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Montgomery, AL 36109
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July 3, 2019

Transmitted Via: Email [redacted]

[redacted]

[redacted]

Subject: ***Individual Permit Application***
Twin Pines Minerals, LLC
Heavy Minerals Mine
Saint George, Charlton County, GA
USACE Project No.: SAS-2018-00554
TTL Project No.: 00180200804.00

Dear [redacted]

TTL, Inc. (TTL) respectfully submits this Individual Permit application package for impacts to waters of the United States associated with the proposed heavy minerals mine operation located near Saint George, in Charlton County, Georgia. By signature of the Joint Application and Notification form enclosed, the applicant, Twin Pines Minerals, LLC designates and authorizes TTL to act as Agent on the Twin Pine Mineral's behalf in the processing of the permit application.

TTL representatives look forward to working with you on this important permitting project.

Sincerely,

TTL, Inc.

Christopher Terrell
Project Professional

Cindy House-Pearson
Senior Natural Resources
Client Manager

Enclosed: *Individual Permit Application Package*

CC: Steven R. Ingle, President – Twin Pines Minerals, LLC (single@greenfuelsenergy.com)
Mark Fowler, – Twin Pines Minerals, LLC (mfowler@twinpinesminerals.com)
Stephen Wiedel – Georgia Environmental Protection Division – Wetlands Unit (Stephen.wiedel@dnr.ga.gov)

JOINT APPLICATION
FOR
A DEPARTMENT OF THE ARMY, CORPS OF ENGINEERS PERMIT,
STATE OF GEORGIA MARSHLAND PROTECTION PERMIT,
REVOCABLE LICENSE AGREEMENT
AND REQUEST FOR
WATER QUALITY CERTIFICATION
AS APPLICABLE

INSTRUCTIONS FOR SUBMITTING APPLICATION:

Every Applicant is Responsible to Complete The Permit Application and Submit as Follows: One copy each of application, location map, drawings, copy of deed and any other supporting information to addresses 1, 2, and 3 below. If water quality certification is required, send only application, location map and drawing to address No. 4.

1. For Department of the Army Permit, mail to: Commander, Savannah District, US Army Corps of Engineers, ATTN: CESAS-RD, 100 W. Oglethorpe Avenue, .Savannah, Georgia 31401-3640. Phone (912) 652-5347 and/or toll free, Nationwide 1-800-448-2402.

2. For State Permit - State of Georgia (six coastal counties only) mail to: Habitat Management Program, Coastal Resources Division, Georgia Department of Natural Resources, 1 Conservation Way, Brunswick, Georgia 31523. Phone (912) 264-7218.

3. For Revocable License - State of Georgia (six coastal counties plus Effingham, Long, Wayne, Brantley and Charlton counties only) - Request must have State of Georgia's assent or a waiver authorizing the use of State owned lands. All applications for dock permits in the coastal counties or for docks located in tidally influenced waters in the counties listed above need to be submitted to Real Estate Unit. In addition to instructions above, you must send two signed form letters regarding revocable license agreement to: Ecological Services Coastal Resources Division, Georgia Department of Natural Resources, 1 Conservation Way, Brunswick, Georgia 31523. Phone (912) 264-7218.

4. For Water Quality Certification State of Georgia, mail to: Water Protection Branch, Environmental Protection Division, Georgia Department of Natural Resources, 4220 International Parkway, Suite 101, Atlanta, Georgia 30354 (404) 675-1631.

The application must be signed by the person authorized to undertake the proposed activity. The applicant must be the owner of the property or be the lessee or have the authority to perform the activity requested. Evidence of the above may be furnished by copy of the deed or other instrument as may be appropriate. The application may be signed by a duly authorized agent if accompanied by a statement from the applicant designating the agent. See item 6, page 2.

1. Application No. _____
2. Date 07-03-2019
3. For Official Use Only_____
4. Name and address of applicant. Twin Pines Minerals, LLC Attn: Mr. Steve Ingle, P.E.2100 Southbridge Parkway Birmingham, Alabama 35209
5. Location where the proposed activity exists or will occur.

Lat. 30.521490 Long. -82.114389

Charlton		
County	Military District	In City or Town
St. George		
Near City or Town	Subdivision	Lot No.
2,413.97 acre	172 amsl	Georgia
Lot Size	Approximate Elevation of Lo	State
	Boone Creek	
Name of Waterway	Name of Nearest Creek, River, Sound, Bay or Hammock	

6. Name, address and title of applicant's authorized agent for permit application coordination.

Cindy Hinson Pearson
Senior Natural Resources Manager
TTL, Inc
2743-B Gunter Park Drive West
Montgomery, Alabama 36109

Statement of Authorization: I hereby designate and authorize the above named person to act in my behalf as my agent in the processing of this permit application and to furnish, upon request, supplemental information in support of this application.

Signature of Applicant — Date: 7-3-19

7. Describe the proposed activity, its purpose and intended use, including a description of the type of structures, if any to be erected on fills, piles, of float-supported platforms, and the type, composition and quantity of materials to be discharged or dumped and means of conveyance. If more space is needed, use remarks section on page 4 or add a supplemental sheet. (See Part III of the Guide for additional information required for certain activities.)

The proposed project, consists of a combination of dragline and conventional pan trap mining at the proposed project site. Mining at the site will be accomplished utilizing dragline mining for the majority of the site. Dragline mining involves the use of a dragline, which is a large crane-like earthmoving machine. Mining and initial reclamation require moving more materials than can be accomplished with standard excavation equipment. Draglines can efficiently move large quantities of material. A large-capacity bucket swings from cables on the end of the boom, scooping material that is then moved to adjacent areas. Draglines are electrically powered and run by two employees, an operator and an oiler. When mining is occurring, measures must be taken to protect the areas adjacent to the mine property. Berms are constructed to ensure that muddy water does not leave the mine property and affect local waterways. Recharge ditches, on the outside of the berm, provide hydration to surrounding properties to ensure mining does not impact groundwater levels on the surrounding property.
Prior to mining the trees will be harvested and the land is cleared. The berms, ponds and best management practices for sediment control are constructed and installed. The topsoil is stockpiled for use during reclamation. The permanent facilities are then constructed and installed. The mining process proceeds as follows: The dragline moves through the mining area excavating the material to be mined which is stockpiled nearby. It is then transferred to an apron feeder which feeds to a crusher/screen. This removes rocks and other large objects. The material is then transferred to a pilfered conveyor system. The oversized organic material will be placed near the screen area for future deposit during the reclamation process. The pilfered conveyor systems feeds a mainline feed conveyor system. The mainline feed conveyor system will incline (or feed a stacker conveyor) and then feed the trommel screen. The trommel feeds the Pre Concentration Plant (PCP).
In the PCP, spiral centrifuges concentrate and separate the heavy mineral sands from the lighter clays and quartz sand and then feeds the Wet Concentrator Plant. The Wet Concentration Plant further reduces and separates the material for processing. The material from the WCP is transported to the Mineral Separation Plant (MSP). The MSP separates valuable and non-valuable mineral products such as zircon, titanium, rutile, ilmenite, etc. After products have been separated, the final products will be containerized, bale strapped or loaded on rail dependent upon customer requirements.
The tailings from the PCP/WCP area will be temporarily stockpiled. Tailing will be loaded onto the mainline belt conveyor system. The mainline belt conveyor system will convey material onto a reclamation conveyor. The reclamation conveyor deposits the tailings back into the mined pit area for reclamation.
As part of reclamation the tailings are manipulated from their stockpiles to the open mined area where they are deposited. The areas are then recontoured, covered with topsoil and revegetated to meet reclamation standards. The reclamation is a continuous

8. Proposed use: Private ☑ Public ☐ Commercial ☑ Other ☐ (Explain)

Heavy mineral sand mining facility

9. Names and addresses of adjoining property owners whose property also adjoins the waterway.

RAYONIER A FLAMIC TIMBER COMPANY C/O RAYONIER TAX SERVICES POST OFFICE BOX 101129 MOBILE, AL 36610 TIAA TIMBERLANDS LLC C/O GREENWOOD RESOURCES INC. 1500 SOUTH FIRST AVE, SUITE 1158 SUITE 150 PORTL

10. Date activity is proposed to commence. 1-1-2020

Date activity is expected to be completed. 1-1-2028

11. Is any portion of the activity for which authorization is sought now complete ☐Y ☑N

a. If answer is "Yes", give reasons in the remarks in the remarks section.
Indicate the existing work on the drawings.

b. If the fill or work is existing, indicate date of commencement and completion.

c. If not completed, indicate percentage completed.

12. List of approvals or certifications required by other Federal, State or local agencies for any structures, construction discharges, deposits or other activities described in this application. Please show zoning approval or status of zoning for this project.

Issuing Agency	Type Approval	Identification No.	Date/Application	Date/Approval
Georgia EPD	Industrial Surface Water and Groundwater		not yet applied	
Georgia EPD	Process Wastewater Discharge NPDES-I		not yet applied	
Georgia EPD	NPDES Stormwater Permit		not yet applied	
Georgia EPD	Surface Mining Permit		not yet applied	

13. Has any agency denied approval for the activity described herein or for any activity directly related to the activity described herein?
☐ Yes ☑ NO (If "yes", explain).

Note: Items 14 and 15 are to be completed if you want to bulkhead, dredge or fill.

14. Description of operation: (If feasible, this information should be shown on the drawing).

a. Purpose of excavation or fill heavy mineral sands mining.

1. Access channel length_____ depth_____ width_____

2. Boat basin length_____ depth_____ width_____

3. Fill area length_____ depth_____ width_____

4. Other _____ length_____ depth_____ width_____
(Note: If channel, give reasons for need of dimensions listed above.)

b. If bulkhead, give dimensions _____

-- Type of bulkhead construction (material)_____

1. Backfill required: Yes _____ No _____ Cubic yards _____

2. Where obtained The wetlands will be backfilled with the same material excavated following mining.

c. Excavated material

1. Cubic yards 39,016,572.32

2. Type of material mineral sands

15. Type of construction equipment to be used _____

a. Does the area to be excavated include any wetland? Yes ☑ No ☐

b Does the disposal area contain any wetland? Yes ☑ No ☐

c. Location of disposal area at excavated area

d. Maintenance dredging, estimated amounts, frequency, and disposal sites to be utilized:_____

e. Will dredged material be entrapped or encased? no

f. Will wetlands be crossed in transporting equipment to project site? yes

g. Present rate of shoreline erosion (if known) NA

16. Description of Avoidance, Minimization and Compensation: Provide a brief explanation describing how impacts to waters of the United States are being avoided and minimized on the project site. Also, provide a brief description of how impacts to waters of the United States will be compensated for, or a brief statement explaining why compensatory mitigation should not be required for those impacts.

The project facilities and proposed mining areas have been located to avoid the higher quality, higher functioning wetlands on the site. A total of 613.098 acres of wetlands have been avoided. A total of 3,705 linear feet of perennial, intermittent and ephemeral streams have been avoided. For the permanently impacted wetlands and streams, mitigation will be in the form of credits purchased from a mitigation bank. For the temporarily impacted wetlands, the resources impacted will be returned to preconstruction contours and elevations within 30 days of the temporary impact. Topsoil will be conserved and replaced at the impacted areas. The impacted areas will then be revegetated in accordance with the reclamation plan. The impacts to wetlands and streams will be compensated for through the purchase of wetland and stream credits from a mitigation bank and/or an in-lieu fee program.

17. Water Quality Certification: In some cases, Federal law requires that a Water Quality Certification from the State of Georgia be obtained prior to issuance of a Federal license or permit. Applicability of this requirement to any specific project is determined by the permitting Federal agency. The information requested below is generally sufficient for the Georgia Environmental Protection Division to issue such a certification if required. Any item, which is not applicable to a specific project, should be so marked. Additional information will be requested if needed.

a. Please submit the following:

1. A plan showing the location and size of any facility, existing or proposed, for handling any sanitary or industrial waste waters generally on your property.

2. A plan of the existing or proposed project and your adjacent property for which permits are being requested.

3. A plan showing the location of all points where petro-chemical products (gasoline, oils, cleaners) used and stored. Any aboveground storage areas must be diked, and there should be no storm drain catch basins within the dike areas. All valving arrangements on any petro-chemical transfer lines should be shown.

4. A contingency plan delineating action to be taken by you in the event of spillage of petro-chemical products or other materials from your operation.

5. Plan and profile drawings showing limits of areas to be dredged, areas to be used for placement of spoil, locations of any dikes to be constructed showing locations of any weir(s), and typical cross sections of the dikes.

b. Please provide the following statements:

1. A statement that all activities will be performed in a manner to minimize turbidity in the stream.

2. A statement that there will be no oils or other pollutants released from the proposed activities which will reach the stream.

3. A statement that all work performed during construction will be done in a manner to prevent interference with any legitimate water uses.

18. Application is hereby made for a permit or permits to authorize the activities described herein; Water Quality Certification from the Georgia Environmental Protection Division is also requested if needed. I certify that I am familiar with the information contained in this application, and that to the best of my knowledge and belief such information is true, complete and accurate. I further certify that I posses the authority to under take the proposed activities.

Signature of Applicant

19. U.S.C. Section 1001 provides that: Whoever, in any matter within the jurisdiction of any department or agency of the United States, knowingly and willfully falsifies, conceals, or covers up by any trick, scheme, or device a material fact or makes any false, fictitious, or fraudulent statements or representations, or makes or uses false writing or document knowing same to contain any false, fictitious or fraudulent statement or entry, shall be fined no more than $10,000 or imprisoned not more than 5 years or both.

PRIVACY ACT NOTICE

The Department of the Army permit program is authorized by Section 10 of the Rivers and Harbors Act of 1899, Section 404 of the Clean Water Act and Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972. These laws require permits authorizing structures and work in or affecting navigable waters of the United States, the discharge of dredged or fills material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Information provided will be used in evaluating the application for a permit. Information in the application is made a matter of public record through issuance of a public notice. Disclosure of the information requested is voluntary; however, the data requested are necessary in order to communicate with the applicant and to evaluate the permit application. If necessary information is not provided, the permit application cannot be processed nor can a permit be issued.

SUPPORTING REMARKS:

INDIVIDUAL PERMIT APPLICATION FOR

Twin Pines Minerals, LLC

HEAVY MINERALS MINE
SAINT GEORGE, CHARLTON COUNTY, GEORGIA
(SAS-2018-00554)

Submitted to:

[redacted]

Prepared by:
TTL, Inc.
2743-B Gunter Park Drive West
Montgomery, Alabama 36109

USACE Project No. SAS-2018-00554
TTL Project No. 000180200804

July 3, 2019

TTL

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1.0 GENERAL DESCRIPTION OF PROJECT AREA AND PROPOSED MINING

Twin Pines Minerals is the applicant for the Individual Permit Application. The project study area consists of approximately 12,000 acres comprised of 6 different tracts of land located near Saint Georgia in Charlton County, Georgia. The first mining phase project site area is an approximately 2,413.97-acre area that comprises the southern-most portions of the Keystone, Adirondack and TIAA tracts. The area will be mined in phases. Each phase will be mined at approximately 25-40 acres per month and backfilled and graded within approximately 30 days following excavation. Planting will occur during the appropriate planting season. The depth of mining across the property will vary based on the resource but will average 50 feet below land surface, with the exception of the TIAA property, where it will be mined 25 feet below land surface. The first mining phase is located as depicted on the U.S. Geological Survey (USGS) 7.5-minute Topographic Map of Moniac, Georgia and Saint George, Georgia (Figure 1). The first mining block project review area center is located near latitude 30.521458 and longitude -82.10593. According to the USGS Topographic Map, the elevation at the project area ranges from approximately 126-172 feet above mean sea level. The adjacent property owners are depicted on Figure 2 and summarized in the Table 1 below.

Table 1: Adjacent Property Owners

Map ID	PIN	Owner Name	Address	City, State Zip
[redacted]				

The TTL waters of the U.S. delineations (Appendix A) were conducted during a period of time spanning from April 2018 to April of 2019 to evaluate aquatic resources within areas that the applicant proposes impacts. Figure 3 provides an aerial view of the proposed project site.

The mining area consists of forested, shrub-scrub, and herbaceous wetlands, streams, and uplands consisting of planted pine, scrub-shrub and forested habitat. The proposed mining area is primarily in use as a commercial forestry operation, therefore much of the habitat has been degraded due to the bedding activities herbicide use typically associated with silvicultural practices in the region.

2.0 PURPOSE AND NEED

The applicant's purpose and need for the proposed project includes the extraction (maximum mineral recovery based on economic consideration and landowner commitments) of high quality heavy mineral reserves in a safe, cost effective and environmentally sound manner for export by truck, rail and eventual barge to national and international customers.

Mineral sand-derived products, particularly those containing titanium dioxide and zirconium, are in high demand worldwide in the pigment, aerospace, medical, foundry, and other industrial products. Elemental components, chiefly titanium, are used as the white pigments. Titanium dioxide is nontoxic and has replaced lead as the predominant pigment in paints and coatings.

Many deposits of heavy mineral sands (HMS) have been identified in the Atlantic Coastal Plain, including more than a dozen deposits that have been mined. Three Atlantic Coastal Plain districts have seen the bulk of the heavy mineral sands production and these districts are: (1) the Jacksonville district in northeastern Florida and southeastern Georgia, (2) a sequence of deposits along the Fall Zone in southeastern Virginia, and (3) the Lakehurst district in southern New Jersey. HMS are sediments containing dense (heavy) minerals that accumulate with sand, silt, and clay in coastal environments locally forming economic concentrations of heavy minerals.

Considerable resources of HMS in the form of detrital grains of titanium, ilmenite, leucoxene, and rutile, could exist in large areas of the Atlantic Coastal Plain. These heavy mineral sand deposits represent possible domestic sources of titanium that have yet to be developed. Identifying potential domestic resources of titanium is useful because titanium has significant industrial applications, and because the great majority of titanium mineral concentrates consumed in the U.S. are imported (91 percent in 2016; Ober, 2017). Only two HMS mining operations are currently (as of 2017) active in the U.S., due to closure of the HMS mines in southern Virginia.

Many prospective areas for HMS deposits in the Atlantic Coastal Plain occur near the modern shores or on barrier islands, for example, the coasts of South Carolina, southeastern Georgia, and northeastern Florida. Much of the modern coastal areas are covered by infrastructure. Thus, land-use and permitting considerations may limit mineral development along the modern coast.

The proposed activity will result in the full-time employment of approximately 150-200 workers from the local area. It is anticipated that the proposed facility will have an operational life of 8 years.

3.0 ALTERNATIVE ANALYSIS

Once it was determined that there was significant global demand for heavy mineral sands, the applicant began the site selection process. The applicant looked at various locations to conduct the mining activity. Site criteria was developed to aid in the selection process. The site criteria considered socio-economic factors for determining a suitable location for the mining activity. Those factors include:

- The location of suitable reserves of heavy mineral sands containing the target minerals suitable for mining with an average mining cut with 2% concentration;
- A 50-mile proximity to the Port of Jacksonville;
- The costs and availability of public services, facilities and improvements required to support a proposed facility and protect public health, safety and the environment;
- Cost associated with handling/transporting of material;
- The direct access to a rail line capable of linking to a port;
- The social and economic impacts of a proposed facility on the affected community; and
- The location of a proposed facility and its potential impacts on environmentally sensitive areas including:
    1) water resources including wetlands, streams, and floodplains;
    2) threatened and endangered species,
    3) cultural resources
    4) protected natural areas including the Okefenokee Swamp National Wildlife Refuge.

The applicant and its consultants identified several potential sites initially and evaluated each based on the established criteria. Additional alternatives were evaluated but eliminated. The possible alternatives were narrowed to five alternatives and a no action alternative. The alternatives included the proposed project, an alternative site, two alternative sites with only upland areas mined, and the proposed project with an alternative mining method. The site alternatives are shown on Figures 4.1-4.3 and described below.

3.1 Alternative 1

Alternative 1, the proposed project, consists of a combination of dragline and excavator/dozer trap mining at the proposed project site. Mining at the site will be accomplished utilizing dragline mining for the majority of the site. Dragline mining involves a large crane-like earthmoving machine equipped with a bucket to scoop material. Mining and initial reclamation require moving more materials than can be accomplished with standard excavation equipment. Draglines can efficiently move large quantities of material. A large-capacity bucket swings from cables on the end of the boom, scooping material that is then moved to adjacent areas. Draglines are electrically powered and run by two employees, an operator and an oiler. When mining is occurring measures must be taken to protect the areas adjacent to the mine property. Berms are constructed to ensure that muddy water does not leave the mine property and affect local waterways.

Prior to mining the trees will be harvested and the land is cleared. The berms, ponds and best management practices for sediment control are constructed and installed. The topsoil is stockpiled for use during reclamation. The permanent facilities are then constructed and installed. The mining process proceeds as follows: The dragline moves through the mining area excavating the material to be mined which is stockpiled nearby. It is then transferred to an apron feeder which feeds to a screen. This removes roots and other large objects. The material is then transferred to a pit/feed conveyor

system. The oversized organic material will be placed near the screen area for future deposit during the reclamation process. The pit/feed conveyor systems feeds a mainline feed conveyor system. The mainline feed conveyor system will incline (or feed a stacker conveyor) and then feed the trommel (screen). The trommel feeds the Pre-Concentration Plant (PCP).

In the PCP, spiral centrifuges concentrate and separate the heavy mineral sands from the lighter clays and quartz sand and then feeds the Wet Concentration Plant. The Wet Concentration Plant (WCP) further reduces and separates the material for processing. The material from the WCP is transported to the Mineral Separation Plant (MSP). The MSP separates valuable and non-valuable mineral products such as zircon, staurolite, rutile, ilmenite, etc. After products have been separated, the final products will be containerized, bulk shipped or loaded on truck or rail dependent upon customer requirements.

The tailings from the PCP/WCP area will be temporarily stockpiled. Tailing will be loaded onto the mainline tails conveyor system. The mainline tails conveyor system will convey material onto a reclamation conveyor. The reclamation conveyor deposits the tailings back into the mined pit area for reclamation.

As part of reclamation the tailings are transported from their stockpiles to the open mined area where they are deposited. The areas are then recontoured, covered with topsoil and revegetated to meet reclamation standards. The operation is a continuous process and while the dragline is operating, backfilling of the pit is occurring as well once the operation gets under way.

On the TIAA portion of the proposed mining area, excavator/dozer trap mining method will be utilized due to the shallower depth of mineral resource. The excavator/dozer trap method is utilized to mine shallower depths. This method has a limited reach, depending on the machine. It also has a lower excavation and production rate. There is more frequent relocation of the machine which results in lost production due to the relocation time. The mining process proceeds as follows: The mining unit (excavator/backhoe/dozer trap) will mine the material. The mining unit will feed a screen. The screen material feeds a pit/feed conveyor system. The oversized/organic material will be placed near the screen area for future deposit during the reclamation process. The pit/feed conveyor system feeds a mainline feed conveyor system. The mainline feed conveyor system will incline (or feed a stacker conveyor) and then feed the trommel. The trommel feeds the PCP. Once at the PCP, the process proceeds as described above.

Alternative 1, the proposed project, consists of 2,413.97-acres as depicted on the U.S. Geological Survey (USGS) 7.5-minute Topographic Maps of Moniac, Georgia and Saint George, Georgia (Figure 1). The center of the site is located near latitude 30.52490044 and longitude -82.12419891. According to the USGS Topographic Map, the elevation at the site ranges from approximately 120 to 175 feet above mean sea level.

The northern boundary of the Alternative 1 site is located approximately 3.73 miles southeast from the nearest boundary of the Okefenokee Swamp National Wildlife Refuge, providing a substantial buffer of protection for this sensitive resource. Alternative 1 contains suitable reserves of heavy mineral sands containing the target minerals suitable for mining. The heavy mineral sands underlying the site are comprised of an average of 2% concentration of the economically viable minerals. The location of Alternative 1 is located within the reasonable 50-mile proximity to the port of Jacksonville. Public services and facilities required to support the mine and protect public health, safety and the environment are available. Alternative 1 has direct rail access, which links to the port of Jacksonville. As a result, the cost of handing/transportation of materials is reduced. The implementation of Alternative 1 is expected to have a beneficial economic impact on the adjacent community due to its projected employment of 150-200 people for 8 years.

Alternative 1 contains numerous forested, shrub-scrub, and herbaceous wetlands as well as portions of intermittent streams. Stream impacts would primarily occur within partially unstable channels that have been historically impacted by agricultural/silvicultural activities. The table below summarizes the quantities of aquatic resources for the project area.

Table 2: Summary of Aquatic Resources Within the Proposed Project Area

Review Area	Wetland	Open Water	Ephemeral Stream	Intermittent Stream	Perennial Stream	Total Stream
	acre		linear feet			
Keystone Tract	544.233	0	0	297	0	297
Adirondack Tract	149.602	0	273	7,998	387	8,658
TIAA Tract	662.712	0	0	0	0	0

The proposed facility's potential impacts on environmentally sensitive areas are discussed in detail in Sections 5, 8 and 9 but are summarized here.

Table 3: Wetland Impact Summary of Proposed Project

Property	Wetland ID	Area (ac)	Temporary Impacted Area(ac)	Permanent Impacted Area (ac)
Adirondack	WA	105.551	57.665	5.512
Adirondack	WB	7.430	6.269	1.161
Adirondack	WC	2.555	2.555	0.000
Adirondack	WD	10.327	3.766	5.993
Adirondack	WE	4.233	4.233	0.000
Adirondack	WF	4.055	4.055	0.000
Adirondack	WG	5.544	0.000	0.000
Adirondack	WH	3.180	3.180	0.000
Keystone	WA-1	58.667	58.661	0.000
Keystone	WA-2	153.254	138.572	14.164
Keystone	WA-3	103.714	98.964	4.004
Keystone	WA-4	19.097	19.097	0.000
Keystone	WA-5	5.160	5.160	0.000
Keystone	WA-6	28.786	28.786	0.000
Keystone	WA-7	11.596	10.690	0.906
Keystone	WB	2.121	0.921	0.815
Keystone	WC	0.920	0.000	0.534

Property	Wetland ID	Area (ac)	Temporary Impacted Area(ac)	Permanent Impacted Area (ac)
Keystone	WD	6.323	1.868	4.335
Keystone	WF	0.704	0.000	0.704
Keystone	WG	5.663	0.000	5.663
Keystone	WH	13.411	0.000	13.411
Keystone	WI	6.069	0.000	0.000
Keystone	WJ	1.071	0.000	0.000
Keystone	WK	0.412	0.188	0.222
TIAA	WB	0.439	0.017	0.000
TIAA	WC	639.858	77.263	7.708
	TOTAL		521.910	65.132

Table 4: Stream Impact Summary of Proposed Project

			Total		Temporary Impacts		Permanent Impacts	
Property	Stream ID	Classification	Length (LF)	Area (AC)	Length (LF)	Area (AC)	Length (LF)	Area (AC)
Adirondack	S-1p	Perennial	387	0.064	0	0	0	0
Adirondack	S-1i	Intermittent	3051	0.307	0	0	2238	0.074
Adirondack	S-3	Intermittent	2161	0.156	0	0	0	0
Adirondack	S-5	Intermittent	639	0.051	0	0	639	0.011
Adirondack	S-6	Intermittent	315	0.025	0	0	315	0.025
Adirondack	S-6A	Intermittent	486	0.027	0	0	486	0.017
Adirondack	S-7	Intermittent	485	0.033	0	0	485	0.033
Adirondack	S-10	Intermittent	198	0.019	0	0	198	0.019
Adirondack	S-11I	Intermittent	71	0.005	0	0	0	0
Adirondack	S-11E	Ephemeral	273	0.019	0	0	0	0
Keystone	S-1	Intermittent	297	0.020	0	0	297	0.02
	TOTAL		8363	0.726	2454	0.204	4658	0.199

Alternative 1 provides habitat for the federal candidate, state listed threatened gopher tortoise and federal candidate, state listed rare gopher frog. Gopher tortoise and gopher frog will be relocated. A detailed discussion of the project's effects on special status species is provided in Section 8.0. With the implementation of these mitigation measures, Alternative 1 is not expected to have an effect on these species.

A cultural resource survey identified a total of 16 archaeological locations within the extent of the permit area. These included 7 isolated finds and 9 archaeological sites. Of these sites, 5 are the remains of early-to-middle-twentieth century domestic assemblages. None of the sites were recommended as eligible for NRHP inclusion and isolated finds are, by their nature, ineligible for NRHP inclusion. One resource was located outside of the permit area boundary is recommended as potentially eligible for NRHP inclusion under Criterion C. This resource is a mid-century ranch home constructed in 1950. Though currently abandoned, the integrity of the structure is intact and its architecture is significant as a representative example of a mid-twentieth century ranch house. The

cultural resource survey recommended avoidance of this property. Additionally, the house is currently located near an existing chip mill and railroad tracks and is currently exposed to heavy audible effects. Due to avoidance measures the historic resource will not suffer adverse visual and audible effects as a result of the proposed mining operations. The house will not be impacted by the project.

