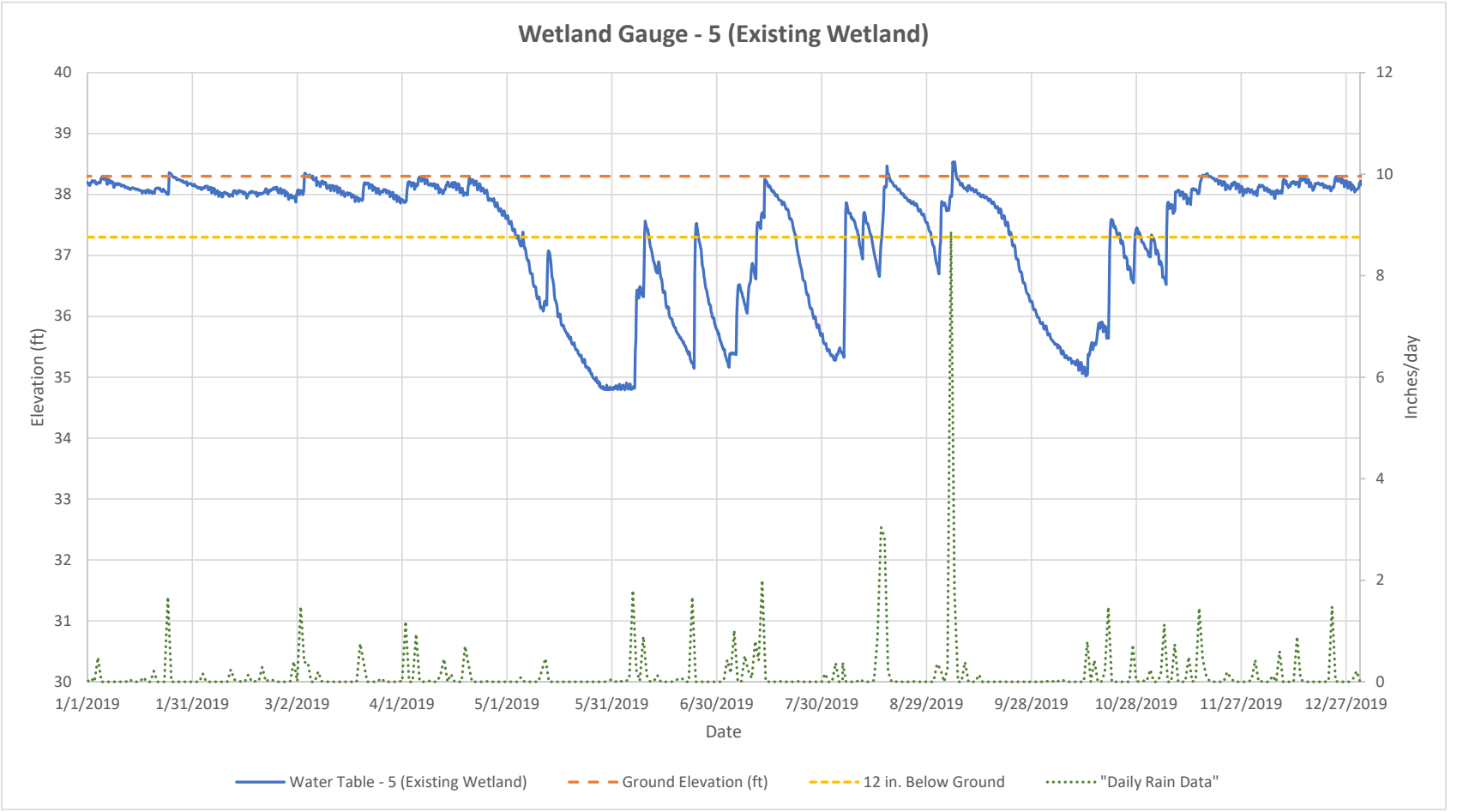
YEAR 1 (2018)



Site Info (Year 1)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	5/5/2018
End Date	12/31/2018
Total Days of Well Data	241.00
Water Table Criteria	-1

Growing Season Information (Year 1)		
Site		Beane Property
Gauge ID		5 (Existing Wetland)
Serial #		20331491
Growing Season Start Date		2/28
Growing Season End Date		12/2
Total Growing Season Days		277
NRCS Soil Series		Murville
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days within Growing Season		65.83
Percent of Growing Season		23.5%

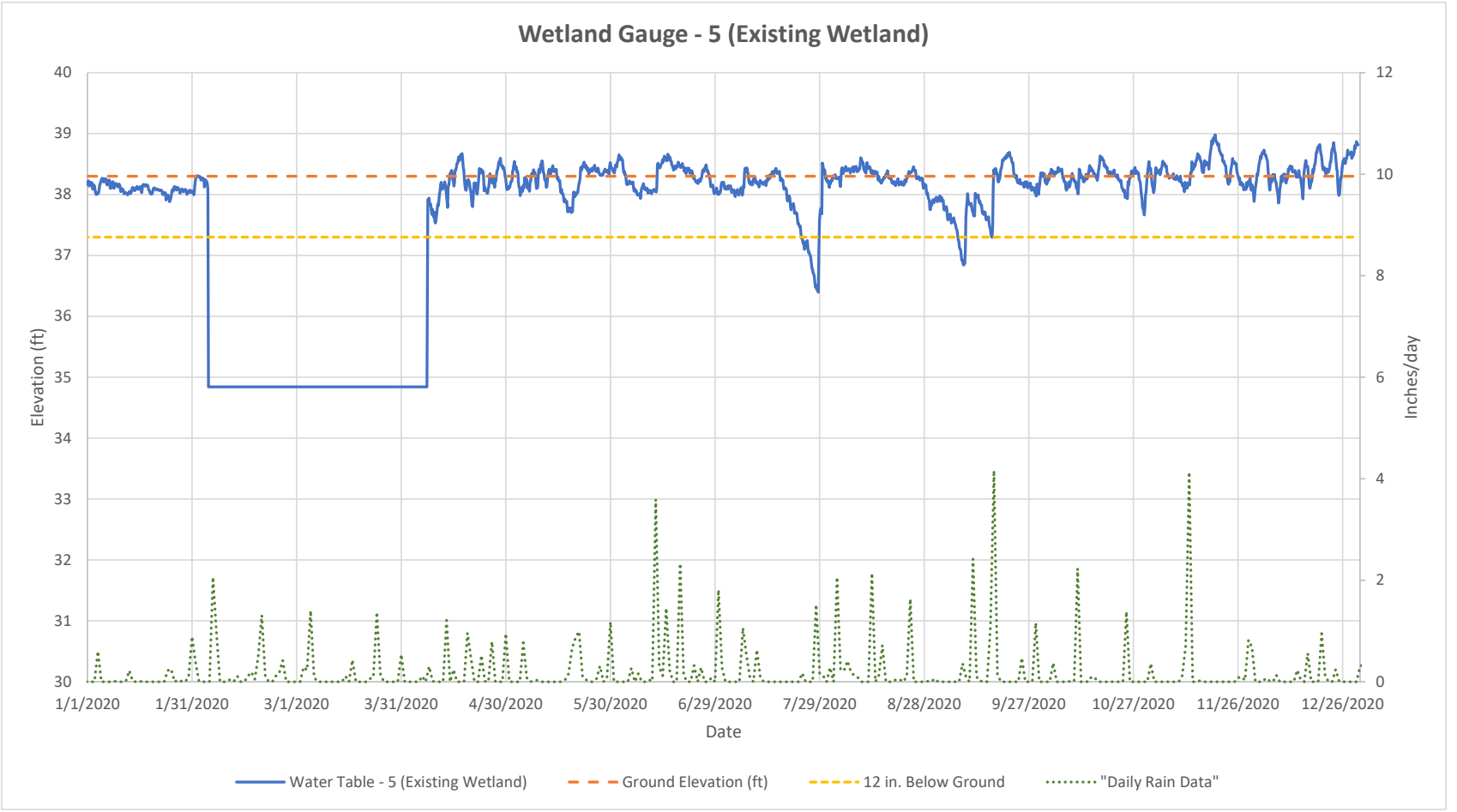
YEAR 2 (2019)



Site Info (Year 2)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	1/1/2019
End Date	12/31/2019
Total Days of Well Data	365.00
Water Table Criteria	-1

Growing Season Information (Year 2)		
Site		Beane Property
Gauge ID		5 (Existing Wetland)
Serial #		20331491
Growing Season Start Date		2/28
Growing Season End Date		12/2
Total Growing Season Days		277
NRCS Soil Series		Murville
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days within Growing Season		64.67
Percent of Growing Season		23.1%

YEAR 3 (2020)



Site Info (Year 3)	
Site	0
Stream/Wetland	Wetland
Begin Date	1/1/2020
End Date	12/31/2020
Total Days of Well Data	301.67
Water Table Criteria	-1

Growing Season Information (Year 3)		
Site		0
Gauge ID		0
Serial #		0
Growing Season Start Date		2/28
Growing Season End Date		12/2
Total Growing Season Days		277
NRCS Soil Series		Murville
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days within Growing Season		107.17
Percent of Growing Season		38.6%

Soil Profile Description

Project/Site:	Beane Property (Groundwater Well Installations)	Sampling Date:	5/4/2018
Investigator(s):	Tom Barrett, Ecosystem Planning & Restoration	Sampling Point:	Existing Well 5
City/County:	Scotts Hill / Pender County, NC	County:	New Hanover
Soil Map Unit Name:	**Murville fine sand**	Lat: 34.328685	Long: -77.803306

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of incators

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Location	Texture	Remarks
0-2								0rganic Matter/Root Mat
2-14	10YR 2/1	100%					Sandy Loam	75 - 90% Masked sand grains, fine sand
14-27	10YR 3/1	100%					Sandy Clay Loam	
27-41	10YR 4/1	100%					Sandy Loam	
41-48	10YR 6/1	100%					Sandy Loam	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2] Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

1 **Dark Surface (S7) (LRR P, S, T, U)**
2
3
4

Indicators for Problematic Hydric Soils

1
2
3

Restrictive Layer (if observed):

Type:
Depth (inches):

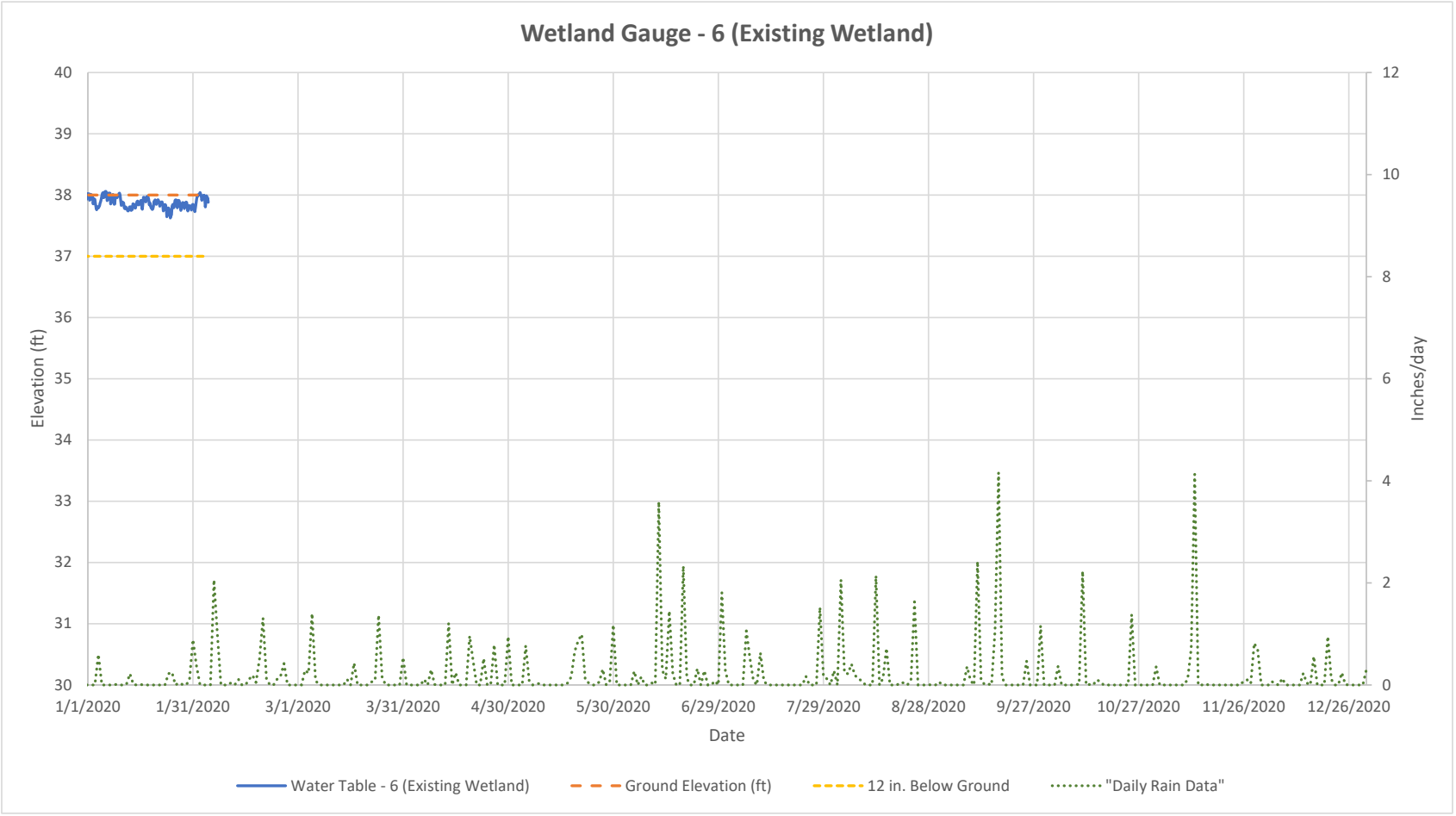
Hydric Soil Present? **Yes** X **No**

Remarks:

Notes:

Site is located off of Sidbury Road near Island Creek in Hanover County, NC.
MLRA 153A, LRR T

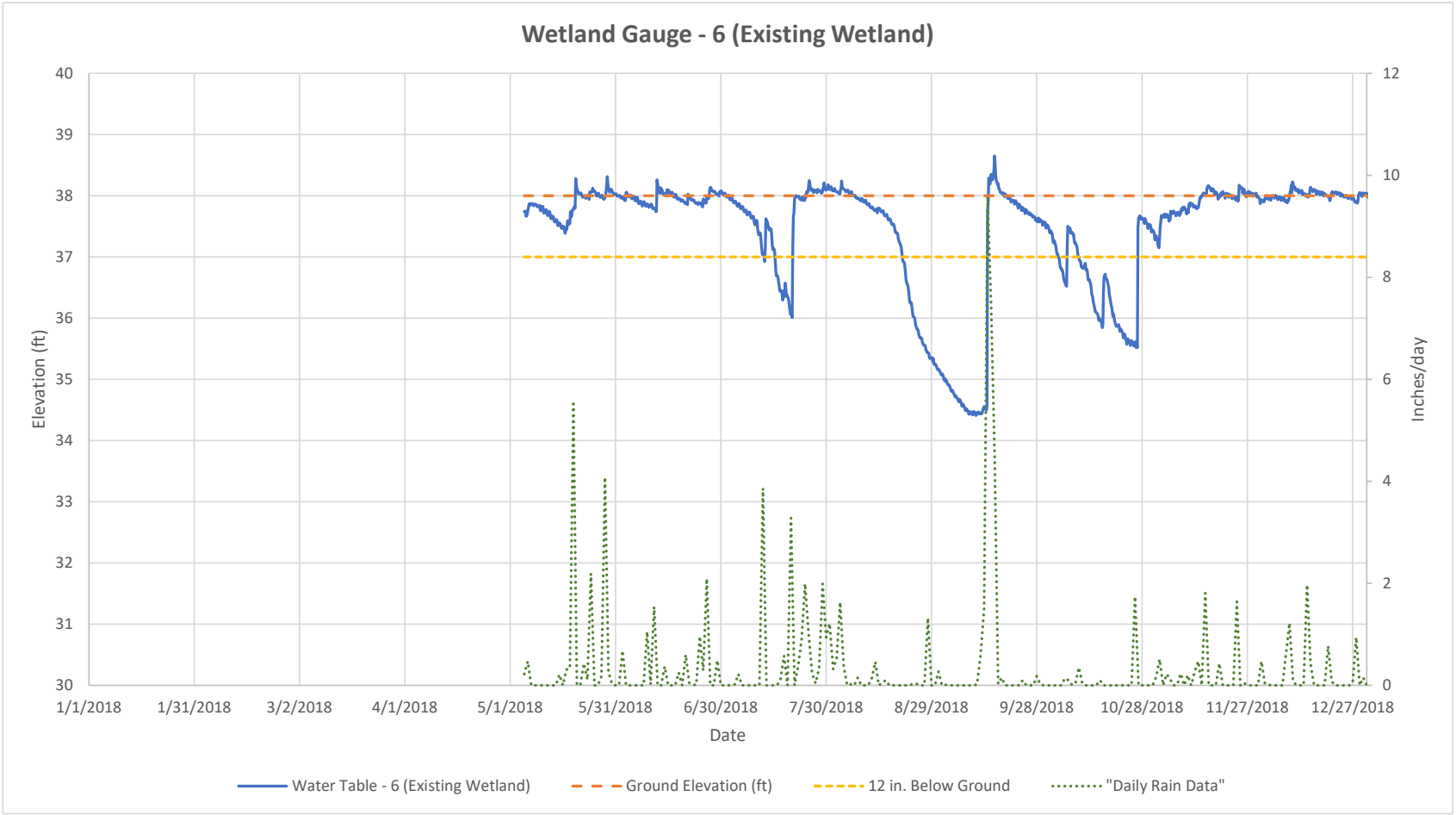
YEAR 3 (2020)



Site Info (Year 3)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	1/1/2020
End Date	2/4/2020
Total Days of Well Data	34.50
Water Table Criteria	-1

Growing Season Information (Year 3)		
Site		Beane Property
Gauge ID		6 (Existing Wetland)
Serial #		20331492
Growing Season Start Date		2/28
Growing Season End Date		12/2
Total Growing Season Days		277
NRCS Soil Series		Leon
7.0%	Growing Season (Days)	19
9.0%	Growing Season (Days)	25
Total Consecutive Days within Growing Season		0.00
Percent of Growing Season		0.0%

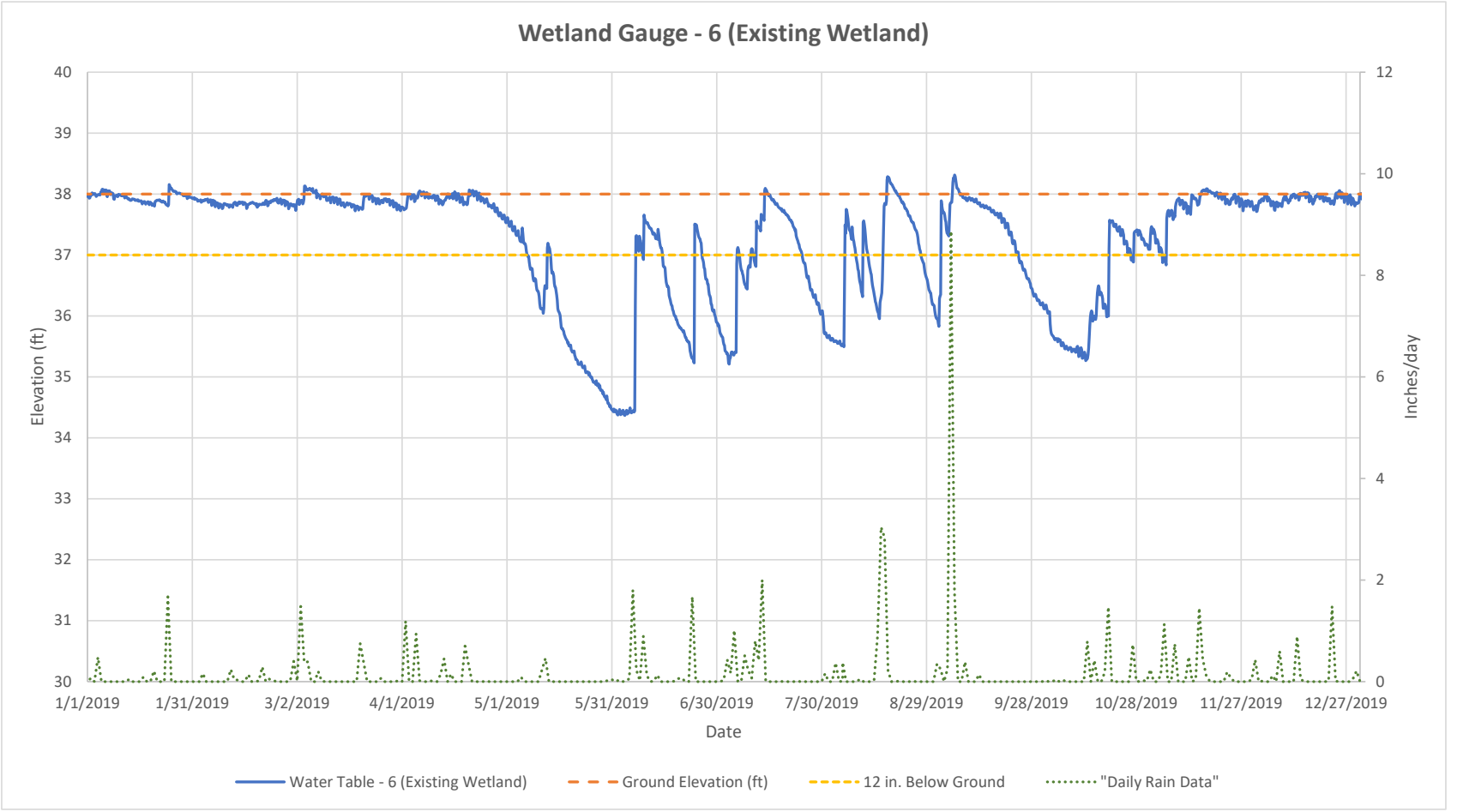
YEAR 1 (2018)



Site Info (Year 1)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	5/5/2018
End Date	12/31/2018
Total Days of Well Data	241.00
Water Table Criteria	-1

Growing Season Information (Year 1)		
Site		Beane Property
Gauge ID		6 (Existing Wetland)
Serial #		20331492
Growing Season Start Date		2/28
Growing Season End Date		12/2
Total Growing Season Days		277
NRCS Soil Series		Leon
7.0%	Growing Season (Days)	19
9.0%	Growing Season (Days)	25
Total Consecutive Days within Growing Season		68.50
Percent of Growing Season		24.5%

YEAR 2 (2019)



Site Info (Year 2)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	1/1/2019
End Date	12/31/2019
Total Days of Well Data	365.17
Water Table Criteria	-1

Growing Season Information (Year 2)		
Site		Beane Property
Gauge ID		6 (Existing Wetland)
Serial #		20331492
Growing Season Start Date		2/28
Growing Season End Date		12/2
Total Growing Season Days		277
NRCS Soil Series		Leon
7.0%	Growing Season (Days)	19
9.0%	Growing Season (Days)	25
Total Consecutive Days within Growing Season		67.83
Percent of Growing Season		24.2%

Soil Profile Description

Project/Site:	Beane Property (Groundwater Well Installations)	Sampling Date:	5/4/2018
Investigator(s):	Tom Barrett, Ecosystem Planning & Restoration	Sampling Point:	Existing Well 6
City/County:	Scotts Hill / Pender County, NC	County:	New Hanover
Soil Map Unit Name:	**Leon sand**	Lat: 34.33123	Long: -77.798242

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of incators

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Location	Texture	Remarks
0-2								0rganic Matter/Root Mat
2-13	10YR 2/1	100%					Sandy Loam	75 - 90% Masked sand grains, fine sand
13-30	10YR 3/1	100%					Sandy Loam	
30-40	7.5YR 4/1	100%					Sandy Loam	fine sand
40-48	7.5YR 5/2	75%	10YR 5/6	25%	C	M	Sandy Loam	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2] Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

1 **Dark Surface (S7) (LRR P, S, T, U)**
2
3
4

Indicators for Problematic Hydric Soils

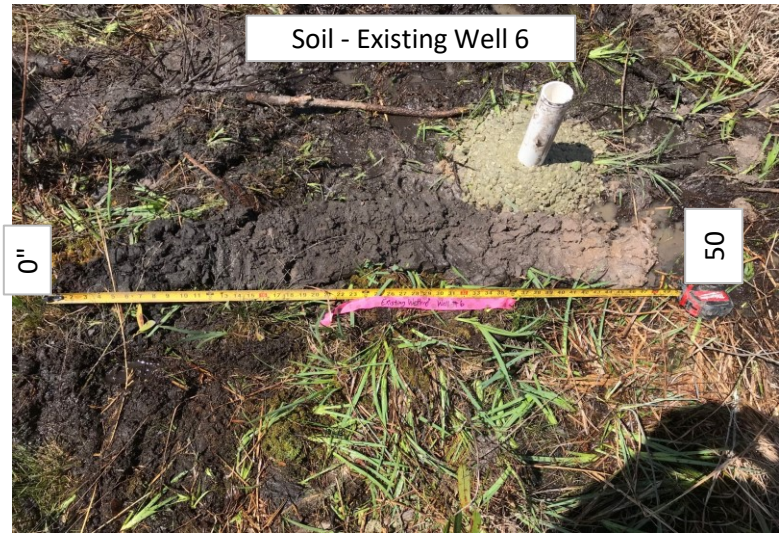
1
2
3

Restrictive Layer (if observed):

Type:
Depth (inches):

Hydric Soil Present? **Yes** X **No**

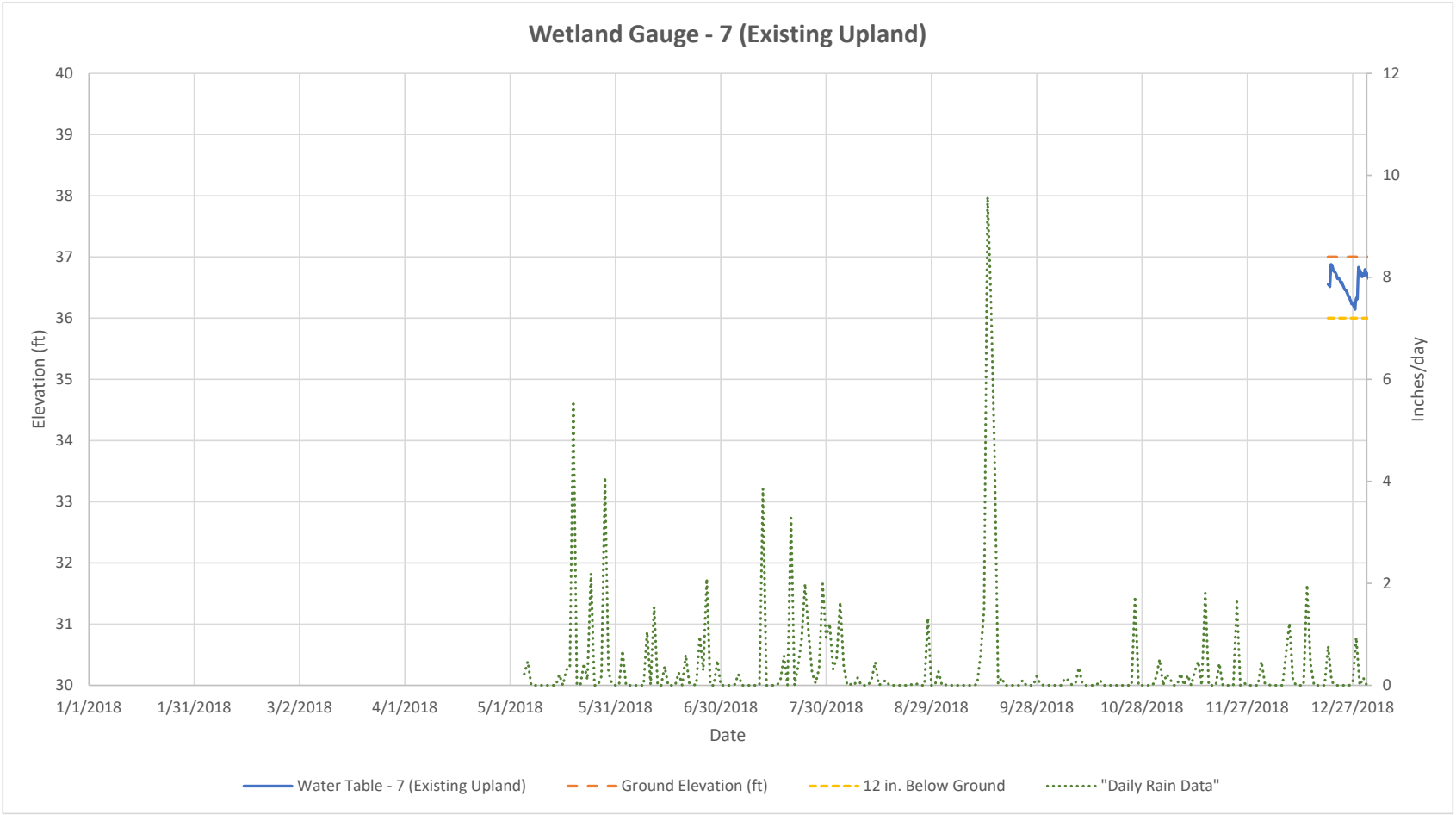
Remarks:



Notes:

Site is located off of Sidbury Road near Island Creek in Hanover County, NC.
MLRA 153A, LRR T