3.2 Alternative 2

Alternative 2 consists of mining an alternative location, the Loncala site. The site is an approximately 1,012-acre area depicted on the U.S. Geological Survey (USGS) 7.5-minute Topographic Maps of Moniac, Georgia and Saint George, Georgia (Figure 1). The center of the site is located near latitude 30.576162 and longitude -82.128950. According to the USGS Topographic Map, the elevation at the site ranges from approximately 120 to 175 feet above mean sea level.

The mining boundary for Alternative 2 is located 1.15 miles from the Okefenokee National Wildlife Refuge property boundary. Alternative 2 is comprised of suitable reserves of heavy mineral sands containing the target minerals suitable for mining. The heavy mineral sands underlying the site are comprised of an average of 2% concentration of the economically viable minerals. The location of Alternative 2 is within the reasonable 50-mile proximity to the port of Jacksonville. Public services and facilities required to support the mine and protect public health, safety and the environment are available onsite. Alternative 2 does not contain direct rail access and is located approximately 3.3 miles from a rail line. Without proper rail access, material would require transportation over greater distances on unimproved roadways or would require the construction of a rail which would ultimately increase onsite impacts. Without the construction of a rail, the cost of handling/transporting of material would increase as a result. The implementation of Alternative 2 is expected to have a beneficial economic impact on the adjacent community due to the its projected employment of 150-200 people for 6 years.

The site is located near the eastern boundary of the Okefenokee National Wildlife Refuge. The northern boundary of Alternative 2 is within one-half mile of the boundary of the Okefenokee National Wildlife Refuge. The western boundary follows a portion of Swamp Perimeter Road. Trail Ridge Road is located along the eastern portion of the site. The site has historically been used for silvicultural activities. The primary sources of hydrology for the site are onsite rainfall and surface water flow.

The majority of the site is located within the Soldiers Camp Island watershed, cataloging unit 12-Digit HUC 030702040301. Three other cataloging unit 12-Digit HUCs occur along the northwestern (Cornhouse Creek – 030702040703), northeastern (Harris Creek – St. Mary's River – 030702040603), and the eastern (Boone Creek – 030702040602) portions of the site. All four cataloging units are located within the St Mary's watershed, cataloging unit 8-Digit HUC 03070204.

A summary of Alternative 2's existing wetlands are summarized in the table below.

Table 5: Existing Wetland Summary for Alternative 2

Wetland ID	Cowardin Habitat Description	Area (acres)
WA	Palustrine; Forested, Broad-Leaved Deciduous/Needle-Leaved Evergreen; Saturated	306.80
WB	Palustrine; Forested, Broad-Leaved Deciduous/Needle-Leaved Evergreen; Saturated	11.96
WC	Palustrine; Forested, Broad-Leaved Deciduous/Needle-Leaved Evergreen; Saturated	19.51

Wetland ID	Cowardin Habitat Description	Area (acres)
WD	Palustrine; Forested, Broad-Leaved Deciduous/Needle-Leaved Evergreen; Saturated	66.84
Total Wetlands		**405.11**

Two tributaries are located within Alternative 2 consisting of approximately 3,020 linear feet of intermittent stream (S1-S2). These streams are located within the northwestern portion of the site. Stream S2 flows into Stream S1, which flows offsite westward towards the Okefenokee National Wildlife Refuge. Table 4 summarizes the stream findings below.

Table 6: Existing Stream Summary for Alternative 2

Wetland ID	Cowardin Habitat Description	Length (linear feet)/ Area (acres)
S1	Riverine; Intermittent; Streambed; Mud	2,210/ 0.33
S2	Riverine; Intermittent; Streambed; Mud	810/ 0.07
Total Intermittent Streams		**3,020/0.40**

One open water (OW1) totaling 0.34 acre occurs within the site. The observed open water appears to be an excavated feature that is adjacent to Wetland D.

Alternative 2 would result in approximately the same amount of permanent impacts to intermittent streams and wetlands. The same facilities would need to be constructed. The amount of temporary impacts would be slightly less than Alternative 1 simply because there are less wetlands and total acreage on the Loncala tract.

Additionally, greater amounts of sensitive species that were identified on Loncala and would be potentially impacted including the American black bear, gopher tortoise and gopher frog. Approximately 3 active juvenile, 4 subadult, 18 active adult, 27 inactive adult, and 6 inactive subadult gopher tortoise burrows, along with 3 gopher frog location would be potentially impacted. With the implementation of mitigation measures, Alternative 2 would not have an effect on these species. Locations of sensitive features are depicted on the Loncala Tract Figure 4.2: Sensitive Features Location Map.

The cultural resources investigation revealed the presence of one cultural resource site recommended as potentially eligible for NRHP inclusion under Criterion D. Additionally, the NRHP status of another cultural resource is listed as unknown as this site was unable to be fully tested due to the site extending outside of the project limits. The investigated portion of the site was determined to lack significant data potential and thus no further archaeological work was recommended within the project area. The cultural resource consultant recommended that until this site could be fully defined and evaluated, the overall NRHP eligibility status should remain as unknown. For the one site considered to be potentially eligible, avoidance or further testing was recommended. If avoidance was not possible, the cultural resource consultant recommended Phase II testing be conducted prior to any ground disturbing activities in order to better evaluate the NRHP eligibility status of this site.

3.3 Alternative 3

Alternative 3 consists of utilizing an alternative mining method on the site of Alternative 1. The

alternative mining method consists of utilizing open pit mining using excavator/dozer trap mining technique on the entire site as opposed to the applicant's preferred mining method utilizing dragline mining technique.

In this mining method, the topsoil is removed with earth moving equipment and stockpiled for later use in reclamation. The excavator/dozer trap method is utilized to mine shallower depths. This method has a limited reach, depending on the machine. It also has a lower excavation and production rate. There is more frequent relocation of the machine which results in lost production due to the relocation time. The mining process proceeds as follows: The mining unit (excavator/backhoe/dozer trap) will mine the material. The mining unit will feed a screen. The screen material feeds a pit/feed conveyor system. The oversized/organic material will be placed near the screen area for future deposit during the reclamation process. The pit/feed conveyor system feeds a mainline feed conveyor system. The mainline feed conveyor system will incline (or feed a stacker conveyor) and then feed the trommel. The trommel feeds the PCP.

In the PCP, spiral centrifuges concentrate and separate the heavy mineral sands from the lighter clays and quartz sand and then feeds the WCP. The WCP further reduces and separates the material for processing. The material from the WCP is transported to the MSP. The MSP separates valuable and non-valuable mineral products such as zircon, staurolite, rutile, ilmenite, etc. After products have been separated, the final products will be containerized, bulk shipped or loaded on rail dependent upon customer requirements.

The tailing from the PCP/WCP area will be temporarily stockpiled. Tailing will be loaded onto the mainline tails conveyor system. The mainline tails conveyor system will convey material onto a reclamation conveyor. The reclamation conveyor deposits the tailings back into the mined pit area for reclamation.

As part of reclamation the tailings are transported from their stockpiles to the open mined area where they are deposited. The areas are then recontoured, covered with topsoil and revegetated to meet reclamation standards. The operation is a continuous process and while the equipment is operating, backfilling of the pit is occurring as well once the operation gets under way.

The northern boundary of the Alternative 3 site is located approximately 3.73 miles from the nearest boundary of the Okefenokee Swamp National Wildlife Refuge, providing a substantial buffer of protection for this sensitive resource. Alternative 3 is comprised of suitable reserves of heavy mineral sands containing the target minerals suitable for mining. The heavy mineral sands underlying the site are comprised of an average of 2% concentration of the economically viable minerals; however, due to a maximum depth of 25 feet the mining method does not allow for proper extraction which would not allow the applicant to meet the requirements of its contracts with customers to supply the amount of heavy mineral sands required. The location of Alternative 3 is within reasonable 50-mile proximity to the Jacksonville Port. Public services and facilities required to support the mine and protect public health, safety and the environment are available. Alternative 3 does contain direct rail access which links to the port of Jacksonville. As a result, the cost of handing/transportation of materials is reduced. The implementation of Alternative 3 is expected to have a beneficial economic impact on the adjacent community due to its projected employment of 150-200 people for 8 years.

The implementation of Alternative 3 would result in the discharge of less cubic volume of dredge and fill in wetlands and streams, but would not affect the overall acreage impacted. This volume reduction is due to the reduced mining depth.

Alternative 3 provides habitat for the federal candidate, state listed threatened gopher tortoise and federal candidate, state rare gopher frog. Gopher tortoise and gopher frog will be relocated for the duration of the project and then reintroduced to the site upon completion of the mining activity. With

these mitigation measures, Alternative 3 is not expected to have an effect on these species.

A cultural resource survey identified a total of 16 archaeological locations within the extent of the permit area. These included 7 isolated finds and 9 archaeological sites. Of these sites, 5 are the remains of early-to-middle-twentieth century domestic assemblages. None of the sites were recommended as eligible for NRHP inclusion and isolated finds are, by their nature, ineligible for NRHP inclusion. One resource located outside of the permit area boundary is recommended as potentially eligible for NRHP inclusion under Criterion C. This resource is a mid-century ranch home constructed in 1950. Though currently abandoned, the integrity of the structure is intact and its architecture is significant as a representative example of a mid-twentieth century ranch house. The cultural resource survey recommended avoidance of this property. Additionally, the house is currently located near an existing chip mill and railroad tracks and is currently exposed to heavy audible effects. Due to avoidance measures the historic resource will not suffer adverse visual and audible effects as a result of the proposed mining operations. The house will not be impacted by the project.

3.4 Alternative 4

Alternative 4 would be to mine only upland areas in the Loncala tract. The site is an approximately 1,012-acre area depicted on the U.S. Geological Survey (USGS) 7.5-minute Topographic Maps of Moniac, Georgia and Saint George, Georgia (Figure 1). The center of the site is located near latitude 30.576162 and longitude -82.128950. According to the USGS Topographic Map, the elevation at the site ranges from approximately 120 to 175 feet above mean sea level.

The mining boundaries for Alternative 4 are located 1.15 miles from the eastern limits of the Okefenokee National Wildlife Refuge property boundary. Alternative 4 is comprised of suitable reserves of heavy mineral sands containing the target minerals suitable for mining. The heavy mineral sands underlying the site are not comprised of an average of 2% concentration of the economically viable minerals. The location of Alternative 4 is within the reasonable 50-mile proximity to the port of Jacksonville. Public services and facilities required to support the mine and protect public health, safety and the environment are available onsite. Alternative 4 does not contain direct rail access and is located approximately 3.3 miles from a rail line. Without proper rail access, material would require transportation over greater distances on unimproved roadways or would require the construction of a rail which would ultimately increase onsite impacts. Without the construction of a rail, the cost of handling/transporting of material would increase as a result. The implementation of Alternative 4 is expected to have a beneficial economic impact on the adjacent community due to the its projected employment of 150-200 people for 6 years.

The northern boundary of Alternative 4 is within one-half mile of the boundary of the Okefenokee National Wildlife Refuge. The boundary follows a portion of Swamp Perimeter Road. Trail Ridge Road is located along the eastern portion of the site. The site has historically been used for silvicultural activities. The primary sources of hydrology for the site are onsite rainfall and surface water flow. The majority of the site is located within the Soldiers Camp Island watershed, cataloging unit 12-Digit HUC 030702040301. Three other cataloging unit 12-Digit HUCs occur along the northwestern (Cornhouse Creek – 030702040703), northeastern (Harris Creek – St. Mary's River– 030702040603), and the eastern (Boone Creek – 030702040602) portions of the site. All four cataloging units are located within the St Mary's watershed, cataloging unit 8-Digit HUC 03070204.

Alternative 4 would have reduced wetland and stream impacts. It is assumed that the permanent impacts of Alternative 4 would be roughly the same as Alternative 1. The permanent mining facilities would still need to be constructed at the site. By mining only in uplands, the temporary impacts to wetlands and streams would be significantly less.

Additionally, greater amounts of sensitive species that were identified in the uplands of the Loncala and would be impacted include the American black bear, gopher tortoise and gopher frog. Approximately 3 active juvenile, 4 subadult, 18 active adult, 27 inactive adult, and 6 inactive subadult gopher tortoise burrows, along with 3 gopher frog location would be impacted. With the implementation of mitigation measures, Alternative 4 would not have an effect on these species. Locations of sensitive features are depicted on the Loncala Tract Figure 4.2: Sensitive Features Location Map.

The cultural resources investigation of this property led to the identification of one cultural resource site recommended as potentially eligible for NRHP inclusion under Criterion D. Additionally, the NRHP status of another cultural resource is listed as unknown as this site was unable to be fully tested due to the site extending outside of the project limits. The investigated portion of the site was determined to lack significant data potential and thus no further archaeological work was recommended within the project area. The cultural resource consultant recommended that until this site could be fully defined and evaluated, the overall NRHP eligibility status should remain as unknown. For the one site considered to be potentially eligible, avoidance or further testing was recommended. If avoidance was not possible, the cultural resource consultant recommended Phase II testing be conducted prior to any ground disturbing activities in order to better evaluate the NRHP eligibility status of this site.

3.5 Alternative 5

Alternative 5 involves mining of only upland locations on the proposed project site. Mining would be accomplished via the dragline method as previously described.

The northern boundary of the Alternative 5 site is located approximately 3.73 miles southeast from the nearest boundary of the Okefenokee Swamp National Wildlife Refuge, providing a substantial buffer of protection for this sensitive resource. Alternative 5 is comprised of suitable reserves of heavy mineral sands containing the target minerals suitable for mining. Mining only the upland areas would not yield the quantity of minerals or average 2% concentration that would allow the applicant to meet the requirements of its contracts with customers to supply the amount of heavy mineral sands required. The location of Alternative 5 is within the reasonable 50-mile proximity to the port of Jacksonville. Public services and facilities required to support the mine and protect public health, safety and the environment are available should Alternative 5 be implemented. Alternative 5 does contain direct rail access which links to the port of Jacksonville. As a result, the cost of handling/transportation is reduced. The implementation of Alternative 5 would have a reduced beneficial economic impact on the adjacent community because the smaller mining area would employ less people and reduce the life of the mine.

Implementation of Alternative 5 would not change the amount of permanent impacts to wetlands and streams since those facilities will still need to be constructed. Impacts would be limited to secondary temporary impacts.

The Alternative 5 site provides habitat for the federal candidate, state listed threatened gopher tortoise and federal candidate, state listed rare gopher frog. Gopher tortoise and gopher frog will be relocated. There would be a reduction in the number of burrows impacted if Alternative 5 was implemented. The projects smaller footprint in the wetlands would result in a reduction in the impact on gopher tortoise and gopher frog species.

A cultural resource survey identified a total of 16 archaeological locations within the extent of the permit area. These included 7 isolated finds and 9 archaeological sites. Of these sites, 5 are the remains of early-to-middle-twentieth century domestic assemblages. None of the sites were recommended as eligible for NRHP inclusion and isolated finds are, by their nature, ineligible for NRHP

inclusion. One resource was located outside of the permit area boundary is recommended as potentially eligible for NRHP inclusion under Criterion C. This resource is a mid-century ranch home constructed in 1950. Though currently abandoned, the integrity of the structure is intact and its architecture is significant as a representative example of a mid-twentieth century ranch house. The cultural resource survey recommended avoidance of this property. Additionally, the house is currently located near an existing chip mill and railroad tracks and is currently exposed to heavy audible effects. Due to avoidance measures the historic resource will not suffer adverse visual and audible effects as a result of the proposed mining operations. The house will not be impacted by the project.

3.6 Alternative 6

Alternative 6 is the No Action Alternative. The No Action Alternative would be to allow the site to remain in its current land use and condition. The current land use of the site is industrial forestry. Implementation of the No Action Alternative would entail the continued active industrial logging of the site. Currently, the site is being managed for forest resources. Implementation of the No Action Alternative would entail the continuing of practice of non-sustainable forestry at the site.

Alternative 6, since it would not involve mining for mineral sands, does not meet the criteria of suitable reserves of heavy mineral sands containing the target minerals suitable for mining. Implementation of this alternative would not allow the applicant to meet the requirements of its contracts with customers to supply the amount of heavy mineral sands required. The criteria of reasonable distance to the port of Jacksonville is met but is not relevant to this alternative, since heavy mineral sands would not be mined. Public services and facilities required to support the mine and protect public health, safety and the environment are available, but is not relative to this alternative. Alternative 6's location within approximately 0.25 mile from a rail line, which links to the port of Jacksonville is not relevant since logging currently occurs with the use of trucks. The implementation of Alternative 6 is not expected to have a beneficial economic impact on the adjacent community because without the heavy mineral sands mining, the employment of 150-200 people for 8 years would not occur.

Implementation of Alternative 6 would not impact any additional wetlands or streams on the site, other than those that are impacted by ongoing mining of forest resources. The industrial logging of the site is, in and of itself, a degradative use of the property. Google Earth and aerial images dating back to 1970 (Figure R) show continuous industrial forestry activity on the site.

There is currently past evidence of intensive mechanical disturbance (shearing, windrowing and bedding). Additionally, there is evidence of intensive herbicide use (site prep and release/mid-rotation).

The prior ownership of the site has not practiced sustainable forestry. None of the tracts have been certified as sustainable forestry by the Sustainable Forestry Initiative (SFI). There is significant on-the-ground evidence that vegetation on the site has been severely negatively impacted by industrial forestry activity. This evidence includes:

- >18" beds (in most drier areas, in all low-lying areas including wetland ecotones and entire area of shallow wetlands)
- Windrows/piles
- Lack of stumps and stump holes
- Low plant diversity, vegetation dominated by 'weedy' old field species (e.g. *Andropgon virginicus, Rubus sp., etc.*)

There are many peer-reviewed studies on the effects of mechanical and chemical treatments on

vegetation. Many of these studies are inconclusive, funded by forest industry, and focus on species richness (including ruderals and exotics) with no attention to species composition. Miller et al 2009 found that preserving biodiversity in managed forests is possible with "judicious, targeted use of forest chemicals". However, the study states that "…there are tradeoffs between intensity of silvicultural practices and potential terrestrial biodiversity. The extreme form of intensive management is the agricultural model, i.e., site preparation and subsequent vegetation control that eliminates most vegetation except for crop trees, resulting in a highly productive stand from a wood production standpoint, but with limited ecological value."

A 2004 study found that "Current site-preparation techniques rely on herbicide combinations ('tank mixes' that affect a broad spectrum of plants), often coupled with mechanical treatments and >1 years post-planting applications to enhance the spectrum and duration of vegetation control. This near-total control of associated vegetation at establishment and more rapid pine canopy closure, coupled with shortened and repeated rotations, likely will affect plant diversity…" Short rotations allow less time for herbaceous establishment before canopy closure which results in less seed rain and depletion of the seed bank (Miller and Miller, 2004).

Mechanical site prep is correlated with high mid-story density which suppresses herbaceous layer. Chemical site prep is correlated with low understory species richness and high midstory density. Additionally, agricultural history (repeated soil disturbance and herbicide application) has a strong influence on vegetation structure and composition (Hedman et al, 2000)

Chemical and physical soil disturbances cause changes in the ectomycorrhizal fungal assemblage that likely have significant and lasting ecological impacts (Jones, et al, 2003).

Additionally, a study looked at the use of herbicides used to establish longleaf pine stand. The rates of application were less than what is typically used by forest industry. Species richness was similar to reference sites, but composition included more ruderal and old-field species less emblematic of high-quality sites (Addlington et al, 2012).

Implementation of Alternative 6 will result in the continuation of these destructive industrial forestry practices on the site.

The Alternative 6 location provides habitat for the federal candidate, state listed threatened gopher tortoise and federal candidate, state rare gopher frog. Gopher tortoise and their burrows would remain and would not be impacted by mining, but the poor-quality existing habitat would remain. Gopher tortoise and gopher frog would not have to be relocated, but the existing silvicultural activities would continue. The implementation of Alternative 4 would not be expected to have an effect on these species.

A cultural resource survey identified a total of 16 archaeological locations within the extent of the permit area. These included 7 isolated finds and 9 archaeological sites. Of these sites, 5 are the remains of early-to-middle-twentieth century domestic assemblages. None of the sites were recommended as eligible for NRHP inclusion and isolated finds are, by their nature, ineligible for NRHP inclusion. One resource was located outside of the permit area boundary is recommended as potentially eligible for NRHP inclusion under Criterion C. This resource is a mid-century ranch home constructed in 1950. Though currently abandoned, the integrity of the structure is intact and its architecture is significant as a representative example of a mid-twentieth century ranch house. The cultural resource survey recommended avoidance of this property. Additionally, the house is currently located near an existing chip mill and railroad tracks and is currently exposed to heavy audible effects. Due to avoidance measures the historic resource will not suffer adverse visual and audible effects as a result of the proposed mining operations. The house will not be impacted by the project.

There would be no change to the effects on the Okefenokee Swamp National Wildlife Refuge if Alternative 6 was implemented.

3.7 Summary of Alternative Analysis

Table 7: Summary of Alternatives Analysis

Factor	Alternative 1 (Proposed Site Dragline/Excavation)	Alternative 2 (Loncala Site)	Alternative 3 (Proposed Site Alt. Mining Method)	Alternative 4 (Loncala Site Uplands)	Alternative 5 (Proposed Site Uplands)	Alternative 6 (No Action Alternative)
Distance from Okefenokee Swamp	3.73 miles	0.50 miles	3.73 miles	0.50 miles	3.73 miles	NA
Heavy Mineral Sand Suitable for Mining	Yes	Yes	No	No	No	No
Proximity to a Port	Yes – Jacksonville Port	Yes – Jacksonville Port	Yes – Jacksonville Port	Yes – Jacksonville Port	Yes – Jacksonville Port	NA
Public Services	Yes	Yes	Yes	Yes	Yes	NA
Proximity to a Rail Line Capable of Linking to Port	Yes – 0.25 of a mile, links to Jacksonville Port	Yes – 3.3 miles, links to Jacksonville Port	Yes – 0.25 of a mile, links to Jacksonville Port	Yes – 3.3 miles, links to Jacksonville Port	Yes – 0.25 of a mile, links to Jacksonville Port	NA
Aquatic Resources On-Site	Yes - 8,052 lf of stream 1,200.129 ac of wetlands	Yes – 3,020 lf of stream 405.11 ac of wetland 0.34 ac of open water	Yes - 8,052 lf of stream 1,200.129 ac of wetlands	Permanent impacts would remain the same. Temporary impact would be significantly reduced.	Permanent impacts would remain the same. Temporary impact would be significantly reduced.	None
Cultural Resources On-Site	Yes – one potentially eligible; no effect	Yes – one potentially eligible site; one unknown effect	Yes – one potentially eligible; no effect	Yes – one potentially eligible site; one unknown potential effect	Yes – one potentially eligible site; no effect	No effect
Effect on T&E Species	No effect with mitigation measures	No effect with mitigation measures	No effect with mitigation measures	No effect with mitigation measures	No effect	No effect
Economic Feasibility (Mining cuts avg 2% HMS)	Yes	No	No	No	No	No
Practicable	**Yes**	**No**	**No**	**No**	**No**	**No**

4.0 AVOIDANCE AND MINIMIZATION

Once the site was selected, Twin Pines Minerals with its consultant, TTL, met to begin the design and permitting process. The team considered layout options that minimized impacts to aquatic resources, but also avoided/minimized impacts to threatened and endangered species.

Appendix B shows the general design of the proposed mining activity including plan and profile drawings. Impacts to some aquatic resources were avoided by locating the project's facilities away from the higher quality wetlands.

Additionally, to avoid impacts to historic resource 5, identified offsite and adjacent to the southeastern portion of the Adirondack property, the proposed mining limits were adjusted northwestward to the northwestern side of Stream S3. This maintains a forested stream corridor between the proposed mining operation and the historic resource. The first mining block of the proposed project will permanently impact 84.706 acres of wetlands, and 2,197 linear feet of intermittent stream. The first mining block of the proposed project will temporarily impact 502.689 acres of wetlands. Figure 4.1a provides a map depicting the locations of the proposed impact areas for the applicant's preferred alternative. The tables below summarize the avoided features.

Table 8: Wetland Avoidance Summary

Property	Wetland ID	Area (ac)	Avoided Area(ac)
Adirondack	WA	105.552	42.375
Adirondack	WB	7.430	0.000
Adirondack	WC	2.555	0.000
Adirondack	WD	10.327	0.568
Adirondack	WE	4.233	0.000
Adirondack	WF	4.055	0.000
Adirondack	WG	5.544	5.544
Adirondack	WH	3.180	0.000
Keystone	WA-1	58.667	0.006
Keystone	WA-2	153.254	0.518
Keystone	WA-3	103.653	0.685
Keystone	WA-4	19.097	0.000
Keystone	WA-5	5.162	0.002
Keystone	WA-6	28.786	0.000
Keystone	WA-7	11.596	0.000
Keystone	WB	2.194	0.458
Keystone	WC	0.957	0.423
Keystone	WD	6.323	0.120
Keystone	WF	0.704	0.000
Keystone	WG	5.970	0.307
Keystone	WH	14.141	0.730
Keystone	WI	6.068	6.068
Keystone	WJ	1.071	1.071
Keystone	WK	0.412	0.002
TIAA	WB	0.439	0.422
TIAA	WC	639.860	554.889
	TOTAL	**1200.140**	**614.188**

Table 9: Stream Avoidance Summary

			Total		Total Avoided	
Property	Stream ID	Classification	Length (LF)	Area (AC	Length (LF)	Area (AC)
Adirondack	S-1p	Perennial	387	0.064	387	0.064
Adirondack	S-1i	Intermittent	3051	0.307	813	0.233
Adirondack	S-3	Intermittent	2161	0.156	2161	0.156
Adirondack	S-5	Intermittent	639	0.051	0	0.040
Adirondack	S-6	Intermittent	315	0.025	0	0.000
Adirondack	S-6A	Intermittent	486	0.027	0	0.010
Adirondack	S-7	Intermittent	485	0.033	0	0.000
Adirondack	S-10	Intermittent	198	0.019	0	0.000
Adirondack	S-11I	Intermittent	71	0.005	71	0.005
Adirondack	S-11E	Ephemeral	273	0.019	273	0.019
Keystone	S-1	Intermittent	297	0.02	0	0.000
		TOTAL	8349	0.726	3705	0.527

5.0 TYPES OF IMPACTS

The current design for the proposed project would impact waters of the U.S. by dragline mining and subsequent placement of approximately 39,016,572.32 cubic yards of fill material in wetlands, and streams, as well as the construction of the associated facilities which would involve the placement of fill material in wetlands. The impacts to waters from the mining activities are considered temporary due to the fact that the mined area will be replaced with the excavated material and once minerals are extracted restored to preconstruction contours and elevations within 90 days. There will be no net loss of waters of the U.S. in these areas. Associated facilities of the mine that will be constructed will result in permanent impacts to waters of the U.S. These impacts are considered permanent due to the fact that they will last longer than one year.

The following table provides a summary of the proposed mining activity at the project site by property area.

Table 10: Mining Summary by Property

Property	Mining Method	Total Area to be mined (ac)	Average Mining Depth	Total Wetland to be Mined (ac)	Total Upland to be Mined (ac)
TIAA	Excavation	216.045	25	77.28	138.765
Keystone	Dragline	570.862	50	316.874	253.949
Adirondack	Dragline	481.526	50	128.163	353.148
TOTAL		**1268.433**		**522.317**	**745.862**

The following table provides a summary of the proposed mining volumes by property area.

Table 11: Mining Volume Summary

Property	Total Volume to be Mined		Total Wetland to Be Mined	
	Cubic feet	Cubic yards	Cubic feet	Cubic yards
TIAA	235,273,005.00	8,713,806.29	84,157,920.00	3,116,956.88
Keystone	1,243,337,436.00	46,049,488.62	690,151,572.00	25,561,143.77
Adirondack	1,048,763,628.00	38,843,058.49	279,139,014.00	10,338,471.66
TOTAL	**2,527,374,069.00**	**93,606,353.39**	**1,053,448,506.00**	**39,016,572.32**

The waters proposed to be impacted include wetlands, and intermittent streams. The streams are generally part of the tributary system of the St. Mary's River. Mapped wetlands and streams are shown on Figure 4.1b. The review area contains approximately 1201.189 acres of wetlands and approximately 8,955 linear feet of stream channel. Aquatic resources quantities and proposed impacts are summarized in the tables below. All activities will be performed in a manner to minimize turbidity in the stream.

There will be no oils or other pollutants released from the proposed activities which will reach the stream.

All work performed during construction will be done in a manner to prevent interference with any legitimate water uses.

Table 12: Wetland Impact Summary

Property	Wetland ID	Area (ac)	Temporary Impacted Area(ac)	Permanent Impacted Area (ac)
Adirondack	WA	105.551	57.665	5.512
Adirondack	WB	7.430	6.269	1.161
Adirondack	WC	2.555	2.555	0.000
Adirondack	WD	10.327	3.766	5.993
Adirondack	WE	4.233	4.233	0.000
Adirondack	WF	4.055	4.055	0.000
Adirondack	WH	3.180	3.180	0.000
Keystone	WA-1	58.667	58.661	0.000
Keystone	WA-2	153.254	135.572	14.164
Keystone	WA-3	103.714	98.964	4.004
Keystone	WA-4	19.097	19.097	0.000
Keystone	WA-5	5.160	5.160	0.000
Keystone	WA-6	28.786	28.786	0.000
Keystone	WA-7	11.596	10.690	0.906
Keystone	WB	2.121	0.921	0.815
Keystone	WC	0.920	0.000	0.534
Keystone	WD	6.323	1.868	4.335
Keystone	WF	0.704	0.000	0.704
Keystone	WG	5.663	0.000	5.663
Keystone	WH	13.411	0.000	13.411
Keystone	WK	0.412	0.188	0.222
TIAA	WB	0.439	0.017	0.000
TIAA	WC	639.858	77.263	7.708
	TOTAL		**521.910**	**65.132**

Table 13: Stream Impact Summary

			Total		Temporary Impacts		Permanent Impacts	
Property	Stream ID	Classification	Length (LF)	Area (AC)	Length (LF)	Area (AC)	Length (LF)	Area (AC)
Adirondack	S-1p	Perennial	387	0.064	0	0.000	0	0.000
Adirondack	S-1i	Intermittent	3043	0.307	0	0.000	2238	0.074
Adirondack	S-3	Intermittent	2161	0.156	0	0.000	0	0.000
Adirondack	S-5	Intermittent	638	0.051	0	0.000	639	0.011
Adirondack	S-6	Intermittent	310	0.025	0	0.000	315	0.023
Adirondack	S-6A	Intermittent	486	0.027	0	0.000	486	0.017
Adirondack	S-7	Intermittent	485	0.033	0	0.000	485	0.033
Adirondack	S-10	Intermittent	198	0.019	0	0.000	198	0.019
Adirondack	S-11I	Intermittent	71	0.005	0	0.000	0	0.000
Adirondack	S-11E	Ephemeral	273	0.019	0	0.000	0	0.000
Keystone	S-1	Intermittent	297	0.02	0	0.000	297	0.020
	TOTAL		**8349**	**0.726**	**0**	**0.00**	**4658**	**0.199**

6.0 MITIGATION PLAN

Mitigation for temporary impacts will consist of returning the site to approximate preconstruction contours and elevations, replacement of the stockpiled topsoil and revegetation. The details of this process are described below:

- Prior to mining the top 6 inches of topsoil will be removed and stockpiled nearby.
- The mined material will be returned to the mined area and restored to approximate pre-construction contours and elevations.
- The stockpiled topsoil will be replaced.
- The area will be revegetated with longleaf pine (*Pinus palustris*) in upland areas and slash pine (*Pinus elliotti*) in the wetlands.

Mitigation for all impacts will be provided through the purchase of wetland and stream credits from an approved commercial mitigation bank. The Savannah District, US Army Corps of Engineers Regulatory Guidelines to Evaluation Proposed Mitigation Bank Credit Purchases in the State of Georgia was utilized when identifying the appropriate mitigation bank. This analysis is provided below. Using the 2018 Department of the Army Savannah District Corps of Engineers Standard Operating Procedure (SOP), the Qualitative Resource Assessments for Adverse Impact were utilized. SOP worksheets are included in Appendix C. The Qualitative Worksheets for Wetland Adverse Impacts were utilized to determine the total quantity of wetland and stream credits to be purchased as summarized below. The wetland and stream credits required for the impacts will be purchased prior to the initiation of the associated activities.

The project would need to obtain 192.72 riverine wetland grandfathered credits and 1105.76 depressional wetland grandfathered credits for a total of 1,298.48 wetland credits. The project would need to obtain 23,282 stream credits to mitigate for the permanent impacts. The project is located in the St. Mary's Primary Service Area (PSA) and in the 03070204 8-digit Hydrologic Unit Code (Figure 5). There are three banks located in the PSA with non-tidal wetland credits. Each bank does not have sufficient credits on its own. Therefore, wetland credits will be purchased from a combination of banks that have credits available. There is also one bank, the Satilla River Mitigation Bank that is within the tertiary service area. There are no banks with stream credits that services the 03070204 8-digit Hydrologic Unit Code. Therefore, stream credits will be purchased from the Georgia Alabama Land Trust In-Lieu Fee Program. Additional information and analyses are provided in the following matrix.

Table 14: Mitigation Bank Analysis

RESOURCE ANALYSIS				
IMPACT SITE DATA				
Resource Category	**Service Area; HUC**	**Distance to Impact Site**	**Credits Needed**	
Freshwater Wetland	PSA 03070204	--	1298.48	
Stream	PSA; 03070204	--	23,282	
			Sufficient Credits Available	**Recommended for Use**
MITIGATION BANK DATA				
Hog Creek Mitigation Bank				
Wetland	PSA; 03070204	60 miles	Not by itself	yes
Musket Bay Mitigation Bank				
Wetland	PSA; 03070204	51 miles	Not by itself	yes
Offerman Mitigation Bank				
Wetland	PSA; 03070204	59 miles	Not by itself	yes
Satilla River Mitigation Bank				
Wetland	PSA; 03070203	38 miles	Not by itself	yes

Additionally, following completion of the proposed mining activities, elevations within the footprint of the wetland will be restored to pre-mining conditions, stockpiled topsoil which will be removed prior to mining will be redeposited within the wetland footprint and the area would be planted with a variety of tree, shrub and herbaceous species.

7.0 WATERS OF THE U.S. JURISDICTIONAL DETERMINATION

During the Twin Pines Minerals due diligence process, TTL performed a delineation of waters of the U.S. for the various tracts during a time period covering April 2018 - April 2019. A report of findings along with a request for a jurisdictional determination for the Keystone and Loncala tracts was submitted to the USACE and review in 2018. On November 27 and 28, 2018, a site visit was conducted with USACE representatives to review the delineated areas. Revised reports based on the site visit are included as Appendix A. Reports of findings along with a request for a jurisdictional determination for the Adirondack and TIAA tracts are included in Appendix A of this submittal.

8.0 THREATENED AND ENDANGERED SPECIES

Project site-specific reviews on the USFWS Information for Planning and Consultation (IPaC) website identified 3 federally-listed species, 3 federal candidate species, and 3 species under review for federal status consideration as having the potential to occur within the vicinity of the project

(Consultation Codes:04EG1000-2018-SLI-2676 Event Code:04EG1000-2018-E-04211). Consultations with state agencies in the preliminary planning process resulted in additional species of concern being added to the list of targeted species for review at the proposed site. TTL personnel Christopher Terrell and Christopher Stanford initially performed a habitat characterization site reconnaissance to observe the presence of or the habitat of the targeted species. If suitable habitat was identified, targeted surveys were conducted. The results of the targeted species surveys are described in detail in the Herpetological Survey Report included in Appendix D.

The federal status species of concern identified by the resource agencies (with IPaC species highlighted in bold) and field findings are summarized in the table below. Results of the review of available data, habitat characterization and focused field surveys for sensitive species are presented below the table.

Table 15: Federal Status Species Potentially Occurring in Project Site Area

Group	Name	Federal Status	Supporting Habitat in or near the Site
Amphibians	**Frosted flatwoods salamander (Ambystoma cingulatum)**	**Threatened**	**Habitat on site is too degraded to support. Species not observed.**
	Striped Newt (Notophthalmus perstriatus)	**Candidate***	**Habitat not observed. Species not observed.**
	Gopher frog (Lithobates capito)	Candidate*	Habitat is present on site. A total of 6 individuals observed.
Birds	**Red-cockaded woodpecker (Picoides borealis)**	**Threatened**	**Habitat not observed. Species not observed. May forage on site.**
Flowering Plants	Florida hartwrightia (Hartwrightia floridana)	Under Review	Flowers September to November. Surveys will be conducted at that time.
	Flooplain tickseed (Coreopsis integrifolia)	Under Review	Flowers August to November. Surveys will be conducted at that time.
	Purple Honeycomb-head (Balduina atropurpurea	Under Review	Flowers September to October. Surveys will be conducted at that time.
Reptiles	**Eastern indigo snake *(Drymarchon corais couperi)***	**Threatened**	**Habitat observed on site. No individuals observed. May forage on site.**
	Gopher tortoise *(Gopherus polyphemus)*	**Candidate***	**Habitat, burrows and individuals observed.**

*Candidate species are not provided protection under the ESA.

8.1 Frosted flatwoods salamander

Potential breeding pond habitats for this species (isolated depressional wetlands forested with pond cypress (*Taxodium ascendens*), black gum (*Nyssa biflora*), slash pine (*Pinus elliottii*), and myrtle-leaved holly (*Ilex myrtifolia*) were visited in December, 2018. Each wetland (25 total) was evaluated as to its potential suitability for the frosted flatwoods salamander based on a ranking system developed by Palis (2002). For each wetland; the hydrology, fire history, presence/absence of graminaceous vegetation within the pond basin (including *Carex*, *Rhynchospora*, *Eriocaulon*, *Xyris*, *Panicum* spp.) as well as the condition of pine uplands (e.g., fire history, integrity of ground cover, soil type and disturbance) surrounding the wetland was considered. Pine uplands on-site, although underlain by hydric-to-mesic flatwoods soils that historically may have supported the specific pine savannah habitats required by flatwoods salamanders (Palis 1996, 1997; US FWS 1999; Jensen and Stevenson 2008); are grossly degraded from commercial forestry operations (e.g., bedding) that date to the 1970s. Today, these uplands no longer support intact ground vegetation (e.g., wiregrass, *Aristida stricta*). Similarly, isolated wetlands on-site are also in poor condition due to bedding, ditching, historic fire suppression and other disturbances.

A total of 12 survey ponds were sampled from February 27 – March 9, 2019. The surveys included 17.25 person-hours dip netting and 175 trap-nights. No frosted flatwoods salamander larvae were found. On these surveys, 2 species of salamanders, 6 species of anurans, 9 species of fishes, and 4 species of snakes were captured. During the same period frosted flatwoods salamander larvae were found on Fort Stewart, Georgia, indicating the species bred at this site during the fall-winter of 2018-2019 (Chris Coppola, U.S. Fish and Wildlife Service, pers. Comm., 2019).

The disappearance of the frosted flatwoods salamander from Chesser Island and Okefenokee National Wildlife refuge lands is most likely attributed to anthropogenic disturbances the region suffered prior to being acquired by the U.S. Fish and Wildlife Service (Jensen 1995). Large-scale declines and extirpations of frosted flatwoods salamanders have been attributed to habitat loss and degradation from commercial forestry practices (Means et al. 1996, Palis 1997). In fact, the impetus, in part, for the federal listing of the species in 1999 was widespread loss of habitat due to silviculture (USFWS 1999). It is probable that the inability to document frosted flatwoods salamanders as well as two easily sampled frog species typical of pine flatwoods habitats on the site (the southern chorus frog (*Pseudacris nigrita*) and ornate chorus frog (*Pseudacris 23rnate*) is due to their extirpation, historically, from habitat changes caused by forestry operations.

The uplands on the site – although in some areas underlain by hydric-to-mesic flatwoods soils that historically may have supported the specific pine savannah habitats required by frosted flatwoods salamanders– are, as detailed above, grossly degraded from commercial forestry operations that (based on a review of aerial photographs) date at least to the early 1970s. Today, these uplands no longer support intact ground vegetation (e.g., wiregrass, Aristida stricta) as is typical of habitat still occupied by this species. The proposed project is not likely to have an effect on the frosted flatwoods salamander.

8.2 Striped newt

Until recently the striped newt was considered a candidate for federal listing under the Endangered Species Act. In December 2018, the U.S. Fish and Wildlife Service determined that federal listing is not warranted at this time. This amphibian is known to have declined and disappeared from portions of its historic range on Trail Ridge, near the Okefenokee National Wildlife Refuge, due to commercial forestry operations (Dodd and LaClaire 1993, Farmer et al. 2017).

Sampling for striped newt adults/larvae at the same 10 wetland sites using the same dipnet and minnow trap survey methods as detailed above for the frosted flatwoods salamander was performed during February-March 2019. Dipnet and minnow trap surveys of 12 isolated wetlands on-site did not document the striped newt. Naturally-functioning longleaf pine–wiregrass sandhills, the preferred habitat for transformed examples of this newt, are lacking on-site.

Due to the profound habitat changes and perturbations from commercial forestry practices (see section 8.1 Frosted Flatwoods Salamander above) it is unlikely that the species persists on the site, if in fact it was ever present. The proposed project is not likely to have an effect on the striped newt.

8.3 Gopher frog

Gopher frog tadpoles were sampled at the same 10 wetland sites using the same dipnet and minnow trap survey methods as detailed above for the frosted flatwoods salamander (also during February-March 2019).

In December, this species was documented from a site on the Keystone Tract, finding an adult female gopher frog in a juvenile gopher tortoise burrow. Gopher frog was recorded during gopher tortoise burrow scoping surveys (conducted spring 2019). Single-opening funnel traps made of aluminum screening were placed at active gopher tortoise burrows in an effort to capture gopher frogs that emerge during the night (traps were set at a minimum of 6 active burrows, for 2 consecutive nights, at all tortoise colonies on-site that contained 8 or more tortoise burrows).

The gopher frog, state-listed as Rare by the Georgia Department of Natural Resources, was documented on the site, including observations for the Adirondack, Keystone, and Loncala tracts. A total of six gopher frogs were observed, including three adults seen in gopher tortoise burrows during indigo snake surveys or gopher tortoise surveys and three adults observed in tortoise burrows while scoping burrows with the burrow camera. Two frogs were captured and voucher photographs were taken of these specimens. Dates and specific location information for these records are provided in the Herpetological Report in Appendix D.

Dipnet and minnow trap surveys of 12 isolated wetlands conducted on-site during February-March 2019 did not document egg masses or tadpoles of the gopher frog. An isolated wetland surveyed in March 2019 (A-04; 30.525379°N, 82.09925° W), dry when revisited on 23 April 2019, is a potential breeding pond for the gopher frog. A small cypress pond, converted in part into a borrow pit and located offsite and just south of the Keystone Tract (30.51613°N, 82.11790°W), may be a breeding site used by gopher frogs.

Prior to construction, all gopher tortoise burrows will be camera scoped to determine the occupancy status of the burrow. Occupied burrows will be trapped and captured gopher frog along with gopher tortoise will be relocated to an area identified in coordination with Georgia DNR.

8.4 Red-cockaded woodpecker

Red-cockaded woodpecker are residents of the Okefenokee National Wildlife Refuge and identified by a resource agency as possibly using the proposed project site for foraging. Suitable habitat consists of well-drained, sandy areas dominated by old-growth, longleaf pine communities with sparse midstory vegetation and dense diverse herbaceous groundcover. Pine trees must be of sufficient size and spatial distribution to be inhabited by red-cockaded woodpeckers. Due to the site's current use as a commercial forestry operation, this habitat does not exist within the review area. No red-cockaded woodpeckers, cavity trees, or sign were observed during field reconnaissance nor during any of the field work.

The proposed project is not likely to have an effect on the red-cockaded woodpecker.

8.5 Florida hartwrightia

This plant flowers from September to November. Focused surveys for this species will be conducted at that time.

8.6 Flooplain tickseed

This plant flowers from August to November. Suitable habitat for this species may not occur in the project review area. If suitable habitat is identified, focused surveys for this species will be conducted during the flowering period.

8.7 Purple honeycomb-head

This plant flowers from August to October. Habitat for this species includes wet savannas and pitcherplant bogs. Focused surveys for this species will be conducted at that time.

8.8 Eastern indigo snake

The soil types present at the project site indicate that suitable habitat may be present for the eastern indigo snake and the gopher tortoise. Surveys for indigo snakes overwintering in gopher tortoise burrows were conducted following visual encounter survey methods that are effective for this species in the southern Georgia portion of its range (Stevenson et al. 2003, Bauder et al. 2017). Specifically, all active/inactive tortoise burrows (n=118) were visited on three dates between December 2018 - March 2019 in an effort to locate basking snakes and shed skins; burrows with fresh snake tracks were examined with a tortoise burrow camera (to look for snakes inside burrows). Additionally, all active/inactive tortoise burrows were scoped with a burrow camera (in late March or April/May) in an effort to document burrow commensals, including indigo snakes.

No eastern indigo snakes or eastern indigo snake shed skins were found during visual encounter surveys, and no fresh snake tracks were located at burrows. A single pygmy rattlesnake (*Sistrurus miliarius*), the shed skin of an eastern coachwhip (*Coluber flagellum*) and two observations of gopher frogs (*Rana capito*) were observed during the surveys.

In addition to the above visual encounter surveys, all active/inactive gopher tortoise burrows on-site were visited on 2-4 April 2019. As part of a tortoise survey, most subadult-and-adult-sized burrows were scoped with a tortoise burrow camera at this time (see section 8.9 gopher tortoise below). No indigo snakes or shed skins were found during this effort. A map of indigo snake survey areas and gopher tortoise burrow locations is provided in Appendix D.

The indigo snake is an extremely vagile species that often moves between upland and wetland habitats in search of food (Stevenson et al. 2010, Breininger et al. 2011). Individual snakes studied in southern Georgia had large home ranges, for some large males up to 3,500 acres in size (Hyslop et al. 2014). A lack of indigo snake observations during focused surveys doesn't demonstrate that the species is never present or transient on the site (even if the species doesn't winter on-site it is possible that snakes from adjacent tracts, if present that is, may occasionally visit the site to forage. However, there are no recent credible sightings known for the property. The proposed project is not likely to have an effect on the eastern indigo snake.

8.9 Gopher tortoise

Suitable habitat for gopher tortoise is present in the review area. Open canopy pine forests with abundant herbaceous understory are the preferred habitat for gopher tortoises and this habitat was present within the review area. Approximately four areas within the proposed project site were identified during surveys that contained gopher tortoise burrows (Appendix D)

From pedestrian surveys, all gopher tortoise burrows were located and each individual burrow classified as "active" or "inactive" (based on presence or absence of fresh tracks, respectively). Also, each burrow was classified as that of an "adult", "subadult", or "juvenile" tortoise (based on burrow width). Gopher tortoise burrow widths were classified as follows: juvenile burrows are 0-7.85 cm in width; subadult burrows 7.86- 25.7 cm wide; adult burrows are 25.8+ cm wide (these widths correspond to carapace lengths of 0-12 cm, 12.1-24 cm, and 24+ cm, respectively). Note: 19 burrows that were less than 14 cm in burrow width were not scoped because of their small size; however, they were closely examined using a mirror or flashlight and in doing so we observed tortoises in 5 of these burrows; we scoped all remaining burrows. A total of 118 active/inactive tortoise burrows comprised of 59 adult burrows, 9 subadult burrows, and 26 juvenile burrows were identified during the surveys. In an effort to determine burrow occupancy in spring, 2019, a tortoise burrow camera was used to scope all adult/subadult burrows. (Juvenile burrows were assumed to be occupied by tortoises if fresh tracks were present). These activities assisted in developing a very precise estimate of just how many gopher tortoises are present on-site.

On the site, the sandy, well-drained environments that support gopher tortoises have historically been site-prepped and bedded and are now in planted pine, usually slash pine. Tortoises are not especially common or widespread on the site, occurring only in 4-5 fairly small and discrete areas of sandy, open-canopied plantation habitat; individual tortoise colonies support ca. 10-15 adult tortoises, or less.

With the burrow camera (or using flashlights/mirrors), we observed gopher tortoises in 23 adult-sized burrows, 11 subadult-sized burrows, and in 1 juvenile-sized burrow. For another 4 active adult-sized burrows, 11 active subadult-sized burrows, and 2 active juvenile burrows, we could not determine conclusively whether or not the burrow was in fact occupied by a tortoise. Tortoise survey data is provided in Appendix A.

Based on the limits of the first mining block, approximately 7 active adult, 10 active subadult, 6 inactive adult and 7 inactive subadult burrows may be impacted by the project.

Conservation measures include avoidance, translocation and /or habitat management to reduce the adverse impacts and potentially benefit the gopher tortoise population. Gopher tortoise burrows will be avoided to the maximum extent practicable at the site. For the gopher tortoise burrows that cannot be avoided, a translocation project will be conducted for the gopher tortoise in these areas. Prior to construction, all gopher tortoise burrows will be camera scoped to determine the occupancy status of the burrow. Occupied burrows will be trapped and captured gopher tortoise will be relocated to an area identified in coordination with Georgia DNR. Upon project completion, gopher tortoise will be relocated to the project site

The applicant has successfully trapped and relocated gopher tortoise for its mining operation in Starke, Florida. The applicant, through its consultant, successfully obtained permits to capture by using bucket traps, live traps, hand shovel and backhoe excavation of tortoise burrows. The animals were relocated to a donor site by non-harmful means. The permit was obtained through the Florida Fish and Wildlife Commission, Division of Habitat and Species Conservation. Additionally, the gopher tortoise has successfully recolonized areas that were previously mined for heavy mineral sands. With the implementation of these mitigation measures, the proposed project is not likely to have an effect

on the gopher tortoise.

As previously stated, consultations with state agencies in the preliminary planning process resulted in additional species of concern being added to the list of targeted species for review at the proposed site. These species do not have federal status but were identified by various resource agencies as being species of special concern. Results of the review of available data, habitat characterization and focused field surveys for other special concern species are presented below the table.

Table 16: Other Special Concern Species Potentially Occurring in Project Review Area

Group	Name	State Status	Supporting Habitat in or near the Site
Birds	Bald eagle (*Haliaeetus leucocephalus)*	Threatened	Habitat not observed. Species not known to occur.
	Bachman's sparrow (*Peucaea aestivalis*)	Rare	Habitat is present. Observed on site in two locations.
Fish	Red face top minnow (*Fundulus rubifrons*)	None	Habitat is present. Observed on site.
Flowering Plants	Dwarf pawpaw (*Asimina pygmea*)	None	Habitat is present. Individuals observed on site.
	Florida orange-grass (*Ctenium floridanum*)	None	Habitat is present.
	Green-fly orchid (*Epidendrum magnolia*)	Unusual	Habitat is present. Was not identified on site.
	Southern umbrella-sedge (*Fuirena scirpoidea*)	None	Habitat is present. Individuals observed on site.
	Florida milk-pea (*Galactia floridana*)	None	Habitat is present. Was not identified on site.
	Chapman's skeleton grass (*Gymnopogon chapmanianus*)	None	Habitat is present. Was not identified on site.
	Narrowleaf water-willow (*Justicia angusta*)	None	Habitat is present. Was not identified on site.
	Southern bog-button (*Lachnocaulon beyrichianum*)	None	Habitat is present.
	Pond spice (*Litsea aestivalis*)	Rare	Habitat is present.
	Odorless bayberry (*Morella inodora*)	Threatened	Habitat is present. Was not identified on site.
	Palafoxia (*Palafoxia integrifolia*)	None	Habitat is present. Flowers August to November. Surveys will be conducted at that time.
	Arrow arum (*Peltandra sagittifolia*)	None	Habitat is present.
	Pennyroyal (*Piloblephis rigida*)	None	Habitat is present. Was not identified on site.
	Chapman's fringed orchid (*Platanthera chapmanii*)	None	Habitat is present. Flowers July to September. Surveys will be conducted at that time.
	Yellow fringeless orchid (*Platanthera integra*)	None	Habitat is present. Flowers July to September. Surveys will be conducted at that time.
	Wild coco (*Pteroglossaspis ecristata*)	Threatened	Habitat not present.

Group	Name	State Status	Supporting Habitat in or near the Site
Flowering Plants	Chapman oak (*Quercus chapmanii*)	None	Habitat is present. Individuals observed on site.
	Nuttall meadowbeauty (*Rhexia nutallia*)	None	Habitat is present. Individuals observed on site.
	Fernald's beakrush (*Rhynchospora fernaldii*)	None	Habitat is present.
	Hooded pitcherplant (*Sarracenia minor* var. *minor*)	Unusual	Habitat is present. Individuals observed on site.
	Parrot pitcherplant (*Sarracenia psittacine*)	Threatened	Habitat is present. Individuals observed on site.
	White sunnybell (*Schoenolirion albiflorum*)	None	Habitat is present.
	S Sandhill skullcap (*Scutellaria arenicola*)	None	Habitat is present.
	Florida ladies-tresses (*Spiranthes floridana*)	None	Habitat is present.
	Wireleaf dropseed (*Sporobolus teretifolius*)	None	Habitat is present.
	Stokes aster (*Stokesia laevis*)	None	Habitat is present. Flowers May through September. Surveys will be conducted at that time.
	Sprawling goats' rue (*Tephrosia chrysophylla*)	None	Habitat is present.
	Bartram's air-plant (*Tillandsia bartramii*)	None	Habitat is present. Individuals observed on site.
	Diverse-leaf crownbeard (*Verbesina heterophylla*)	None	Habitat is present.
Mammals	Black bear (*Ursus americanus floridanus*)	None	Habitat is present. Individuals not observed on site. Individuals observed on Alternate 2 site.
Reptiles	Spotted Turtle (*Clemmys guttata*)	Unusual	Extremely limited habitat is present on site. Individuals not observed on site.
	Southern hog-nosed snake (*Heterodon simus*)	Threatened	Extremely limited habitat is present on site. Individuals not observed on site.
	Black swampsnake (*Liodytes pygaea*)	None	Habitat is present on site. Individuals observed on site.
	Mimic glass lizard (*Ophisaurus mimicus*)	Rare	Extremely limited habitat is present on site. Individuals not observed on site.
	Florida pine snake (*Pituophis melanoleucus*)	None	Habitat is present on site. Individuals observed on site.

8.10 Bald eagle

Juvenile bald eagles and non-nesting adults can be seen throughout Georgia, but known nesting activity is concentrated mostly along the coast and near major rivers, wetlands, and reservoirs in the southern and central parts of the state. Like other members of the "fish eagle" group, bald eagles almost always nest near open water. Bald eagle was not observed on the site. Habitat for bald eagle does not occur on site. The proposed project is not likely to have an effect on the bald eagle.

8.11 Bachman's sparrow

Habitat for this species consists of open pine or oak woods; old fields; brushy areas, young large grassy pine regeneration areas. The state-listed Bachman's sparrow (*Peucaea aestivalis*) was documented from one location on-site and from a second location just east of the site boundary during the herpetological surveys in April of 2019. This species may utilize the site for foraging. Based on the temporary nature of the majority of the impacts of the project and the poor quality of the existing habitat on site, the proposed project is not likely to have an effect on the Bachman's sparrow.

8.12 Red face top minnow

Habitat for this species includes stream margins, backwaters, pools, marshes, and wetlands, often associated with aquatic vegetation. Habitat for this species occurs on the project site. This species was identified on site.

8.13 Dwarf pawpaw

Habitat for this species consists of flatwoods and wet savannas. Habitat for this species occurs on the project site. Six populations of this species were identified on site.

8.14 Florida orange-grass

Habitat for this species consists of moist pine barrens. Habitat for this species is present on site.

8.15 Green-fly orchid

This species is epiphytic especially on *Magnolia grandiflora*, *Quercus virginiana*, and *Taxodium* spp.in blackwater river swamps and mesic hardwood hammocks. Habitat for this species is present on site.

8.16 Southern umbrella-sedge

Habitat for this species consists of pineland depressions, and wet savannas with *Toxicodendron vernix*. Habitat for this species is present on the project site. Populations of this species were identified on the project site.

8.17 Florida milk-pea

Habitat for this species consists of pine flatwoods. This plant is a herbaceous vine that can reach 3 feet in length. It tends to stay prostrate and trailing but will climb if given a support. Habitat for this species is present on the project site. This species was not identified on site.