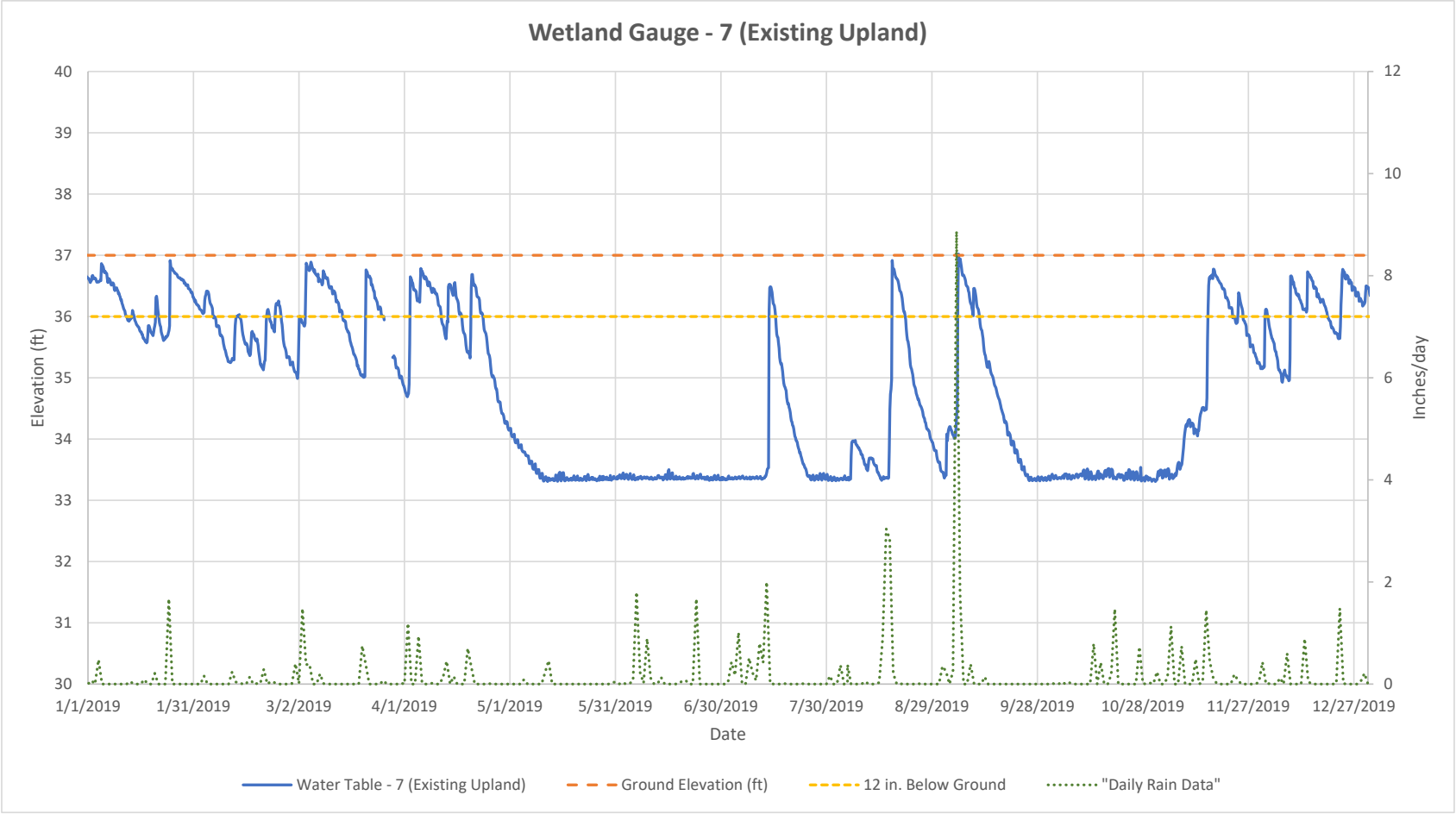
YEAR 1 (2018)



Site Info (Year 1)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	12/20/2018
End Date	12/31/2018
Total Days of Well Data	12.00
Water Table Criteria	-1

Growing Season Information (Year 1)		
Site		Beane Property
Gauge ID		7 (Existing Upland)
Serial #		20508149
Growing Season Start Date		2/28/18
Growing Season End Date		12/2/18
Total Growing Season Days		277
NRCS Soil Series		Johnston
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days within Growing Season		0.00
Percent of Growing Season		0.0%

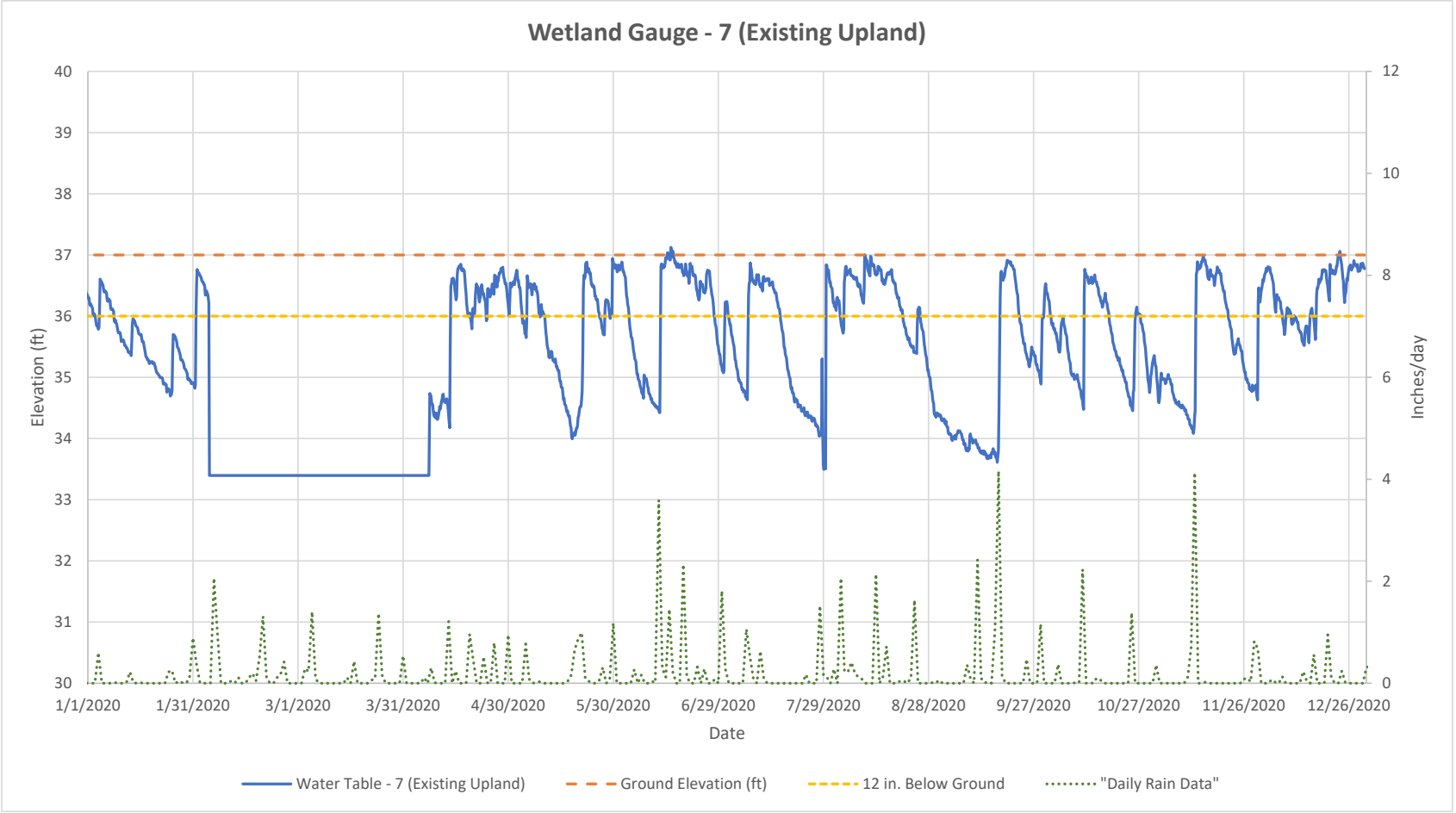
YEAR 2 (2019)



Site Info (Year 2)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	1/1/2019
End Date	12/31/2019
Total Days of Well Data	362.67
Water Table Criteria	-1

Growing Season Information (Year 2)		
Site		Beane Property
Gauge ID		7 (Existing Upland)
Serial #		20508149
Growing Season Start Date		2/28/19
Growing Season End Date		12/2/19
Total Growing Season Days		277
NRCS Soil Series		Johnston
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days within Growing Season		10.50
Percent of Growing Season		3.6%

YEAR 3 (2020)



Site Info (Year 3)	
Site	0
Stream/Wetland	Wetland
Begin Date	1/1/2020
End Date	12/31/2020
Total Days of Well Data	301.67
Water Table Criteria	-1

Growing Season Information (Year 3)		
Site		Beane Property
Gauge ID		7 (Existing Upland)
Serial #		20508149
Growing Season Start Date		2/28/20
Growing Season End Date		12/2/20
Total Growing Season Days		277
NRCS Soil Series		Johnston
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days within Growing Season		16.83
Percent of Growing Season		5.8%

Soil Profile Description

Project/Site:	Beane Property (Groundwater Well Installations)	Sampling Date:	12/19/18
Investigator(s):	Tom Barrett, Ecosystem Planning & Restoration	Sampling Point:	Existing Well 7
City/County:	Scotts Hill / Pender County, NC	County:	New Hanover
Soil Map Unit Name:	**Johnston soils**	Lat: 34.330637	Long: -77.807523

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of incators

Depth	Matrix			Redox Features					
(inches)	Color (moist)		%	Color (moist)		%	Type[1]	Location	Texture	Remarks
0 - 9	10YR	3/1	90%	7.5YR	3/4	10%	C	M	Sandy Clay Loam	oxidized rhizospheres
9 - 25	2.5Y	6/6	100%						Sandy Clay Loam	
25 - 41	2.5Y	6/6	60%	7.5YR	5/8	40%	C	M	Sandy Clay	
41 - 48	10YR	5/6	100%						Loamy Sand	
48 - 55	7.5YR	8/1	100%						Loamy Sand	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2] Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

1 **Redox Dark Surface (F6)**
2
3
4

Indicators for Problematic Hydric Soils

1
2
3

Restrictive Layer (if observed):

Type:
Depth (inches):

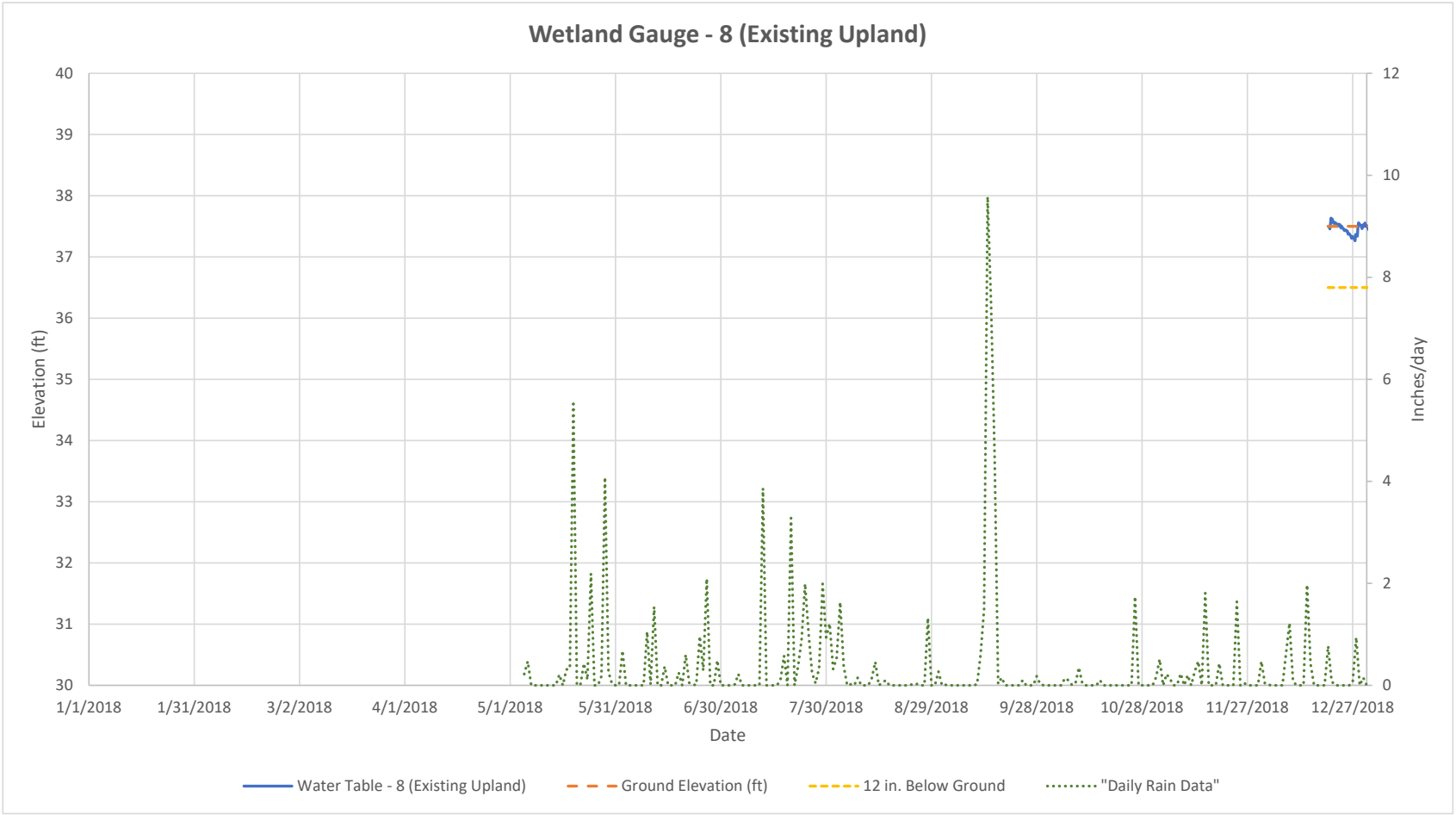
Hydric Soil Present? **Yes** X **No**

Remarks:

Notes:

Site is located off of Sidbury Road near Island Creek in Hanover County, NC
MLRA 153A, LRR T

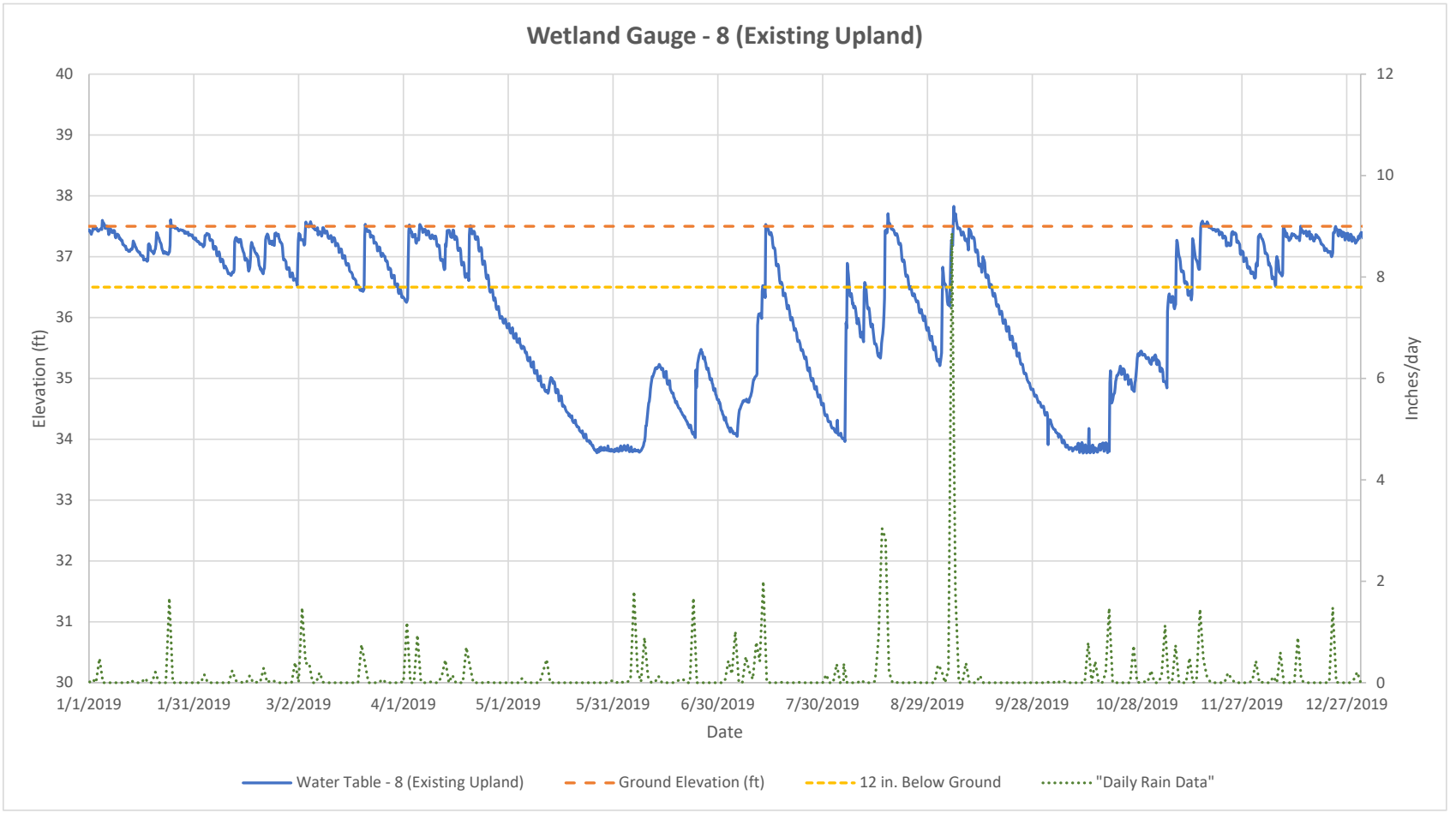
YEAR 1 (2018)



Site Info (Year 1)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	12/20/2018
End Date	12/31/2018
Total Days of Well Data	12.00
Water Table Criteria	-1

Growing Season Information (Year 1)		
Site		Beane Property
Gauge ID		8 (Existing Upland)
Serial #		20508152
Growing Season Start Date		2/28/18
Growing Season End Date		12/2/18
Total Growing Season Days		277
NRCS Soil Series		Seagate
5.0%	Growing Season (Days)	14
12.5%	Growing Season (Days)	35
Total Consecutive Days within Growing Season		0.00
Percent of Growing Season		0.0%

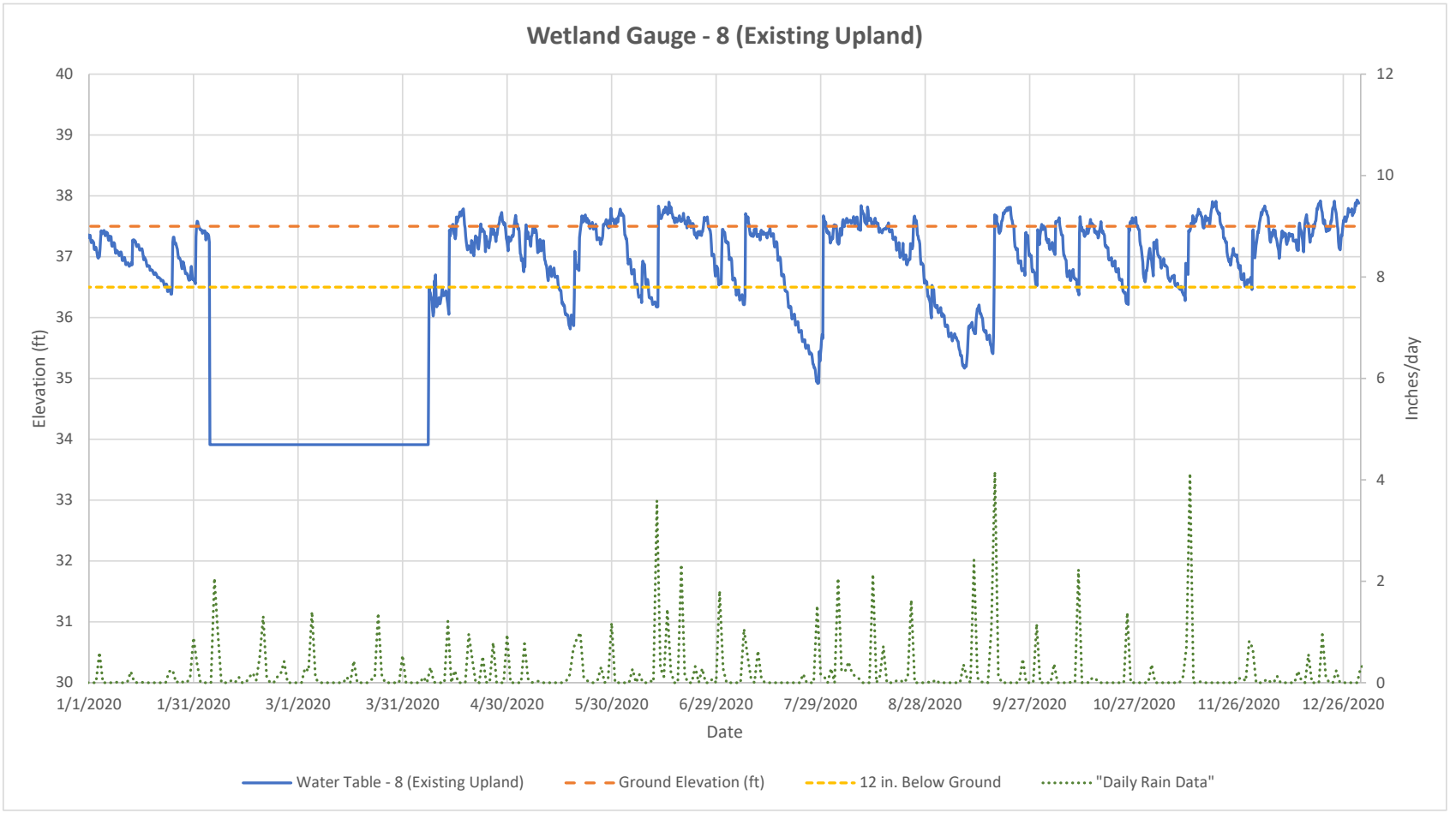
YEAR 2 (2019)



Site Info (Year 2)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	1/1/2019
End Date	12/31/2019
Total Days of Well Data	364.83
Water Table Criteria	-1

Growing Season Information (Year 2)		
Site		Beane Property
Gauge ID		8 (Existing Upland)
Serial #		20508152
Growing Season Start Date		2/28/19
Growing Season End Date		12/2/19
Total Growing Season Days		277
NRCS Soil Series		Seagate
5.0%	Growing Season (Days)	14
12.5%	Growing Season (Days)	35
Total Consecutive Days within Growing Season		23.33
Percent of Growing Season		8.3%

YEAR 3 (2020)



Site Info (Year 3)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	1/1/2020
End Date	12/31/2020
Total Days of Well Data	301.67
Water Table Criteria	-1

Growing Season Information (Year 3)		
Site		Beane Property
Gauge ID		8 (Existing Upland)
Serial #		20508152
Growing Season Start Date		2/28/20
Growing Season End Date		12/2/20
Total Growing Season Days		277
NRCS Soil Series		Seagate
5.0%	Growing Season (Days)	14
12.5%	Growing Season (Days)	35
Total Consecutive Days within Growing Season		31.33
Percent of Growing Season		11.2%

Soil Profile Description

Project/Site:	Beane Property (Groundwater Well Installations)	Sampling Date:	12/19/18
Investigator(s):	Tom Barrett, Ecosystem Planning & Restoration	Sampling Point:	Existing Well 8
City/County:	Scotts Hill / Pender County, NC	County:	New Hanover
Soil Map Unit Name:	**Seagate fine sand**	Lat: 34.329547	Long: -77.807623

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of incators

Depth	Matrix			Redox Features					
(inches)	Color (moist)		%	Color (moist)	%	Type[1]	Location	Texture	Remarks
0 - 7	10YR	3/1	100%					Loamy Sand	60% masked sand grains
7 - 17	7.5YR	2.5/1	100%					Sandy Clay Loam	100% masked sand grains
17 - 25	7.5YR	3/2	60%	10YR 5/3	40%	C	M	Sandy Loam	90 - 100% masked sand grains
25 - 29	7.5YR	5/1	100%					Sandy Loam	95% masked sand grains
29 - 32	7.5YR	3/1	100%					Sandy Loam	
32 - 40	7.5YR	4/1	100%					Sandy Loam	
40 - 50	5YR	5/1	100%					Loamy Sand	
50 - 55	2.5Y	8/1	100%					Loamy Sand	buried wood at this depth

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2] Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

1
2
3
4

Indicators for Problematic Hydric Soils

1
2
3

Restrictive Layer (if observed):

Type:

Depth (inches):

Hydric Soil Present?

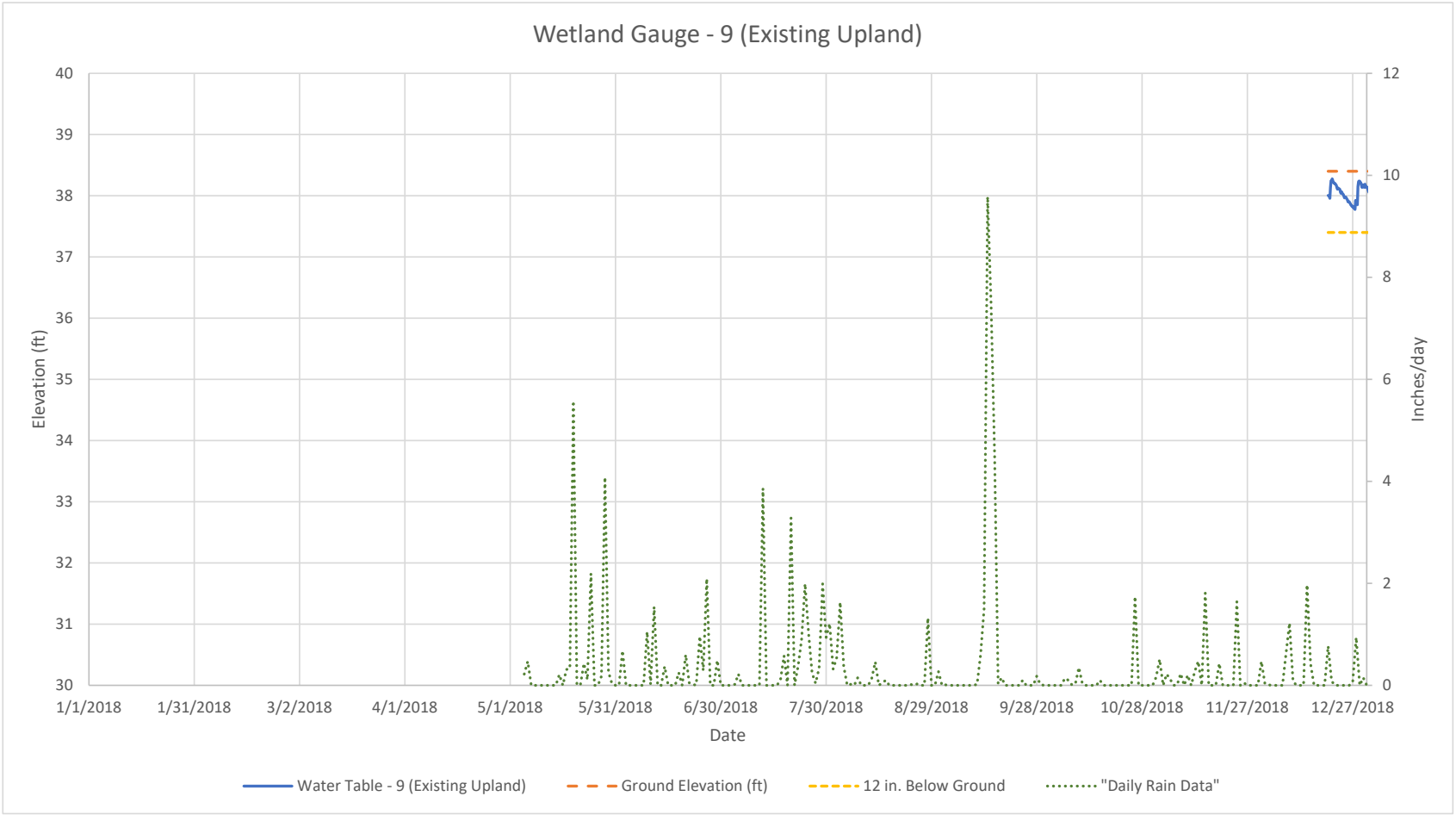
Yes **No**

Remarks:

Notes:

Site is located off of Sidbury Road near Island Creek in Hanover County, NC
MLRA 153A, LRR T

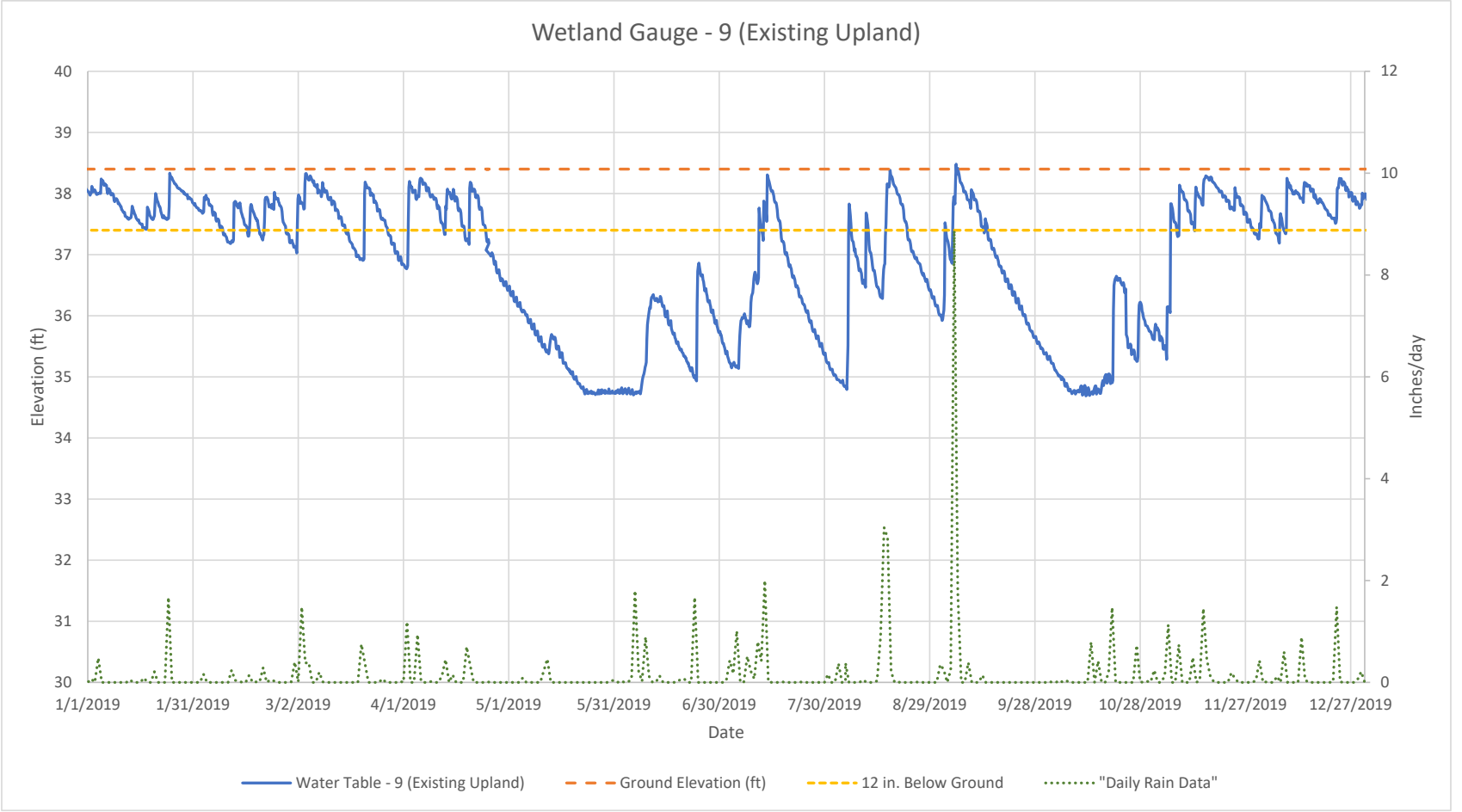
YEAR 1 (2018)



Site Info (Year 1)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	12/20/2018
End Date	12/31/2018
Total Days of Well Data	12.00
Water Table Criteria	-1

Growing Season Information (Year 1)		
Site		Beane Property
Gauge ID		9 (Existing Upland)
Serial #		20508153
Growing Season Start Date		2/28/18
Growing Season End Date		12/2/18
Total Growing Season Days		277
NRCS Soil Series		Seagate
5.0%	Growing Season (Days)	14
12.5%	Growing Season (Days)	35
Total Consecutive Days within Growing Season		0.00
Percent of Growing Season		0.0%

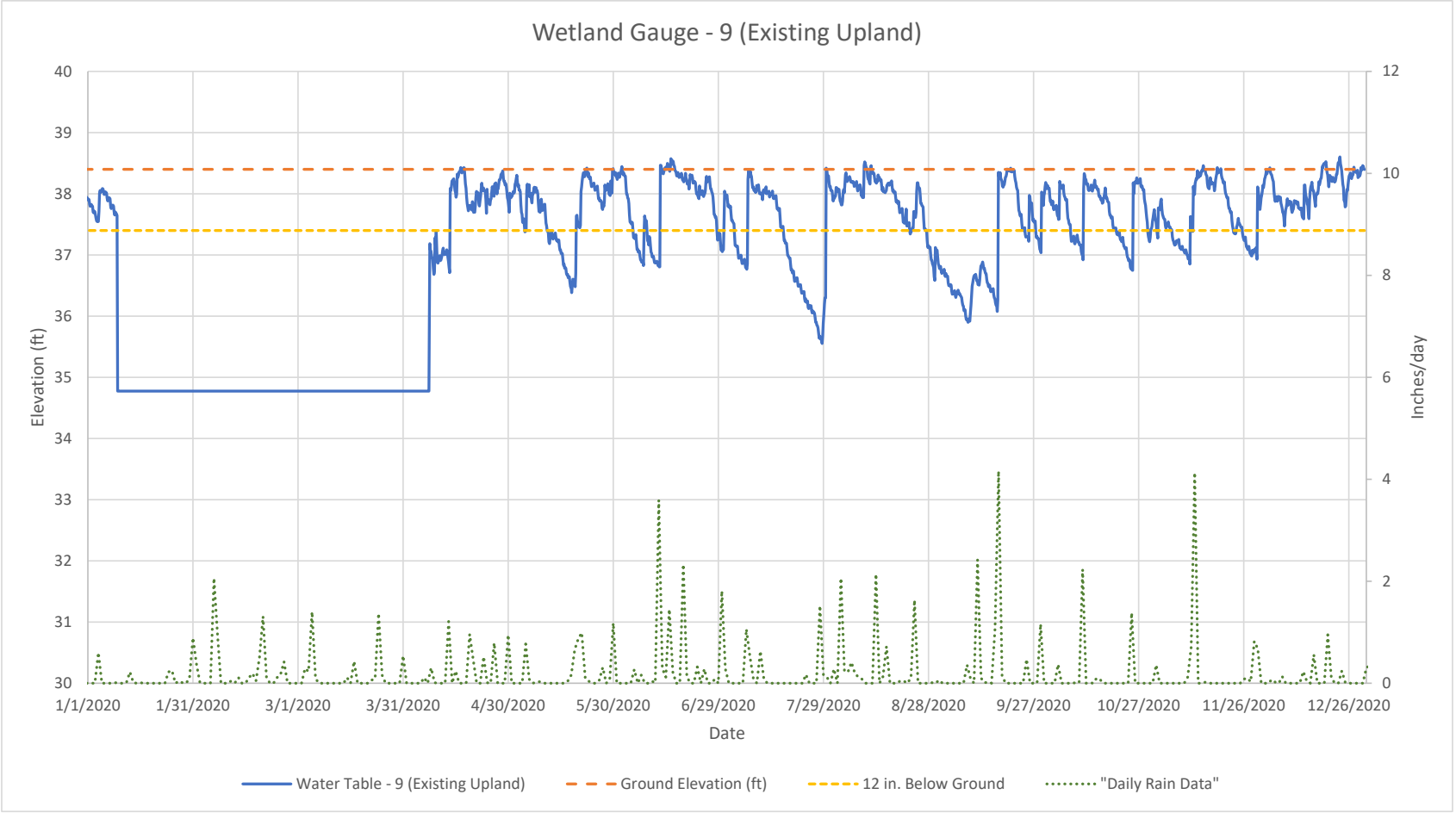
YEAR 2 (2019)



Site Info (Year 2)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	1/1/2019
End Date	12/31/2019
Total Days of Well Data	365.00
Water Table Criteria	-1

Growing Season Information (Year 2)		
Site		Beane Property
Gauge ID		9 (Existing Upland)
Serial #		20508153
Growing Season Start Date		2/28/19
Growing Season End Date		12/2/19
Total Growing Season Days		277
NRCS Soil Series		Seagate
5.0%	Growing Season (Days)	14
12.5%	Growing Season (Days)	35
Total Consecutive Days within Growing Season		16.67
Percent of Growing Season		5.8%

YEAR 3 (2020)



Site Info (Year 3)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	1/1/2020
End Date	12/31/2020
Total Days of Well Data	275.50
Water Table Criteria	-1

Growing Season Information (Year 3)		
Site		Beane Property
Gauge ID		9 (Existing Upland)
Serial #		20508153
Growing Season Start Date		2/28/20
Growing Season End Date		12/2/20
Total Growing Season Days		277
NRCS Soil Series		Seagate
5.0%	Growing Season (Days)	14
12.5%	Growing Season (Days)	35
Total Consecutive Days within Growing Season		23.83
Percent of Growing Season		8.3%

Soil Profile Description

Project/Site:	Beane Property (Groundwater Well Installations)	Sampling Date:	12/19/18
Investigator(s):	Tom Barrett, Ecosystem Planning & Restoration	Sampling Point:	Existing Well 9
City/County:	Scotts Hill / Pender County, NC	County:	New Hanover
Soil Map Unit Name:	**Seagate fine sand**	Lat: 34.328673	Long: -77.808841

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of incators

Depth	Matrix			Redox Features					
(inches)	Color (moist)		%	Color (moist)	%	Type[1]	Location	Texture	Remarks
0 - 3	10YR	2/1	100%					Loamy Sand	75% masked sand grains
3 - 8	5YR	4/1	100%					Loamy Sand	50% masked sand grains
8 - 11	7.5YR	3/1	100%					Loamy Sand	80% masked sand grains
11-16	10YR	2/1	100%					Loamy Sand	100% masked sand grains
16 - 31	7.5YR	3/2	100%					Sandy Loam	
31 - 47	10YR	4/2	100%					Sandy Loam	
47 - 55	10YR	5/2	100%					Loamy Sand	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2] Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

1 **Thin Dark Surface (S9) (LRR S, T, U)**
2
3
4

Indicators for Problematic Hydric Soils

1
2
3

Restrictive Layer (if observed):

Type:
Depth (inches):

Hydric Soil Present?

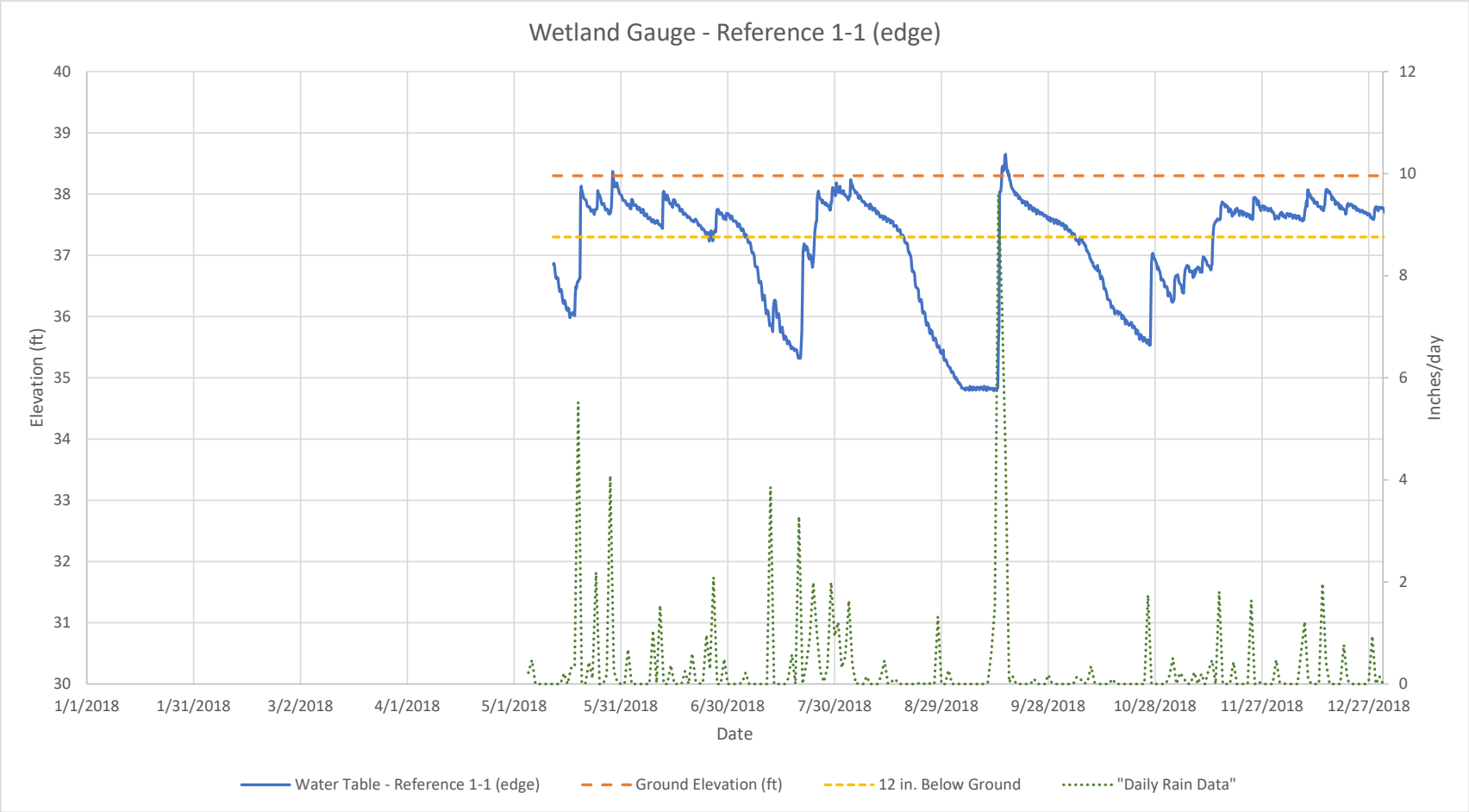
Yes **No**

Remarks:

Notes:

Site is located off of Sidbury Road near Island Creek in Hanover County, NC
MLRA 153A, LRR T

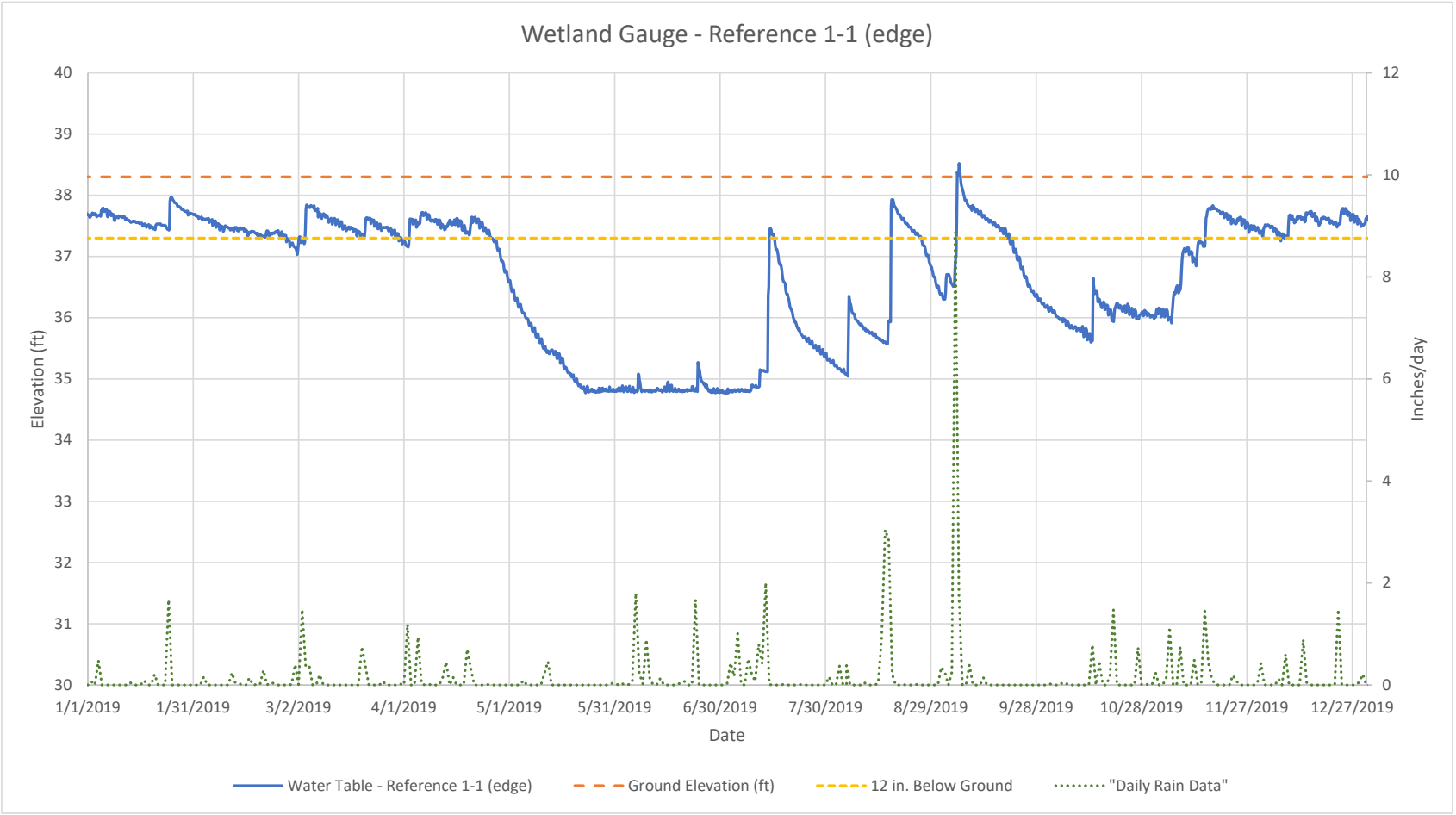
YEAR 1 (2018)



Site Info (Year 1)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	5/12/2018
End Date	12/31/2018
Total Days of Well Data	234.00
Water Table Criteria	-1

Growing Season Information (Year 1)		
Site		Beane Property
Gauge ID		Reference 1-1 (edge)
Serial #		20331494
Growing Season Start Date		2/28/18
Growing Season End Date		12/2/18
Total Growing Season Days		277
NRCS Soil Series		Murville
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days w/in Current Growing Season		35.83
Percent of Growing Season		12.6%

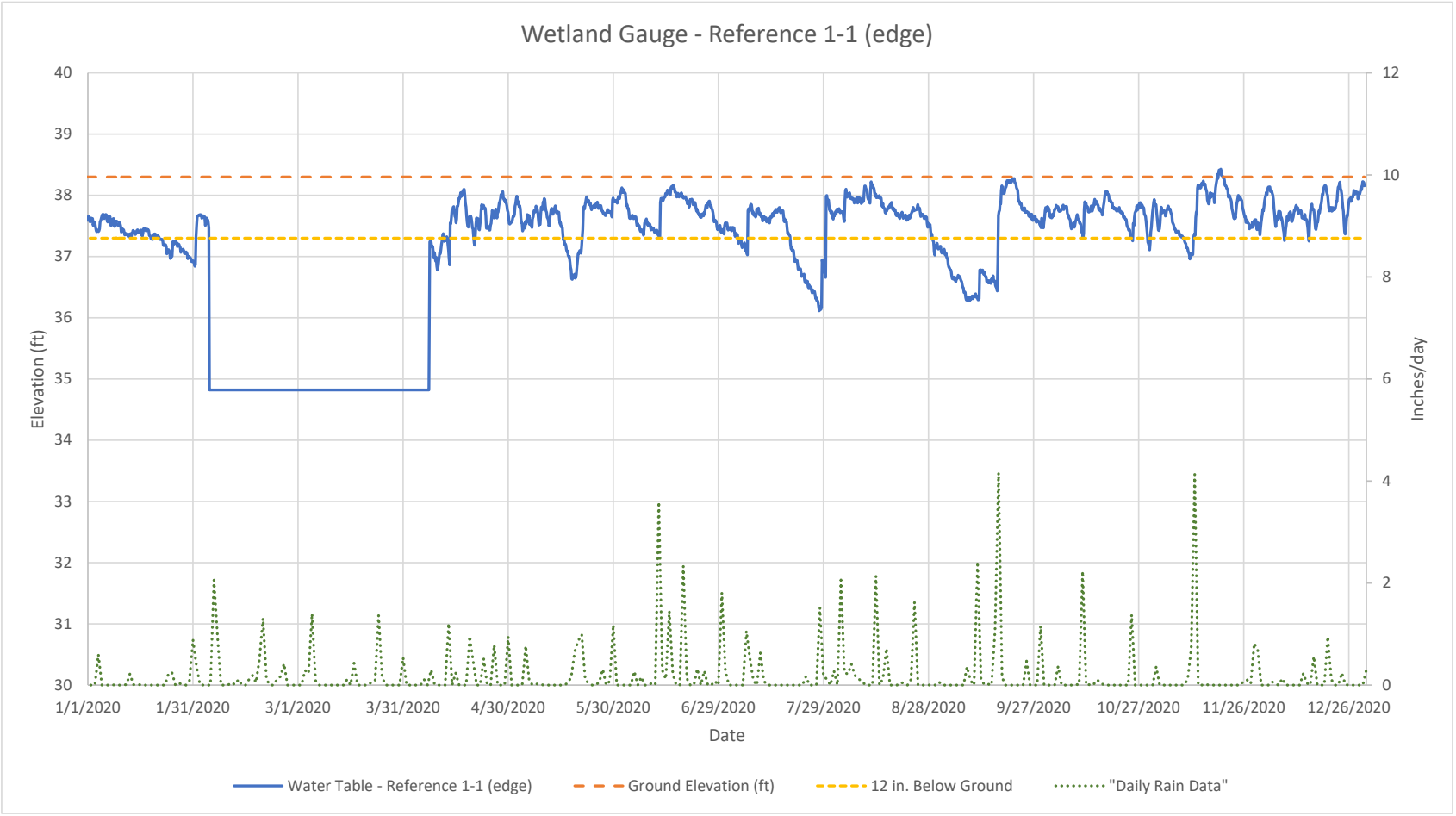
YEAR 2 (2019)



Site Info (Year 2)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	1/1/2019
End Date	12/31/2019
Total Days of Well Data	365.00
Water Table Criteria	-1

Growing Season Information (Year 2)		
Site		Beane Property
Gauge ID		Reference 1-1 (edge)
Serial #		20331494
Growing Season Start Date		2/28/19
Growing Season End Date		12/2/19
Total Growing Season Days		277
NRCS Soil Series		Murville
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days w/in Current Growing Season		25.83
Percent of Growing Season		9.0%

YEAR 3 (2020)



Site Info (Year 3)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	1/1/2020
End Date	12/31/2020
Total Days of Well Data	301.67
Water Table Criteria	-1

Growing Season Information (Year 3)		
Site		Beane Property
Gauge ID		Reference 1-1 (edge)
Serial #		20331494
Growing Season Start Date		2/28/20
Growing Season End Date		12/2/20
Total Growing Season Days		277
NRCS Soil Series		Murville
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days w/in Current Growing Season		44.50
Percent of Growing Season		15.9%

Soil Profile Description

Project/Site:	Beane Property (Groundwater Well Installations)	Sampling Date:	5/11/2018
Investigator(s):	Tom Barrett, Ecosystem Planning & Restoration	Sampling Point:	Ref Well 1-1 edge
City/County:	Scotts Hill / Pender County, NC	County:	New Hanover
Soil Map Unit Name:	**Murville fine sand**	Lat: 34.324844	Long: -77.811679

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of incators

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Location	Texture	Remarks
0-4								Thick Organic Matter
4-19	10YR 2/1	100%					Sandy Loam	75 - 90% masked sand grains, fine sand
19-48	10YR 3/1	100%					Sandy Clay Loam	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2] Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

1 **Dark Surface (S7) (LRR P, S, T, U)**
2
3
4

Indicators for Problematic Hydric Soils

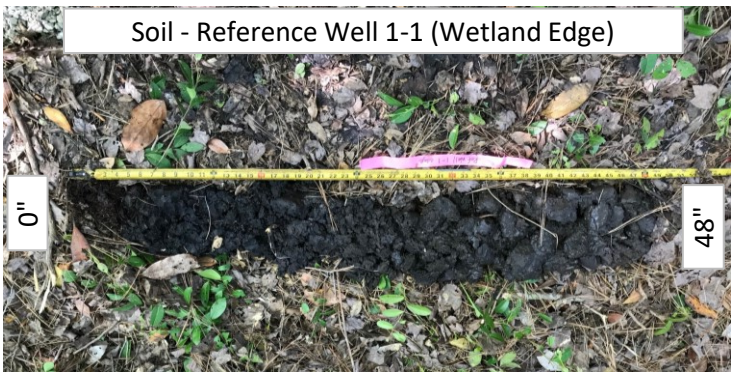
1
2
3

Restrictive Layer (if observed):

Type:
Depth (inches):

Hydric Soil Present? **Yes** X **No**

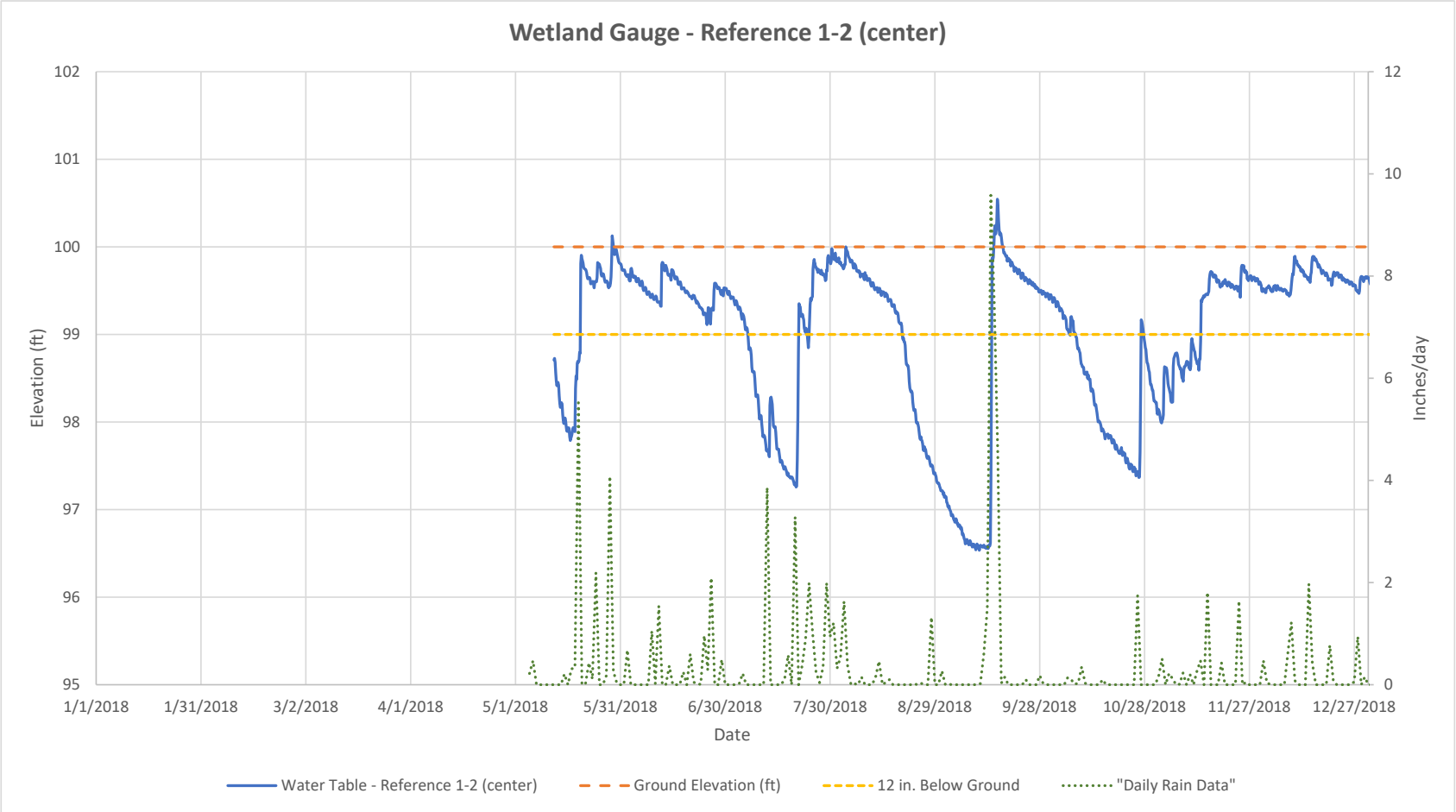
Remarks:



Notes:

Site is located off of Sidbury Road near Island Creek in Hanover County, NC.
MLRA 153A, LRR T