8.18 Chapman's skeleton grass

Habitat for this species consists of calcareous glades and relict prairies with dryish clay loam soils. It also grows in sandy pine barrens and sites inhabited by dwarf palmetto, *Serenoa repens*. Habitat for this species is present on the project site. This species was not identified on the site.

8.19 Narrowleaf water-willow

Habitat for this species consists of roadside ditches, often with *Hartwrightia* in shallow sloughs and wet savannas. It is emergent in shallow water wetlands. Habitat for this species is present on the project site. This species was not identified on the site.

8.20 Southern bog-button

Habitat for this species consists of flatwoods. Habitat for this species is present on the project site.

8.21 Pond spice

Habitat for this species consists of cypress ponds, and swamp margins. Habitat for this species is present on the project site. This species was not identified on the site.

8.22 Odorless bayberry

Habitat consists of bayheads, titi swamps, moist to wet pinelands. Habitat for this species is present of the project site. This species was not identified on the site.

8.23 Palafoxia

Habitat for this species consists of sandy pine oak scrub. Habitat for this species is present on the project site.

8.24 Arrow arum

Habitat for this species consists of swamps, wet hammocks on pristine sphagnum mats. This species is relatively common in the Piedmont area of Georgia, but lesser known in the coastal plain. Habitat for this species is present on the project site.

8.25 Pennyroyal

Habitat for this species consists of myrtle oak scrub. Habitat for this species is present on the project site.

8.26 Chapman's fringed orchid

Habitat for this species consists of wet savannas, wet pine flatwoods, hillside seeps, and wet roadsides. Habitat for this species is present of the project site.

8.27 Yellow fringeless orchid

Habitat for this species consists of wet savannas and pitcherplant bogs. Habitat for this species is present of the project site.

8.28 Wild coco

Habitat for this species consists of grassy savannas, palmetto barrens and longleaf pine grasslands. Habitat for this species is present on the project site.

8.29 Chapman oak

Habitat for this species consists of sand ridges, dunes, and oak-pine scrub. Habitat for this species is present on the project site. This species was identified on the project site.

8.30 Nuttall meadowbeauty

Habitat for this species consists of pine flatwoods and bogs. Habitat for this species is present on the project site. This species was identified on the project site.

8.31 Fernald's beakrush

Habitat for this species consists of sandy, peaty pond margins and depressions. Habitat for this species is present on the project site.

8.32 Hooded pitcherplant

Habitat for this species consists of wet savannas and pitcherplant bogs. Habitat for this species is present on the project site. This species was identified on the proposed project site.

8.33 Parrot pitcherplant

Habitat for this species consists of wet savannas and pitcherplant bogs. Habitat for this species is present on the project site. This species was identified on the proposed project site.

8.34 White sunnybell

Habitat for this species consists of wet savannas. Habitat for this species is present on the project site. This species was not identified on the site.

8.35 Sandhill skullcap

Habitat for this species consists of sandy scrub. Habitat for this species is present on the project site.

8.36 Florida ladies-tresses

Habitat for this species consists of wet savannas, and mowed grassy openings in the Okefenokee area. Habitat for this species is present on the project site. This species was not identified on the site.

8.37 Wireleaf dropseed

Habitat for this species consists of longleaf pine-wiregrass savannas and pitcherplant bogs. Habitat for this species is present on the project site.

8.38 Stokes aster

Habitat for this species consists of coastal plains, bogs, pine savanna, and open woodlands. Habitat for this species is present on the project site. This species flowers May through September. Surveys will be conducted at that time.

8.39 Sprawling goats' rue

Habitat for this species consists of dry sandy scrub. Habitat for this species is present on the project site. This species was not identified on site.

8.40 Bartram's air-plant

This plant is epiphytic in bay swamps, freshwater tidal swamps; beech-magnolia bluff forests. Habitat for this species is present on the project site. Populations of this plant were identified on the project site.

8.41 Diverse-leaf crownbeard

Habitat for this species consists of sandy peat in fire-maintained savannahs or in open stands of slash pine-palmetto flatwoods where wiregrass dominates. Habitat for this species is present on the project site. This species was not identified on site.

8.42 Black Bear

Most of the South Georgia bear habitat is slash pine (*Pinus elliottii*) flatwoods, lowland mixed hardwoods, cypress/gum wetlands, and emergent freshwater prairie. The core of the range is a contiguous area of protected public lands totaling 666,107 acres including Dixon Memorial State Forest (and WMA) and Okefenokee NWR in Georgia, and Osceola National Forest and John Bethea State Forest in Florida. Most of the perimeter of the core area is industrial forest land which is managed with intensive pine site preparation and short timber rotations. Most (97%) of the diet of the South Georgia population bears was of plant origin, with the top 3 food items being black gum, saw palmetto, and acorns. Home ranges of adult female bears were in areas with disproportionately high loblolly bay (*Gordonia lasianthus*) and gum-bay-cypress (*Taxodium* spp.) vegetation associations (Dobey et al. 2005). Although Dobey et al.'s (2005) analyses did not rank pine associations highly, 57% of the summer diet of bears was comprised of food items found almost exclusively in pine (i.e., huckleberry, blueberry, bitter gallberry) or bears to have access to all life requisites, they need to be located within the home range of the bear. The mean annual home-range size for females in the South Georgia population was 13,813 acres and they expanded their home ranges during years of poor black gum production (Dobey et al. 2005). The expansion was most apparent between autumn 1998 and 1999 when the average home-range size for females increased from 3,583 acres to 19,373 acres and included a larger proportion of upland areas open to hunting (Dobey et al. 2005). Male home-range size was 84,708 acres (Dobey et al. 2005). Black bear was identified on the Loncala tract (Alternate 2). The proposed project is not likely to have an effect on black bear.

The following table provides a summary of the potential impacts of the project to federal status species.

Table 17: Summary of Potential Impacts to Federal Status Species in Project Site Area

Group	Name	Federal Status	Supporting Habitat in or near the Site	Effects to Species from Project	Mitigation Measures Proposed to Avoid Adverse Effect
Amphibians	**Frosted flatwoods salamander (Ambystoma cingulatum)**	**T**	**Habitat on site is too degraded to support. Species not observed.**	**No effect anticipated.**	**No mitigation measures proposed.**
	Striped Newt (Notophthalmus perstriatus)	**C***	**Habitat not observed. Species not observed.**	**No effect anticipated.**	**No mitigation measures proposed.**
	Gopher frog (Lithobates capito)	C*	Habitat is present on site. A total of 6 individuals observed.	Occupied habitat is within impact area. Six individuals identified.	Pre-Construction Surveys to scope burrows and relocate species.
Birds	**Red-cockaded woodpecker (Picoides borealis)**	**T**	**Habitat not observed. Species not observed. May forage on site.**	**No effect anticipated.**	**No mitigation measures proposed.**
Flowering Plants	Florida hartwrightia (*Hartwrightia floridana*)	Under Review	Flowers September to November. Surveys will be conducted at that time.	To Be Determined	To Be Determined
	Flooplain tickseed (*Coreopsis integrifolia*)	Under Review	Flowers August to November. Surveys will be conducted at that time.	To Be Determined	To Be Determined
	Purple Honeycomb-head (*Balduina atropurpurea)*	Under Review	Flowers September to October. Surveys will be conducted at that time.	To Be Determined	To Be Determined
Reptiles	**Eastern indigo snake *(Drymarchon corais couperi)***	**T**	**Habitat observed on site. No individuals observed. May forage on site.**	To Be Determined	To Be Determined
	Gopher tortoise *(Gopherus 33olyphemus)*	**C***	**Habitat, burrows and individuals observed.**	**Burrows in impact area.**	**Pre-Construction Surveys to scope burrows and relocate species.**

**Candidate species are not provided protection under the ESA.*
T = Threatened; C= Candidate

Two federal candidate species, the gopher tortoise and the gopher frog will be impacted by the project due to construction of facilities and mining activities. Mitigation measures to reduce this impact include pre-construction surveys to scope burrows and the relocation of the species. Additionally, gopher tortoise will be relocated to the project site upon completion of the mining activities. Based on the implementation of these conservation measures, the proposed project is not expected to have a significant effect on threatened and endangered species. The associated IPaC threatened and endangered species lists specifically acquired for the review area is included as Appendix D.

9.0 CULTURAL RESOURCES

A desktop and subsequent Phase I Cultural Resources Survey was conducted for the Keystone review area by Terra Xplorations (report dated October 26, 2018). Phase I investigations of this property led to the discovery of six archaeological sites and four isolated finds. Based on the results of the field investigation, none of these resources were considered significant, having been heavily impacted by numerous years of repeated pine cultivation activities. All six archaeological sites were recommended ineligible for NRHP inclusion under Criterion D based on their lack of integrity. As no significant cultural resources will be impacted by the proposed mining operation, TerraX recommended clearance for the project.

An additional Phase I Cultural Resources Survey for the Adirondack tract was conducted by Terra Xplorations (report dated May 31,2019) on the tract. The Phase I investigation of this property led to the identification of one archaeological site and two isolated finds. The single archaeological site and both isolated finds date to the early-to-middle twentieth century. Neither the single archaeological site nor the isolated finds are recommended as eligible for NRHP inclusion under Criterion D. An architectural survey identified six resources within view of the proposed project area. Of these six, only one, is recommended as potentially eligible for NRHP inclusion under Criterion C. This resource is a mid-century ranch home constructed in 1950. Though currently abandoned, the integrity of the structure is intact and its architecture is significant as a representative example of a mid-twentieth century ranch house. TerraX recommends avoidance of this property, and notes that it may suffer adverse visual and audible effects as a result of the proposed mining operations. However, the house is currently located near an existing chip mill and railroad tracks and is currently exposed to heavy audible effects. The house will not be impacted by the project directly.

An additional Phase I Cultural Resources Survey for the TIAA tract was conducted by Terra Xplorations (report dated June 16, 2019) on the tract. As a summary of findings of this survey, three archaeological sites and one isolated find were discovered. TerraX recommended that the sites be considered ineligible for NRHP inclusion under Criterion D and isolated finds, by their nature, are not eligible for NRHP inclusion. Based on the findings of the survey, no further cultural resources studies were recommended for the proposed project area.

The proposed project is not expected to significantly impact cultural resources. Copies of the Phase I Cultural Resources Survey reports are provided in Appendix E.

10.0 REFERENCES

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FIGURES

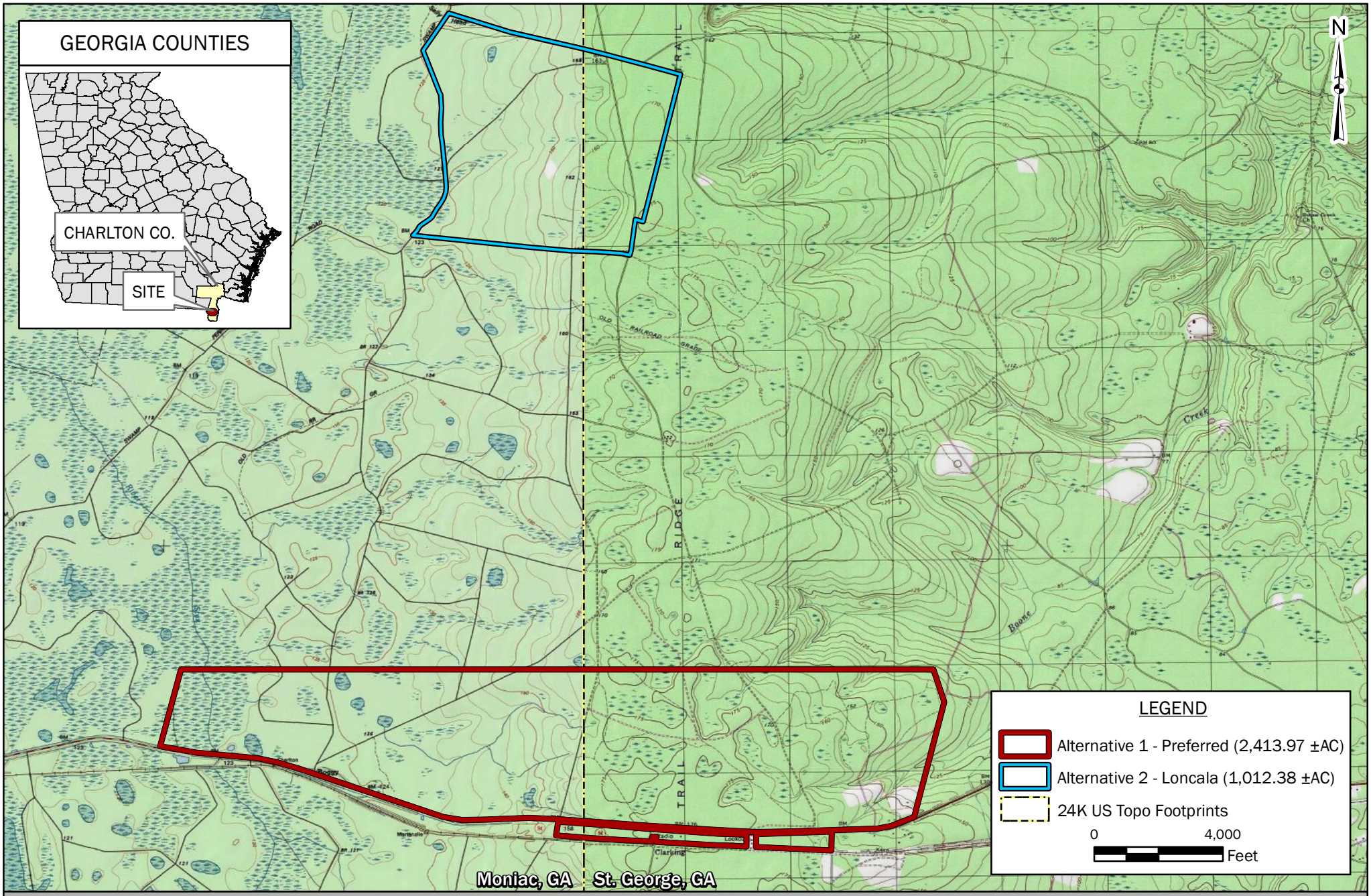


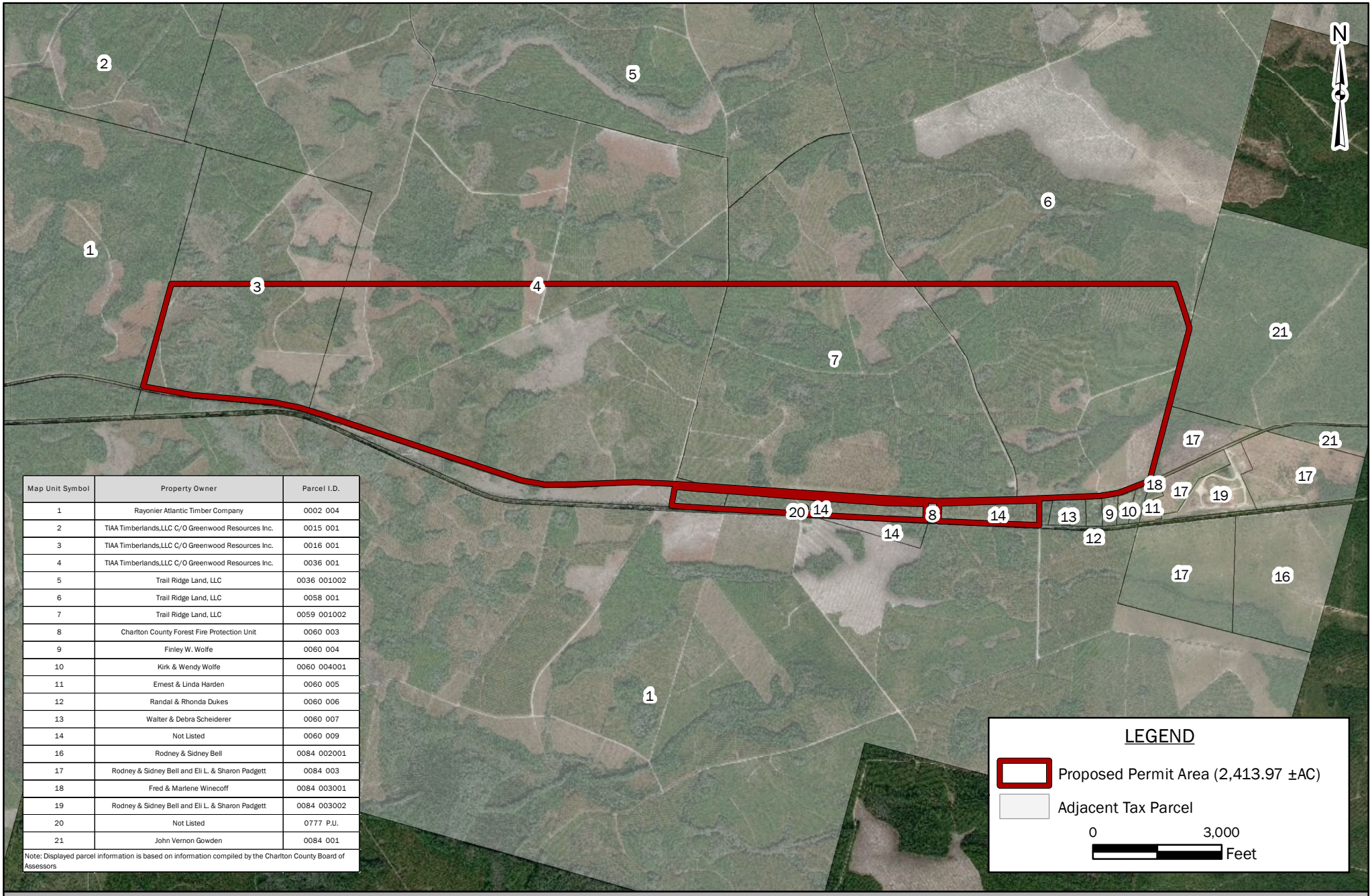
FIGURE 1: SITE LOCATIONS & TOPOGRAPHIC MAP

TWIN PINES MINERALS

USACE INDIVIDUAL PERMIT APPLICATION

BASEMAP: Moniac, Georgia & Saint George, Georgia USGS 7.5 Minute Quadrangle Map, 1994.

DRAWN BY:AGW
CHECKED BY: CMS
DRAWING DATE: 7/2/2019
REVISION DATE: N/A
TTL JOB NO.: 000180200804.00
APPROXIMATE SCALE: 1" = 3,000'



Map Unit Symbol	Property Owner	Parcel I.D.
1	Rayonier Atlantic Timber Company	0002 004
2	TIAA Timberlands,LLC C/O Greenwood Resources Inc.	0015 001
3	TIAA Timberlands,LLC C/O Greenwood Resources Inc.	0016 001
4	TIAA Timberlands,LLC C/O Greenwood Resources Inc.	0036 001
5	Trail Ridge Land, LLC	0036 001002
6	Trail Ridge Land, LLC	0058 001
7	Trail Ridge Land, LLC	0059 001002
8	Charlton County Forest Fire Protection Unit	0060 003
9	Finley W. Wolfe	0060 004
10	Kirk & Wendy Wolfe	0060 004001
11	Ernest & Linda Harden	0060 005
12	Randal & Rhonda Dukes	0060 006
13	Walter & Debra Scheiderer	0060 007
14	Not Listed	0060 009
16	Rodney & Sidney Bell	0084 002001
17	Rodney & Sidney Bell and Eli L. & Sharon Padgett	0084 003
18	Fred & Marlene Winecoff	0084 003001
19	Rodney & Sidney Bell and Eli L. & Sharon Padgett	0084 003002
20	Not Listed	0777 P.U.
21	John Vernon Gowden	0084 001

Note: Displayed parcel information is based on information compiled by the Charlton County Board of Assessors

TTL

FIGURE 2: REAL ESTATE TAX PARCEL MAP FOR SITE & SURROUNDING PROPERTIES

TWIN PINES MINERALS

USACE INDIVIDUAL PERMIT APPLICATION

BASEMAP: DigitalGlobe, 1/24/2016 and 9/17/2017.

DRAWN BY:AGW
CHECKED BY: CMS
DRAWING DATE: 7/2/2019
REVISION DATE: N/A
TTL JOB NO.: 000180200804.00
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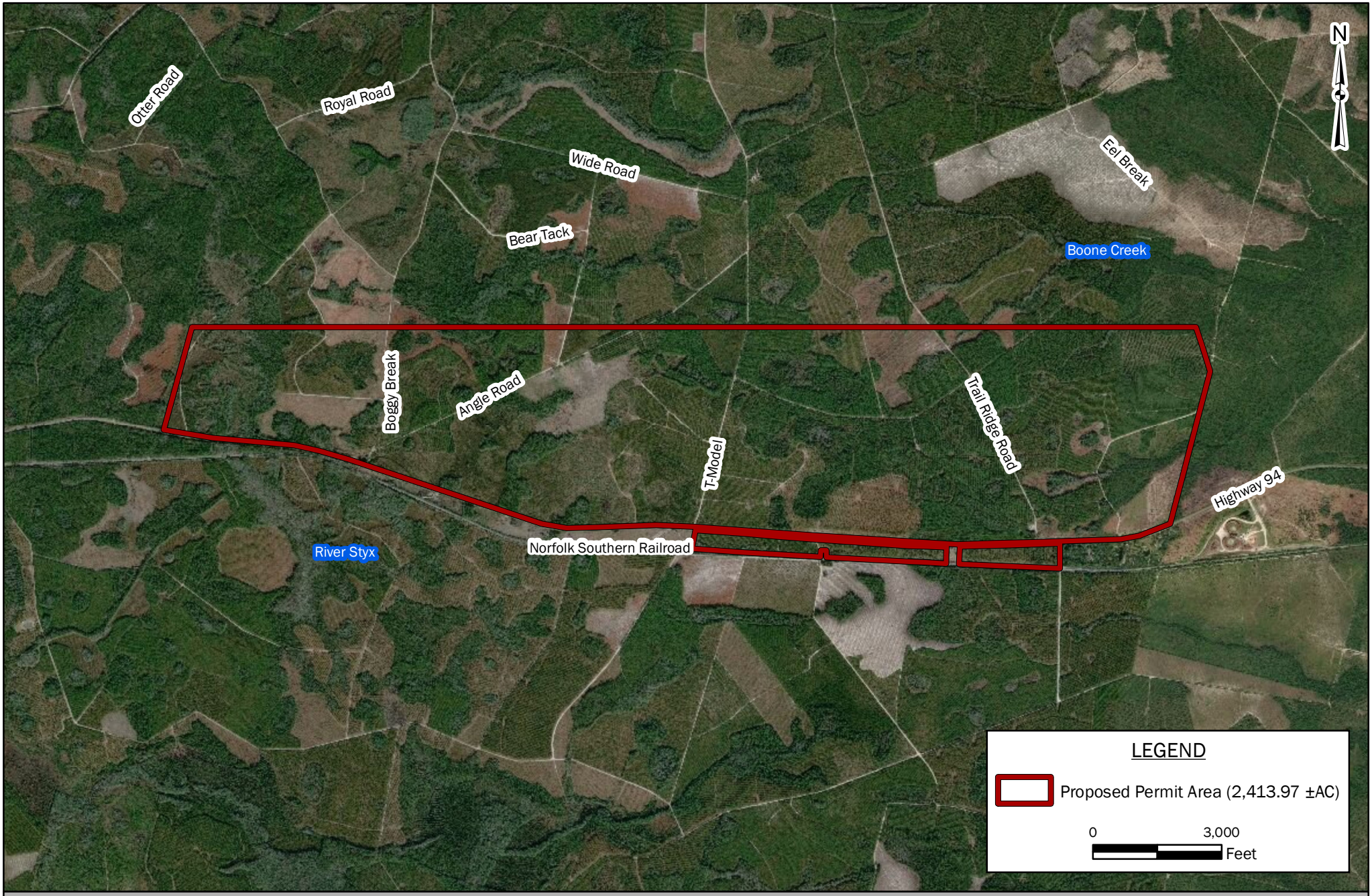

TTL

FIGURE 3: SITE LOCATION & AERIAL PHOTOGRAPH

TWIN PINES MINERALS

USACE INDIVIDUAL PERMIT APPLICATION

BASEMAP: DigitalGlobe, 1/24/2016 and 9/17/2017.

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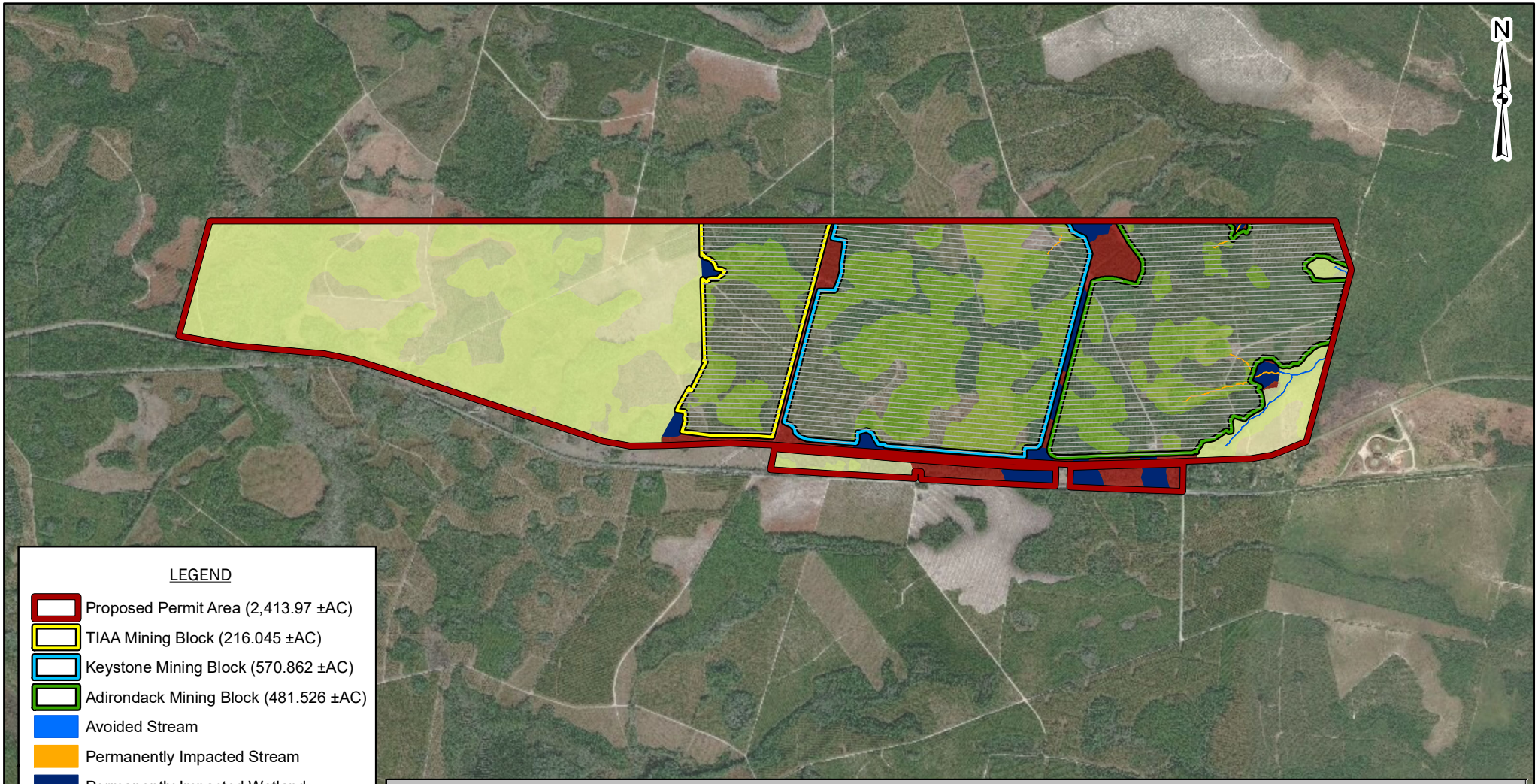

Summary of Features								
Aquatic Feature	Total		Temporary Impacts		Permanent Impacts		Total Avoided	
	Length (LF)	Area (AC)	Length (LF)	Area (AC)	Length (LF)	Area (AC)	Length (LF)	Area (AC)
Wetland	---	1,201.230	---	521.910	---	65.132	---	614.188
Perennial Stream	387	0.064	0	0	0	0	387	0.064
Intermittent Stream	7,703	0.623	0	0	4,658	0.199	3,045	0.424
Ephemeral Stream	273	0.020	0	0	0	0	273	0.020

TTL

FIGURE 4.1a: ALTERNATIVE 1

TWIN PINES MINERALS

USACE INDIVIDUAL PERMIT APPLICATION

BASEMAP: Saint George, Georgia USGS 7.5 Minute Quadrangle Map, 1994.