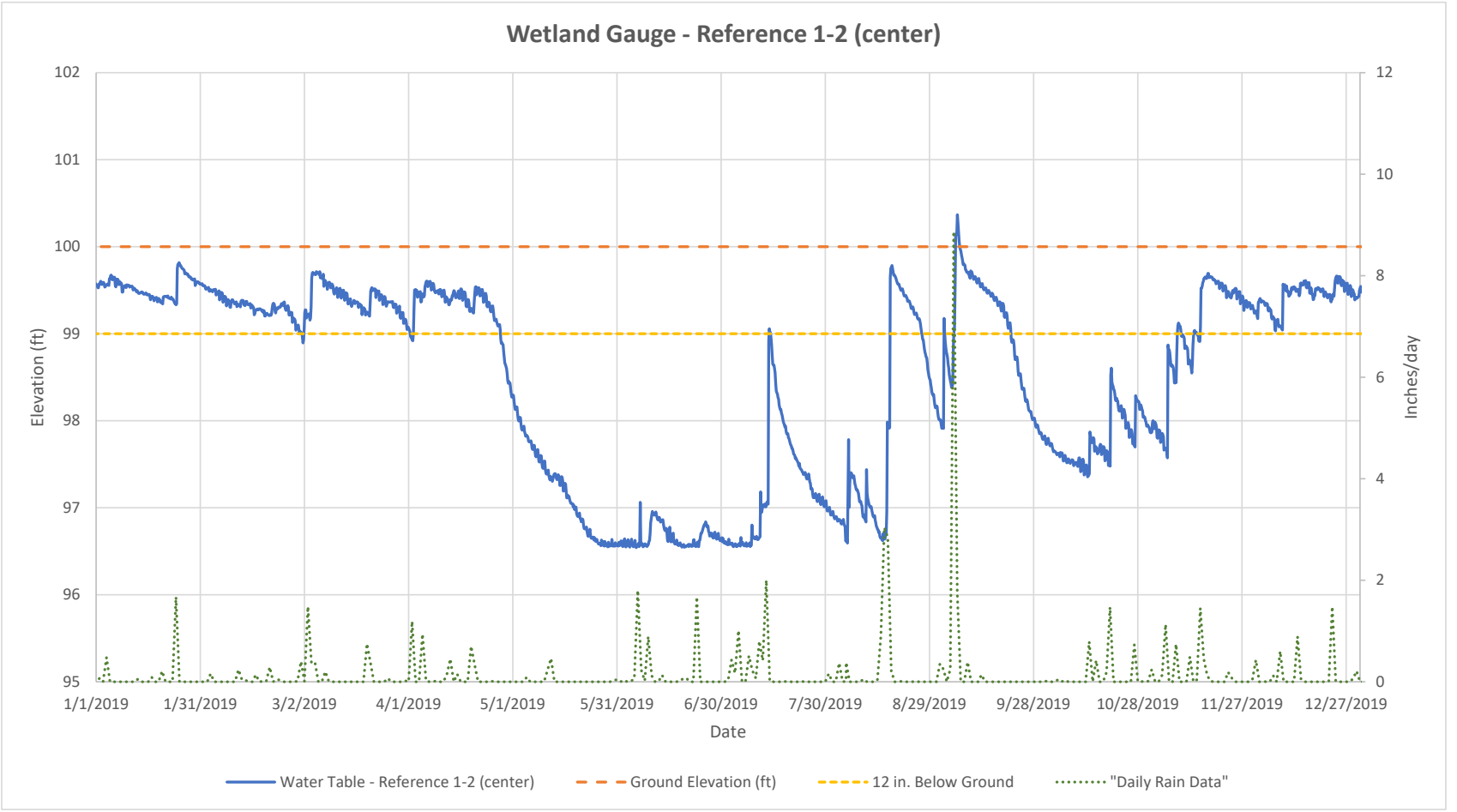
YEAR 1 (2018)



Site Info (Year 1)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	5/12/2018
End Date	12/31/2018
Total Days of Well Data	234.00
Water Table Criteria	-1

Growing Season Information (Year 1)		
Site		Beane Property
Gauge ID		Reference 1-2 (center)
Serial #		20331495
Growing Season Start Date		2/28/18
Growing Season End Date		12/2/18
Total Growing Season Days		277
NRCS Soil Series		Murville
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days w/in Current Growing Season		47.83
Percent of Growing Season		17.0%

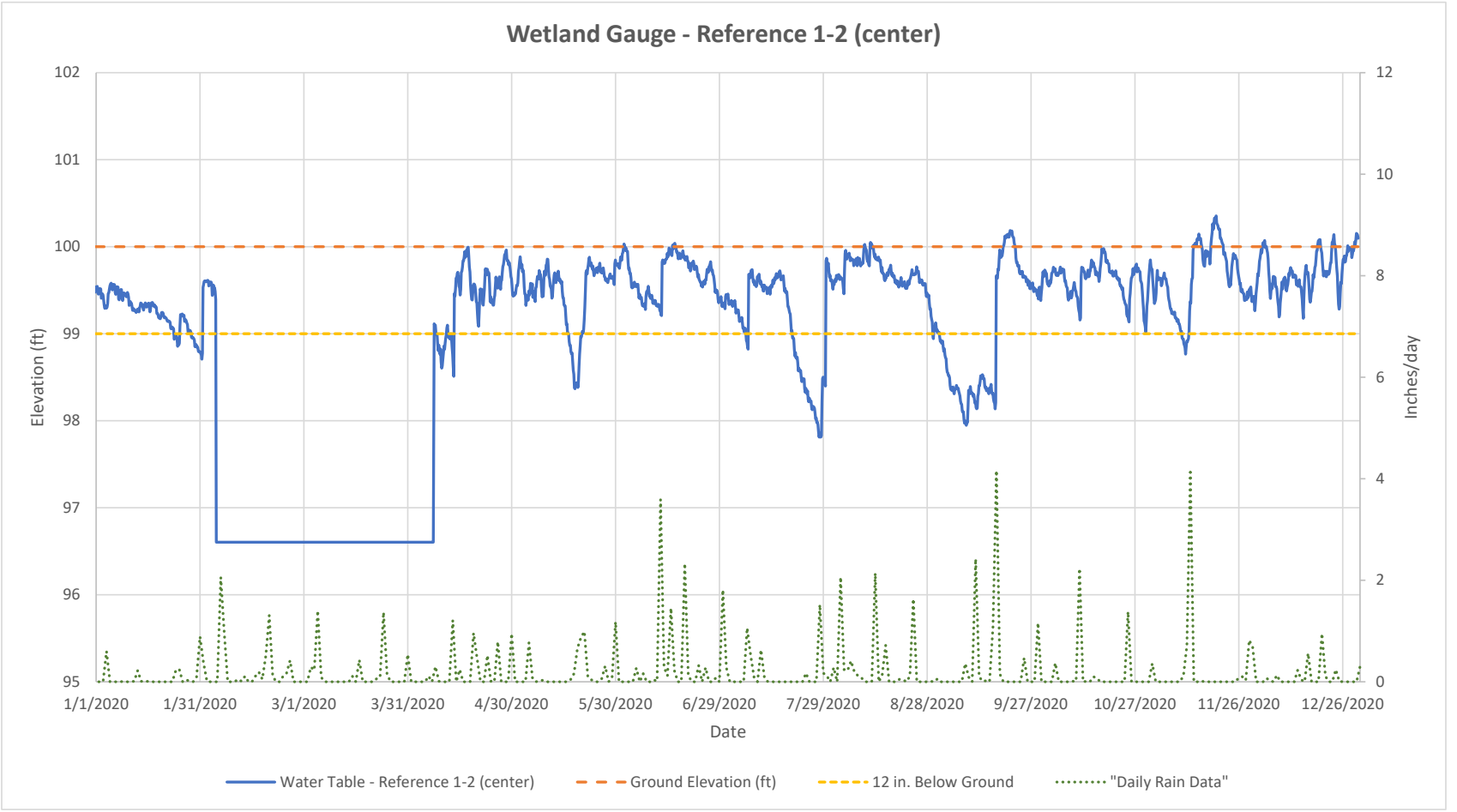
YEAR 2 (2019)



Site Info (Year 2)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	1/1/2019
End Date	12/31/2019
Total Days of Well Data	365.00
Water Table Criteria	-1

Growing Season Information (Year 2)		
Site		Beane Property
Gauge ID		Reference 1-2 (center)
Serial #		20331495
Growing Season Start Date		2/28/19
Growing Season End Date		12/2/19
Total Growing Season Days		277
NRCS Soil Series		Murville
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days w/in Current Growing Season		30.67
Percent of Growing Season		10.8%

YEAR 3 (2020)



Site Info (Year 3)	
Site	0
Stream/Wetland	Wetland
Begin Date	1/1/2020
End Date	12/31/2020
Total Days of Well Data	301.67
Water Table Criteria	-1

Growing Season Information (Year 3)		
Site		Beane Property
Gauge ID		Reference 1-2 (center)
Serial #		20331495
Growing Season Start Date		2/28/20
Growing Season End Date		12/2/20
Total Growing Season Days		277
NRCS Soil Series		Murville
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days w/in Current Growing Season		53.67
Percent of Growing Season		19.1%

Soil Profile Description

Project/Site:	Beane Property (Groundwater Well Installations)	Sampling Date:	5/11/2018
Investigator(s):	Tom Barrett, Ecosystem Planning & Restoration	Sampling Point:	Ref Well 1-2 center
City/County:	Scotts Hill / Pender County, NC	County:	New Hanover
Soil Map Unit Name:	**Murville fine sand**	Lat: 34.324893	Long: -77.811027

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of incators

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Location	Texture	Remarks
0-3								0rganic Matter/Root Mat
3-20	10YR 2/1	100%					Sandy Loam	75 - 90% masked sand grains, fine sand
20-38	10YR 3/1	100%					Sandy Clay Loam	fine sand
38-48	10YR 4/1	100%					Sandy Loam	fine sand

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2] Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

1 **Dark Surface (S7) (LRR P, S, T, U)**
2
3
4

Indicators for Problematic Hydric Soils

1
2
3

Restrictive Layer (if observed):

Type:
Depth (inches):

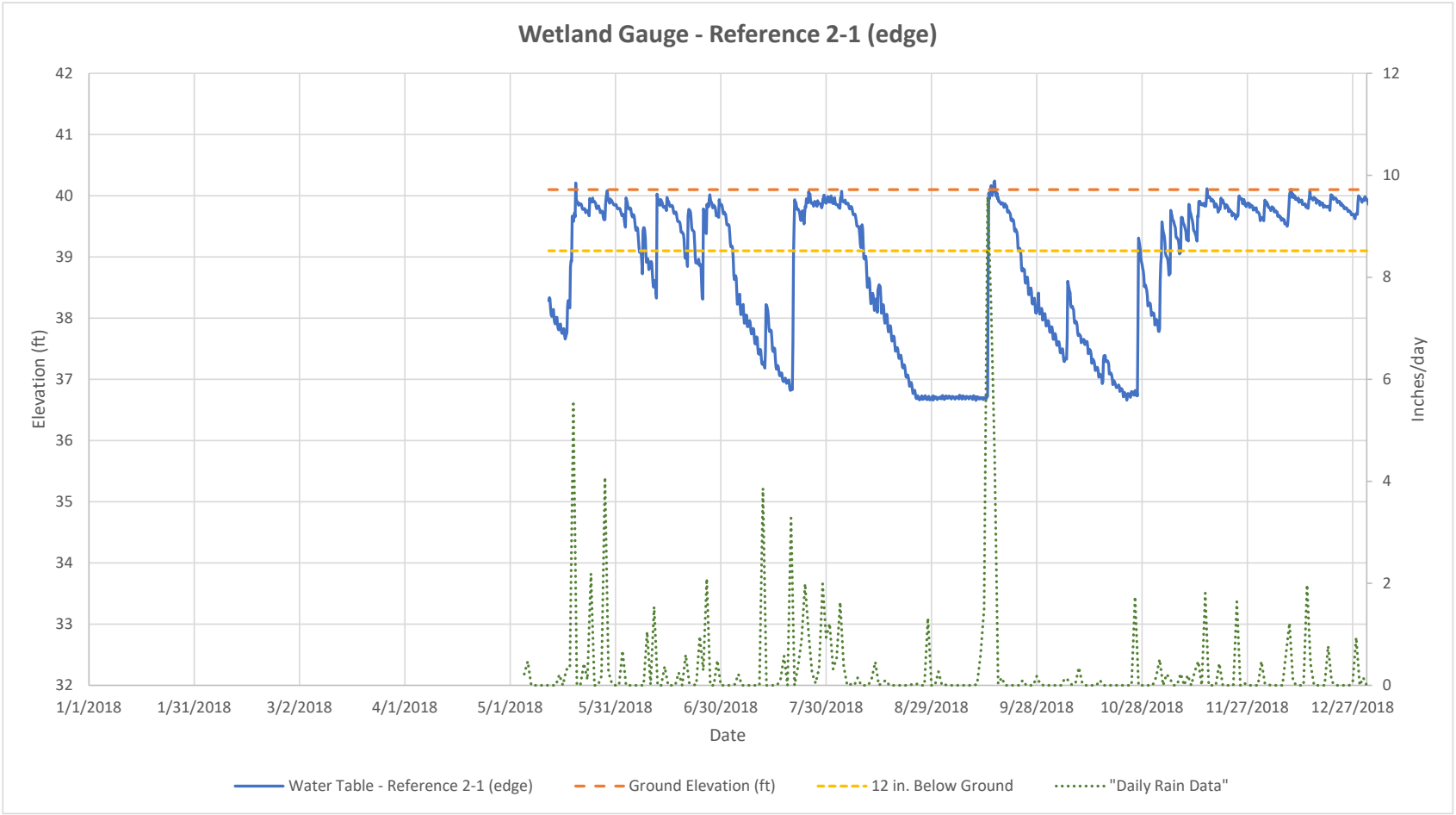
Hydric Soil Present? **Yes** X **No**

Remarks:

Notes:

Site is located off of Sidbury Road near Island Creek in Hanover County, NC.
MLRA 153A, LRR T

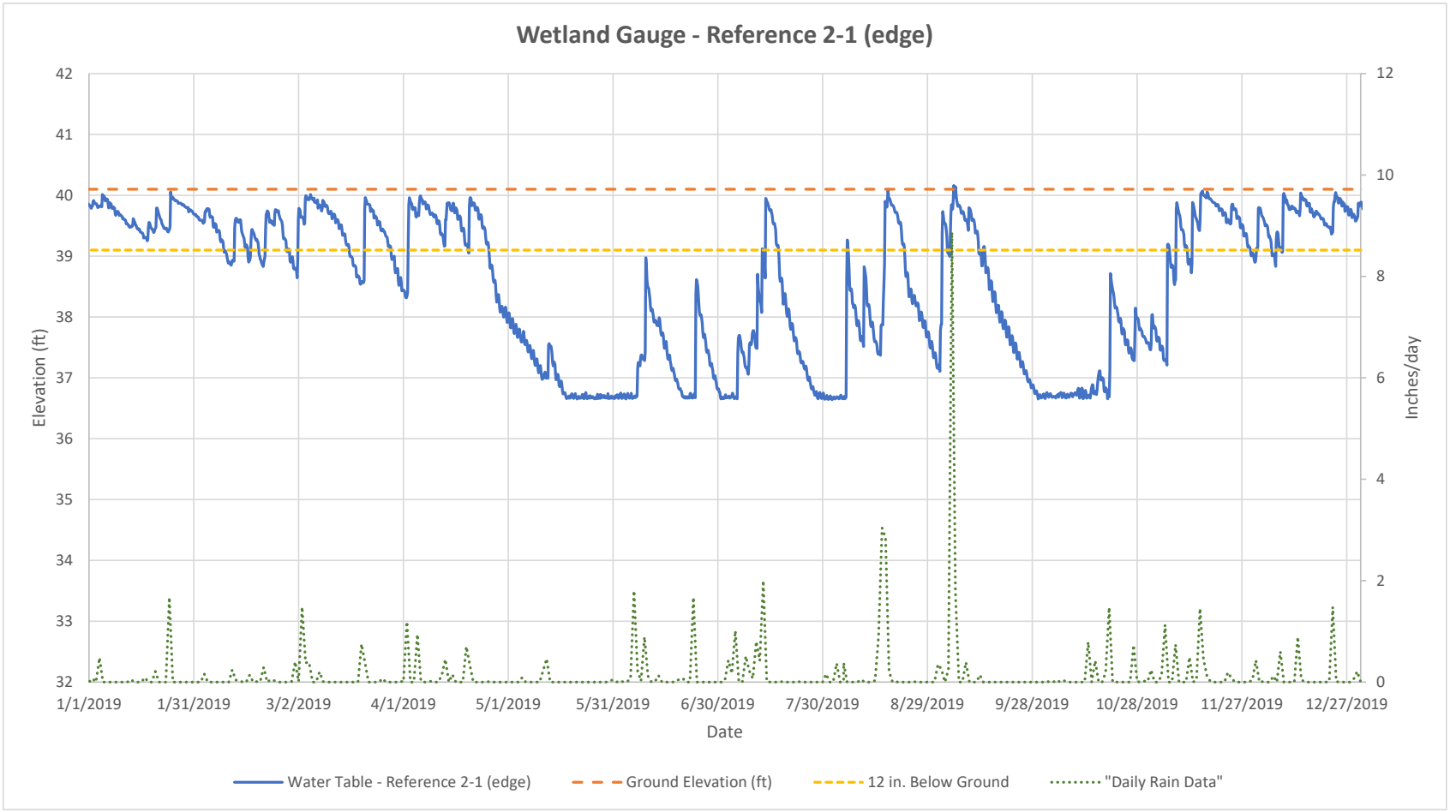
YEAR 1 (2018)



Site Info (Year 1)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	5/12/2018
End Date	12/31/2018
Total Days of Well Data	234.00
Water Table Criteria	-1

Growing Season Information (Year 1)		
Site		Beane Property
Gauge ID		Reference 2-1 (edge)
Serial #		20331496
Growing Season Start Date		2/28/18
Growing Season End Date		12/2/18
Total Growing Season Days		277
NRCS Soil Series		Murville
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days w/in Current Growing Season		24.83
Percent of Growing Season		8.7%

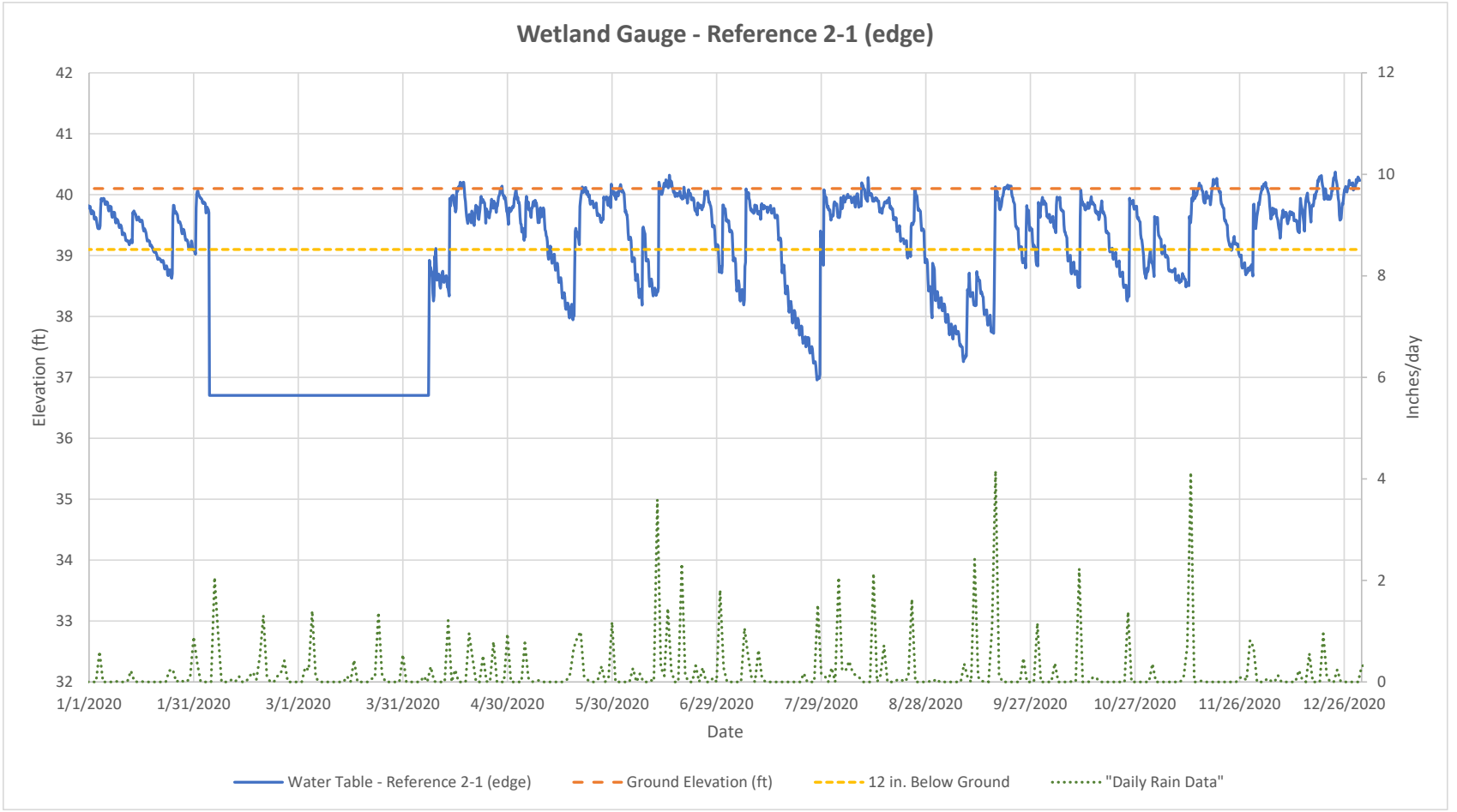
YEAR 2 (2019)



Site Info (Year 2)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	1/1/2019
End Date	12/31/2019
Total Days of Well Data	364.83
Water Table Criteria	-1

Growing Season Information (Year 2)		
Site		Beane Property
Gauge ID		Reference 2-1 (edge)
Serial #		20331496
Growing Season Start Date		2/28/19
Growing Season End Date		12/2/19
Total Growing Season Days		277
NRCS Soil Series		Murville
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days w/in Current Growing Season		17.33
Percent of Growing Season		6.1%

YEAR 3 (2020)



Site Info (Year 3)	
Site	0
Stream/Wetland	Wetland
Begin Date	1/1/2020
End Date	12/31/2020
Total Days of Well Data	301.50
Water Table Criteria	-1

Growing Season Information (Year 3)		
Site		Beane Property
Gauge ID		Reference 2-1 (edge)
Serial #		20331496
Growing Season Start Date		2/28/20
Growing Season End Date		12/2/20
Total Growing Season Days		277
NRCS Soil Series		Murville
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days w/in Current Growing Season		28.17
Percent of Growing Season		10.1%

Soil Profile Description

Project/Site:	Beane Property (Groundwater Well Installations)	Sampling Date:	5/10/2018
Investigator(s):	Tom Barrett, Ecosystem Planning & Restoration	Sampling Point:	Ref Well 2-1 edge
City/County:	Scotts Hill / Pender County, NC	County:	New Hanover
Soil Map Unit Name:	**Murville fine sand**	Lat: 34.330362	Long: -77.797341

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of incators

Depth	Matrix			Redox Features					
(inches)	Color (moist)		%	Color (moist)		%	Type[1]	Location	Texture	Remarks
0-5	10YR	2/1	100%						Sandy Loam	80% masked sand grains, fine sand
5-10	10YR	3/1	100%						Sandy Loam	Fine roots; fine sand
10-18	10YR	5/2	98%	10YR	5/8	2%	C	PL	Sandy Loam	oxidized rhizospheres, fine sand
18-28	10YR	5/2	75%	10YR	7/2	25%	C	M	Sandy Loam	
28-34	2.5Y	7/1	70%	2.5Y	6/6	30%	C	M	Loamy Sand	fine sand
34-46	10YR	5/3	80%	10YR	7/2	20%	D	M	Loamy Sand	
46-48+	2.5Y	6/6	85%	10YR	6/8	15%	C	M	Loamy Sand	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2] Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

1 **Depleted Below Dark Surface (A11)**
2 **Dark Surface (S7) (LRR P, S, T, U)**
3
4

Indicators for Problematic Hydric Soils

1
2
3

Restrictive Layer (if observed):

Type:
Depth (inches):

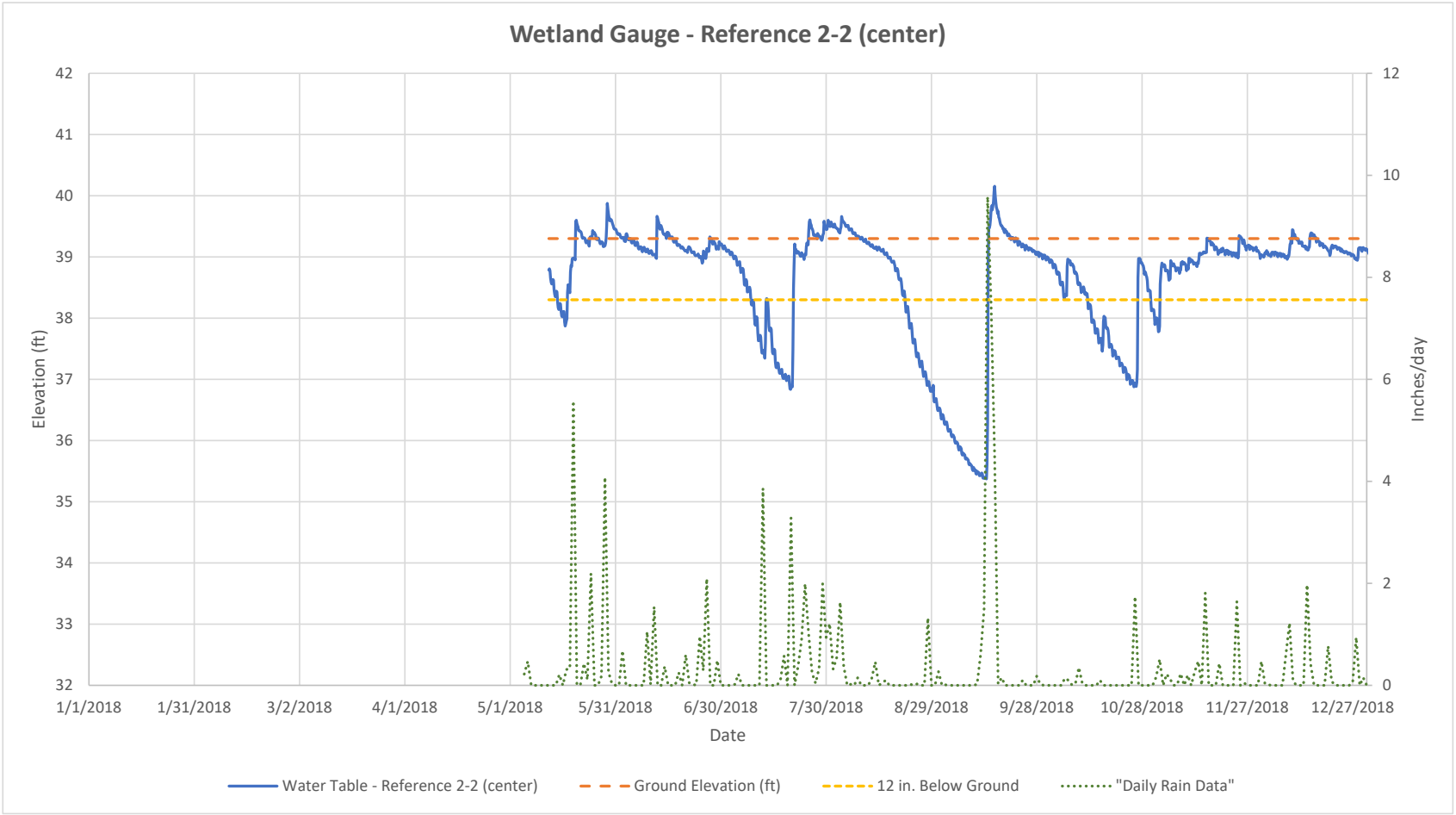
Hydric Soil Present? **Yes** X **No**

Remarks:

Notes:

Site is located off of Sidbury Road near Island Creek in Hanover County, NC.
MLRA 153A, LRR T

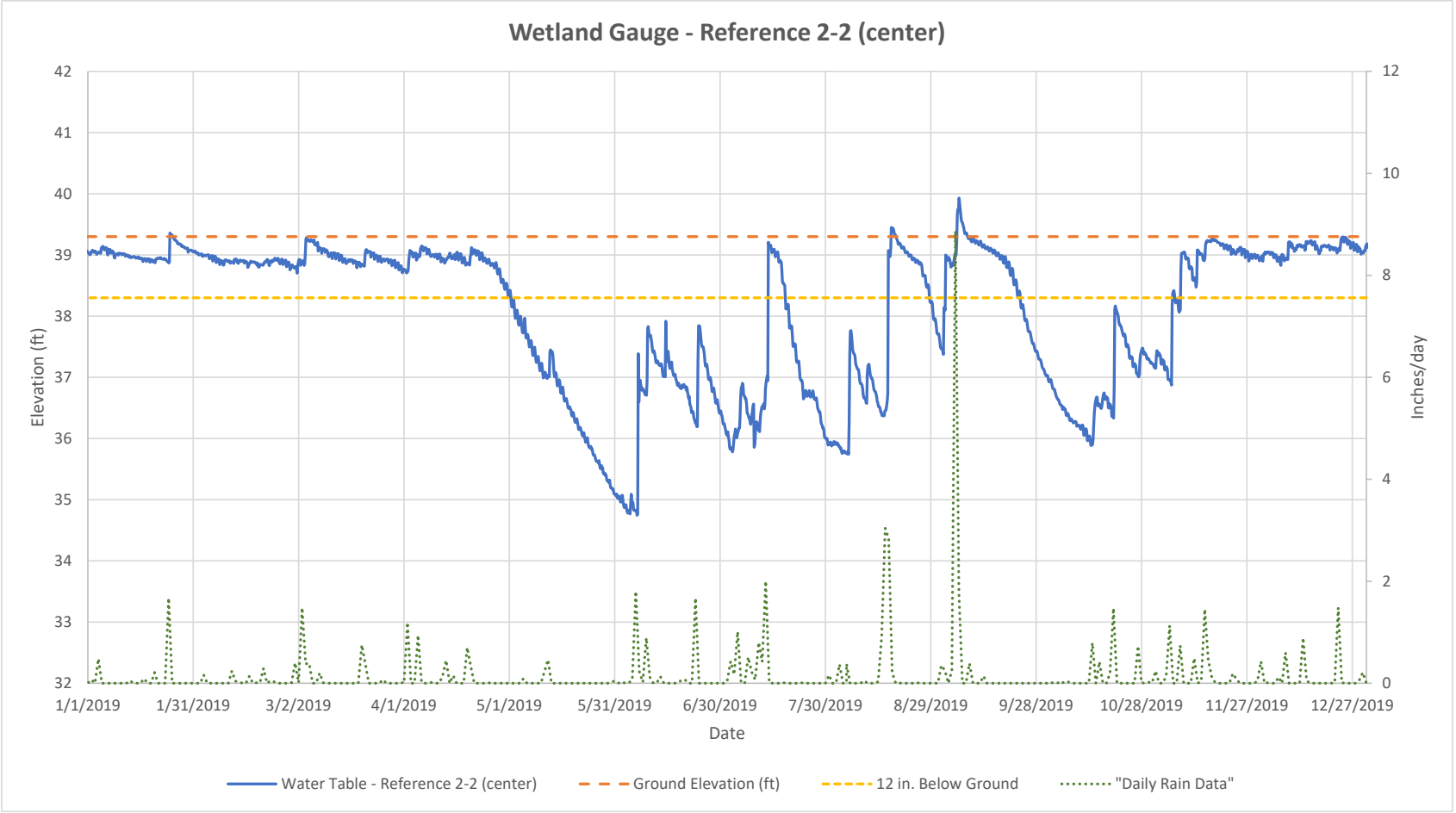
YEAR 1 (2018)



Site Info (Year 1)	
Site	Beane
Stream/Wetland	Wetland
Begin Date	5/12/2018
End Date	12/31/2018
Total Days of Well Data	234.00
Water Table Criteria	-1

Growing Season Information (Year 1)		
Site		Beane
Gauge ID		Reference 2-2 (center)
Serial #		20331497
Growing Season Start Date		2/28/18
Growing Season End Date		12/2/18
Total Growing Season Days		277
NRCS Soil Series		Murville
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days w/in Current Growing Season		52.33
Percent of Growing Season		18.8%

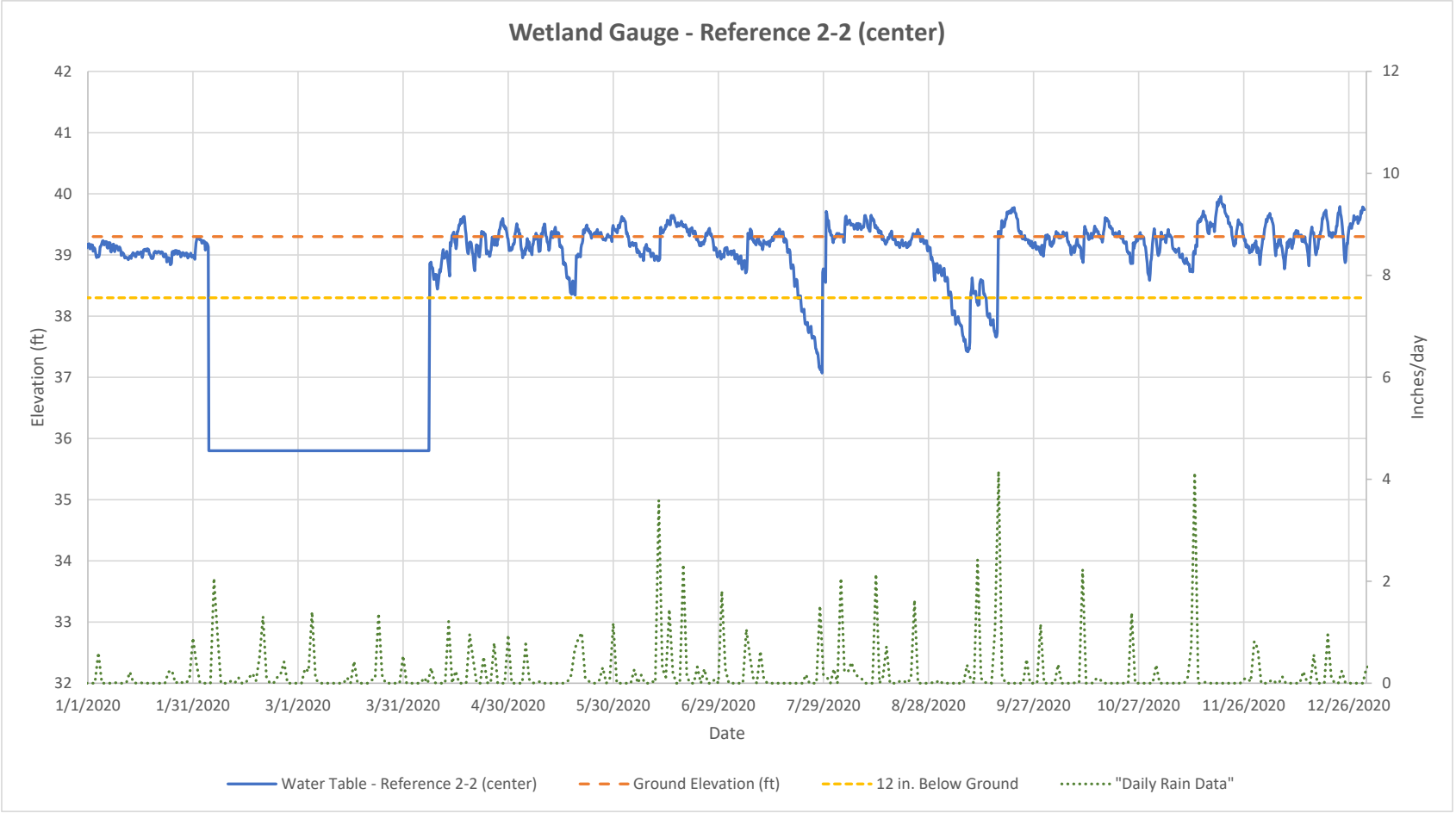
YEAR 2 (2019)



Site Info (Year 2)	
Site	Beane
Stream/Wetland	Wetland
Begin Date	1/1/2019
End Date	12/31/2019
Total Days of Well Data	365.00
Water Table Criteria	-1

Growing Season Information (Year 2)		
Site		Beane
Gauge ID		Reference 2-2 (center)
Serial #		20331497
Growing Season Start Date		2/28/19
Growing Season End Date		12/2/19
Total Growing Season Days		277
NRCS Soil Series		Murville
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days w/in Current Growing Season		62.50
Percent of Growing Season		22.4%

YEAR 3 (2020)



Site Info (Year 3)	
Site	Beane
Stream/Wetland	Wetland
Begin Date	1/1/2020
End Date	12/31/2020
Total Days of Well Data	301.50
Water Table Criteria	-1

Growing Season Information (Year 3)		
Site		Beane
Gauge ID		Reference 2-2 (center)
Serial #		20331497
Growing Season Start Date		2/28/20
Growing Season End Date		12/2/20
Total Growing Season Days		277
NRCS Soil Series		Murville
12.0%	Growing Season (Days)	33
16.0%	Growing Season (Days)	44
Total Consecutive Days w/in Current Growing Season		105.17
Percent of Growing Season		37.9%

Soil Profile Description

Project/Site:	Beane Property (Groundwater Well Installations)	Sampling Date:	5/10/2018
Investigator(s):	Tom Barrett, Ecosystem Planning & Restoration	Sampling Point:	Ref Well 2-2 center
City/County:	Scotts Hill / Pender County, NC	County:	New Hanover
Soil Map Unit Name:	**Murville fine sand**	Lat: 34.330211	Long: -77.797179

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of incators

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Location	Texture	Remarks
0-3								0rganic Matter/Root Mat
3-14	10YR 2/1	100%					Sandy Clay Loam	95%-100% masked sand; fine sand
14-26	7.5YR 3/1	100%					Sandy Loam	fine sand
26-46	7.5YR 4/1	100%					Sandy Loam	
46-48	2.5Y 7/1	100%					Loamy Sand	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2] Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

1 **Dark Surface (S7) (LRR P, S, T, U)**
2
3
4

Indicators for Problematic Hydric Soils

1
2
3

Restrictive Layer (if observed):

Type:
Depth (inches):

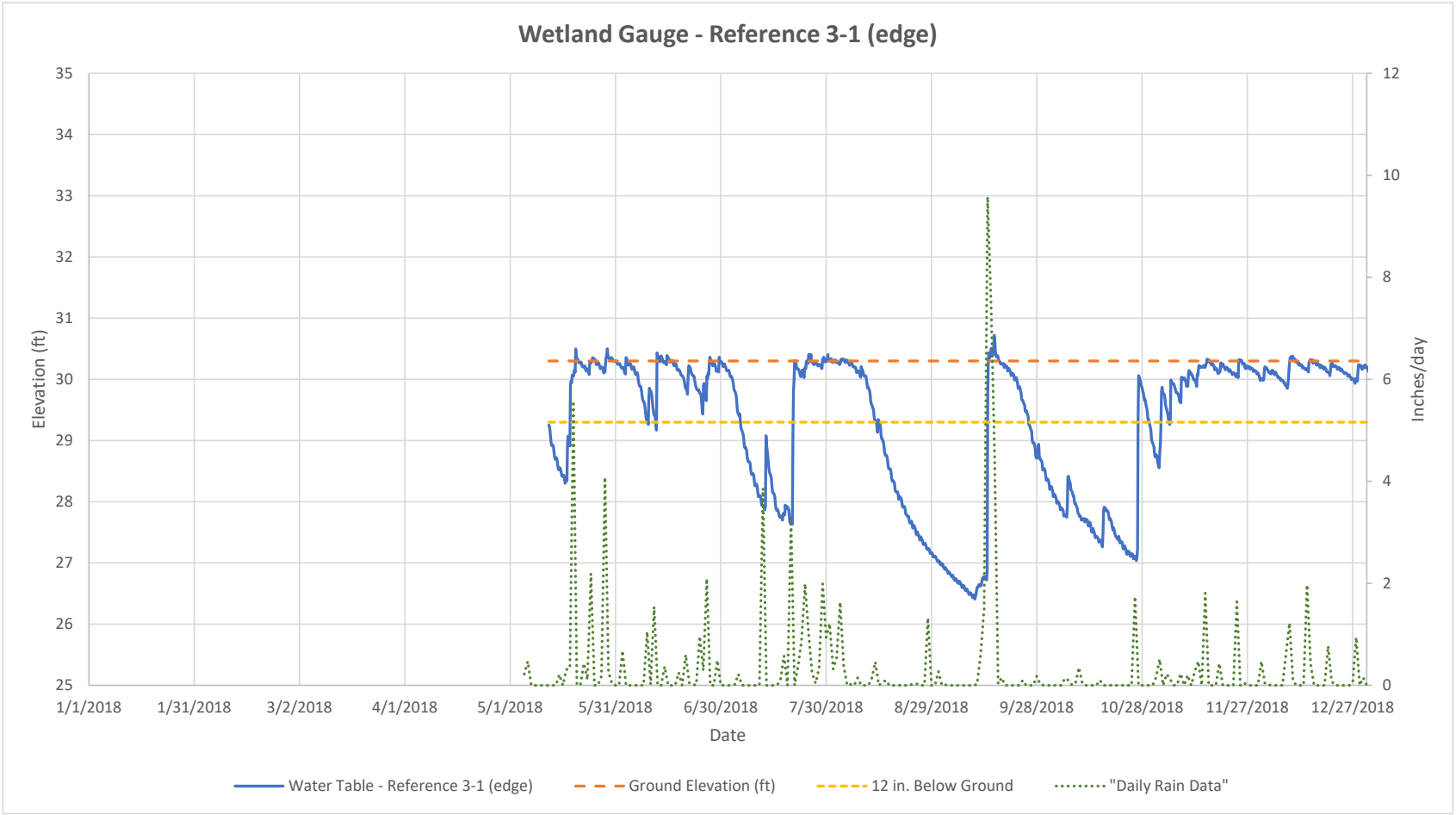
Hydric Soil Present? **Yes** X **No**

Remarks:

Notes:

Site is located off of Sidbury Road near Island Creek in Hanover County, NC.
MLRA 153A, LRR T

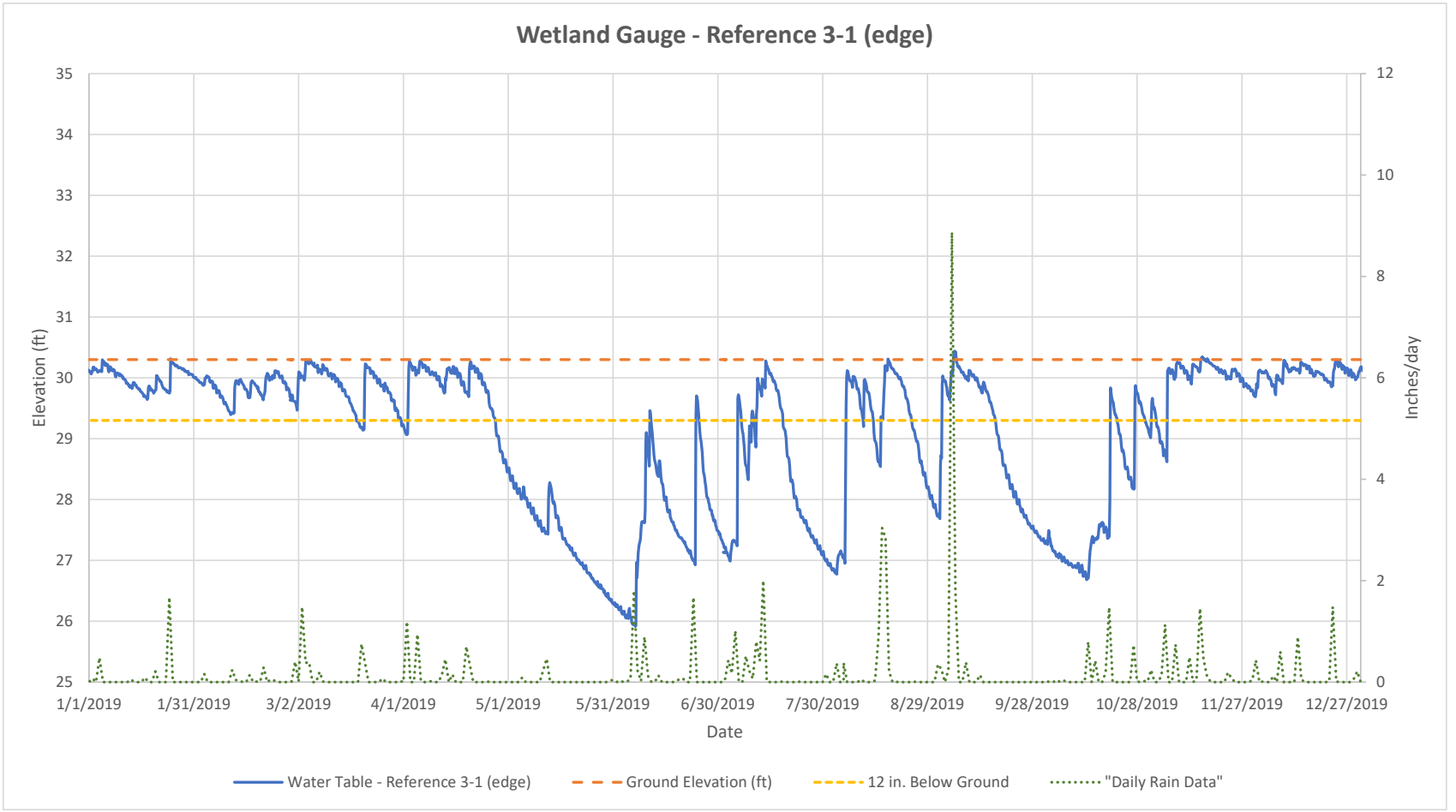
YEAR 1 (2018)



Site Info (Year 1)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	5/12/2018
End Date	12/31/2018
Total Days of Well Data	234.00
Water Table Criteria	-1

Growing Season Information (Year 1)		
Site		Beane Property
Gauge ID		Reference 3-1 (edge)
Serial #		20331498
Growing Season Start Date		2/28
Growing Season End Date		12/2
Total Growing Season Days		277
NRCS Soil Series		Stallings
7.0%	Growing Season (Days)	19
9.0%	Growing Season (Days)	25
Total Consecutive Days w/in Current Growing Season		28.00
Percent of Growing Season		10.1%

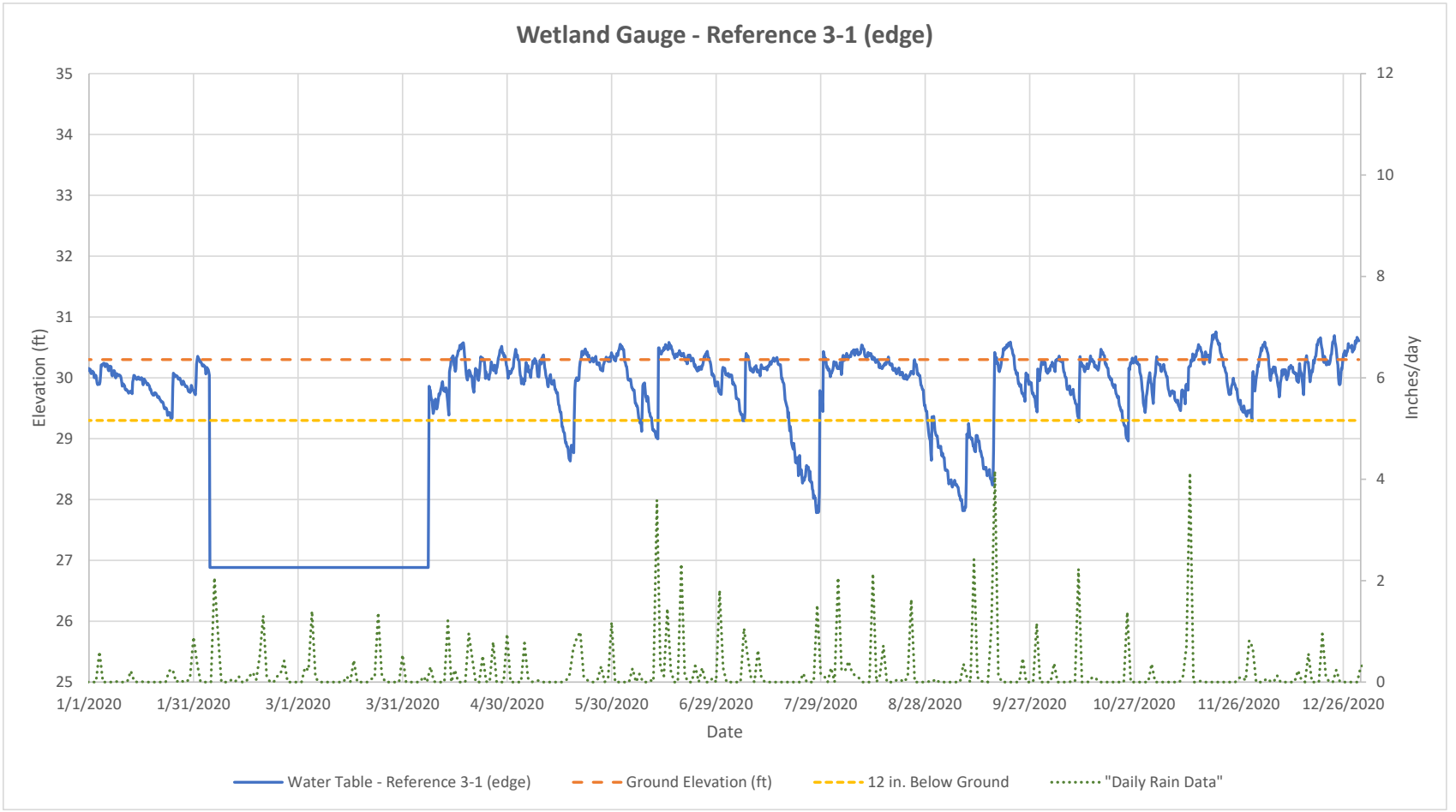
YEAR 2 (2019)



Site Info (Year 2)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	1/1/2019
End Date	12/31/2019
Total Days of Well Data	365.00
Water Table Criteria	-1

Growing Season Information (Year 2)		
Site		Beane Property
Gauge ID		Reference 3-1 (edge)
Serial #		20331498
Growing Season Start Date		2/28
Growing Season End Date		12/2
Total Growing Season Days		277
NRCS Soil Series		Stallings
7.0%	Growing Season (Days)	19
9.0%	Growing Season (Days)	25
Total Consecutive Days w/in Current Growing Season		27.33
Percent of Growing Season		9.7%

YEAR 3 (2020)



Site Info (Year 3)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	1/1/2020
End Date	12/31/2020
Total Days of Well Data	301.67
Water Table Criteria	-1

Growing Season Information (Year 3)		
Site		Beane Property
Gauge ID		Reference 3-1 (edge)
Serial #		20331498
Growing Season Start Date		2/28/20
Growing Season End Date		12/2/20
Total Growing Season Days		277
NRCS Soil Series		Stallings
7.0%	Growing Season (Days)	19
9.0%	Growing Season (Days)	25
Total Consecutive Days w/in Current Growing Season		38.17
Percent of Growing Season		13.7%

Soil Profile Description

Project/Site:	Beane Property (Groundwater Well Installations)	Sampling Date:	5/11/2018
Investigator(s):	Tom Barrett, Ecosystem Planning & Restoration	Sampling Point:	Ref Well 3-1 edge
City/County:	Scotts Hill / Pender County, NC	County:	New Hanover
Soil Map Unit Name:	**Stallings fine sand**	Lat: 34.338065	Long: -77.807218

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of incators

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Location	Texture	Remarks
0-8	10YR 2/1	100%					Sandy Clay Loam	75 - 90% masked sand grains, fine sand
8-13	10YR 4/1	85%	10YR 4/6	15%	C	M	Sandy Clay Loam	
13-30	10YR 5/1	60%	10YR 6/8	40%	C	M	Sandy Clay Loam	fine sand
30-48	10YR 6/1	70%	10YR 5/8	30%	C	M	Sandy Clay Loam	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2] Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

1 **Depleted Below Dark Surface (A11)**
2
3
4

Indicators for Problematic Hydric Soils

1
2
3

Restrictive Layer (if observed):

Type:
Depth (inches):

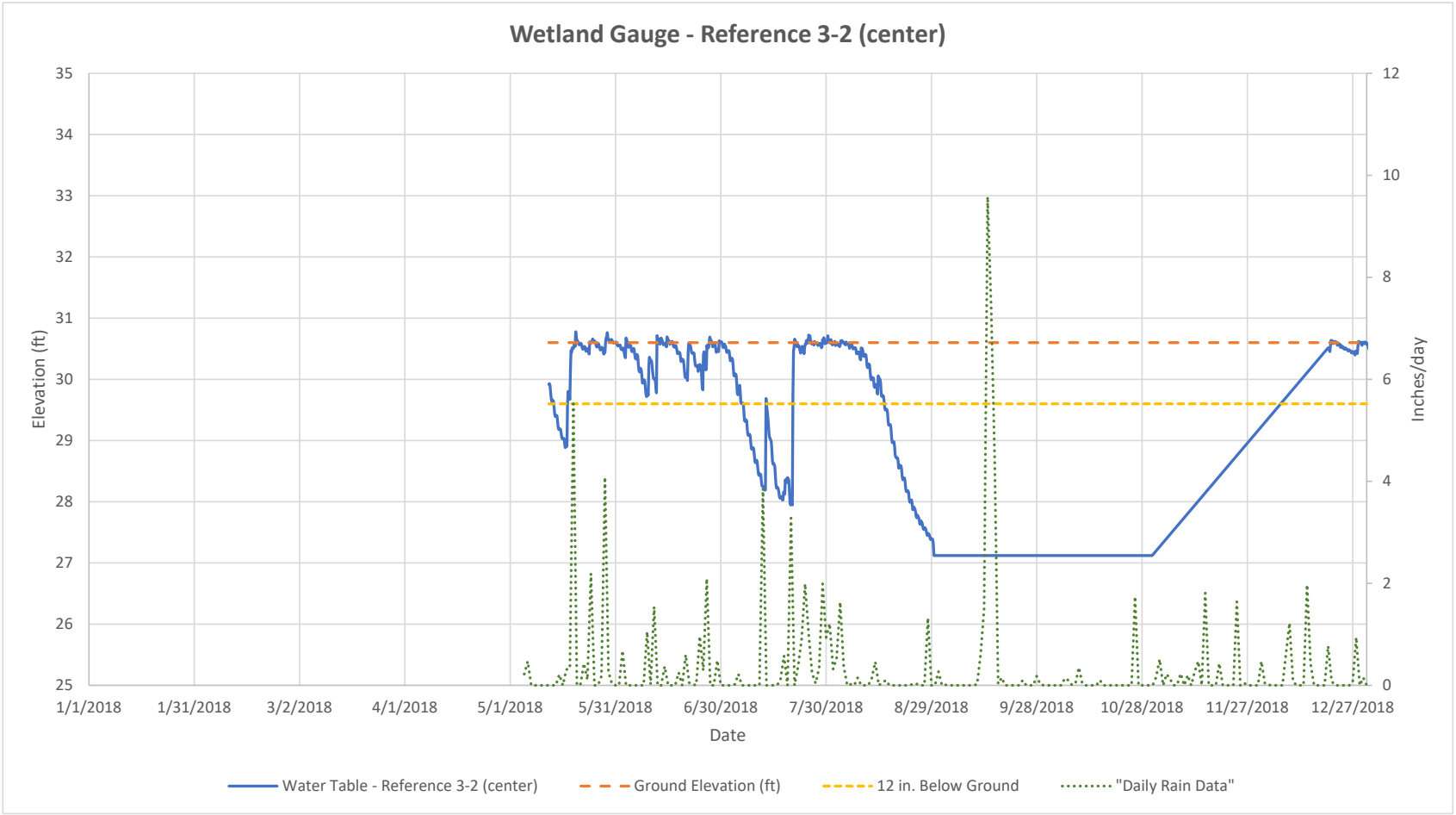
Hydric Soil Present? **Yes** X **No**

Remarks:

Notes:

Site is located off of Sidbury Road near Island Creek in Hanover County, NC.
MLRA 153A, LRR T

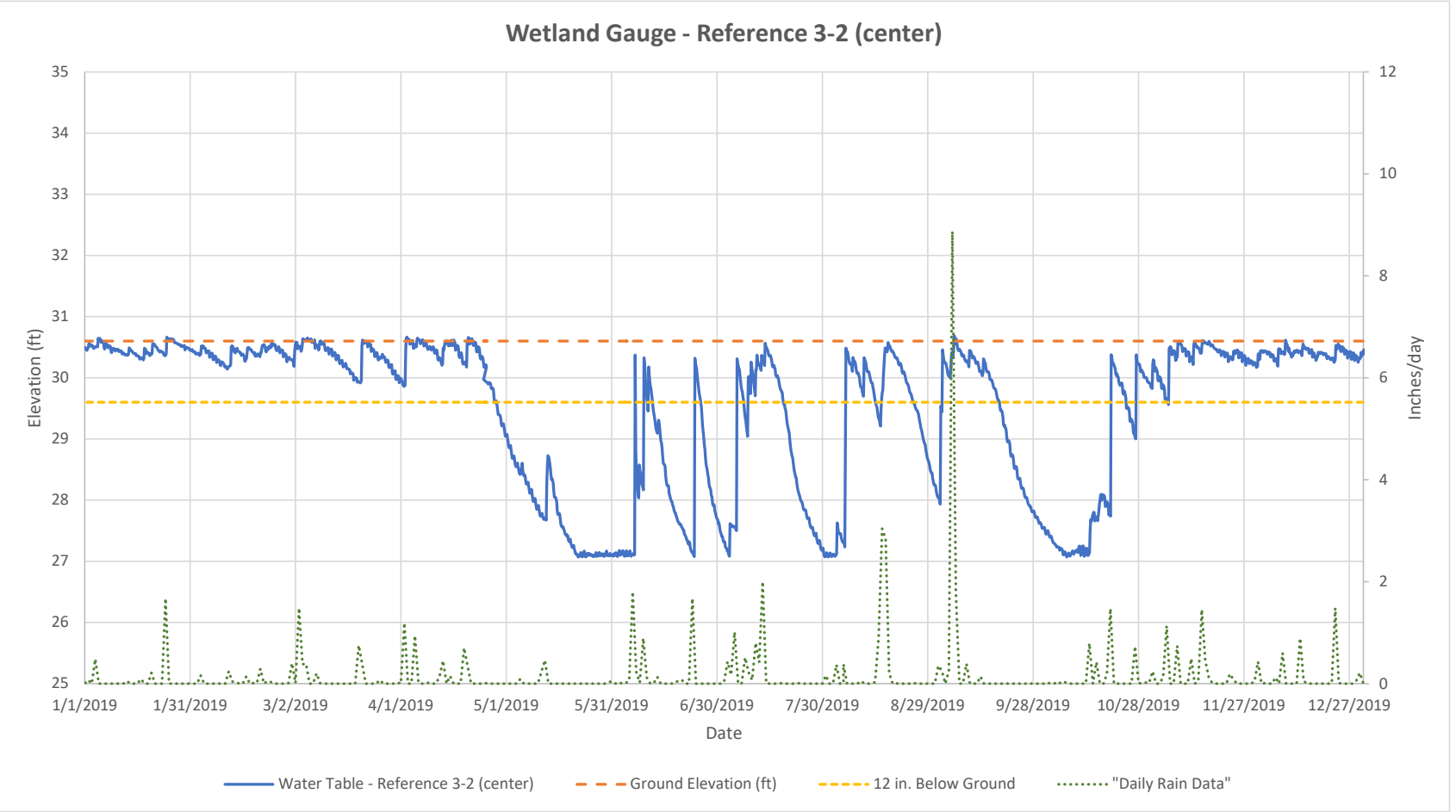
YEAR 1 (2018)