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DRAWING DATE: 7/2/2019
REVISION DATE: N/A
TTL JOB NO.: 000180200804.00
APPROXIMATE SCALE: 1" = 3,000'

FIGURE 4.1b: ALTERNATIVE 1 SENSITIVE FEATURES LOCATION MAP

TWIN PINES MINERALS

USACE INDIVIDUAL PERMIT APPLICATION

BASEMAP: DigitalGlobe, 1/24/2016 & 9/17/2017.

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DRAWING DATE: 7/2/2019
REVISION DATE: N/A
TTL JOB NO.: 000180200804.00
APPROXIMATE SCALE: 1" = 3,000'

FIGURE 4.2: ALTERNATIVE 2 SENSITIVE FEATURES LOCATION MAP

TWIN PINES MINERALS - LONCALA TRACT

USACE INDIVIDUAL PERMIT APPLICATION

BASEMAP: DigitalGlobe, 1/24/2016.

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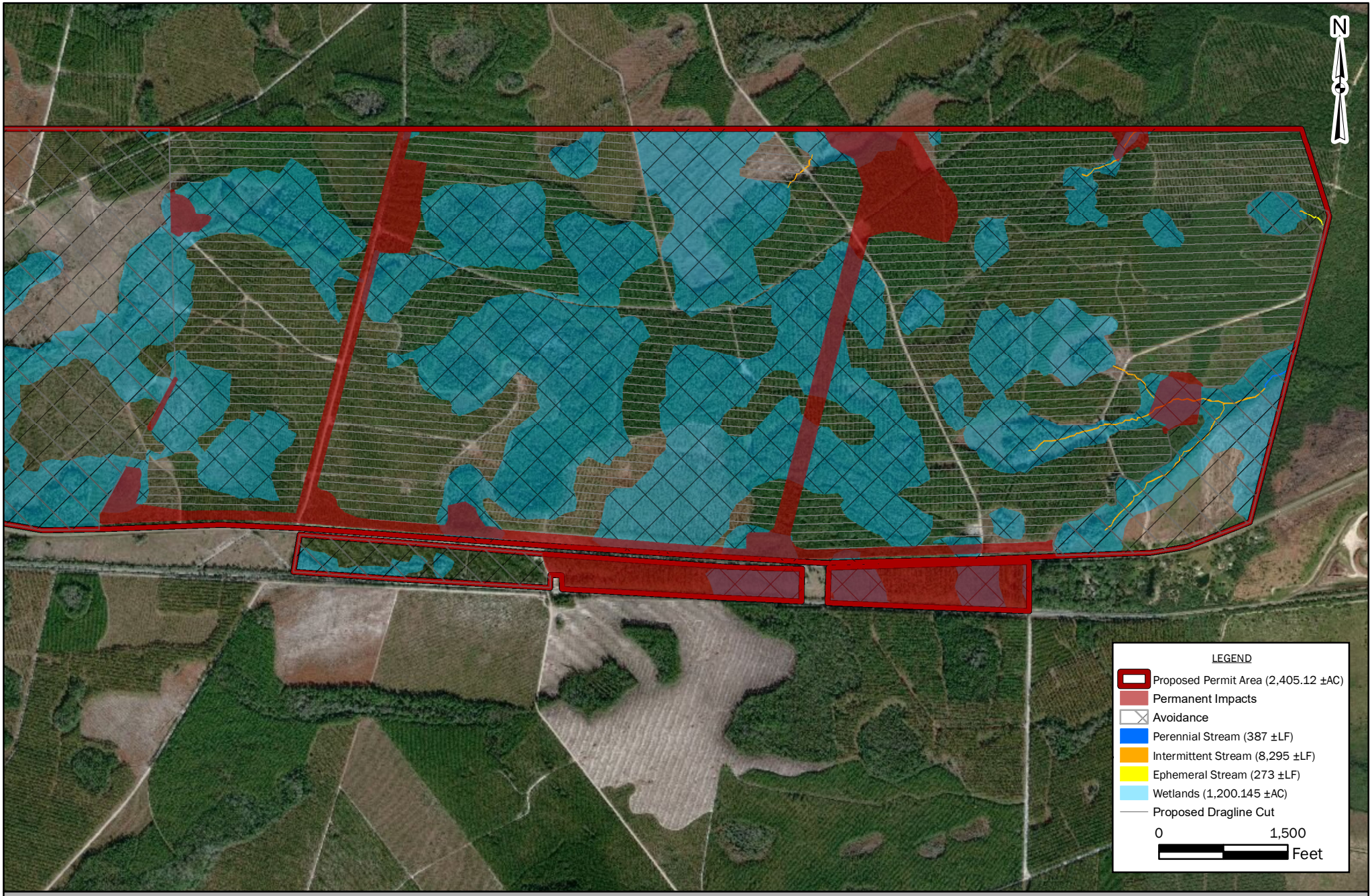

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FIGURE 4.3: ALTERNATIVE 5

TWIN PINES MINERALS

USACE INDIVIDUAL PERMIT APPLICATION

BASEMAP: DigitalGlobe, 1/24/2016 & 9/17/2017.

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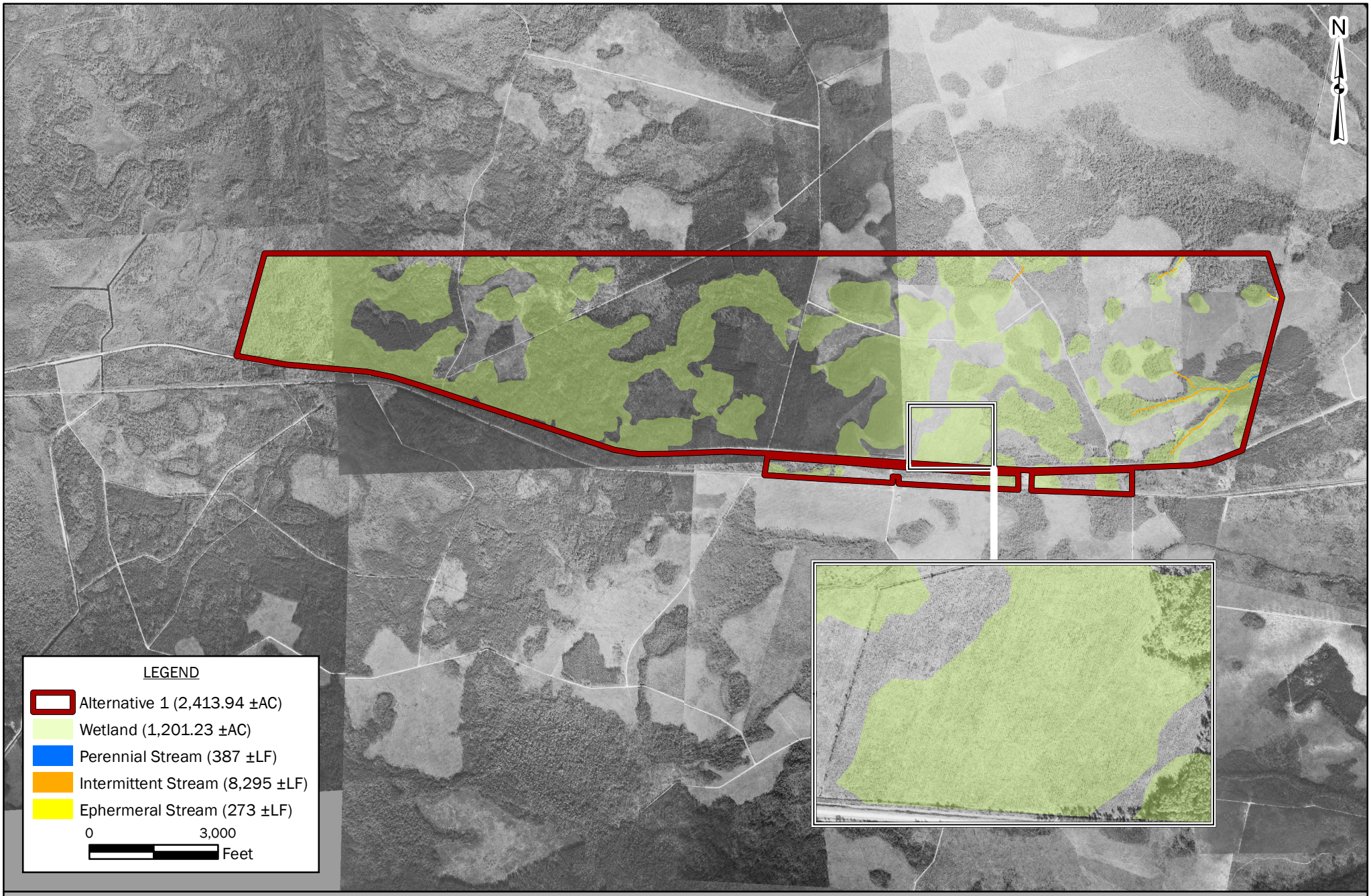

FIGURE 4.4: 1970 AERIAL PHOTOGRAPH

TWIN PINES MINERALS

USACE INDIVIDUAL PERMIT APPLICATION

BASEMAP: USGS Single Frame Photo SWDG00030130, SWDG00010127, SWDG00010128, SWDG00010124, SWDG00030131, SWDG00010050, and SWDG00010126. Image dates January 8, 1970 & January 23, 1970.

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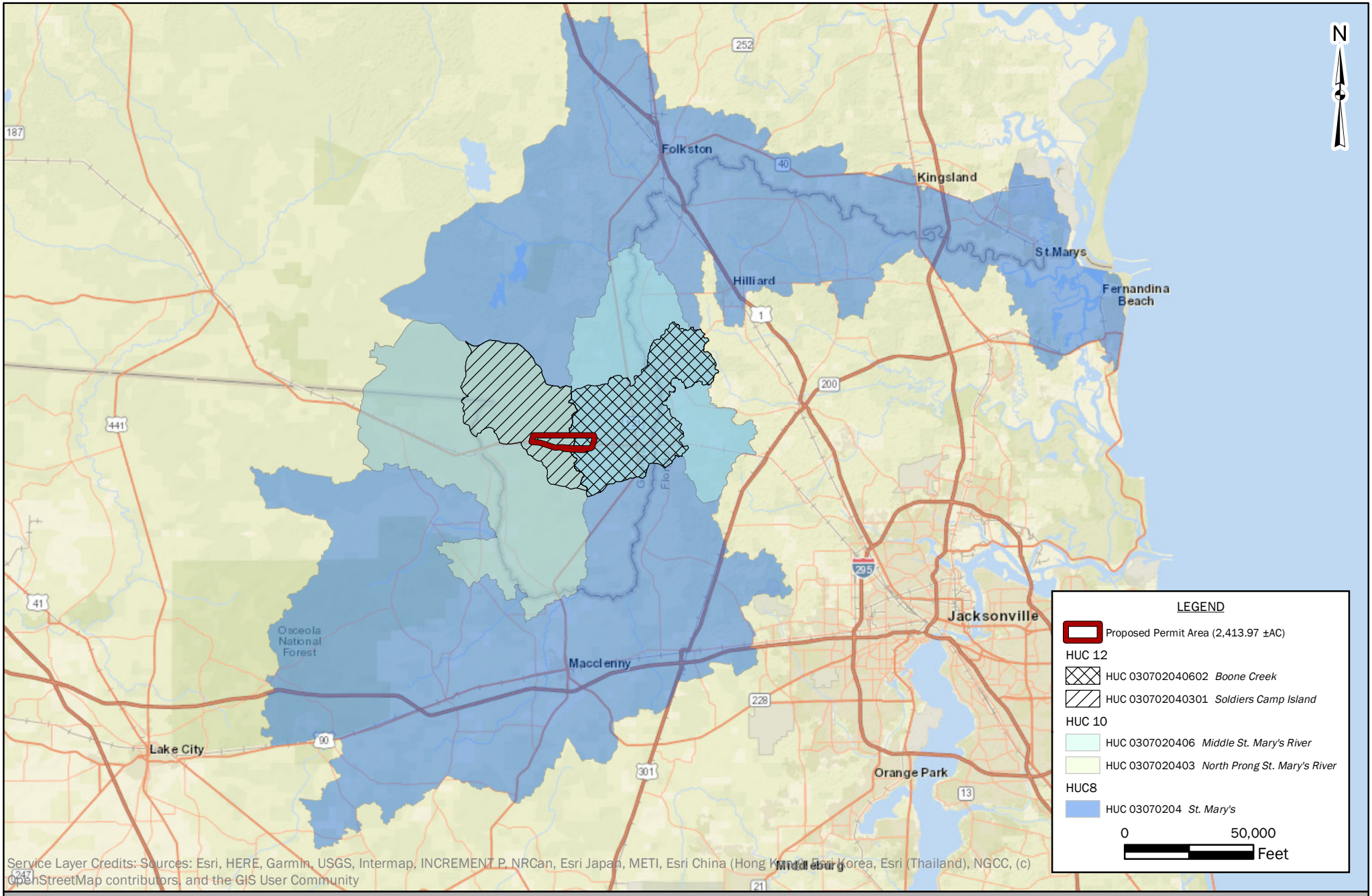

FIGURE 5: HYDROLOGIC UNIT CODE (HUC) MAP

TWIN PINES MINERALS

USACE INDIVIDUAL PERMIT APPLICATION

DRAWN BY:AGW
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DRAWING DATE: 7/2/2019
REVISION DATE: N/A
TTL JOB NO.: 000180200804.00
APPROXIMATE SCALE: 1" = 50,000'

APPENDICES

Appendix A:
TTL Waters of the U.S. Delineation Reports

WATERS OF THE UNITED STATES DELINEATION REPORT

APPROXIMATELY 551.1-ACRE ADIRONDACK TRACT SAINT GEORGE, CHARLTON COUNTY, GEORGIA

Submitted to:

Twin Pines Minerals, LLC

Attn: Mr. Steve Ingle, P.E.
2100 Southbridge Parkway
Birmingham, Alabama 35209

Prepared by:

TTL, Inc.
2743-B Gunter Park Drive West
Montgomery, Alabama 36109

Project No. 000180200804.00

July 3, 2019

TTL

SIGNATURE OF ENVIRONMENTAL PROFESSIONALS

TTL, Inc. has performed a waters of the United States (U.S.) delineation in general conformance with the scope and limitations of the *U. S. Army Corps of Engineers Wetland Delineation Manual, 1987 Edition*, and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region Version 2.0* (2010). Identification of ephemeral, intermittent and perennial streams has been performed in general conformance with methodology outlined in *Methodology for Identification of Intermittent and Perennial Streams and their Origins, Version 4.11* (2010).

Christopher Terrell
Environmental Professional

July 3, 2019
Date

Cindy House-Pearson
Senior Natural Resources
Client Manager

July 3, 2019
Date

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APPENDICES

Appendix A	Normal Weather Conditions Table Agricultural Applied Climate Information System (AgACIS) Data U.S. Drought Monitor – Georgia Palmer Drought Index
Appendix B	Selected Site Photographs
Appendix C	U.S. Army Corps of Engineers Wetland Determination Data Forms
Appendix D	North Carolina (NC) Division of Water Quality (DWQ) Stream Identification Forms
Appendix E	USACE Savannah District Request for Corps of Engineers Jurisdictional Determination (JD) and/or Delineation Review Form

1.0 INTRODUCTION

TTL, Inc. (TTL) was contracted by Twin Pines Minerals, LLC (Twin Pines) to perform a delineation of the waters of the United States (WOTUS) associated with a proposed development of a heavy mineral mining operation in Saint George, Charlton County, Georgia (Figure 1). TTL conducted the field activities for this project from March 8, 2019 to March 22, 2019. The U.S. Army Corps of Engineers (USACE) project number is SAS-2018-00554.

Activities within jurisdictional waters of the U.S. are regulated by the USACE. Authority to permit discharges (fill) within jurisdictional wetlands or non-navigable waters of the U.S. is granted under Section 404 of the Clean Water Act (CWA) of 1972. Authority to permit work and placement of structures in navigable waters of the U.S. is granted under Sections 9 and 10 of the Rivers and Harbors Act of 1899. For regulatory purposes under the CWA, wetlands are defined by the USACE as:

> Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.

2.0 SITE DESCRIPTION

The site is an approximately 551.1-acre area depicted on the U.S. Geological Survey (USGS) 7.5-minute Topographic Map of Saint George, Georgia (Figure 1). The center of the site is located near latitude 30.537849 and longitude -82.099831. According to the USGS Topographic Map, the elevation at the site ranges from approximately 120 to 170 feet above mean sea level.

The western delineation area boundary follows a portion of Trail Ridge Road. The delineation area has historically been used for silvicultural activities. The primary sources of hydrology for the delineation area are onsite rainfall and surface water flow.

Driving directions to the site are as follows: from the intersection of GA-23 and GA-94 (in St. George, GA), travel west along GA-94 for approximately 6.93 miles to the intersection of GA-94 and Trail Ridge Road (dirt road). Turn north (right) onto Trail Ridge Road and the western boundary of the delineation area is located immediately east.

3.0 LITERATURE AND RECORDS REVIEW

Prior to conducting the field effort, TTL performed a literature and records review to develop an understanding of the potential for the presence of waters of the U.S. on the subject site or surrounding properties. These data sources and the review findings are described below.

3.1 Hydric Soils

The Natural Resources Conservation Service (NRCS) maintains a database of soil types (map units) for most areas of the U.S. (NRCS, 2017). The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit which represents a large area dominated by one or more major types of soil. Map units are further classified with a rating of hydric, partially hydric or non-hydric. Map units are useful for planning purposes to provide an overall understanding of the soils that occur in a general area. However, due to the natural variability of the landscape, direct observation of the soils profile is necessary to identify hydric soil indicators.

A classification of hydric means that the soil components listed for a given map unit are rated as being hydric. “Predominantly hydric” means that more than 66 percent to less than 100 percent of soil components are hydric. "Partially hydric" means that more than 33 percent to less than 65 percent of soil components are hydric. “Predominantly non-hydric” means that more than 0 percent and less than 32 percent of soil components are hydric. "Not hydric" means that all soil components are rated as not hydric. "Unknown hydric" indicates that at least one component is not rated so a definitive rating for the map unit cannot be made. A NRCS map of the soils located on the site with the associated hydric rating is presented in Figure 3 and summarized in Table 1 below.

Table 1: Soil Map Units Classifications

Map Unit Symbol	Description	Hydric Rating	Hydric Description
LeA	Leon fine sand, 0 to 2 percent slopes	97	Predominantly hydric
LvA	Lynn Haven fine sand, 0 to 2 percent slopes	90	Predominantly hydric
LYA	Lynn Haven, Allanton and Kingsferry soils, ponded, 0 to 1 percent slopes	97	Predominantly hydric
MaA	Mandarin fine sand, 0 to 2 percent slopes	6	Predominantly non-hydric
KJA	Kinston and Johnston soils, 0 to 2 percent slopes, frequently flooded	100	Hydric

3.2 National Wetland Inventory

The U.S. Fish and Wildlife Service (USFWS) created and maintains the National Wetland Inventory (NWI) database of information on the characteristics, extent, and status of the wetlands and deepwater habitats within the U.S. This information is useful for planning purposes and provides an overall understanding of the habitats that may be present in or around the site. The NWI classifies habitat types as marine, estuarine, riverine, lacustrine or palustrine with additional modifiers as appropriate to identify the water regime, water chemistry, soil or other characteristics based on *Classification of Wetlands and Deepwater Habitats of the U.S.* (Cowardin, 1979).

TTL reviewed the NWI data for the site using the USFWS NWI Wetlands Mapper web-based tool to determine the potential for wetlands to exist on the site. The USFWS NWI Mapper identified numerous wetland and stream features within the delineation area boundary. Figure 4 depicts the NWI Map, and Table 2 summarizes the habitat below.

Table 2: NWI Classifications

Map Unit Symbol	Description of Habitat
PFO1/4C	Palustrine; Forested; Broad-leaved Deciduous; Needle-Leaved Evergreen, Seasonally Flooded.
PFO1C	Palustrine; Forested; Broad-leaved Deciduous; Seasonally Flooded.
PFO6/4C	Palustrine; Forested; Deciduous; Needle-Leaved Evergreen, Seasonally Flooded.
PFO6F	Palustrine; Forested; Deciduous; Semipermanently Flooded.
R4SBC	Riverine; Intermittent; Streambed; Seasonally flooded.
R5UBH	Riverine; Unknown Perennial; Unconsolidated Bottom; Permanently Flooded.

3.3 Hydrologic Unit Code

The U.S. is divided and sub-divided into successively smaller hydrologic units which are classified into six levels: regions, sub-regions, accounting units, watershed, sub-watershed, and cataloging units. The hydrologic units are arranged within each other, from the smallest (cataloging unit) to the largest (regions). Each hydrologic unit is identified by a unique hydrologic unit code (HUC) consisting of two to 12 digits based on the six levels of classification in the hydrologic system (Seaber, Kapinos, Knapp, 1987). The site is located within the Boone Creek cataloging unit 12-Digit HUC 030702040603. This cataloging unit is located within the Middle Saint Mary's River sub-watershed, 10-Digit HUC 0307020406. The Middle Saint Mary's River sub-watershed is located within the St Mary's River watershed, 8-Digit HUC 03070204 (Figure 5).

3.4 Normal Weather Conditions

TTL calculates a subject site's normal weather conditions before performing site work to understand whether aquatic features in the landscape may exhibit certain characteristics related to current and near past hydrologic regime. TTL calculates data obtained from an on-line NRCS climactic database, Agricultural Applied Climate Information System (AgACIS), and derives its calculation method from the Tennessee Department of Environment and Conservation's guide for making hydrologic determinations (TDEC, 2011). An evaluation of weather conditions was performed for the three-month period prior to the field activities. Calculations for the site indicate that the weather conditions were drier than normal for the time of year that field work was performed.

The Palmer Drought Severity Index provided by National Oceanic and Atmospheric Administration (NOAA) is accessed at http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/palmer.html and was used to cross-reference the results calculated. The Palmer Drought Severity Index indicates that the region of the site experienced no drought conditions during the weeks prior to the site visit.

As an additional cross-reference, the U.S. Drought Monitor was accessed and evaluated. The U.S. Drought Monitor is produced through a partnership between the National Drought Mitigation Center at the University of Nebraska-Lincoln, the United States Department of Agriculture (USDA), and NOAA. The most recent update of the U.S. Drought Monitor (March 12, 2019) Map of Georgia exhibited no drought conditions in the vicinity of the review area.

The Normal Weather Conditions Table, AgACIS data, Palmer Drought Severity Index Map, and U.S Drought Monitor Map of Georgia are included in Appendix A.

4.0 WETLAND AND WATERS DELINEATION

4.1 Wetland Identification Methodology

TTL utilizes the *U.S. Army Corps of Engineers Wetland Delineation Manual* (USACE, 1987) and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region* (USACE, 2010) technical guidelines for determining the presence of wetlands. This determination requires that a positive wetland indicator be present for each of the three parameters (hydrology, soil, and vegetation), with the exception of areas altered by recent human activities or natural events. During field activities, TTL assessed the project area for the presence of hydrophytic vegetation and used a Dutch hand-auger to evaluate the project area for the presence of hydric soils. TTL examined the soil for hydric soil indicators as identified in the *Field Indicators of Hydric Soils in the United States, V. 8.1* (NRCS, 2017). Additionally, TTL observed the project area

for indications of inundated or saturated soils, water marks, drift lines, crayfish burrows, sediment deposits and other wetland hydrology indicators. TTL used *Wetland Determination Data Forms – Atlantic and Gulf Coastal Plain Region* (2010) to record field conditions for the soil, vegetation and hydrology for wetlands and uplands located on the site. At least one data point was established in each habitat type observed within the review area.

TTL traversed the delineation area on foot and placed orange flagging labeled with Upland Data Point (UDP) or Wetland Data Point (WDP) point identification at the data point location. The location of the data point flagging was mapped with a Trimble Geo7x Global Positioning System (GPS) unit, which was set to sub-meter tolerances. Field data was post-processed using Trimble PathfinderOffice V 5.3 and exported to ESRI's ArcMap 10.2. Area features were manually digitized in ArcGIS using the flag locations; geographic coordinates and area quantities were calculated using ArcGIS "area" function.

4.2 Wetland Findings

The delineation area contains five wetland areas (WA-WE) consisting of approximately 149.602 acres. The boundaries of the wetland areas and data point locations are depicted on Figure 6. Selected site photographs of our field observations are provided in Appendix B. Wetland Determination Data Forms are included in Appendix C. Table 3 summarizes the wetland findings below.

Table 3: Wetland Summary

Wetland ID	Cowardin Habitat Description	Area (acres)
WA	Palustrine; Forested; Broad-leaved Deciduous; Needle-Leaved Evergreen, Seasonally Flooded	105.552
WB	Palustrine; Forested; Broad-leaved Deciduous; Needle-Leaved Evergreen, Seasonally Flooded	8.915
WC	Palustrine; Forested; Broad-leaved Deciduous; Needle-Leaved Evergreen, Seasonally Flooded	2.555
WD	Riverine; Unknown Perennial; Unconsolidated bottom; Permanently flooded	15.568
WE	Palustrine; Forested; Deciduous; Needle-Leaved Evergreen, Seasonally Flooded	4.233
WF	Palustrine; Forested; Deciduous; Semipermanently Flooded	4.055
WG	Palustrine; Forested; Deciduous; Semipermanently Flooded	5.544
WH	Palustrine; Forested; Deciduous; Semipermanently Flooded	3.180

Wetland WA is the largest wetland within the delineation area. Wetland WA is located in the central portion of the delineation area. Wetland WD is located along the northwestern portion of the delineation area. Wetlands WB, WE, WF, WG and WH are located in the northern portion of the delineation area. Wetland WC is located in the southwestern portion of the delineation area. The soils textures within the wetland areas are comprised of a sand content that meets hydric soil indicator S8 – Stripped Matrix, and a peat/mucky mineral content that meets hydric soil indicator A7 - 5cm Mucky Mineral. The hydrology for this area is supported by localized stormwater and a shallow water table. The wetland vegetation communities within the delineation area vary from large areas of hipped and benched, planted pine habitat [dominated by slash pine (*Pinus elliottii*) whose growth has been stunted due to hydric conditions, inkberry (*Ilex glabra*), red maple (Acer rubrum), Carolina redroot (*Lachnanthes caroliniana*), loblolly bay (*Gordonia* lasianthus), broomsedge (*Andropogon virginicus*) and Virginia chain fern (*Woodwardia virginica*)], to forested pocosin habitat that exhibited few signs of silvicultural activities [dominated by pond cypress (*Taxodium ascendens*), swamp tupelo

(*Nyssa biflora*), large gallberry (*Ilex coriacea*), myrtle leaf holly (Ilex myrtifolia), manyhead rush (Juncus polycephalus) and Virginia chain fern.

4.3 Streams Identification and Methodology

TTL used the *North Carolina Division of Water Quality – Methodology for Identification of Intermittent and Perennial Streams and Their Origins v. 4.11, September 1, 2010 (NC Method)* technical guideline to determine the most appropriate classification of each subject stream. This technical guideline for stream identification is the preferred methodology for distinguishing between intermittent and perennial streams in the southeast United States and requires evaluation of 26 attributes of the stream and assigning a numeric score to each on the *NC DWQ Stream Identification Form Version 4.11*. A four-tiered, weighted scale is utilized for evaluating and scoring the features categorized in sets of geomorphic, hydrologic, and biological attributes. Additionally, TTL utilized the *Regulatory Guidance Letter No. 05-05*: *Ordinary High Water Mark Identification* (USACE, 2005) as the basis for the delineation, mapping, and linear footage/areal estimations of on-site streams.

Identified streams were mapped using the method described in Section 4.1. Stream Identification Forms (v. 4.11) were used to classify streams that were not clearly perennial (i.e. flowing water at greater than 48 hours since rainfall, strong morphology and obvious biological presence). TTL traversed the stream channels on foot and placed blue flagging labeled with stream data point identifications near the observed ordinary high water mark (OHWM). The locations of the boundary flags were mapped with a Trimble Geo7x Global Positioning System (GPS) unit, which was set to sub-meter tolerances. Field data was post-processed using Trimble Pathfinder Office V 5.3 and exported to ESRI's ArcMap 10.2. Area features were manually digitized in ArcGIS using the flag locations; geographic coordinates and area quantities were calculated using ArcGIS "area" function.