Site Info (Year 1)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	5/12/2018
End Date	12/31/2018
Total Days of Well Data	121.67
Water Table Criteria	-1

Growing Season Information (Year 1)		
Site		Beane Property
Gauge ID		Reference 3-2 (center)
Serial #		20331499
Growing Season Start Date		2/28
Growing Season End Date		12/2
Total Growing Season Days		277
NRCS Soil Series		Stallings
7.0%	Growing Season (Days)	19
9.0%	Growing Season (Days)	25
Total Consecutive Days w/in Current Growing Season		50.00
Percent of Growing Season		18.1%

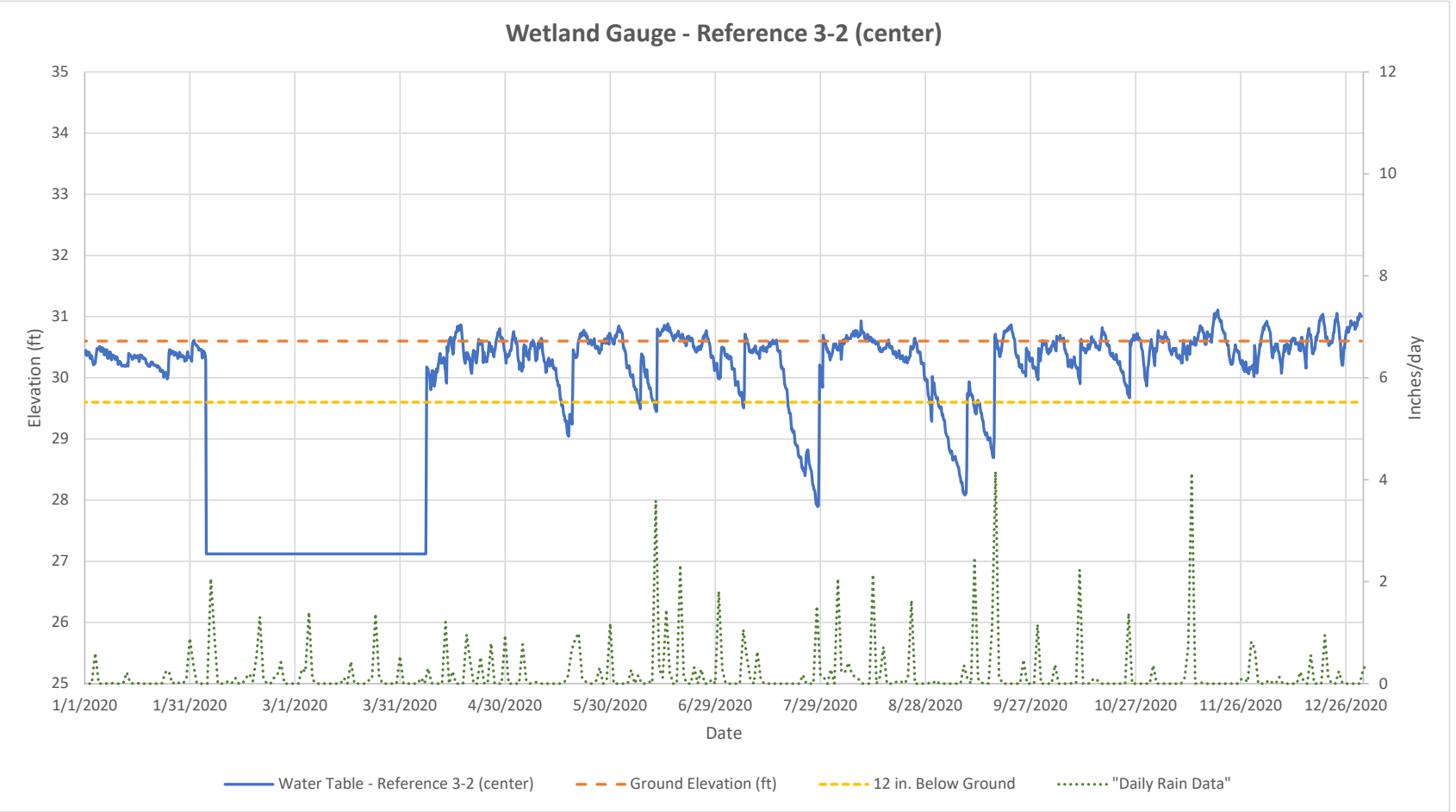
YEAR 2 (2019)



Site Info (Year 2)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	1/1/2019
End Date	12/31/2019
Total Days of Well Data	365.00
Water Table Criteria	-1

Growing Season Information (Year 2)		
Site		Beane Property
Gauge ID		Reference 3-2 (center)
Serial #		20331499
Growing Season Start Date		2/28
Growing Season End Date		12/2
Total Growing Season Days		277
NRCS Soil Series		Stallings
7.0%	Growing Season (Days)	19
9.0%	Growing Season (Days)	25
Total Consecutive Days w/in Current Growing Season		58.67
Percent of Growing Season		20.9%

YEAR 3 (2020)



Site Info (Year 3)	
Site	Beane Property
Stream/Wetland	Wetland
Begin Date	1/1/2020
End Date	12/31/2020
Total Days of Well Data	301.67
Water Table Criteria	-1

Growing Season Information (Year 3)		
Site		Beane Property
Gauge ID		Reference 3-2 (center)
Serial #		20331499
Growing Season Start Date		2/28/20
Growing Season End Date		12/2/20
Total Growing Season Days		277
NRCS Soil Series		Stallings
7.0%	Growing Season (Days)	19
9.0%	Growing Season (Days)	25
Total Consecutive Days within Growing Season		77.33
Percent of Growing Season		27.8%

Soil Profile Description

Project/Site:	Beane Property (Groundwater Well Installations)	Sampling Date:	5/11/2018
Investigator(s):	Tom Barrett, Ecosystem Planning & Restoration	Sampling Point:	Ref Well 3-2 center
City/County:	Scotts Hill / Pender County, NC	County:	New Hanover
Soil Map Unit Name:	**Stallings fine sand**	Lat: 34.337517	Long: -77.806900

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of incators

Depth	Matrix			Redox Features					
(inches)	Color (moist)		%	Color (moist)		%	Type[1]	Location	Texture	Remarks
0-16	10YR	2/1	100%						Sandy Clay Loam	75 - 90% masked sand grains, fine sand
16-21	10YR	5/1	90%	10YR	5/8	10%	C	M	Sandy Clay Loam	
21-44	10YR	5/1	60%	10YR	5/8	40%	C	M	Sandy Clay	fine sand
44-48	10YR	5/1	60%	10YR	5/8	20%	C	M	Sandy Clay Loam	
				10YR	5/3	20%	C	M	Sandy Clay Loam	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains [2] Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

1 **Thick Dark Surface (A12)**
2
3
4

Indicators for Problematic Hydric Soils

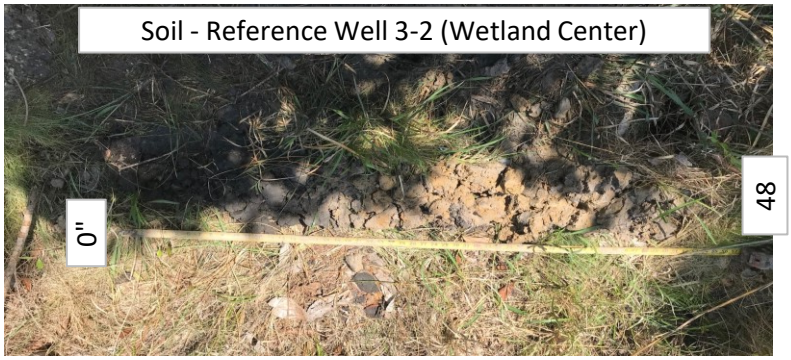
1
2
3

Restrictive Layer (if observed):

Type:
Depth (inches):

Hydric Soil Present? **Yes** X **No**

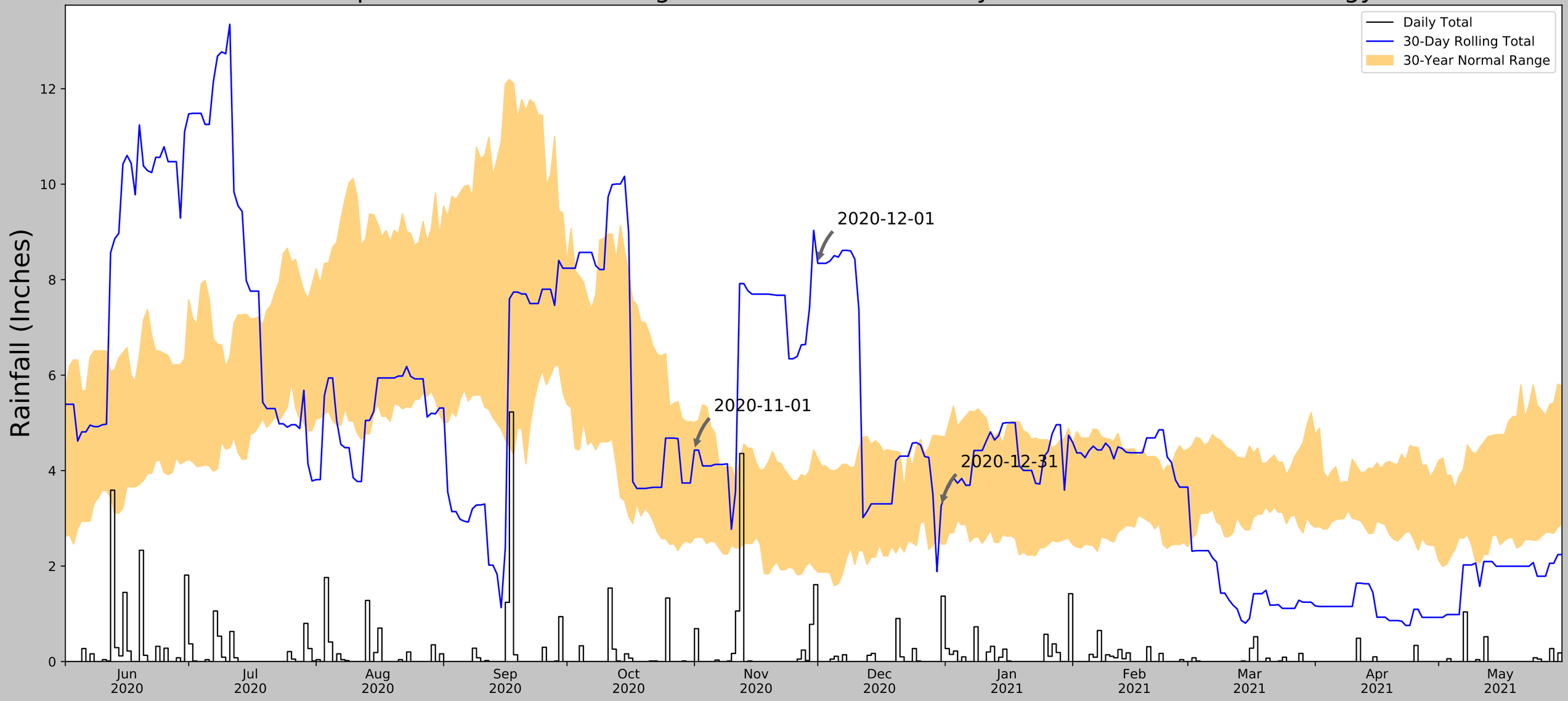
Remarks:



Notes:

Site is located off of Sidbury Road near Island Creek in Hanover County, NC.
MLRA 153A, LRR T

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	34.331618, -77.805624
Observation Date	2020-12-31
Elevation (ft)	40.44
Drought Index (PDSI)	Severe wetness

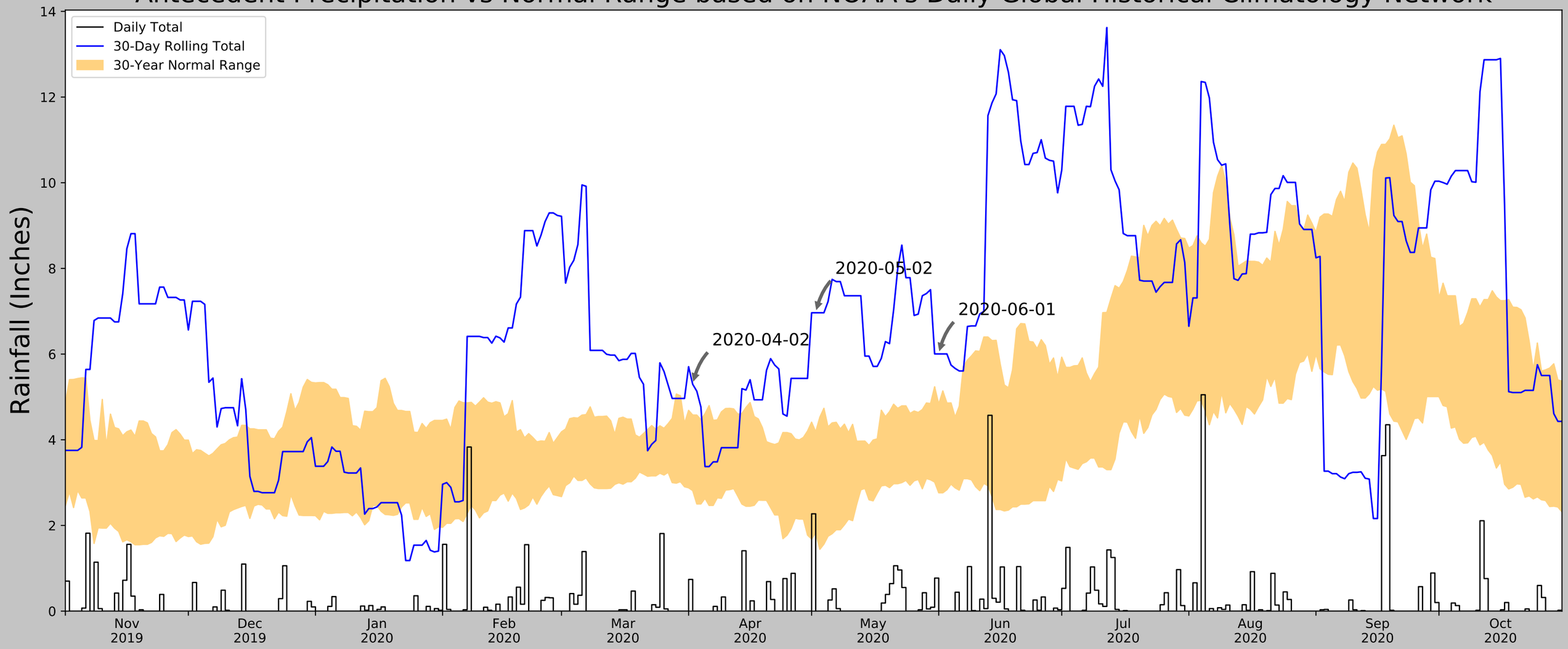
Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2020-12-31	2.46063	4.714173	3.255906	Normal	2	3	6
2020-12-01	1.874016	4.252756	8.34252	Wet	3	2	6
2020-11-01	2.590945	5.008662	4.429134	Normal	2	1	2
Result							Normal Conditions - 14

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
WILMINGTON 7 N	34.3208, -77.9206	40.026	6.603	0.414	2.974	11075	90
WRIGHTSBORO 2.9 ENE	34.3037, -77.8795	37.073	2.626	2.953	1.189	19	0
WILMINGTON INTL AP	34.2675, -77.8997	33.136	3.871	6.89	1.769	259	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	34.331618, -77.805624
Observation Date	2020-06-01
Elevation (ft)	40.44
Drought Index (PDSI)	Severe wetness

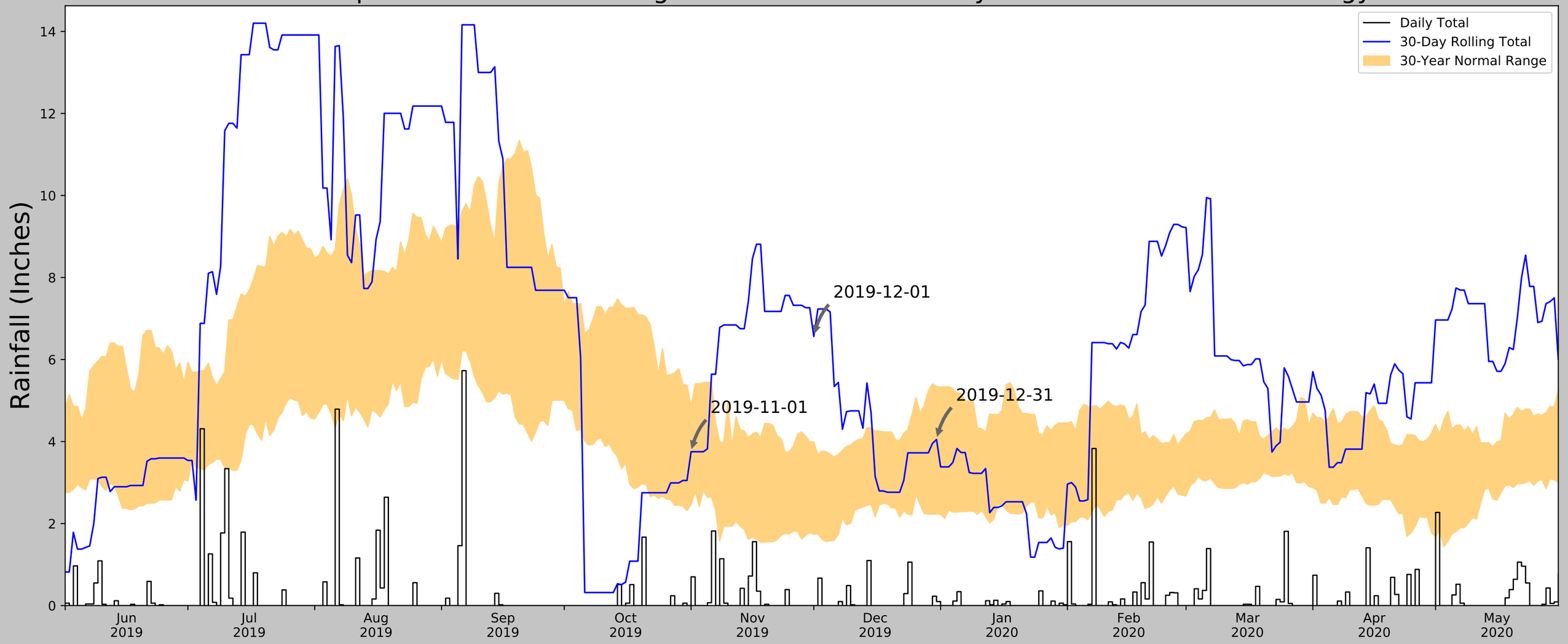
Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

30 Days Ending	30^{th} %ile (in)	70^{th} %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2020-06-01	2.761811	4.83189	6.003937	Wet	3	3	9
2020-05-02	1.828347	4.186221	6.964567	Wet	3	2	6
2020-04-02	2.814567	4.577559	5.295276	Wet	3	1	3
Result							Wetter than Normal - 18

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
LELAND 5.7 WSW	34.2024, -78.0948	68.898	18.771	28.458	8.981	4320	90
WINNABOW 3.6 SE	34.1073, -78.0559	33.136	21.087	7.304	9.643	25	0
SOUTHPORT 1.0 NE	33.9322, -78.008	18.045	29.926	22.395	14.137	2	0
LELAND 2.2 SW	34.2194, -78.0336	26.903	15.151	13.537	7.023	1	0
LELAND 3.5 SSW	34.1947, -78.0311	24.934	15.977	15.506	7.437	4	0
TOPSAIL BEACH 0.9 E	34.3756, -77.6176	6.89	11.147	33.55	5.39	4	0
BURGAW 3W	34.5494, -77.9719	49.869	17.782	9.429	8.17	456	0
BURGAW 4 E	34.5322, -77.8639	33.136	14.251	7.304	6.517	236	0
E ARCADIA 2 NE	34.3992, -78.3158	50.853	29.469	10.413	13.568	287	0
MOORES CREEK NB	34.4581, -78.1094	21.982	19.399	18.458	9.088	1	0
SOUTHPORT 5 N	33.9947, -78.0078	20.013	25.99	20.427	12.226	5685	0
WALLACE 1SE	34.7314, -77.9831	35.105	29.412	5.335	13.392	134	0
WILLARD 4 SW	34.6606, -78.0453	55.118	26.513	14.678	12.32	194	0
WILMINGTON 7 N	34.3208, -77.9206	40.026	6.603	0.414	2.974	3	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	34.331618, -77.805624
Observation Date	2019-12-31
Elevation (ft)	40.44
Drought Index (PDSI)	Incipient wetness

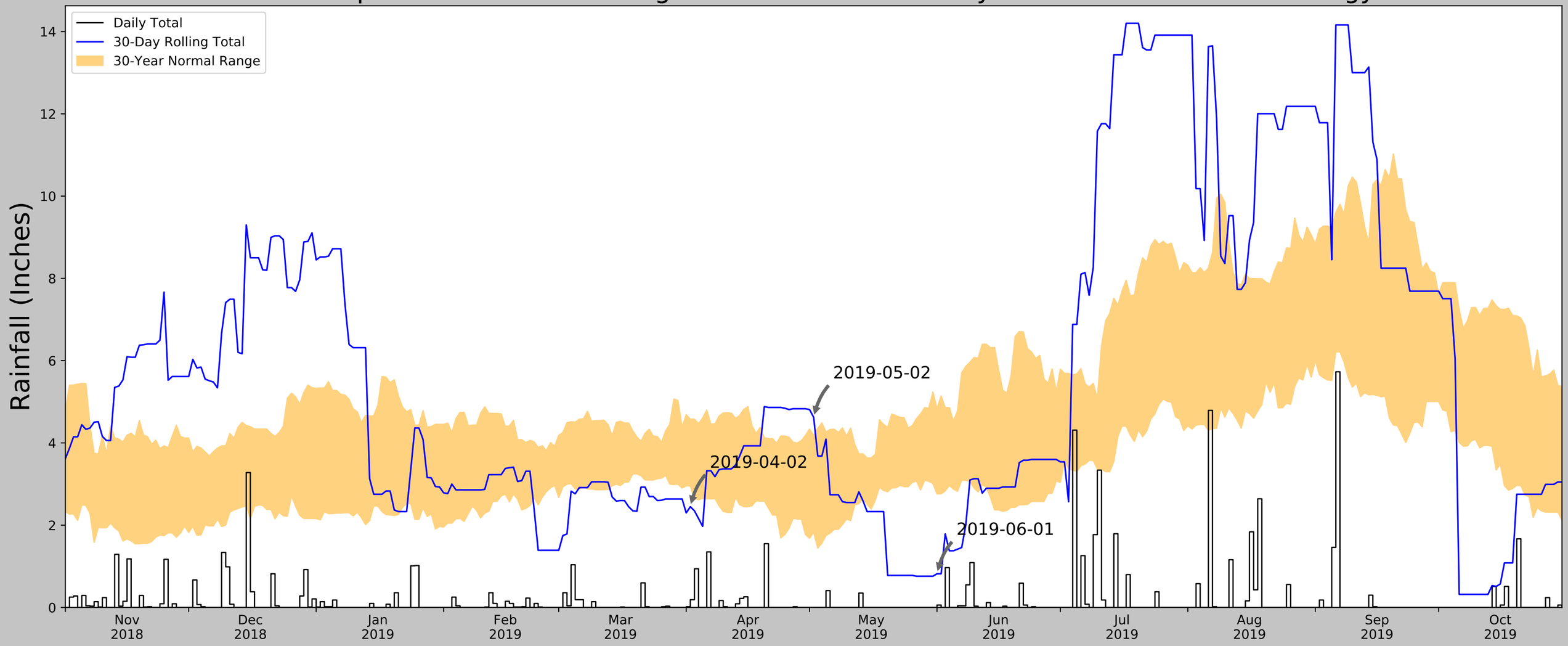
30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2019-12-31	2.232284	5.340945	4.051181	Normal	2	3	6
2019-12-01	1.740551	3.992126	6.562992	Wet	3	2	6
2019-11-01	2.463386	4.853543	3.751969	Normal	2	1	2
Result							Normal Conditions - 14

Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
LELAND 5.7 WSW	34.2024, -78.0948	68.898	18.771	28.458	8.981	4320	90
WINNABOW 3.6 SE	34.1073, -78.0559	33.136	21.087	7.304	9.643	25	0
SOUTHPORT 1.0 NE	33.9322, -78.008	18.045	29.926	22.395	14.137	2	0
LELAND 2.2 SW	34.2194, -78.0336	26.903	15.151	13.537	7.023	1	0
LELAND 3.5 SSW	34.1947, -78.0311	24.934	15.977	15.506	7.437	4	0
TOPSAIL BEACH 0.9 E	34.3756, -77.6176	6.89	11.147	33.55	5.39	4	0
BURGAW 3W	34.5494, -77.9719	49.869	17.782	9.429	8.17	456	0
BURGAW 4 E	34.5322, -77.8639	33.136	14.251	7.304	6.517	236	0
E ARCADIA 2 NE	34.3992, -78.3158	50.853	29.469	10.413	13.568	287	0
MOORES CREEK NB	34.4581, -78.1094	21.982	19.399	18.458	9.088	1	0
SOUTHPORT 5 N	33.9947, -78.0078	20.013	25.99	20.427	12.226	5685	0
WALLACE 1SE	34.7314, -77.9831	35.105	29.412	5.335	13.392	134	0
WILLARD 4 SW	34.6606, -78.0453	55.118	26.513	14.678	12.32	194	0
WILMINGTON 7 N	34.3208, -77.9206	40.026	6.603	0.414	2.974	3	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	34.331618, -77.805624
Observation Date	2019-06-01
Elevation (ft)	40.44
Drought Index (PDSI)	Moderate drought

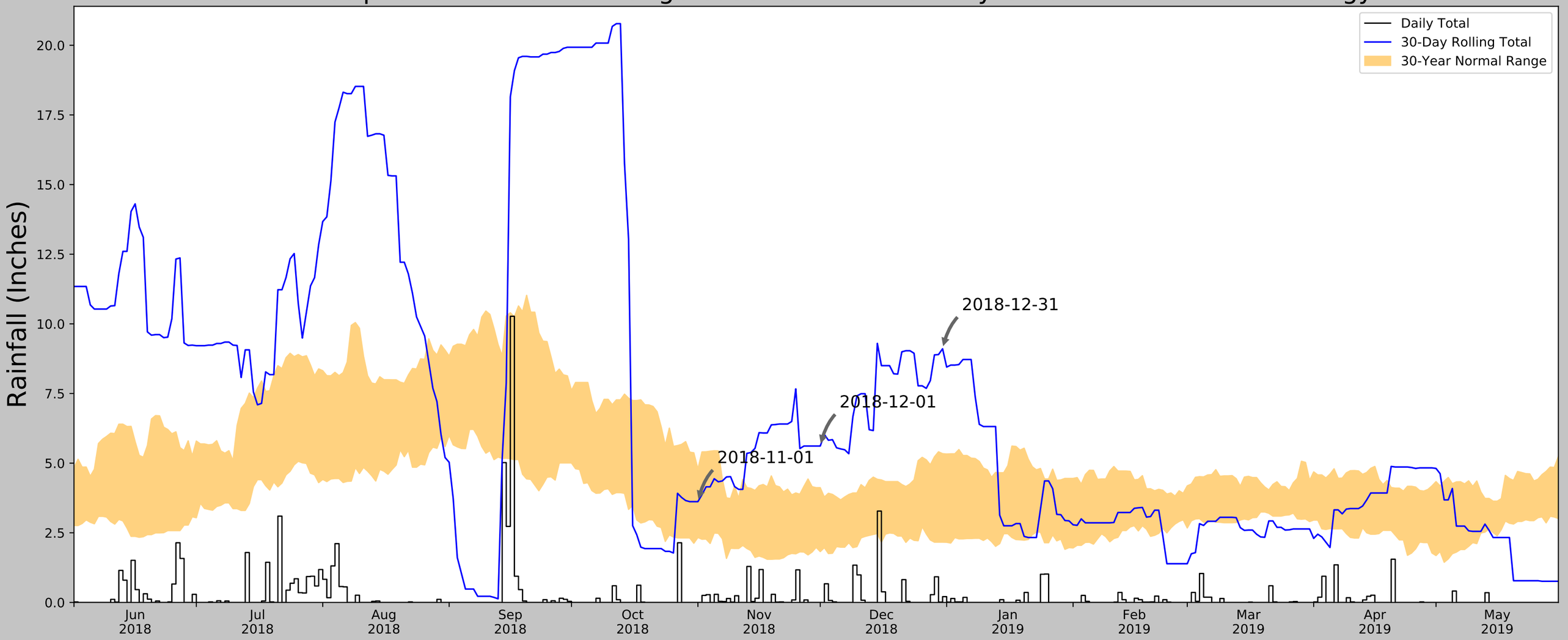
30 Days Ending	30^{th} %ile (in)	70^{th} %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2019-06-01	2.761811	4.83189	0.818898	Dry	1	3	3
2019-05-02	1.828347	4.182677	4.622047	Wet	3	2	6
2019-04-02	2.956693	4.577559	2.448819	Dry	1	1	1
Result							Normal Conditions - 10

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
LELAND 5.7 WSW	34.2024, -78.0948	68.898	18.771	28.458	8.981	3955	90
WINNABOW 3.6 SE	34.1073, -78.0559	33.136	21.087	7.304	9.643	25	0
SOUTHPORT 1.0 NE	33.9322, -78.008	18.045	29.926	22.395	14.137	2	0
LELAND 2.2 SW	34.2194, -78.0336	26.903	15.151	13.537	7.023	1	0
LELAND 3.5 SSW	34.1947, -78.0311	24.934	15.977	15.506	7.437	4	0
TOPSAIL BEACH 0.9 E	34.3756, -77.6176	6.89	11.147	33.55	5.39	4	0
BURGAW 3W	34.5494, -77.9719	49.869	17.782	9.429	8.17	456	0
BURGAW 4 E	34.5322, -77.8639	33.136	14.251	7.304	6.517	236	0
E ARCADIA 2 NE	34.3992, -78.3158	50.853	29.469	10.413	13.568	287	0
MOORES CREEK NB	34.4581, -78.1094	21.982	19.399	18.458	9.088	1	0
SOUTHPORT 5 N	33.9947, -78.0078	20.013	25.99	20.427	12.226	5990	0
WALLACE 1SE	34.7314, -77.9831	35.105	29.412	5.335	13.392	134	0
WILLARD 4 SW	34.6606, -78.0453	55.118	26.513	14.678	12.32	255	0
WILMINGTON 7 N	34.3208, -77.9206	40.026	6.603	0.414	2.974	3	0

Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	34.331618, -77.805624
Observation Date	2018-12-31
Elevation (ft)	40.44
Drought Index (PDSI)	Extreme wetness

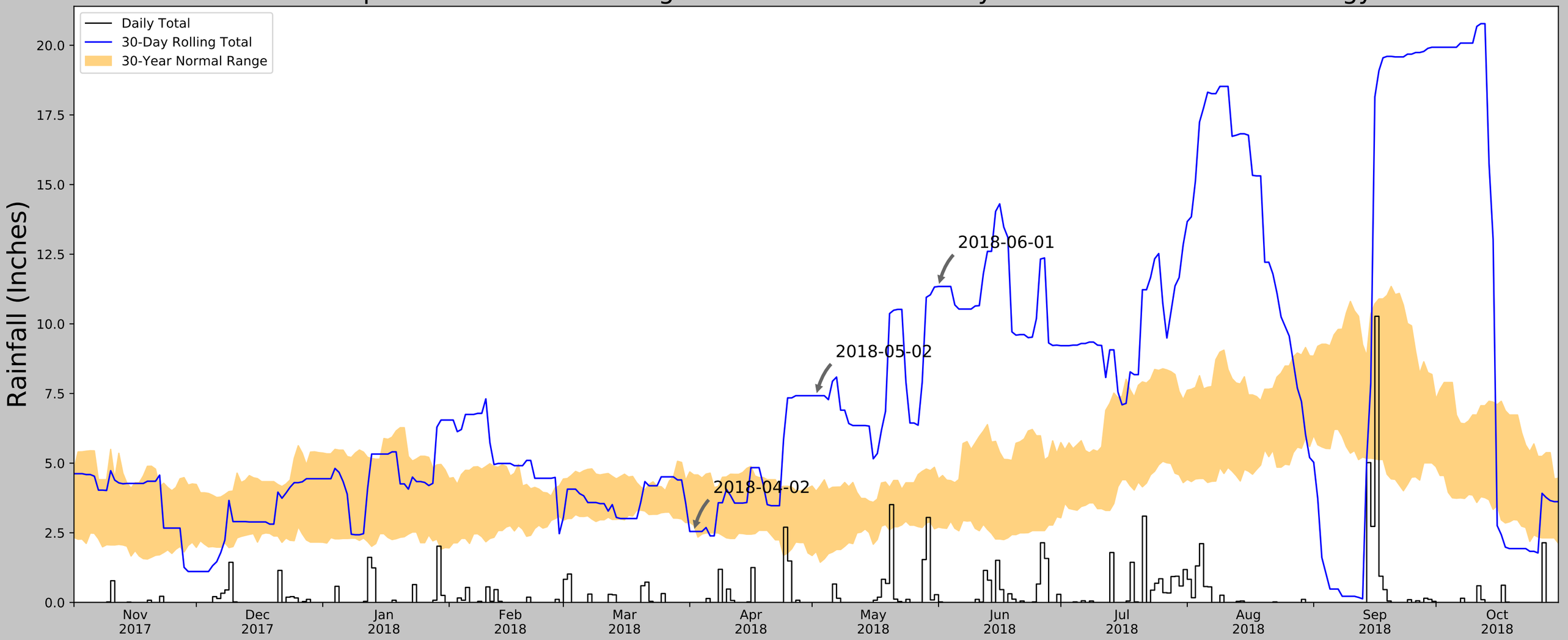
30 Days Ending	30^{th} %ile (in)	70^{th} %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2018-12-31	2.163386	5.340945	9.1063	Wet	3	3	9
2018-12-01	1.82441	4.120079	5.614173	Wet	3	2	6
2018-11-01	2.33189	4.787402	3.61811	Normal	2	1	2
Result							Wetter than Normal - 17

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
LELAND 5.7 WSW	34.2024, -78.0948	68.898	18.771	28.458	8.981	3955	90
WINNABOW 3.6 SE	34.1073, -78.0559	33.136	21.087	7.304	9.643	25	0
SOUTHPORT 1.0 NE	33.9322, -78.008	18.045	29.926	22.395	14.137	2	0
LELAND 2.2 SW	34.2194, -78.0336	26.903	15.151	13.537	7.023	1	0
LELAND 3.5 SSW	34.1947, -78.0311	24.934	15.977	15.506	7.437	4	0
TOPSAIL BEACH 0.9 E	34.3756, -77.6176	6.89	11.147	33.55	5.39	4	0
BURGAW 3W	34.5494, -77.9719	49.869	17.782	9.429	8.17	456	0
BURGAW 4 E	34.5322, -77.8639	33.136	14.251	7.304	6.517	236	0
E ARCADIA 2 NE	34.3992, -78.3158	50.853	29.469	10.413	13.568	287	0
MOORES CREEK NB	34.4581, -78.1094	21.982	19.399	18.458	9.088	1	0
SOUTHPORT 5 N	33.9947, -78.0078	20.013	25.99	20.427	12.226	5990	0
WALLACE 1SE	34.7314, -77.9831	35.105	29.412	5.335	13.392	134	0
WILLARD 4 SW	34.6606, -78.0453	55.118	26.513	14.678	12.32	255	0
WILMINGTON 7 N	34.3208, -77.9206	40.026	6.603	0.414	2.974	3	0

Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



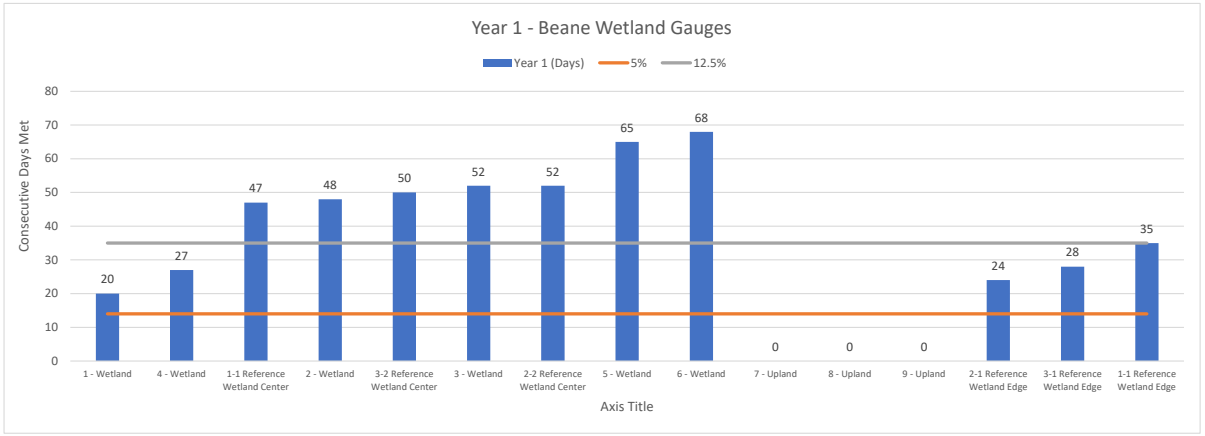
Coordinates	34.331618, -77.805624
Observation Date	2018-06-01
Elevation (ft)	40.44
Drought Index (PDSI)	Mild wetness

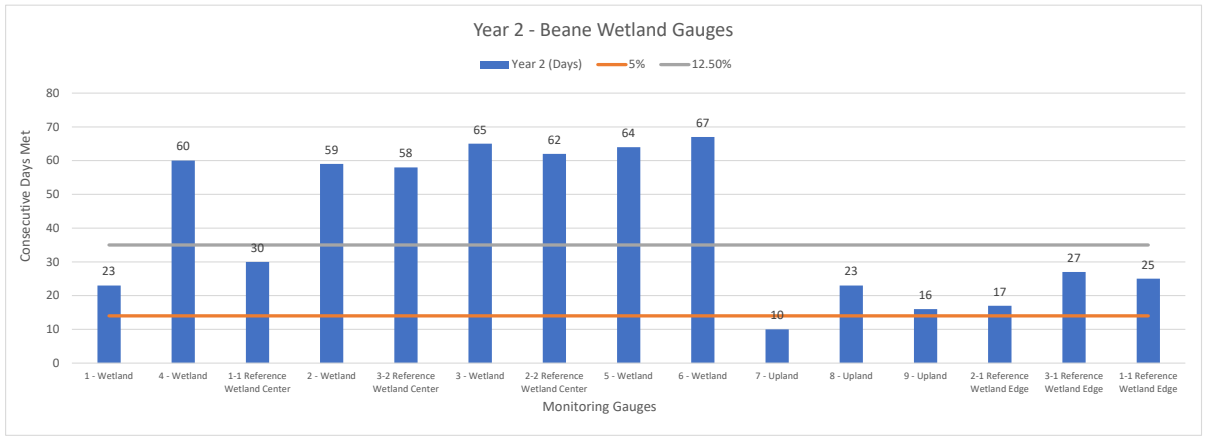
30 Days Ending	30^{th} %ile (in)	70^{th} %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2018-06-01	2.70315	4.433465	11.34252	Wet	3	3	9
2018-05-02	1.828347	3.992914	7.42126	Wet	3	2	6
2018-04-02	2.768504	4.577559	2.547244	Dry	1	1	1
Result							Wetter than Normal - 16

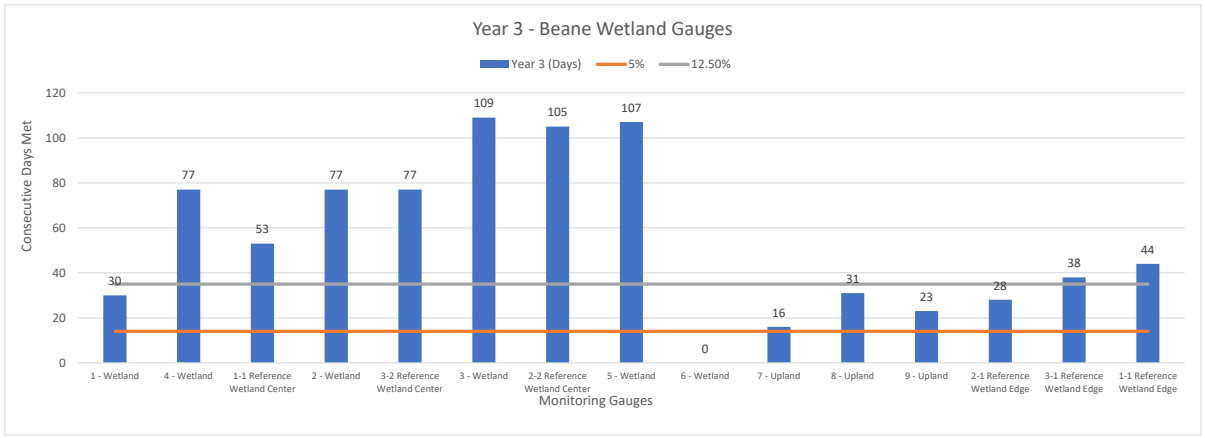
Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
LELAND 5.7 WSW	34.2024, -78.0948	68.898	18.771	28.458	8.981	3596	88
WINNABOW 3.6 SE	34.1073, -78.0559	33.136	21.087	7.304	9.643	24	1
SOUTHPORT 1.0 NE	33.9322, -78.008	18.045	29.926	22.395	14.137	1	1
LELAND 2.2 SW	34.2194, -78.0336	26.903	15.151	13.537	7.023	1	0
TOPSAIL BEACH 0.9 E	34.3756, -77.6176	6.89	11.147	33.55	5.39	4	0
BURGAW 3W	34.5494, -77.9719	49.869	17.782	9.429	8.17	456	0
BURGAW 4 E	34.5322, -77.8639	33.136	14.251	7.304	6.517	236	0
E ARCADIA 2 NE	34.3992, -78.3158	50.853	29.469	10.413	13.568	287	0
MOORES CREEK NB	34.4581, -78.1094	21.982	19.399	18.458	9.088	1	0
SOUTHPORT 5 N	33.9947, -78.0078	20.013	25.99	20.427	12.226	6331	0
WALLACE 1SE	34.7314, -77.9831	35.105	29.412	5.335	13.392	134	0
WILLARD 4 SW	34.6606, -78.0453	55.118	26.513	14.678	12.32	279	0
WILMINGTON 7 N	34.3208, -77.9206	40.026	6.603	0.414	2.974	3	0

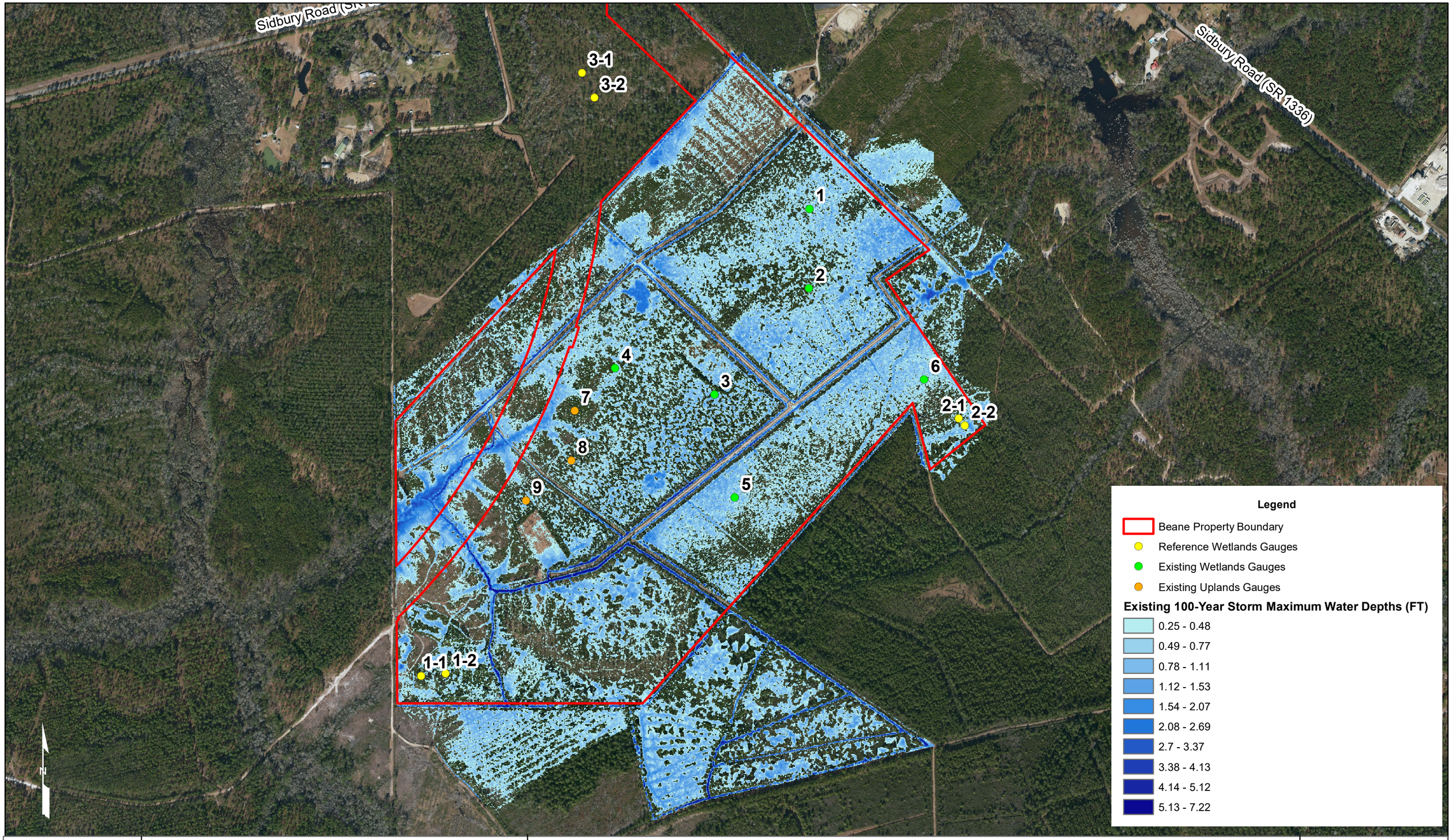

Year 1 - Beane Wetland Gauges
Year 1 (Days)
5%
12.5%
Consecutive Days Met
0
10
20
30
40
50
60
70
80
20
27
47
48
50
52
52
65
68
0
0
0
24
28
35
1 - Wetland
4 - Wetland
1-1 Reference Wetland Center
2 - Wetland
3-2 Reference Wetland Center
3 - Wetland
2-2 Reference Wetland Center
5 - Wetland
6 - Wetland
7 - Upland
8 - Upland
9 - Upland
2-1 Reference Wetland Edge
3-1 Reference Wetland Edge
1-1 Reference Wetland Edge
Axis Title


Year 2 - Beane Wetland Gauges
Year 2 (Days)
5%
12.50%
Consecutive Days Met
0
10
20
30
40
50
60
70
80
23
60
30
59
58
65
62
64
67
10
23
16
17
27
25
1 - Wetland
4 - Wetland
1-1 Reference Wetland Center
2 - Wetland
3-2 Reference Wetland Center
3 - Wetland
2-2 Reference Wetland Center
5 - Wetland
6 - Wetland
7 - Upland
8 - Upland
9 - Upland
2-1 Reference Wetland Edge
3-1 Reference Wetland Edge
1-1 Reference Wetland Edge
Monitoring Gauges


Year 3 - Beane Wetland Gauges
Year 3 (Days)
5%
12.50%
Consecutive Days Met
0
20
40
60
80
100
120
30
77
53
77
77
109
105
107
0
16
31
23
28
38
44
1 - Wetland
4 - Wetland
1-1 Reference Wetland Center
2 - Wetland
3-2 Reference Wetland Center
3 - Wetland
2-2 Reference Wetland Center
5 - Wetland
6 - Wetland
7 - Upland
8 - Upland
9 - Upland
2-1 Reference Wetland Edge
3-1 Reference Wetland Edge
1-1 Reference Wetland Edge
Monitoring Gauges