4.4 Stream and Ditch Findings

TTL identified eleven channels within the delineation area consisting of approximately 8,658 linear feet (1.454 acres) of channels (S-1-S-11). The channels consist of three non-jurisdictional ditches as well as ephemeral, intermittent, and perennial streams. These channels are located throughout the delineation area. Stream S-1 has an intermittent flow regime along one reach and ephemeral flow along another reach. Stream S-11 has an intermittent flow regime along one reach and perennial flow along another reach. All streams drain to Boone Creek. Table 4 summarizes the stream findings below.

Table 4: Stream and Ditch Summary

Stream ID	Cowardin Habitat Description	Length (linear feet)/ Area (acres)
S-1	Riverine; Perennial; Streambed; Mud	387/ 0.064
S-1	Riverine; Intermittent; Streambed; Mud	3,043/ 0.307
S-2	Ditch	3,239/ 0.265
S-3	Riverine; Intermittent; Streambed; Mud	2,161/ 0.156
S-4	Ditch	39/ 0.004
S-5	Riverine; Intermittent; Streambed; Mud	638/ 0.052
S-6	Riverine; Intermittent; Streambed; Mud	646/ 0.055
S-6A	Riverine; Intermittent; Streambed; Mud	486/0.027
S-7	Riverine; Intermittent; Streambed; Mud	755/ 0.053
S-8	Ditch	524/ 0.065
S-9	Ditch	3,530/ 0.363
S-10	Riverine; Intermittent; Streambed; Mud	198/ 0.019
S-11i	Riverine; Intermittent; Streambed; Mud	71/ 0.005
S-11e	Riverine; Ephemeral; Streambed; Mud	273/0.019

4.5 Jurisdictional Determination Request

The USACE has the sole authority to determine whether wetlands or water features are "jurisdictional." Under certain circumstances, wetland areas are considered non-jurisdictional because they lack a significant nexus with other wetlands or waters of the U.S. TTL utilized the *USACE Jurisdictional Determination Form Instructional Guidebook* (USACE and EPA, 2007) to complete a *SAS APPENDIX 1: Request for Corps of Engineers Jurisdictional Determination (JD) and/or Delineation Review Form* (Appendix E).

It is TTL's opinion that with the exception of the ditches (S-2, S-4, S-8, S-9), all observed tributaries and wetlands within the delineation area are jurisdictional features due to their significant nexus to nearby relatively permanent waters. Copies of tables of the aquatic features details and flag locations are also included in Appendix E. The ditches that occur within wetlands have been included and calculated as part of the wetland total acreage.

TTL recommends that a delineation review of aquatic resources of the potentially jurisdictional site features be requested from the USACE Savannah District. If the USACE is not engaged regarding a jurisdictional determination or delineation review of aquatic resources, TTL is neither responsible for the final determination of jurisdictional features within the review corridor, nor responsible for

violations associated with unauthorized activities that may occur within areas deemed jurisdictional by the USACE at a later time.

5.0 CONCLUSIONS

- Approximately 149.602 acres of forested wetland were identified within the delineation area.
- Approximately 387 linear feet (0.064 acres) of perennial stream were identified within the delineation area.
- Approximately 7,998 linear feet (0.674 acres) of intermittent stream were identified within the delineation area.
- Approximately 273 linear feet (0.019 acre) of ephemeral stream were identified within the delineation area.
- Approximately 7,332 linear feet (0.697 acre) of non-jurisdictional ditches were identified within the delineation area.
- Upon approval by the client, TTL will submit a request for a delineation review of aquatic resources from the USACE of all aquatic features within the delineation area.

5.0 REFERENCES

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FIGURES

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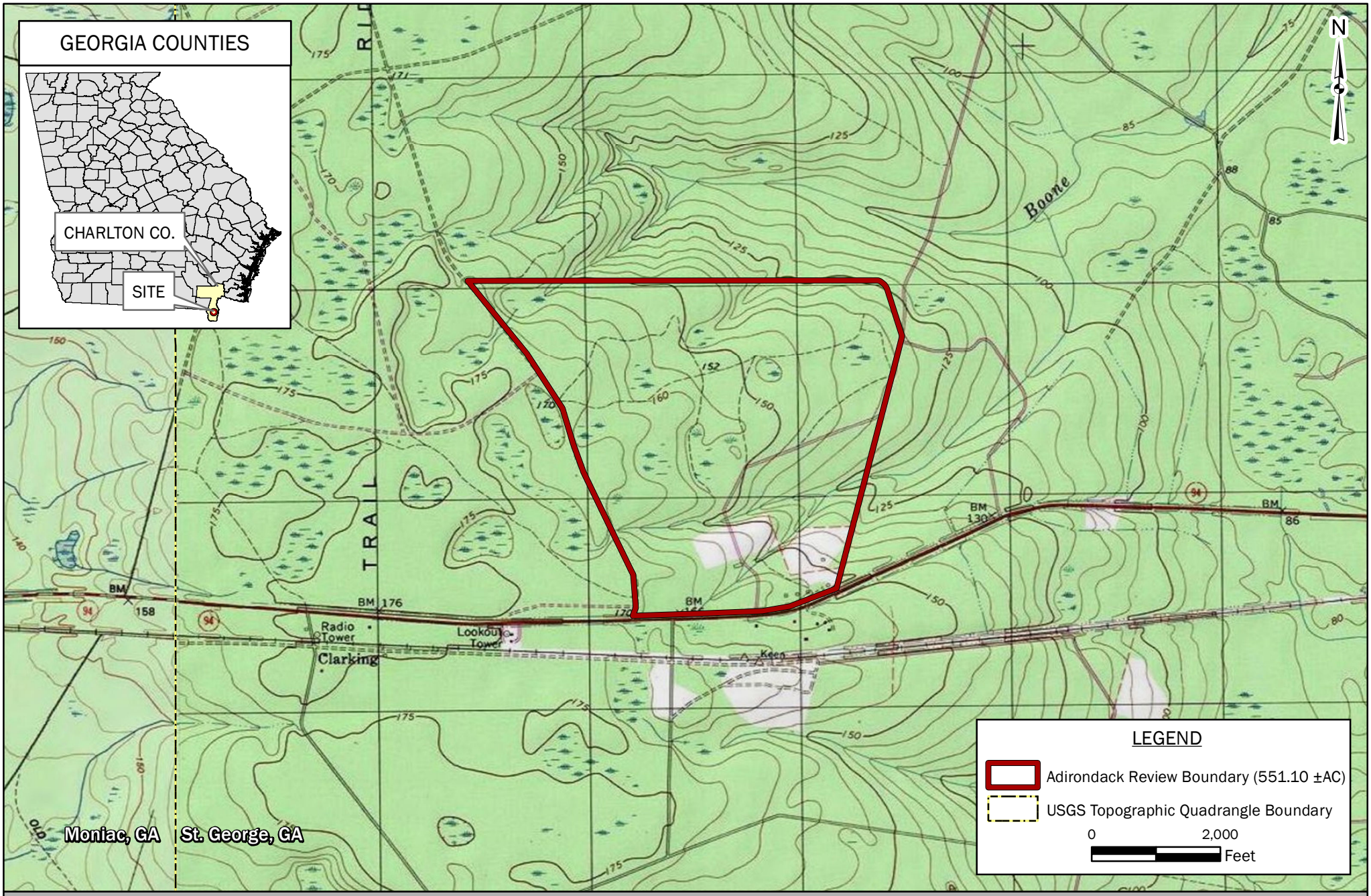

TTL

FIGURE 1: SITE LOCATION & TOPOGRAPHIC MAP

TWIN PINES MINERALS - ADIRONDACK TRACT

WATERS OF THE U.S. DELINEATION - USACE FILE NO. SAS-2018-00554

BASEMAP: Saint George, Georgia USGS 7.5 Minute Quadrangle Map, 1994.

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CHECKED BY: CMS
DRAWING DATE: 7/1/2019
REVISION DATE: N/A
TTL JOB NO.: 000180200804.00
APPROXIMATE SCALE: 1" = 2,000'

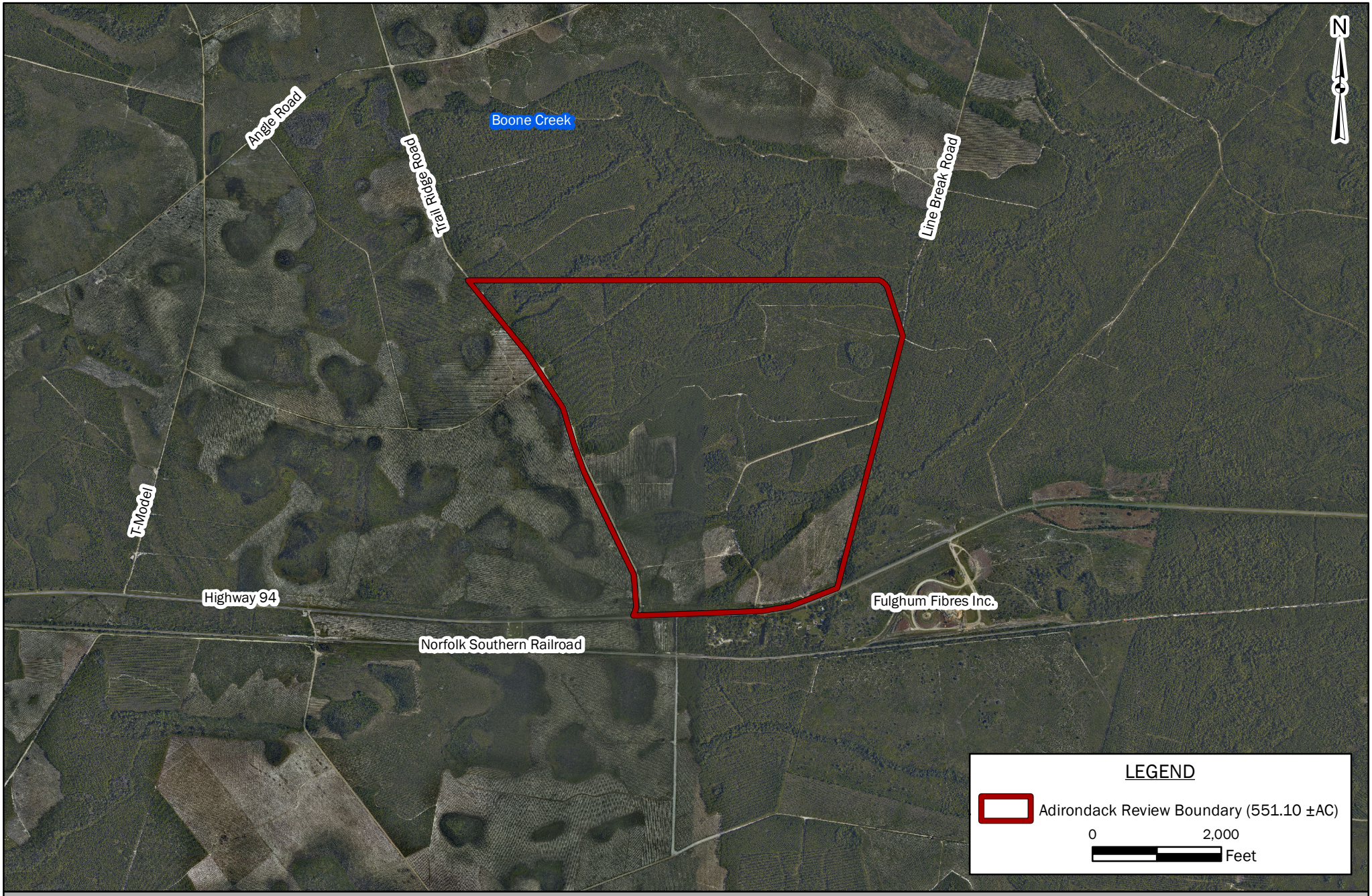

FIGURE 2: SITE LOCATION & AERIAL PHOTOGRAPH

TWIN PINES MINERALS - ADIRONDACK TRACT

WATERS OF THE U.S. DELINEATION - USACE FILE NO. SAS-2018-00554

BASEMAP: Twin Pines Ortho Imagery, 09/2018.

DRAWN BY:AGW
CHECKED BY: CMS
DRAWING DATE: 7/1/2019
REVISION DATE: N/A
TTL JOB NO.: 000180200804.00
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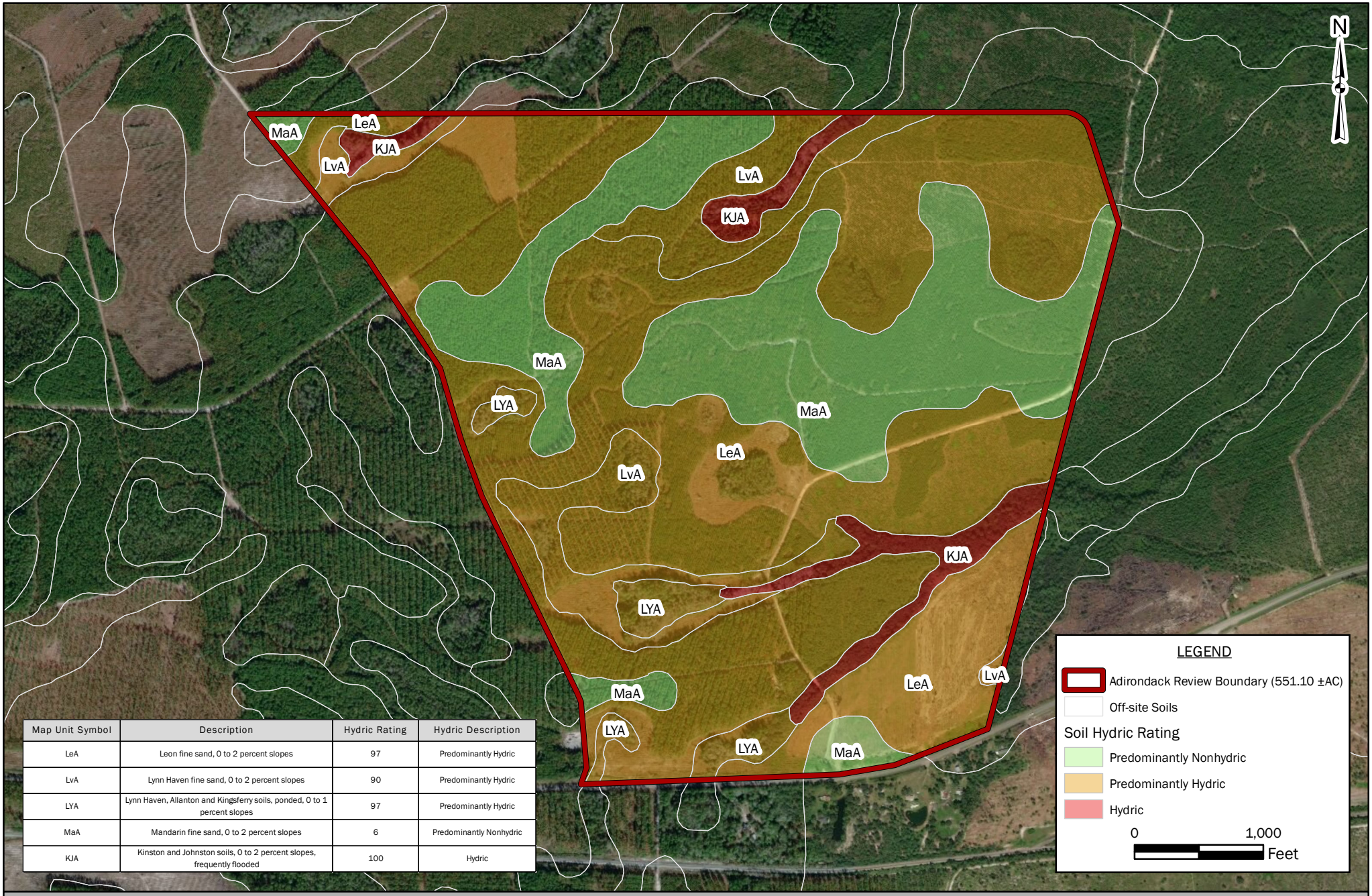

Map Unit Symbol	Description	Hydric Rating	Hydric Description
LeA	Leon fine sand, 0 to 2 percent slopes	97	Predominantly Hydric
LvA	Lynn Haven fine sand, 0 to 2 percent slopes	90	Predominantly Hydric
LYA	Lynn Haven, Allanton and Kingsferry soils, ponded, 0 to 1 percent slopes	97	Predominantly Hydric
MaA	Mandarin fine sand, 0 to 2 percent slopes	6	Predominantly Nonhydric
KJA	Kinston and Johnston soils, 0 to 2 percent slopes, frequently flooded	100	Hydric

TTL

FIGURE 3: NATURAL RESOURCES CONSERVATION SERVICE (NRCS) MAP WITH HYDRIC RATING

TWIN PINES MINERALS - ADIRONDACK TRACT

WATERS OF THE U.S. DELINEATION - USACE FILE NO. SAS-2018-00554

BASEMAP: DigitalGlobe, 1/24/2017 & 9/17/2017.

DRAWN BY:AGW
CHECKED BY: CMS
DRAWING DATE: 7/1/2019
REVISION DATE: N/A
TTL JOB NO.: 000180200804.00
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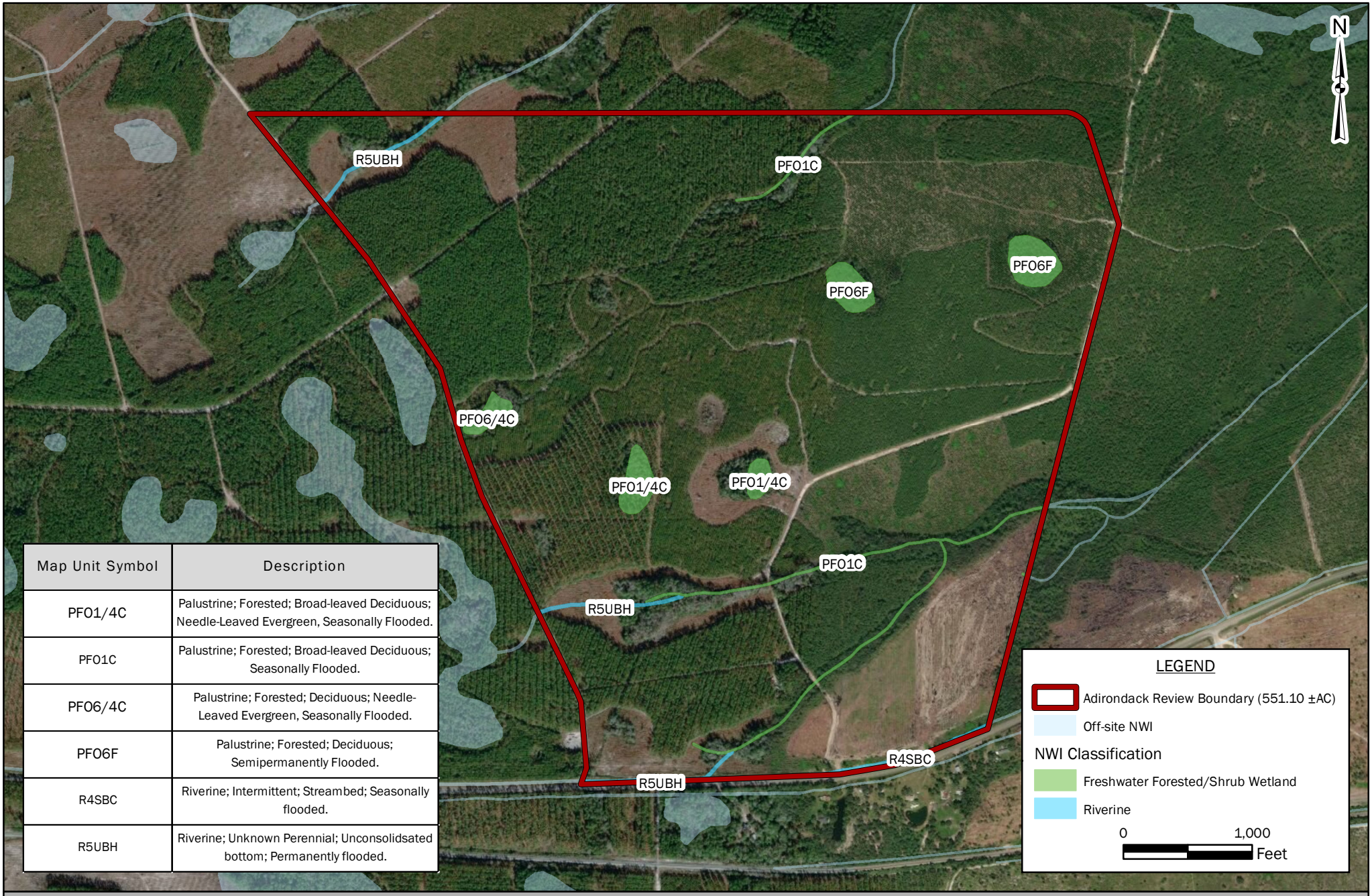

Map Unit Symbol	Description
PFO1/4C	Palustrine; Forested; Broad-leaved Deciduous; Needle-Leaved Evergreen, Seasonally Flooded.
PFO1C	Palustrine; Forested; Broad-leaved Deciduous; Seasonally Flooded.
PFO6/4C	Palustrine; Forested; Deciduous; Needle-Leaved Evergreen, Seasonally Flooded.
PFO6F	Palustrine; Forested; Deciduous; Semipermanently Flooded.
R4SBC	Riverine; Intermittent; Streambed; Seasonally flooded.
R5UBH	Riverine; Unknown Perennial; Unconsolidsated bottom; Permanently flooded.

TTL

FIGURE 4: NATIONAL WETLAND INVENTORY (NWI) MAP

TWIN PINES MINERALS - ADIRONDACK TRACT

WATERS OF THE U.S. DELINEATION - USACE NO. SAS-2018-00554

BASEMAP: DigitalGlobe, 1/24/2017 & 9/17/2017.

DRAWN BY:AGW
CHECKED BY: CMS
DRAWING DATE: 7/1/2019
REVISION DATE: N/A
TTL JOB NO.: 000180200804.00
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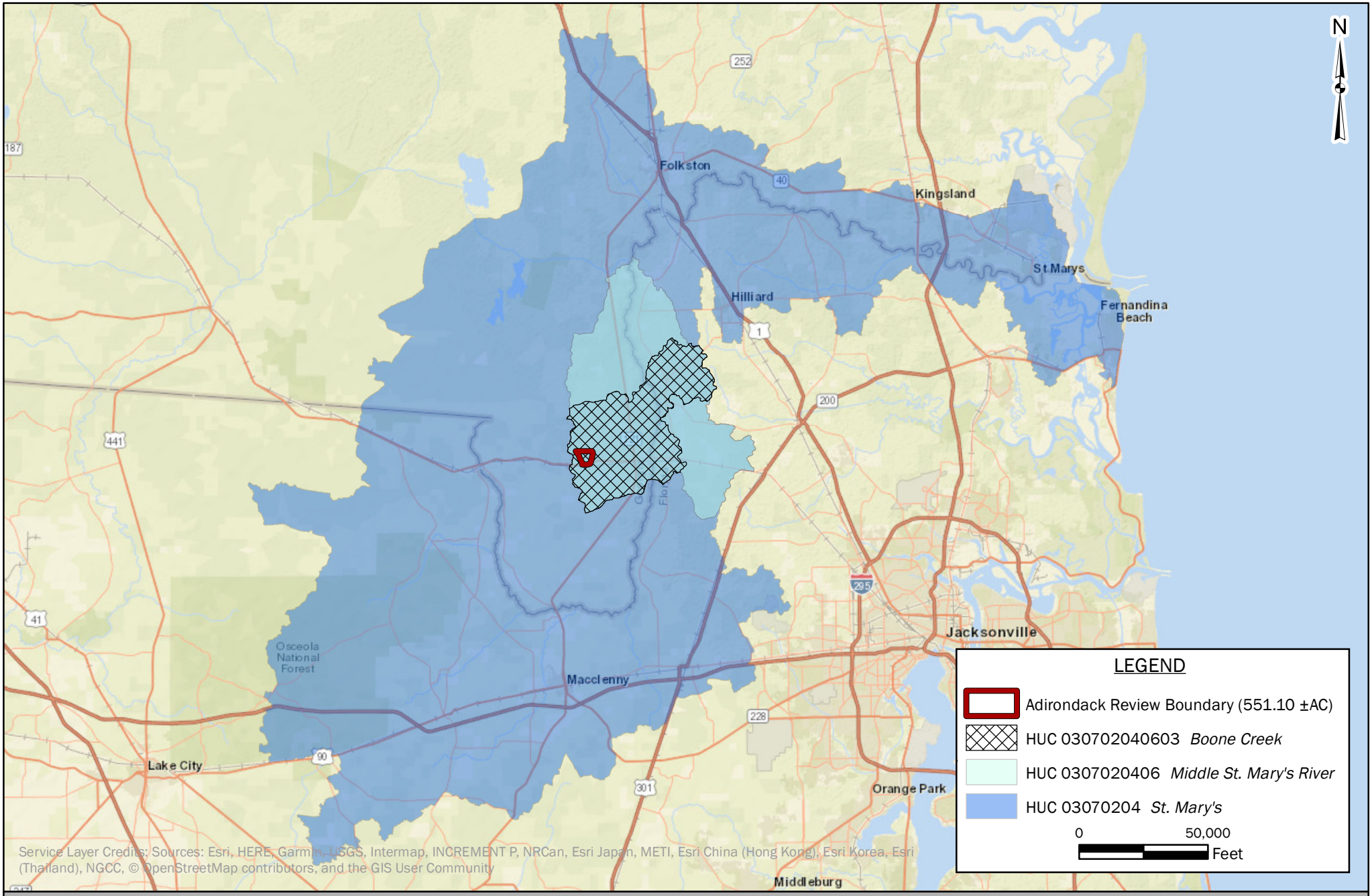

TTL

FIGURE 5: HYDROLOGIC UNIT CODE (HUC) MAP

TWIN PINES MINERALS - ADIRONDACK TRACT

WATERS OF THE U.S. DELINEATION - USACE PERMIT NO. SAS-2018-00554

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CHECKED BY: CMS
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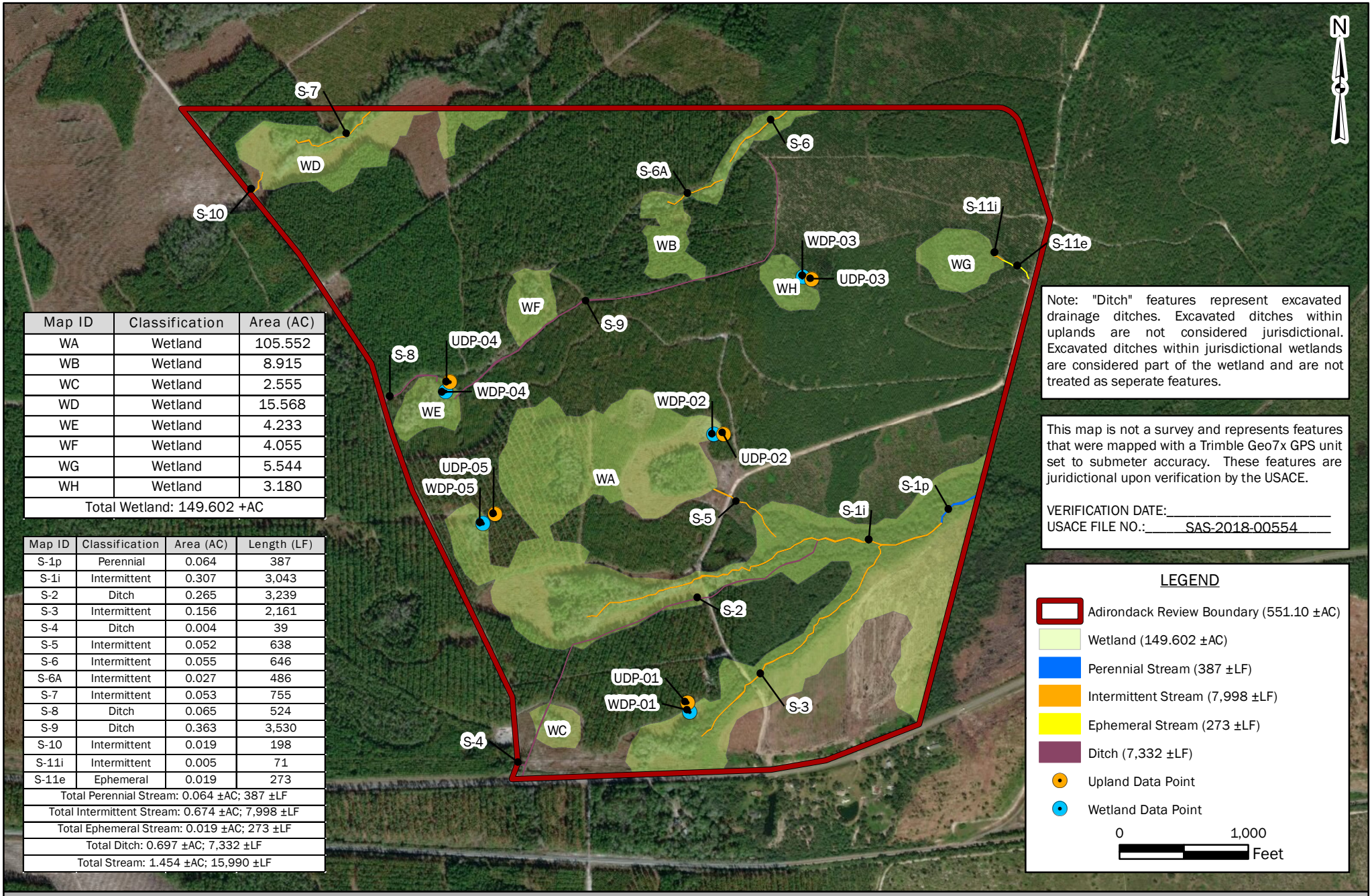


Map ID	Classification	Area (AC)
WA	Wetland	105.552
WB	Wetland	8.915
WC	Wetland	2.555
WD	Wetland	15.568
WE	Wetland	4.233
WF	Wetland	4.055
WG	Wetland	5.544
WH	Wetland	3.180
Total Wetland: 149.602 +AC		

Map ID	Classification	Area (AC)	Length (LF)
S-1p	Perennial	0.064	387
S-1i	Intermittent	0.307	3,043
S-2	Ditch	0.265	3,239
S-3	Intermittent	0.156	2,161
S-4	Ditch	0.004	39
S-5	Intermittent	0.052	638
S-6	Intermittent	0.055	646
S-6A	Intermittent	0.027	486
S-7	Intermittent	0.053	755
S-8	Ditch	0.065	524
S-9	Ditch	0.363	3,530
S-10	Intermittent	0.019	198
S-11i	Intermittent	0.005	71
S-11e	Ephemeral	0.019	273
Total Perennial Stream: 0.064 ±AC; 387 ±LF			
Total Intermittent Stream: 0.674 ±AC; 7,998 ±LF			
Total Ephemeral Stream: 0.019 ±AC; 273 ±LF			
Total Ditch: 0.697 ±AC; 7,332 ±LF			
Total Stream: 1.454 ±AC; 15,990 ±LF			

Note: "Ditch" features represent excavated drainage ditches. Excavated ditches within uplands are not considered jurisdictional. Excavated ditches within jurisdictional wetlands are considered part of the wetland and are not treated as seperate features.