Appendix 4

Surface Water Modeling



1 inch = 700 feet

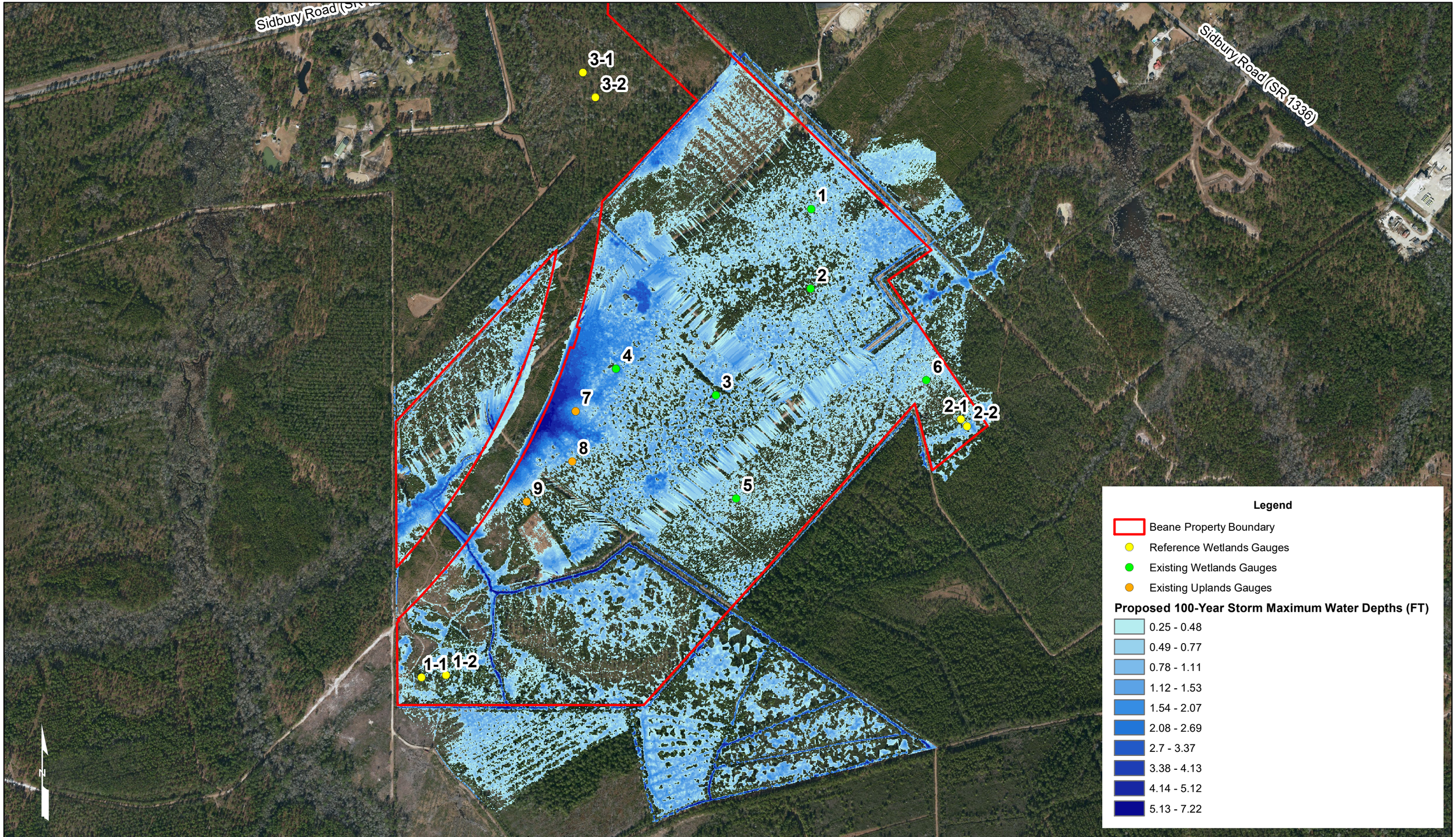
0 350 700 1,400 2,100 Feet

Beane Property Wetland Mitigation Site

Existing 100-year Storm Maximum Water Depths

New Hanover County, NC

Figure 1



1 inch = 700 feet

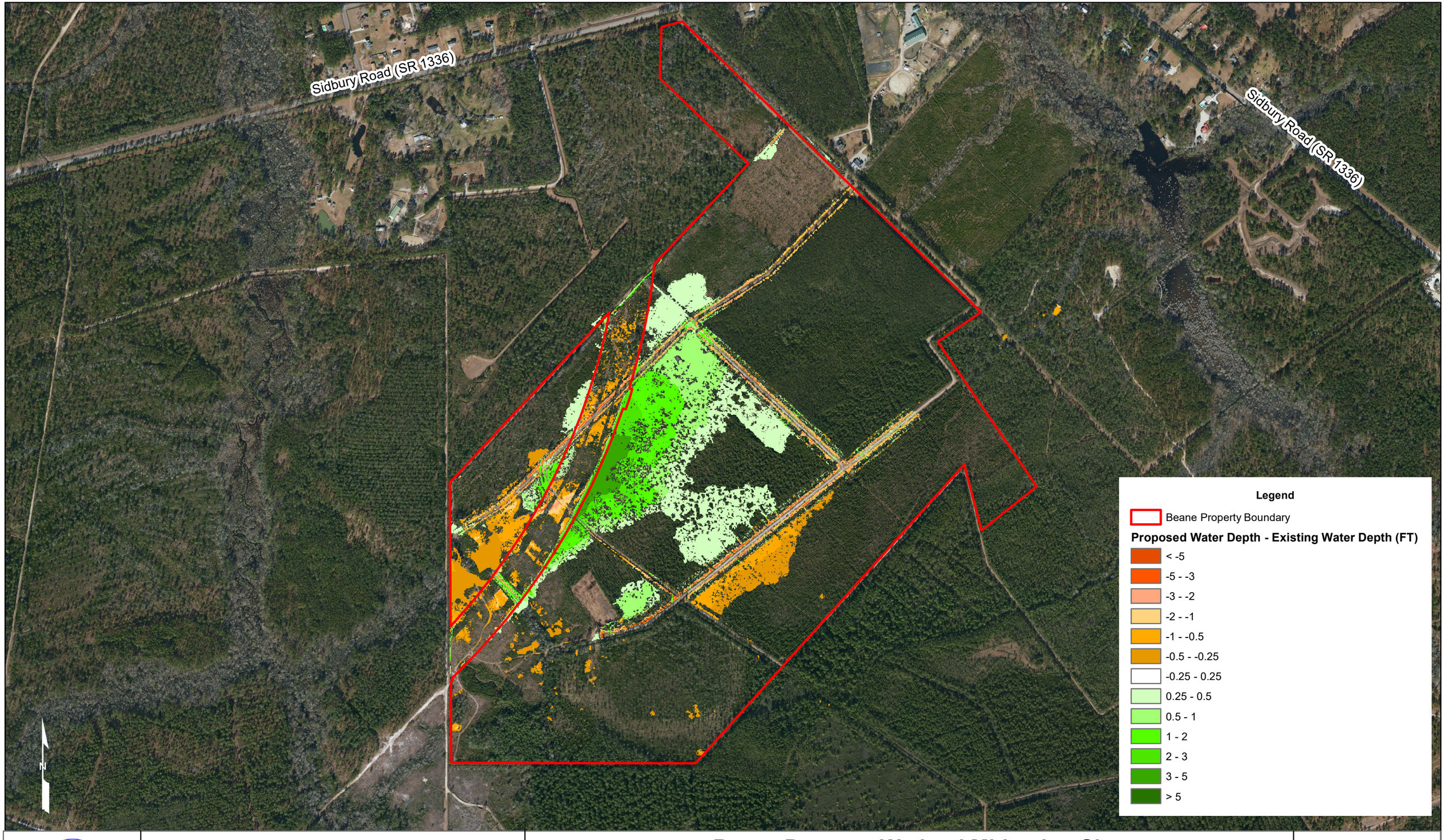
0 350 700 1,400 2,100 Feet

Beane Property Wetland Mitigation Site

Proposed 100-year Storm Maximum Water Depths

New Hanover County, NC

Figure 2



1 inch = 700 feet

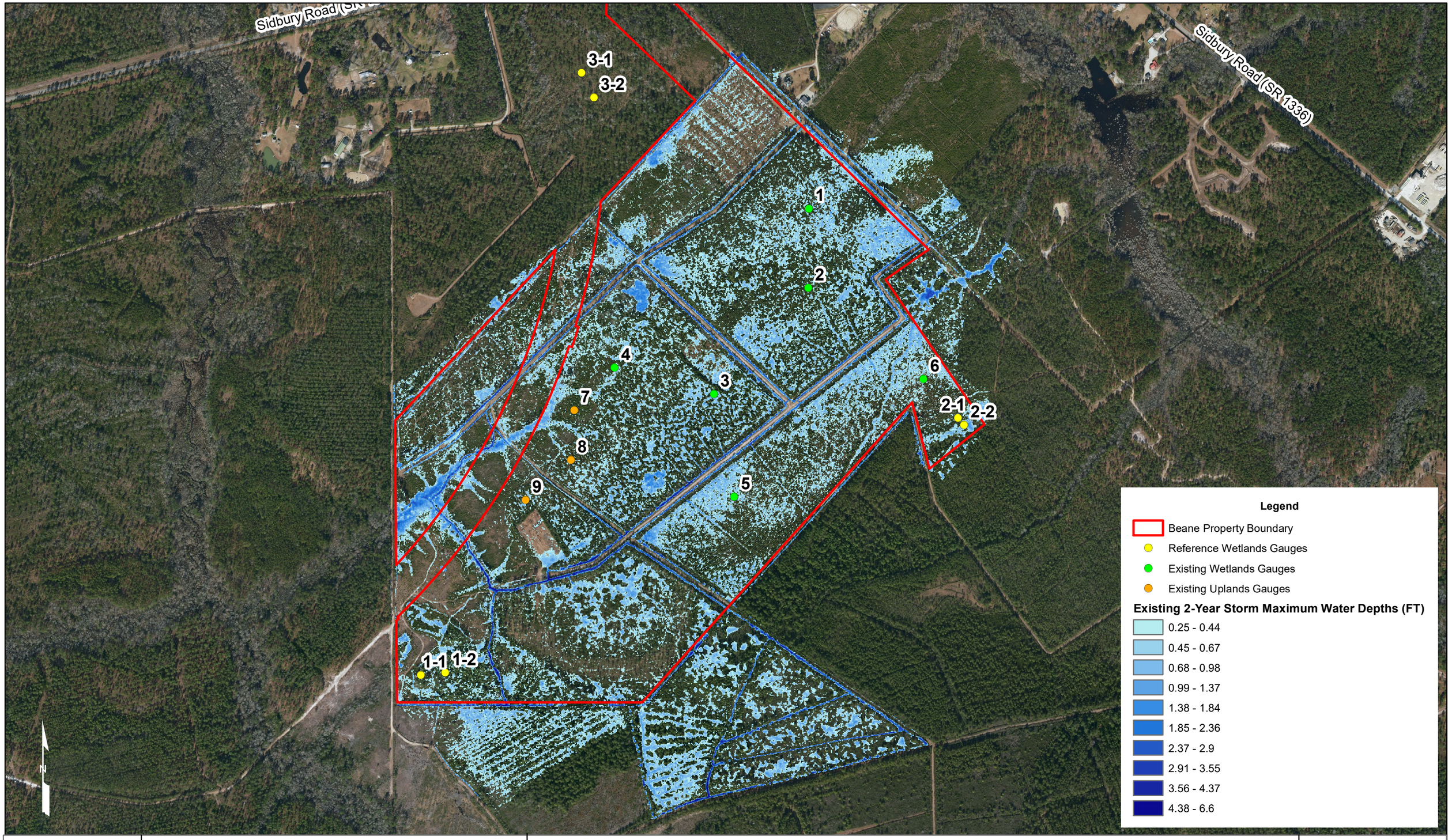
0 350 700 1,400 2,100 Feet

Beane Property Wetland Mitigation Site

Difference in 100-year Storm Maximum Water Depths

New Hanover County, NC

Figure 3



1 inch = 700 feet

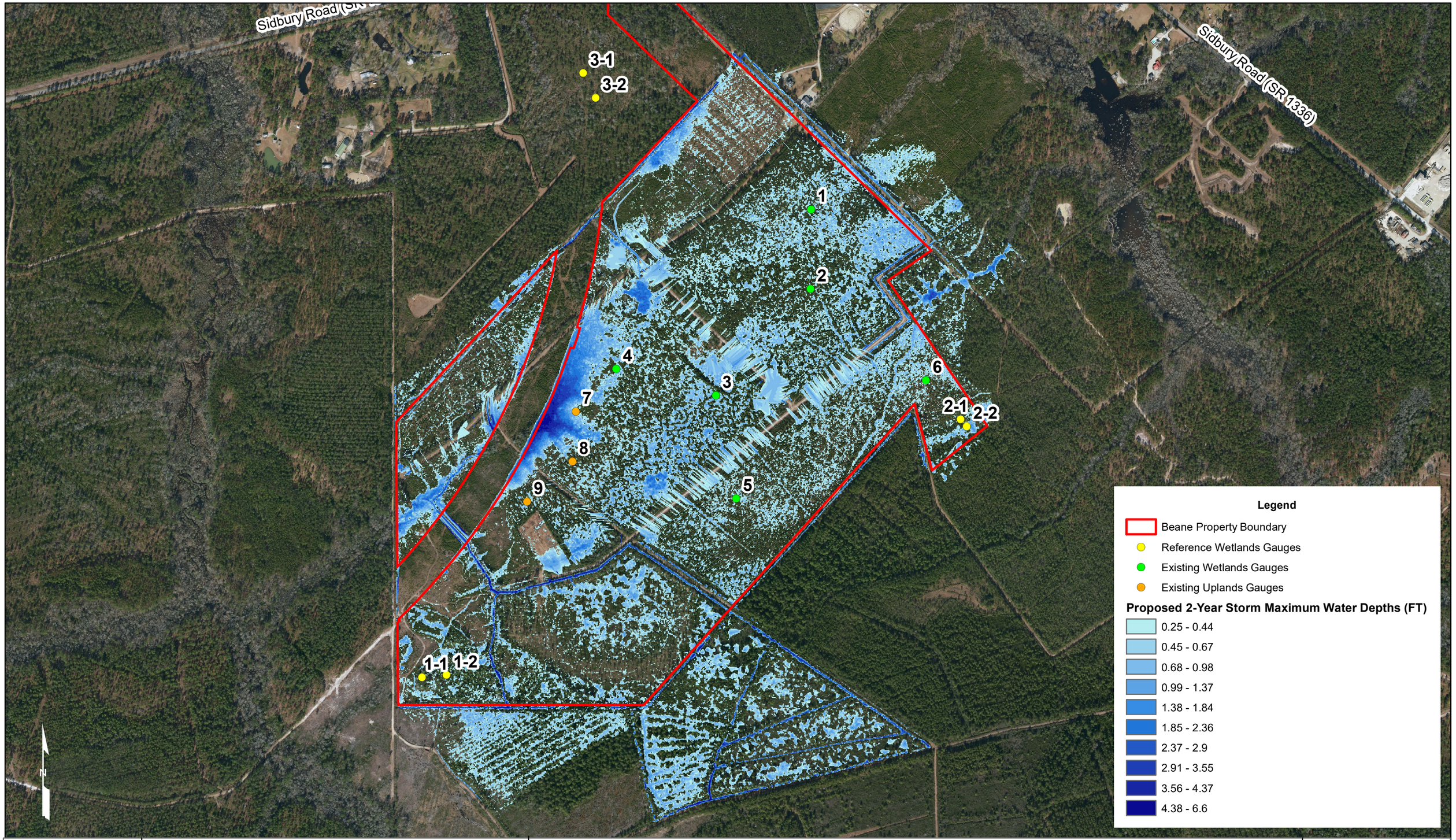
0 350 700 1,400 2,100 Feet

Beane Property Wetland Mitigation Site

Existing 2-year Storm Maximum Water Depths

New Hanover County, NC

Figure 4



1 inch = 700 feet

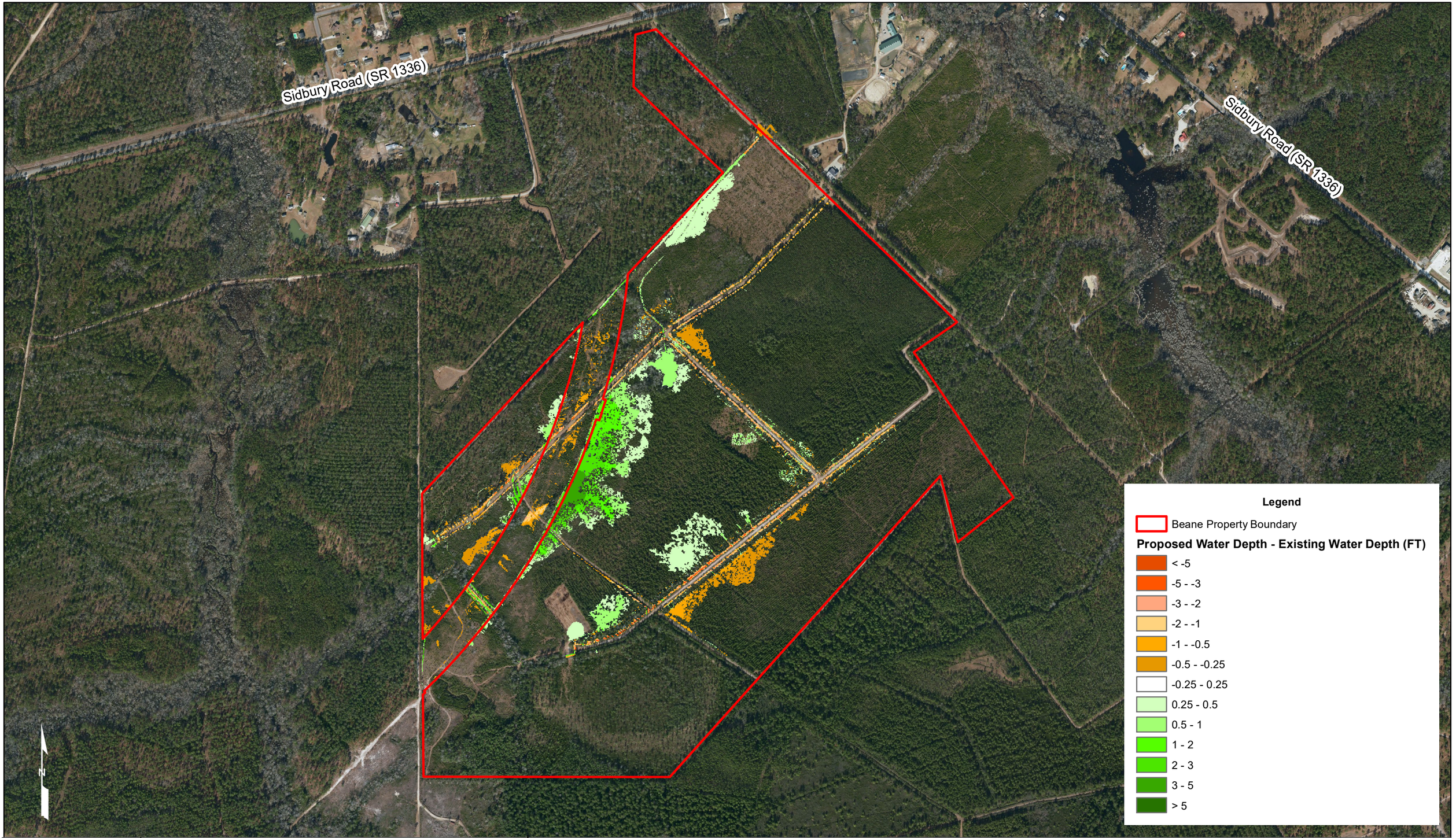
0 350 700 1,400 2,100 Feet

Beane Property Wetland Mitigation Site

Proposed 2-year Storm Maximum Water Depths

New Hanover County, NC

Figure 5



1 inch = 700 feet

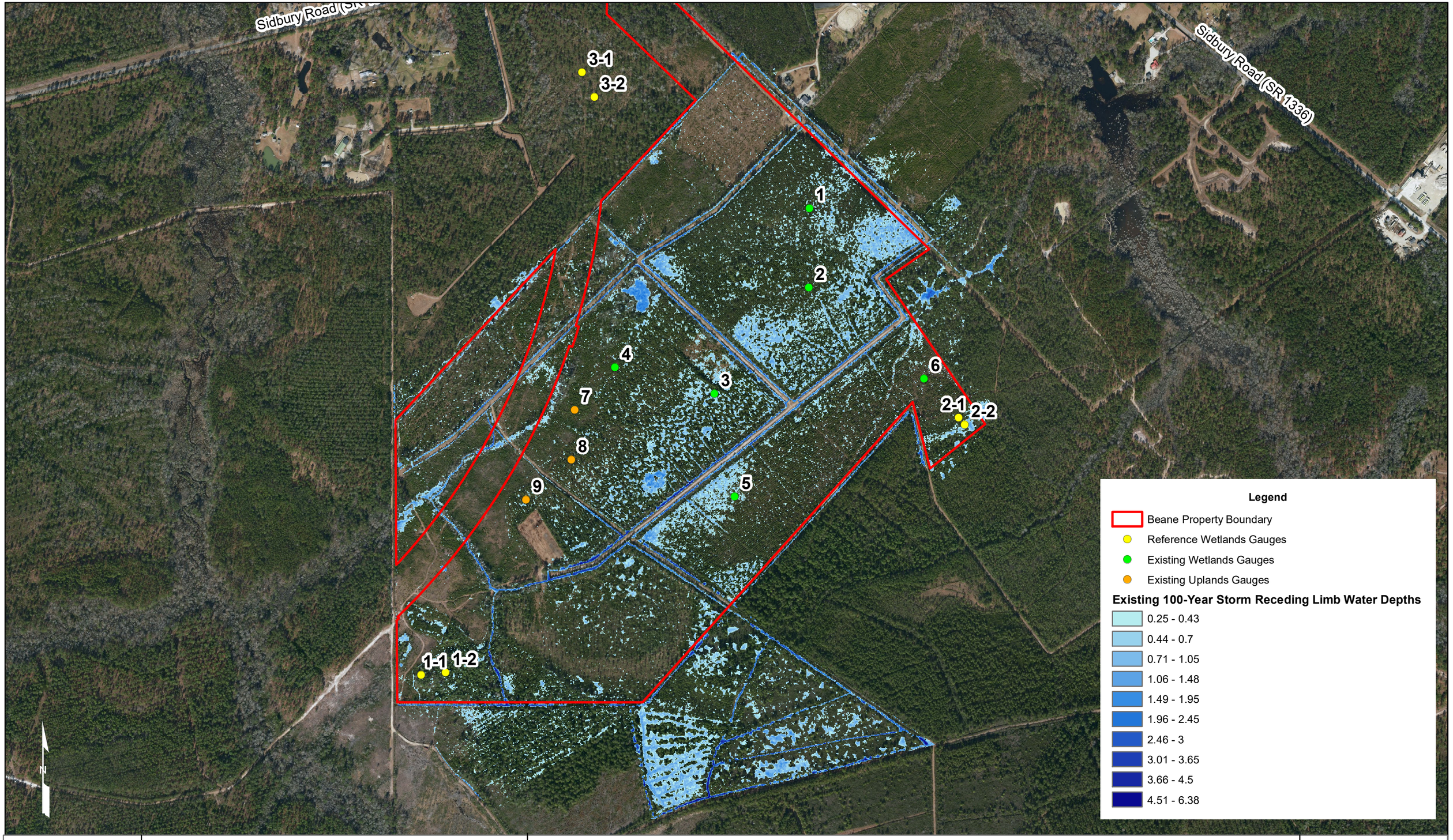
0 350 700 1,400 2,100 Feet

Beane Property Wetland Mitigation Site

Difference in 2-year Maximum Water Depths

New Hanover County, NC

Figure 6



1 inch = 700 feet

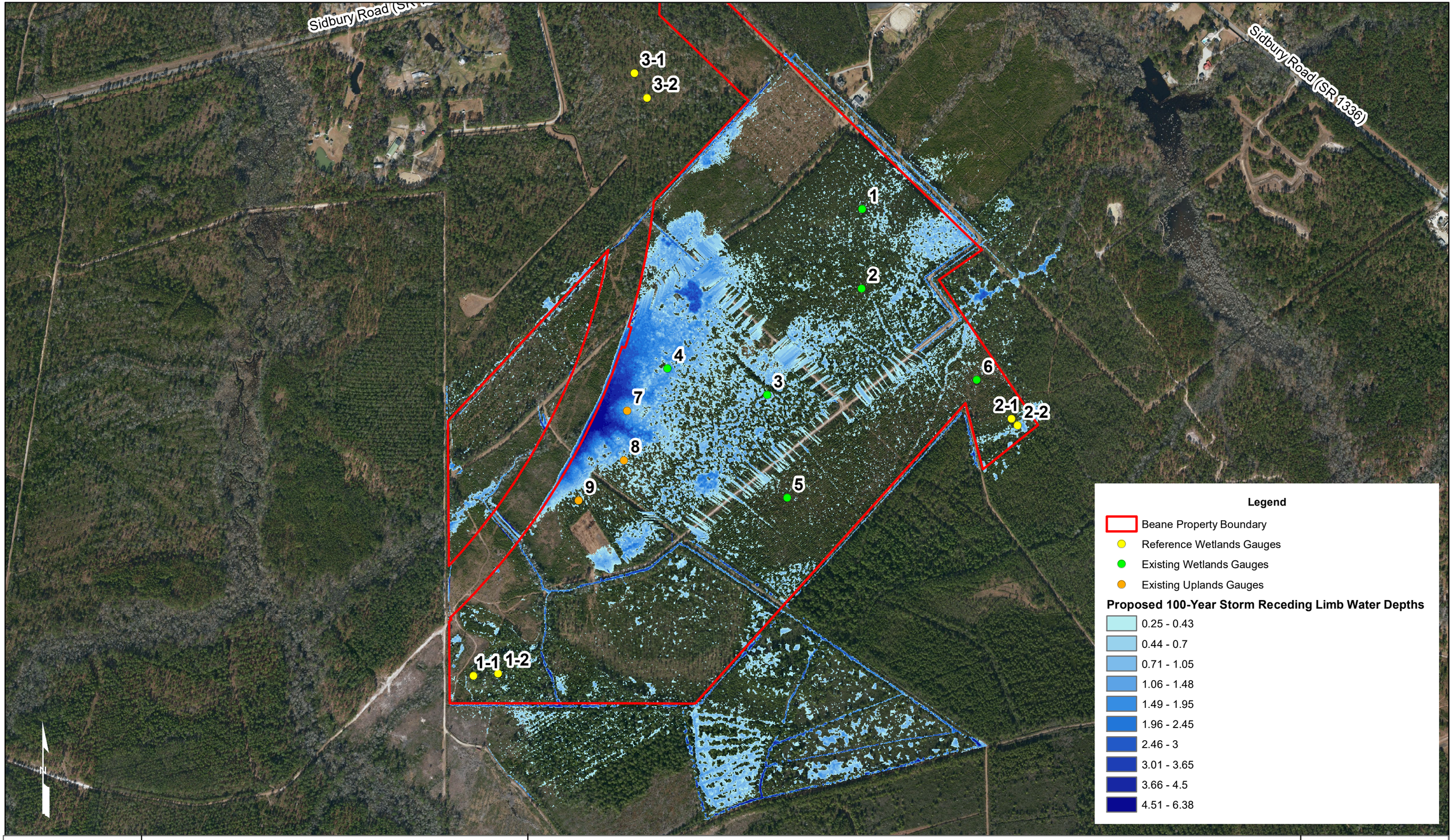
0 350 700 1,400 2,100 Feet

Beane Property Wetland Mitigation Site

Existing 100-year Receding Limb Water Depths

New Hanover County, NC

Figure 7



1 inch = 700 feet

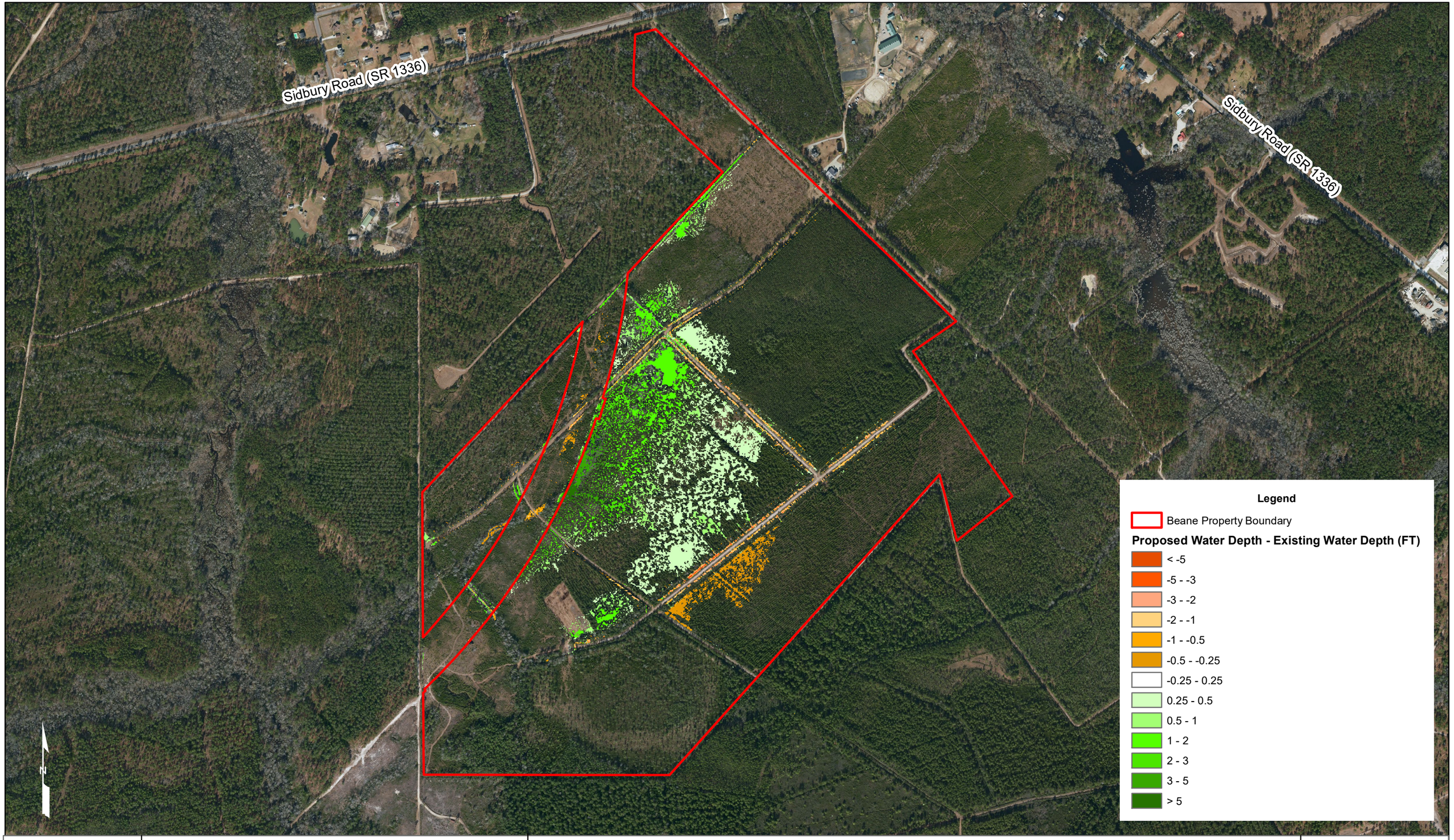
0 350 700 1,400 2,100 Feet

Beane Property Wetland Mitigation Site

Proposed 100-year Receding Limb Water Depths

New Hanover County, NC

Figure 8



1 inch = 700 feet

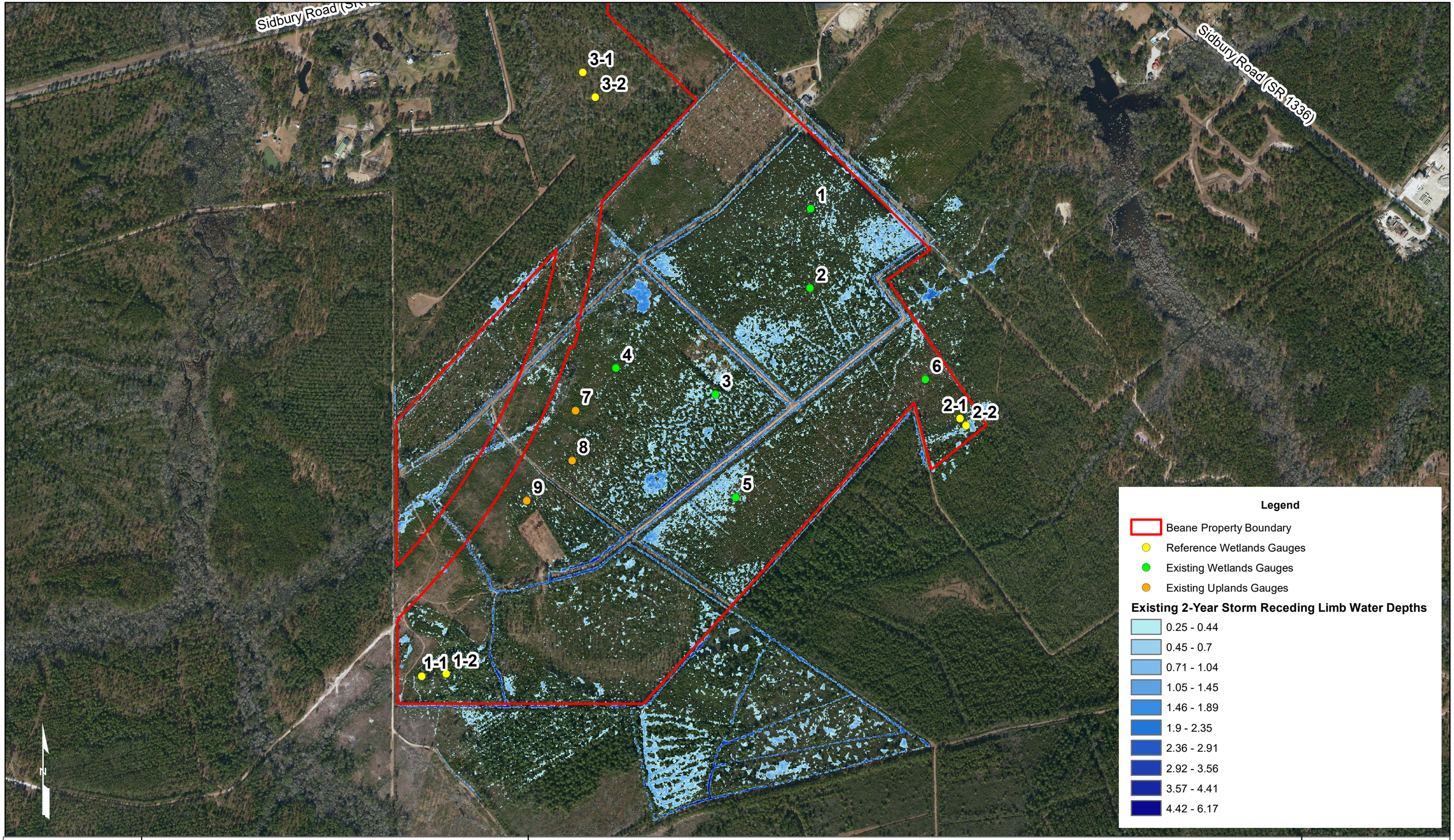
0 350 700 1,400 2,100 Feet

Beane Property Wetland Mitigation Site

Difference in 100-year Receding Limb Water Depths

New Hanover County, NC

Figure 9



1 inch = 700 feet

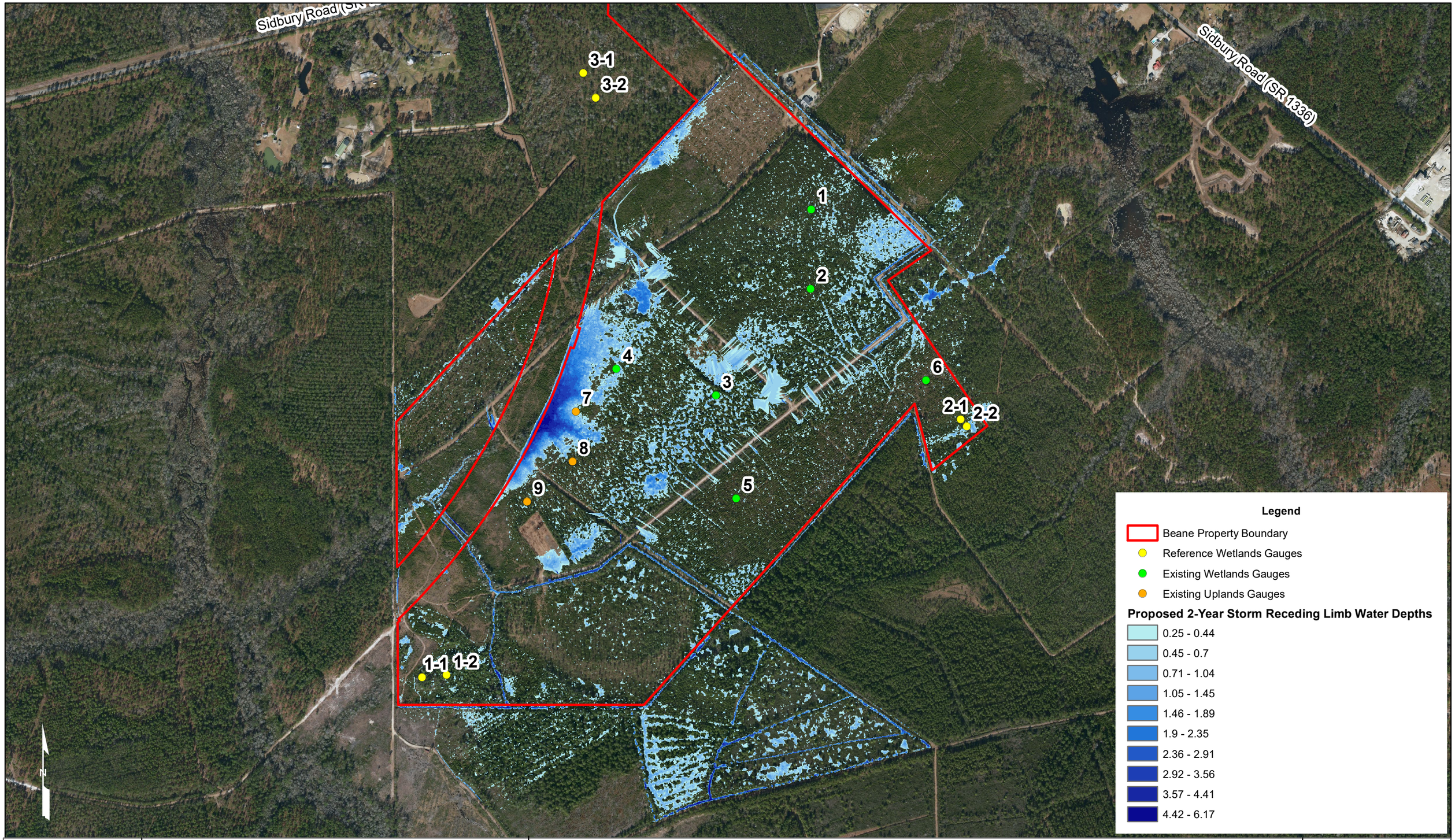
0 350 700 1,400 2,100 Feet

Beane Property Wetland Mitigation Site

Existing 2-Year Storm Receding Limb Water Depths

New Hanover County, NC

Figure 10



1 inch = 700 feet

0 350 700 1,400 2,100 Feet

Beane Property Wetland Mitigation Site

Proposed 2-Year Storm Receding Limb Water Depths

New Hanover County, NC

Figure 11

Sidbury Road (SR 1336)

Sidbury Road (SR 1336)

Legend

Beane Property Boundary

Proposed Water Depth - Existing Water Depth (FT)

- < -5
- -5- -3
- -3 - -2
- -2 - -1
- -1 - -0.5
- -0.5 - -0.25
- -0.25 - 0.25
- 0.25 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 5
- > 5

N

1 inch = 700 feet

0 350 700 1,400 2,100 Feet

Beane Property Wetland Mitigation Site

Difference in 2-year Receding Limb Water Depths

New Hanover County, NC

Figure 12