This map is not a survey and represents features that were mapped with a Trimble Geo7x GPS unit set to submeter accuracy. These features are juridictional upon verification by the USACE.

VERIFICATION DATE:_____
USACE FILE NO.:_____SAS-2018-00554_____

LEGEND

- Adirondack Review Boundary (551.10 ±AC)
- Wetland (149.602 ±AC)
- Perennial Stream (387 ±LF)
- Intermittent Stream (7,998 ±LF)
- Ephemeral Stream (273 ±LF)
- Ditch (7,332 ±LF)
- Upland Data Point
- Wetland Data Point

0 1,000 Feet

TTL

FIGURE 6: WATERS OF THE U.S. DELINEATION MAP

TWIN PINES MINERALS - ADIRONDACK TRACT

WATERS OF THE U.S. DELINEATION - USACE PERMIT NO. SAS-2018-00554

BASEMAP: DigitalGlobe, 1/24/2017 & 9/17/2017.

DRAWN BY:AGW
CHECKED BY: CMS
DRAWING DATE: 7/1/2019
REVISION DATE: N/A
TTL JOB NO.: 000180200804.00
APPROXIMATE SCALE: 1" = 1,000'

APPENDIX A

Normal Weather Conditions Table
AgACIS Data
Palmer Drought Index
U.S. Drought Monitor – Georgia

Calculation of Normal Weather Conditions
General Project Location: Folkston, Georgia
Analysis for March 2019 Site Visits

			Long-Term Rainfall Records							
	Month	Standard Deviation*	Minus One Standard Deviation (Dry)	Normal* (Mean Inches)	Plus One Standard Deviation (Wet)	Actual Rainfall**	Condition (wet, normal, dry)	Condition Value***	Month Weight Value	Weighted Value
1st prior month	2/8/2019 - 3/8/2019	1.89	1.79	3.68	5.57	1.58	Dry	1	3	3
2nd prior month	1/7/2019 - 2/7/2019	2.48	1.04	3.52	6.00	2.07	Normal	2	2	4
3rd prior month	12/6/2018 - 1/6/2019	1.68	1.32	3.00	4.68	2.18	Normal	2	1	2
									Sum:	9

Sum:	Conclusion:
6-9	**prior period has been drier than normal**
10-14	prior period has been normal
15-18	prior period has been wetter than normal

* Standard Deviation and Mean Values can be found through the National Oceanic and Atmospheric Associations Earth System Research Laboratory: http://www.esrl.noaa.gov/psd/data/usstation/

** Rainfall data can be found through AgACIS

*** Condition Values: 1 = dry, 2 = normal, 3 = wet

Climatological Data for FARGO 17 NE, GA - December 2018

Date	Max Temperature	Min Temperature	Avg Temperature	GDD Base 40	GDD Base 50	Precipitation	Snowfall	Snow Depth
2018-12-01	72	46	59.0	19	9	0.12	M	M
2018-12-02	M	M	M	M	M	M	M	M
2018-12-03	M	M	M	M	M	M	M	M
2018-12-04	M	M	M	M	M	M	M	M
2018-12-05	64	42	53.0	13	3	0.00	M	M
2018-12-06	56	38	47.0	7	0	0.00	M	M
2018-12-07	M	M	M	M	M	M	M	M
2018-12-08	M	M	M	M	M	M	M	M
2018-12-09	66	54	60.0	20	10	0.91	M	M
2018-12-10	73	43	58.0	18	8	0.02	M	M
2018-12-11	M	M	M	M	M	M	M	M
2018-12-12	55	39	47.0	7	0	0.00	M	M
2018-12-13	61	45	53.0	13	3	0.00	M	M
2018-12-14	67	45	56.0	16	6	0.86	M	M
2018-12-15	M	M	M	M	M	M	M	M
2018-12-16	68	51	59.5	20	10	0.06	M	M
2018-12-17	M	M	M	M	M	M	M	M
2018-12-18	M	M	M	M	M	M	M	M
2018-12-19	65	44	54.5	15	5	0.00	M	M
2018-12-20	64	52	58.0	18	8	0.02	M	M
2018-12-21	64	56	60.0	20	10	0.15	M	M
2018-12-22	M	M	M	M	M	M	M	M
2018-12-23	M	M	M	M	M	M	M	M
2018-12-24	64	47	55.5	16	6	0.00	M	M
2018-12-25	M	M	M	M	M	M	M	M
2018-12-26	64	44	54.0	14	4	0.00	M	M
2018-12-27	66	52	59.0	19	9	0.00	M	M
2018-12-28	M	M	M	M	M	M	M	M
2018-12-29	M	M	M	M	M	M	M	M
2018-12-30	79	61	70.0	30	20	0.01	M	M
2018-12-31	M	M	M	M	M	M	M	M
Average|Sum	65.5	47.4	56.5	265	111	2.15	M	M

Climatological Data for FARGO 17 NE, GA - January 2019

Date	Max Temperature	Min Temperature	Avg Temperature	GDD Base 40	GDD Base 50	Precipitation	Snowfall	Snow Depth
2019-01-01	M	M	M	M	M	M	M	M
2019-01-02	M	M	M	M	M	M	M	M
2019-01-03	77	62	69.5	30	20	0.00	M	M
2019-01-04	76	63	69.5	30	20	0.15	M	M
2019-01-05	M	M	M	M	M	M	M	M
2019-01-06	M	M	M	M	M	M	M	M
2019-01-07	M	M	M	M	M	M	M	M
2019-01-08	75	52	63.5	24	14	0.00	M	M
2019-01-09	M	M	M	M	M	M	M	M
2019-01-10	61	42	51.5	12	2	0.00	M	M
2019-01-11	M	M	M	M	M	M	M	M
2019-01-12	62	35	48.5	9	0	T	M	M
2019-01-13	M	M	M	M	M	M	M	M
2019-01-14	M	M	M	M	M	M	M	M
2019-01-15	52	47	49.5	10	0	0.00	M	M
2019-01-16	M	M	M	M	M	M	M	M
2019-01-17	M	M	M	M	M	M	M	M
2019-01-18	67	48	57.5	18	8	0.00	M	M
2019-01-19	M	M	M	M	M	M	M	M
2019-01-20	M	M	M	M	M	M	M	M
2019-01-21	M	M	M	M	M	M	M	M
2019-01-22	M	M	M	M	M	M	M	M
2019-01-23	66	48	57.0	17	7	0.01	M	M
2019-01-24	78	58	68.0	28	18	1.60	M	M
2019-01-25	M	M	M	M	M	M	M	M
2019-01-26	M	M	M	M	M	M	M	M
2019-01-27	57	44	50.5	11	1	0.00	M	M
2019-01-28	M	M	M	M	M	M	M	M
2019-01-29	M	M	M	M	M	M	M	M
2019-01-30	M	M	M	M	M	0.03	M	M
2019-01-31	47	34	40.5	1	0	0.00	M	M
Average|Sum	65.3	48.5	56.9	190	90	1.79	M	M

Climatological Data for FARGO 17 NE, GA - February 2019

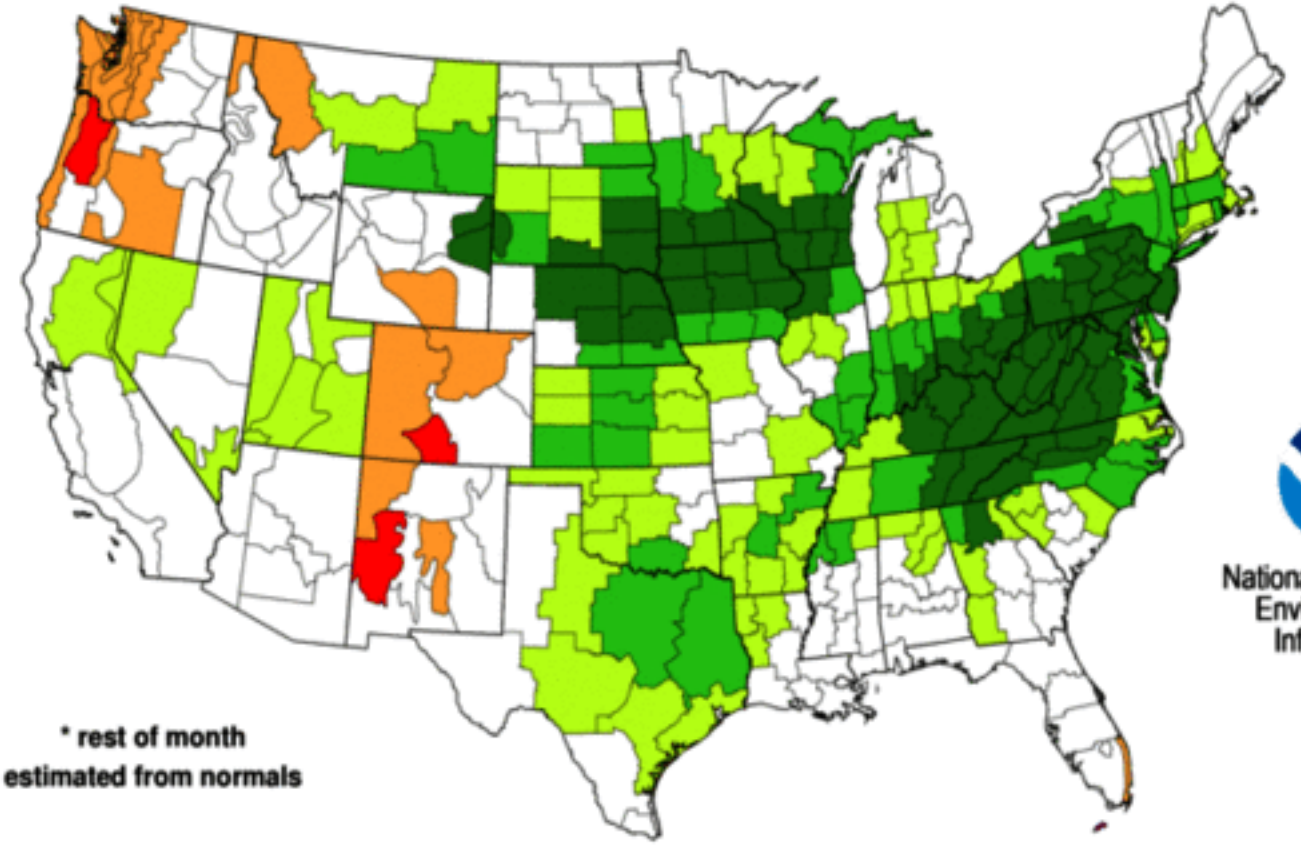
Date	Max Temperature	Min Temperature	Avg Temperature	GDD Base 40	GDD Base 50	Precipitation	Snowfall	Snow Depth
2019-02-01	M	M	M	M	M	M	M	M
2019-02-02	61	52	56.5	17	7	0.19	M	M
2019-02-03	M	M	M	M	M	M	M	M
2019-02-04	64	55	59.5	20	10	0.24	M	M
2019-02-05	70	50	60.0	20	10	0.00	M	M
2019-02-06	M	M	M	M	M	M	M	M
2019-02-07	M	M	M	M	M	M	M	M
2019-02-08	M	M	M	M	M	M	M	M
2019-02-09	M	M	M	M	M	M	M	M
2019-02-10	M	M	M	M	M	M	M	M
2019-02-11	M	M	M	M	M	M	M	M
2019-02-12	M	M	M	M	M	0.00	M	M
2019-02-13	82	50	66.0	26	16	0.13	M	M
2019-02-14	M	M	M	M	M	M	M	M
2019-02-15	M	M	M	M	M	M	M	M
2019-02-16	73	41	57.0	17	7	0.00	M	M
2019-02-17	M	M	M	M	M	M	M	M
2019-02-18	M	M	M	M	M	M	M	M
2019-02-19	M	M	M	M	M	M	M	M
2019-02-20	79	51	65.0	25	15	0.07	M	M
2019-02-21	M	M	M	M	M	M	M	M
2019-02-22	M	M	M	M	M	M	M	M
2019-02-23	M	M	M	M	M	M	M	M
2019-02-24	M	M	M	M	M	M	M	M
2019-02-25	M	M	M	M	M	M	M	M
2019-02-26	M	M	M	M	M	M	M	M
2019-02-27	M	M	M	M	M	M	M	M
2019-02-28	74	57	65.5	26	16	0.13	M	M
Average|Sum	71.9	50.9	61.4	151	81	0.76	M	M

Climatological Data for FARGO 17 NE, GA - March 2019

Date	Max Temperature	Min Temperature	Avg Temperature	GDD Base 40	GDD Base 50	Precipitation	Snowfall	Snow Depth
2019-03-01	M	M	M	M	M	M	M	M
2019-03-02	76	59	67.5	28	18	0.96	M	M
2019-03-03	M	M	M	M	M	M	M	M
2019-03-04	81	53	67.0	27	17	0.29	M	M
2019-03-05	M	M	M	M	M	M	M	M
2019-03-06	M	M	M	M	M	M	M	M
2019-03-07	M	M	M	M	M	M	M	M
2019-03-08	M	M	M	M	M	M	M	M
2019-03-09	78	52	65.0	25	15	0.00	M	M
2019-03-10	83	61	72.0	32	22	0.00	M	M
2019-03-11	M	M	M	M	M	M	M	M
2019-03-12	M	M	M	M	M	M	M	M
2019-03-13	86	54	70.0	30	20	0.00	M	M
2019-03-14	M	M	M	M	M	M	M	M
2019-03-15	M	M	M	M	M	M	M	M
2019-03-16	M	M	M	M	M	M	M	M
2019-03-17	M	M	M	M	M	M	M	M
2019-03-18	M	M	M	M	M	M	M	M
2019-03-19	M	M	M	M	M	M	M	M
2019-03-20	M	M	M	M	M	M	M	M
2019-03-21	M	M	M	M	M	M	M	M
2019-03-22	M	M	M	M	M	M	M	M
2019-03-23	M	M	M	M	M	M	M	M
2019-03-24	M	M	M	M	M	M	M	M
2019-03-25	M	M	M	M	M	M	M	M
2019-03-26	M	M	M	M	M	M	M	M
2019-03-27	M	M	M	M	M	M	M	M
2019-03-28	M	M	M	M	M	M	M	M
2019-03-29	M	M	M	M	M	M	M	M
2019-03-30	M	M	M	M	M	M	M	M
2019-03-31	M	M	M	M	M	M	M	M
Average|Sum	80.8	55.8	68.3	142	92	1.25	M	M

Palmer Hydrological Drought Index
Long–Term (Hydrological) Conditions

March 2019: through March 9 2019*



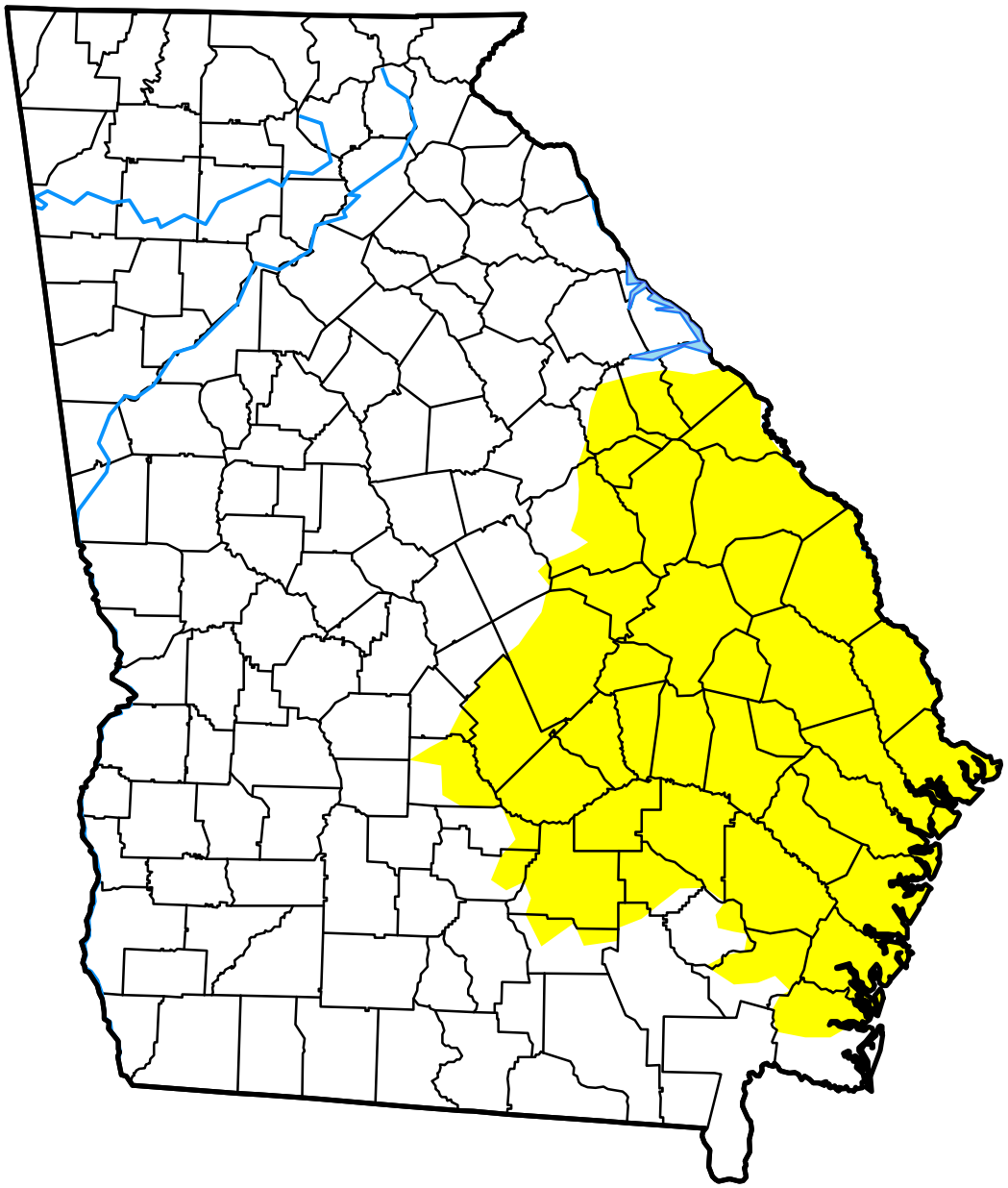
National Centers for Environmental Information

* rest of month estimated from normals

extreme drought	severe drought	moderate drought	mid–range	moderately moist	very moist	extremely moist
–4.00 and below	–3.00 to –3.99	–2.00 to –2.99	–1.99 to +1.99	+2.00 to +2.99	+3.00 to +3.99	+4.00 and above

U.S. Drought Monitor

Georgia



March 12, 2019

(Released Thursday, Mar. 14, 2019)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	72.77	27.23	0.00	0.00	0.00	0.00
Last Week *03-05-2019*	98.19	1.81	0.00	0.00	0.00	0.00
3 Months Ago *12-11-2018*	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year *01-01-2019*	100.00	0.00	0.00	0.00	0.00	0.00
Start of Water Year *09-25-2018*	70.95	29.05	6.72	0.00	0.00	0.00
One Year Ago *03-13-2018*	31.80	68.20	51.71	7.46	0.00	0.00

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:

Jessica Blunden

NCEI/NOAA

http://droughtmonitor.unl.edu/

APPENDIX B

Site Photographs

Site Photographs

Waters of the U.S. Delineation: Adirondack Tract — TTL Project No. 000180200804.00
Twin Pines Minerals ● Charlton County, Georgia
Photos taken March 8, 2019 – March 22, 2019

Photograph 1: View of perennial Stream 1 (S1).

Photograph 2: View of non-jurisdictional ditch (S2).

Photograph 3: View of intermittent Stream 3 (S3).

Photograph 4: View of non-jurisdictional ditch (S4).

Photograph 5: View of intermittent Stream 5 (S5).

Photograph 6: View of intermittent Stream 6 (S6).

Photograph 7: View of intermittent Stream 7 (S7).

Photograph 8: View of non-jurisdictional ditch (S8).

Photograph 9: View of non-jurisdictional ditch (S9).

Photograph 10: View of intermittent Stream 10 (S10).

Photograph 11: View of ephemeral portion of Stream 11 (S11).

Photograph 12: View of intermittent portion of Stream 11 (S11).

Photograph 13: View of the Wetland Data Point 1 (WDP-1) location.

Photograph 14: View of the Upland Data Point 1 (UDP-1) location.

Photograph 15: View of the Wetland Data Point 2 (WDP-2) location.

Photograph 16: View of the Upland Data Point 2 (UDP-2) location.

Photograph 17: View of the Wetland Data Point 3 (WDP-3) location.

Photograph 18: View of the Upland Data Point 3 (UDP-3) location.

Photograph 19: View of the Wetland Data Point 4 (WDP-4) location.

Photograph 20: View of the Upland Data Point 4 (UDP-4) location.

Photograph 21: View of the Wetland Data Point 5 (WDP-5) location.

Photograph 22: View of the Upland Data Point 5 (UDP-5) location.

APPENDIX C

U.S. Army Corps of Engineers Wetland Determination Data Forms

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Adirondack Tract City/County: Charlton County Sampling Date: 03/22/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: UDP-1

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Flatwoods Local relief (concave, convex, none): None Slope (%): 0-2%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.5191001892089 Long: -82.0980987548828 Datum: NAD83

Soil Map Unit Name: Leon fine sand, 0 to 2 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No ✓ (If no, explain in Remarks.)

Are Vegetation Yes, Soil Yes, or Hydrology Yes significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

- Vegetation historically impacted by silvicultural activities (planted pine).
- Soils/Hydrology historically impacted by silvicultural activities (bedding for planted pine).
- Drier than normal, but not drought conditions.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes ✓	No _____	Depth (inches): 20
Saturation Present? (includes capillary fringe)	Yes _____	No ✓	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Negative FACW and OBL: 1 to FACU and UPL: 2

VEGETATION – Use scientific names of plants. Sampling Point: UDP-1

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 35.00 20% of total cover: 14.00	0.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1. *Pinus elliottii*	30.0	yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 15.00 20% of total cover: 6.00	30.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: ____ 20% of total cover: ____	0.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Andropogon virginicus*	20.0	yes	FAC
2. *Smilax auriculata*	10.0	yes	FACU
3. *Dichanthelium aciculare*	10.0	yes	FACU
4. *Eleocharis sp.*	5.0	no	NI
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 22.50 20% of total cover: 9.00	45.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
50% of total cover: ____ 20% of total cover: ____	0.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species	30	x 2 =	60
FAC species	20	x 3 =	60
FACU species	20	x 4 =	80
UPL species		x 5 =	
Column Totals:	70 (A)		200 (B)

Prevalence Index = B/A = 2.85

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

Indicators of hydrology and hydric soils were not observed although the prevalence index was less than 3.

SOIL

Sampling Point: UDP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-18"	10YR 3/1	60					Sa	masked sand grains
	10YR 6/1	40					Sa	unmasked sand grains

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** ✓

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Adirondack Tract City/County: Charlton County Sampling Date: 03/22/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: UDP-2

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Flatwoods Local relief (concave, convex, none): None Slope (%): 0-2%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.5249004364013 Long: -82.0971984863281 Datum: NAD83

Soil Map Unit Name: Leon fine sand, 0 to 2 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✓ (If no, explain in Remarks.)

Are Vegetation Yes, Soil Yes, or Hydrology Yes significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✓	**Is the Sampled Area within a Wetland?** Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:

- Vegetation historically impacted by silvicultural activities (planted pine).
- Soils/Hydrology historically impacted by silvicultural activities (bedding for planted pine).
- Drier than normal, but not drought conditions.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ____

Water Table Present? Yes ✓ No ____ Depth (inches): 21

Saturation Present? (includes capillary fringe) Yes ✓ No ____ Depth (inches): 19

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Negative FACW and OBL: 1 to FACU and UPL: 4

VEGETATION – Use scientific names of plants. Sampling Point: UDP-2

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus elliottii*	60.0	yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 30.00 20% of total cover: 12.00	60.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 20% of total cover:	0.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1. *Serenoa repens*	50.0	yes	FACU
2. *Vaccinium myrsinites*	10.0	no	FACU
3.			
4.			
5.			
6.			
7.			
50% of total cover: 30.00 20% of total cover: 12.00	60.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Smilax smallii*	10.0	yes	FACU
2. *Smilax auriculata*	10.0	yes	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 10.00 20% of total cover: 4.00	20.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
50% of total cover: 20% of total cover:	0.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species	60	x 2 =	120
FAC species		x 3 =	
FACU species	80	x 4 =	320
UPL species		x 5 =	
Column Totals:	140 (A)		440 (B)

Prevalence Index = B/A = 3.14

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

SOIL

Sampling Point: UDP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6"	10YR 3/1	50					Sa	masked sand grains
	10YR 7/1	50					Sa	unmasked sand grains
6-16"	10YR 7/1	100					Sa	
16-18"	10YR 3/3	100					Sa	spodic horizon

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

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Organic Bodies (A6) **(LRR P, T, U)**
___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
___ Muck Presence (A8) **(LRR U)**
___ 1 cm Muck (A9) **(LRR P, T)**
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Coast Prairie Redox (A16) **(MLRA 150A)**
___ Sandy Mucky Mineral (S1) **(LRR O, S)**
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) **(LRR P, S, T, U)**
___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
___ Thin Dark Surface (S9) **(LRR S, T, U)**
___ Loamy Mucky Mineral (F1) **(LRR O)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Marl (F10) **(LRR U)**
___ Depleted Ochric (F11) **(MLRA 151)**
___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
___ Umbric Surface (F13) **(LRR P, T, U)**
___ Delta Ochric (F17) **(MLRA 151)**
___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) **(LRR O)**
___ 2 cm Muck (A10) **(LRR S)**
___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** ✓

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Adirondack Tract City/County: Charlton County Sampling Date: 03/22/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: UDP-3

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Flatwoods Local relief (concave, convex, none): None Slope (%): 0-2%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.5282001495361 Long: -82.0950012207031 Datum: NAD83

Soil Map Unit Name: Leon fine sand, 0 to 2 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✓ (If no, explain in Remarks.)

Are Vegetation Yes, Soil Yes, or Hydrology Yes significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:

- Vegetation historically impacted by silvicultural activities (planted pine).
- Soils/Hydrology historically impacted by silvicultural activities (bedding for planted pine).
- Drier than normal, but not drought conditions.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes ____	No ✓	Depth (inches): ____
Water Table Present?	Yes ✓	No ____	Depth (inches): 23
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 20

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Negative FACW and OBL: 2 to FACU and UPL: 3

VEGETATION – Use scientific names of plants. Sampling Point: UDP-3

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus elliottii*	50.0	yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 25.00 20% of total cover: 10.00	50.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 20% of total cover:	0.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1. *Serenoa repens*	20.0	yes	FACU
2. *Ilex glabra*	5.0	yes	FACW
3.			
4.			
5.			
6.			
7.			
50% of total cover: 12.50 20% of total cover: 5.00	25.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Gelsemium sempervirens*	30.0	yes	FAC
2. *Smilax auriculata*	10.0	yes	FACU
3. *Rubus cuneifolius*	10.0	yes	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 25.00 20% of total cover: 10.00	50.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1. *Vitis rotundifolia*	10.0	yes	FAC
2.			
3.			
4.			
5.			
50% of total cover: 5.00 20% of total cover: 2.00	10.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 43% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species	55	x 2 =	110
FAC species	40	x 3 =	120
FACU species	40	x 4 =	160
UPL species		x 5 =	
Column Totals:	135 (A)		390 (B)

Prevalence Index = B/A = 2.89

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

SOIL

Sampling Point: UDP-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6"	10YR 2/1	60					Sa	masked sand grains
	10YR 5/1	40					Sa	unmasked sand grains
6-18"	10YR 6/2	100					Sa	

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

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Organic Bodies (A6) **(LRR P, T, U)**
___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
___ Muck Presence (A8) **(LRR U)**
___ 1 cm Muck (A9) **(LRR P, T)**
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Coast Prairie Redox (A16) **(MLRA 150A)**
___ Sandy Mucky Mineral (S1) **(LRR O, S)**
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) **(LRR P, S, T, U)**
___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
___ Thin Dark Surface (S9) **(LRR S, T, U)**
___ Loamy Mucky Mineral (F1) **(LRR O)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Marl (F10) **(LRR U)**
___ Depleted Ochric (F11) **(MLRA 151)**
___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
___ Umbric Surface (F13) **(LRR P, T, U)**
___ Delta Ochric (F17) **(MLRA 151)**
___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) **(LRR O)**
___ 2 cm Muck (A10) **(LRR S)**
___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** ✓

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Adirondack Tract City/County: Charlton County Sampling Date: 03/22/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: UDP-4

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Flatwoods Local relief (concave, convex, none): None Slope (%): 0-2%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.5259990692138 Long: -82.1038970947265 Datum: NAD83

Soil Map Unit Name: Leon fine sand, 0 to 2 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ✓ (If no, explain in Remarks.)

Are Vegetation Yes, Soil Yes, or Hydrology Yes significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No	**Is the Sampled Area within a Wetland?** Yes No ✓
Hydric Soil Present?	Yes	No ✓	
Wetland Hydrology Present?	Yes	No ✓	

Remarks:

- Vegetation historically impacted by silvicultural activities (planted pine).
- Soils/Hydrology historically impacted by silvicultural activities (bedding for planted pine).
- Drier than normal, but not drought conditions.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes	No ✓	Depth (inches):
Water Table Present?	Yes ✓	No	Depth (inches): 18
Saturation Present? (includes capillary fringe)	Yes ✓	No	Depth (inches): 16

Wetland Hydrology Present? Yes No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Positive FACW and OBL: 3 to FACU and UPL: 1

VEGETATION – Use scientific names of plants. Sampling Point: UDP-4

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus elliottii*	70.0	yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 35.00 20% of total cover: 10.00	70.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1. *Acer rubrum*	10.0	yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 5.00 20% of total cover: 2.00	10.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1. *Serenoa repens*	40.0	yes	FACU
2. *Ilex glabra*	5.0	no	FACW
3.			
4.			
5.			
6.			
7.			
50% of total cover: 22.50 20% of total cover: 9.00	45.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Andropogon virginicus*	30.0	yes	FAC
2. *Scleria triglomerata*	10.0	yes	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 20.00 20% of total cover: 8.00	40.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1. *Vitis rotundifolia*	10.0	yes	FAC
2.			
3.			
4.			
5.			
50% of total cover: 5.00 20% of total cover: 2.00	10.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 83% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

SOIL

Sampling Point: UDP-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-4"	10YR 3/1	30					Sa	masked sand grains
	10YR 7/1	70					Sa	unmasked sand grains
4-18"	10YR 6/2	100					Sa	

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** ✓

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Adirondack Tract City/County: Charlton County Sampling Date: 03/22/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: UDP-5

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Flatwoods Local relief (concave, convex, none): None Slope (%): 0-2%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.5231990814208 Long: -82.102798461914 Datum: NAD83

Soil Map Unit Name: Leon fine sand, 0 to 2 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✓ (If no, explain in Remarks.)

Are Vegetation Yes, Soil Yes, or Hydrology Yes significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:

- Vegetation historically impacted by silvicultural activities (planted pine).
- Soils/Hydrology historically impacted by silvicultural activities (bedding for planted pine).
- Drier than normal, but not drought conditions.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes ____	No ✓	Depth (inches): ____
Water Table Present?	Yes ✓	No ____	Depth (inches): 22
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 19

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Negative FACW and OBL: 1 to FACU and UPL: 3

VEGETATION – Use scientific names of plants. Sampling Point: UDP-5

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: ____ 20% of total cover: ____	0.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1. *Pinus elliottii*	30.0	yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 15.00 20% of total cover: 6.00	30.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1. *Serenoa repens*	10.0	yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 5.00 20% of total cover: 2.00	10.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Andropogon virginicus*	20.0	yes	FAC
2. *Lachnanthes caroliniana*	10.0	yes	OBL
3. *Dichanthelium aciculare*	5.0	no	FACU
4. *Eupatorium capillifolium*	5.0	no	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 20.00 20% of total cover: 8.00	40.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1. *Vitis rotundifolia*	10.0	yes	FAC
2.			
3.			
4.			
5.			
50% of total cover: 5.00 20% of total cover: 2.00	10.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

SOIL

Sampling Point: UDP-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-5"	10YR 5/1	100					Sa	
5-12"	10YR 7/1	100					Sa	
12-18"	10YR 3/3	100					Sa	

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

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Organic Bodies (A6) **(LRR P, T, U)**
___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
___ Muck Presence (A8) **(LRR U)**
___ 1 cm Muck (A9) **(LRR P, T)**
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Coast Prairie Redox (A16) **(MLRA 150A)**
___ Sandy Mucky Mineral (S1) **(LRR O, S)**
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) **(LRR P, S, T, U)**
___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
___ Thin Dark Surface (S9) **(LRR S, T, U)**
___ Loamy Mucky Mineral (F1) **(LRR O)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Marl (F10) **(LRR U)**
___ Depleted Ochric (F11) **(MLRA 151)**
___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
___ Umbric Surface (F13) **(LRR P, T, U)**
___ Delta Ochric (F17) **(MLRA 151)**
___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) **(LRR O)**
___ 2 cm Muck (A10) **(LRR S)**
___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** ✓

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Adirondack Tract City/County: Charlton County Sampling Date: 03/22/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: WDP-1

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-1%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.5188999176025 Long: -82.0979995727539 Datum: NAD83

Soil Map Unit Name: Lynn Haven, Allanton and Kingsferry soils, ponded, 0 to 1 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✓ (If no, explain in Remarks.)

Are Vegetation Yes, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks:

- Vegetation historically impacted by silvicultural activities (planted pine) which are stunted due to hydric conditions.
- Drier than normal, but not drought conditions.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ✓ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes ____	No ✓	Depth (inches): ____
Water Table Present?	Yes ✓	No ____	Depth (inches): 12"
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 8"

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Positive FACW and OBL: 9 to FACU and UPL: 0

VEGETATION – Use scientific names of plants.

Sampling Point: WDP-1

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus elliottii*	25.0	yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 12.50 20% of total cover: 5.00	25.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1. *Gordonia lasianthus*	10.0	yes	FACW
2. *Acer rubrum*	10.0	yes	FAC
3.			
4.			
5.			
6.			
7.			
50% of total cover: 10.00 20% of total cover: 4.00	20.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1. *Cliftonia monophyla*	10.0	yes	OBL
2. *Ilex glabra*	10.0	yes	FACW
3. *Lyonia lucida*	5.0	yes	FACW
4.			
5.			
6.			
7.			
50% of total cover: 12.50 20% of total cover: 5.00	25.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Andropogon virginicus*	40.0	yes	FAC
2. *Lachnanthes caroliniana*	10.0	no	OBL
3. *Woodwardia virginica*	10.0	no	OBL
4. *Scleria triglomerata*	10.0	no	FACW
5. *Woodwardia areolata*	5.0	no	OBL
6.			
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 37.50 20% of total cover: 15.00	75.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
50% of total cover: ____ 20% of total cover: ____	0.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ____

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

SOIL

Sampling Point: WDP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-18"	10YR 3/1	75					Sa	
	10YR 5/1	25					Sa	stripped areas

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ✓ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Adirondack Tract City/County: Charlton County Sampling Date: 03/22/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: WDP-2

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-1%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.5249004364013 Long: -82.0973968505859 Datum: NAD83

Soil Map Unit Name: Leon fine sand, 0 to 2 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No ✓ (If no, explain in Remarks.)

Are Vegetation Yes, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

- Vegetation historically impacted by silvicultural activities (planted pine) which are stunted due to hydric conditions.
- Drier than normal, but not drought conditions.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ✓ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ✓ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes ✓	No _____	Depth (inches): 8.5"
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 6"

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Positive FACW and OBL: 5 to FACU and UPL: 0

VEGETATION – Use scientific names of plants. Sampling Point: WDP-2

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: ____ 20% of total cover: ____	0.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1. *Pinus elliottii*	25.0	yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 12.50 20% of total cover: 5.00	25.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 12.50 20% of total cover: 5.00	0.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Juncus polycephalus*	30.0	yes	OBL
2. *Lachnanthes caroliniana*	10.0	yes	OBL
3. *Woodwardia virginica*	10.0	yes	OBL
4. *Xyris elliottii*	10.0	yes	OBL
5. *Andropogon virginicus*	10.0	yes	FAC
6.			
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 35.00 20% of total cover: 14.00	70.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
50% of total cover: ____ 20% of total cover: ____	0.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

SOIL

Sampling Point: WDP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-12"	10YR 2/1	60					Sa	
	10YR 6/1	40					Sa	stripped areas
12-18"	10YR 7/1	100					Sa	

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ✓ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Adirondack Tract City/County: Charlton County Sampling Date: 03/22/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: WDP-3

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-1%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.5282001495361 Long: -82.0951995849609 Datum: NAD83

Soil Map Unit Name: Leon fine sand, 0 to 2 percent slopes NWI classification: PFO6F

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✓ (If no, explain in Remarks.)

Are Vegetation Yes, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks:

- Vegetation historically impacted by silvicultural activities (planted pine) which are stunted due to hydric conditions.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ✓ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ✓ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes ✓	No ____	Depth (inches): 6"
Water Table Present?	Yes ✓	No ____	Depth (inches): 2"
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 0"

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Positive FACW and OBL: 8 to FACU and UPL: 0

VEGETATION – Use scientific names of plants. Sampling Point: WDP-3

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus elliottii*	50.0	yes	FACW
2. *Taxodium ascendens*	20.0	yes	OBL
3.			
4.			
5.			
6.			
7.			
50% of total cover: 35.00 20% of total cover: 14.00	70.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 12.50 20% of total cover: 5.00	0.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1. *Ilex myrtifolia*	20.0	yes	FACW
2. *Hypericum tetrapetalum*	10.0	yes	OBL
3.			
4.			
5.			
6.			
7.			
50% of total cover: 15.00 20% of total cover: 6.00	30.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Juncus polycephalus*	10.0	yes	OBL
2. *Lachnanthes caroliniana*	10.0	yes	OBL
3. *Sagitaria graminea*	10.0	yes	OBL
4. *Xyris elliottii*	10.0	yes	OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 20.00 20% of total cover: 8.00	40.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
50% of total cover: ____ 20% of total cover: ____	0.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 8 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

SOIL

Sampling Point: WDP-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6"	10YR 3/1	60					Sa	
	10YR 5/1	40					Sa	stripped areas
6-18"	10YR 6/1	100					Sa	

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ✓ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Adirondack Tract City/County: Charlton County Sampling Date: 03/22/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: WDP-4

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-1%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.525800704956 Long: -82.1039962768554 Datum: NAD83

Soil Map Unit Name: Lynn Haven, Allanton and Kingsferry soils, ponded, 0 to 1 percent slopes NWI classification: PFO6/4C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✓ (If no, explain in Remarks.)

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks:

- Drier than normal, but not drought conditions.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ✓ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes ____	No ✓	Depth (inches): ____
Water Table Present?	Yes ✓	No ____	Depth (inches): 0"
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 0"

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Positive FACW and OBL: 9 to FACU and UPL: 0

Buttressed trunk bases and multiply trunkated canopy trees.

VEGETATION – Use scientific names of plants.

Sampling Point: WDP-4

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Taxodium ascendens*	40.0	yes	OBL
2. *Acer rubrum*	20.0	yes	FAC
3. *Nyssa biflora*	20.0	yes	OBL
4. *Magnolia virginiana*	10.0	no	FACW
5.			
6.			
7.			
50% of total cover: 45.00 20% of total cover: 18.00	90.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 12.50 20% of total cover: 5.00	0.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1. *Ilex myrtifolia*	10.0	yes	FACW
2. *Lyonia lucida*	10.0	yes	FACW
3. *Morella caroliniensis*	10.0	yes	FACW
4.			
5.			
6.			
7.			
50% of total cover: 15.00 20% of total cover: 6.00	30.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Toxicodendron radicans*	10.0	yes	FAC
2. *Woodwardia areolata*	10.0	yes	OBL
3. *Woodwardia virginica*	10.0	yes	OBL
4. *Smilax laurifolia*	10.0	yes	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 20.00 20% of total cover: 8.00	40.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
50% of total cover: ____ 20% of total cover: ____	0.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 10 (A)

Total Number of Dominant Species Across All Strata: 10 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

SOIL

Sampling Point: WDP-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-18"	10YR 2/1	100					Mu Mi	

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ✓ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** ___

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt; Mi=Mineral

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Adirondack Tract City/County: Charlton County Sampling Date: 03/22/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: WDP-5

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-1%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.523000717163 Long: -82.1031036376953 Datum: NAD83

Soil Map Unit Name: Lynn Haven fine sand, 0 to 2 percent slopes NWI classification: none

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✓ (If no, explain in Remarks.)

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks:

-Drier than normal, but not drought conditions.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ✓ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes ____	No ✓	Depth (inches): ____
Water Table Present?	Yes ✓	No ____	Depth (inches): 0"
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 0"

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Positive FACW and OBL: 9 to FACU and UPL: 0

Buttressed trunk bases and multiply trunkated canopy trees.

VEGETATION – Use scientific names of plants. Sampling Point: WDP-5

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Taxodium ascendens*	40.0	yes	OBL
2. *Acer rubrum*	20.0	yes	FAC
3. *Nyssa biflora*	20.0	yes	OBL
4. *Magnolia virginiana*	10.0	no	FACW
5.			
6.			
7.			
50% of total cover: 45.00 20% of total cover: 18.00	90.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 12.50 20% of total cover: 5.00	0.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1. *Ilex myrtifolia*	10.0	yes	FACW
2. *Lyonia lucida*	10.0	yes	FACW
3. *Morella caroliniensis*	10.0	yes	FACW
4.			
5.			
6.			
7.			
50% of total cover: 15.00 20% of total cover: 6.00	30.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Toxicodendron radicans*	10.0	yes	FAC
2. *Woodwardia areolata*	10.0	yes	OBL
3. *Woodwardia virginica*	10.0	yes	OBL
4. *Smilax laurifolia*	10.0	yes	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 20.00 20% of total cover: 8.00	40.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
50% of total cover: ____ 20% of total cover: ____	0.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 10 (A)

Total Number of Dominant Species Across All Strata: 10 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

SOIL

Sampling Point: WDP-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-18"	10YR 2/1	100					Mu Mi	

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ✓ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt; Mi=Mineral

APPENDIX D

North Carolina (NC) Division of Water Quality (DWQ) Stream Identification Forms

NC DWQ Stream Identification Form Version 4.11

Stream ID: S1

Date: 03/09/2019	**Project/Site:** Adirondack Tract	**Latitude:** 30.5233993530273
Evaluator: TTL, Inc./C. Terrell	**County:** Charlton	**Longitude:** -82.0914001464843
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 30.50	**Stream Determination:** Perennial	*e.g. Quad Name*: St. George, GA

A. Geomorphology (Subtotal = 13.50)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	2 ✓	3
2. Sinuosity of channel along thalweg	0	1	2 ✓	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	2 ✓	3
4. Particle size of stream substrate	0	1 ✓	2	3
5. Active/relict floodplain	0	1	2 ✓	3
6. Depositional bars or benches	0	1 ✓	2	3
7. Recent alluvial deposits	0	1 ✓	2	3
8. Headcuts	0	1 ✓	2	3
9. Grade control	0	0.5	1 ✓	1.5
10. Natural valley	0	0.5 ✓	1	1.5
11. Second or greater order channel	No = 0 ✓		Yes = 3	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 8.00)				
12. Presence of Baseflow	0	1	2 ✓	3
13. Iron oxidizing bacteria	0	1 ✓	2	3
14. Leaf litter	1.5	1 ✓	0.5	0
15. Sediment on plants or debris	0	0.5 ✓	1	1.5
16. Organic debris lines or piles	0	0.5 ✓	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3 ✓	

C. Biology (Subtotal = 9.00)				
18. Fibrous roots in streambed	3	2 ✓	1	0
19. Rooted upland plants in streambed	3 ✓	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1 ✓	2	3
21. Aquatic Mollusks	0 ✓	1	2	3
22. Fish	0	0.5 ✓	1	1.5
23. Crayfish	0	0.5 ✓	1	1.5
24. Amphibians	0	0.5 ✓	1	1.5
25. Algae	0 ✓	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75	✓ OBL = 1.5	Other = 0	

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

Stream ID: S3

Date: 03/09/2019	**Project/Site:** Adirondack Tract	**Latitude:** 30.520299911499
Evaluator: TTL, Inc./C. Terrell	**County:** Charlton	**Longitude:** -82.0955963134765
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 25.00	**Stream Determination:** Intermittent	*e.g. Quad Name*: St. George, GA

A. Geomorphology (Subtotal = 8.00)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1 ✓	2	3
2. Sinuosity of channel along thalweg	0	1 ✓	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1 ✓	2	3
4. Particle size of stream substrate	0	1 ✓	2	3
5. Active/relict floodplain	0	1 ✓	2	3
6. Depositional bars or benches	0	1 ✓	2	3
7. Recent alluvial deposits	0	1 ✓	2	3
8. Headcuts	0 ✓	1	2	3
9. Grade control	0	0.5 ✓	1	1.5
10. Natural valley	0	0.5 ✓	1	1.5
11. Second or greater order channel	No = 0 ✓		Yes = 3	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7.50)				
12. Presence of Baseflow	0	1	2 ✓	3
13. Iron oxidizing bacteria	0	1 ✓	2	3
14. Leaf litter	1.5	1	0.5 ✓	0
15. Sediment on plants or debris	0	0.5 ✓	1	1.5
16. Organic debris lines or piles	0	0.5 ✓	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3 ✓	

C. Biology (Subtotal = 9.50)				
18. Fibrous roots in streambed	3	2 ✓	1	0
19. Rooted upland plants in streambed	3 ✓	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1 ✓	2	3
21. Aquatic Mollusks	0 ✓	1	2	3
22. Fish	0	0.5 ✓	1	1.5
23. Crayfish	0	0.5 ✓	1	1.5
24. Amphibians	0	0.5 ✓	1	1.5
25. Algae	0	0.5 ✓	1	1.5
26. Wetland plants in streambed	FACW = 0.75	✓ OBL = 1.5	Other = 0	

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

Stream ID: S5

Date: 03/09/2019	**Project/Site:** Adirondack Tract	**Latitude:** 30.5233001708984
Evaluator: TTL, Inc./C. Terrell	**County:** Charlton	**Longitude:** -82.0967025756835
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 22.00	**Stream Determination:** Intermittent	*e.g. Quad Name*: St. George, GA

A. Geomorphology (Subtotal = 6.00)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1 ✓	2	3
2. Sinuosity of channel along thalweg	0 ✓	1	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0 ✓	1	2	3
4. Particle size of stream substrate	0	1 ✓	2	3
5. Active/relict floodplain	0	1 ✓	2	3
6. Depositional bars or benches	0	1 ✓	2	3
7. Recent alluvial deposits	0	1 ✓	2	3
8. Headcuts	0 ✓	1	2	3
9. Grade control	0	0.5 ✓	1	1.5
10. Natural valley	0	0.5 ✓	1	1.5
11. Second or greater order channel	No = 0 ✓		Yes = 3	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7.50)				
12. Presence of Baseflow	0	1	2 ✓	3
13. Iron oxidizing bacteria	0	1 ✓	2	3
14. Leaf litter	1.5	1	0.5 ✓	0
15. Sediment on plants or debris	0	0.5 ✓	1	1.5
16. Organic debris lines or piles	0	0.5 ✓	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3 ✓	

C. Biology (Subtotal = 8.50)				
18. Fibrous roots in streambed	3	2 ✓	1	0
19. Rooted upland plants in streambed	3 ✓	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1 ✓	2	3
21. Aquatic Mollusks	0 ✓	1	2	3
22. Fish	0 ✓	0.5	1	1.5
23. Crayfish	0	0.5 ✓	1	1.5
24. Amphibians	0	0.5 ✓	1	1.5
25. Algae	0 ✓	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75	✓ OBL = 1.5	Other = 0	

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

Stream ID: S6

Date: 03/09/2019	**Project/Site:** Adirondack Tract	**Latitude:** 30.5312995910644
Evaluator: TTL, Inc./C. Terrell	**County:** Charlton	**Longitude:** -82.0962982177734
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 27.00	**Stream Determination:** Intermittent	*e.g. Quad Name*: St. George, GA

A. Geomorphology (Subtotal = 10.00)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	2 ✓	3
2. Sinuosity of channel along thalweg	0	1	2 ✓	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1 ✓	2	3
4. Particle size of stream substrate	0	1 ✓	2	3
5. Active/relict floodplain	0	1 ✓	2	3
6. Depositional bars or benches	0	1 ✓	2	3
7. Recent alluvial deposits	0	1 ✓	2	3
8. Headcuts	0 ✓	1	2	3
9. Grade control	0	0.5 ✓	1	1.5
10. Natural valley	0	0.5 ✓	1	1.5
11. Second or greater order channel	No = 0 ✓		Yes = 3	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 8.00)				
12. Presence of Baseflow	0	1	2 ✓	3
13. Iron oxidizing bacteria	0	1 ✓	2	3
14. Leaf litter	1.5	1 ✓	0.5	0
15. Sediment on plants or debris	0	0.5 ✓	1	1.5
16. Organic debris lines or piles	0	0.5 ✓	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3 ✓	

C. Biology (Subtotal = 9.00)				
18. Fibrous roots in streambed	3	2 ✓	1	0
19. Rooted upland plants in streambed	3 ✓	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1 ✓	2	3
21. Aquatic Mollusks	0 ✓	1	2	3
22. Fish	0	0.5 ✓	1	1.5
23. Crayfish	0	0.5 ✓	1	1.5
24. Amphibians	0	0.5 ✓	1	1.5
25. Algae	0 ✓	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75	✓ OBL = 1.5	Other = 0	

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

Stream ID: S7

Date:	03/13/2019	**Project/Site:**	Adirondack Tract	**Latitude:**	30.5312995910644
Evaluator:	TTL, Inc./C. Terrell	**County:**	Charlton	**Longitude:**	-82.1066970825195
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30**	26.00	**Stream Determination:**	Intermittent	*e.g. Quad Name*:	St. George, GA

A. Geomorphology (Subtotal = 9.00)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	2 ✓	3
2. Sinuosity of channel along thalweg	0	1 ✓	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1 ✓	2	3
4. Particle size of stream substrate	0	1 ✓	2	3
5. Active/relict floodplain	0	1 ✓	2	3
6. Depositional bars or benches	0	1 ✓	2	3
7. Recent alluvial deposits	0	1 ✓	2	3
8. Headcuts	0 ✓	1	2	3
9. Grade control	0	0.5 ✓	1	1.5
10. Natural valley	0	0.5 ✓	1	1.5
11. Second or greater order channel	No = 0 ✓		Yes = 3	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 8.00)				
12. Presence of Baseflow	0	1	2 ✓	3
13. Iron oxidizing bacteria	0	1 ✓	2	3
14. Leaf litter	1.5	1 ✓	0.5	0
15. Sediment on plants or debris	0	0.5 ✓	1	1.5
16. Organic debris lines or piles	0	0.5 ✓	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3 ✓	

C. Biology (Subtotal = 9.00)				
18. Fibrous roots in streambed	3	2 ✓	1	0
19. Rooted upland plants in streambed	3 ✓	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1 ✓	2	3
21. Aquatic Mollusks	0 ✓	1	2	3
22. Fish	0	0.5 ✓	1	1.5
23. Crayfish	0	0.5 ✓	1	1.5
24. Amphibians	0	0.5 ✓	1	1.5
25. Algae	0 ✓	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75	✓ OBL = 1.5	Other = 0	

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

Stream ID: S10

Date: 03/10/2019	**Project/Site:** Adirondack Tract	**Latitude:** 30.5301990509033
Evaluator: TTL, Inc./C. Terrell	**County:** Charlton	**Longitude:** -82.1087036132812
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 23.00	**Stream Determination:** Intermittent	*e.g. Quad Name*: St. George, GA

A. Geomorphology (Subtotal = 7.00)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1 ✓	2	3
2. Sinuosity of channel along thalweg	0	1 ✓	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1 ✓	2	3
4. Particle size of stream substrate	0	1 ✓	2	3
5. Active/relict floodplain	0	1 ✓	2	3
6. Depositional bars or benches	0 ✓	1	2	3
7. Recent alluvial deposits	0	1 ✓	2	3
8. Headcuts	0 ✓	1	2	3
9. Grade control	0	0.5 ✓	1	1.5
10. Natural valley	0	0.5 ✓	1	1.5
11. Second or greater order channel	No = 0 ✓		Yes = 3	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7.00)				
12. Presence of Baseflow	0	1 ✓	2	3
13. Iron oxidizing bacteria	0	1 ✓	2	3
14. Leaf litter	1.5	1 ✓	0.5	0
15. Sediment on plants or debris	0	0.5 ✓	1	1.5
16. Organic debris lines or piles	0	0.5 ✓	1	1.5
17. Soil-based evidence of high water table?	No = 0		Yes = 3 ✓	

C. Biology (Subtotal = 9.00)				
18. Fibrous roots in streambed	3	2 ✓	1	0
19. Rooted upland plants in streambed	3 ✓	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1 ✓	2	3
21. Aquatic Mollusks	0 ✓	1	2	3
22. Fish	0	0.5 ✓	1	1.5
23. Crayfish	0	0.5 ✓	1	1.5
24. Amphibians	0	0.5 ✓	1	1.5
25. Algae	0 ✓	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75	✓ OBL = 1.5	Other = 0	

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

Stream ID: S11e

Date: 03/21/2019	**Project/Site:** Adirondack Tract	**Latitude:** 30.5284004211425
Evaluator: TTL, Inc./C. Terrell	**County:** Charlton	**Longitude:** -82.0898971557617
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 16.00	**Stream Determination:** Ephemeral	*e.g. Quad Name*: St. George, GA

A. Geomorphology (Subtotal = 6.00)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1 ✓	2	3
2. Sinuosity of channel along thalweg	0	1 ✓	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1 ✓	2	3
4. Particle size of stream substrate	0	1 ✓	2	3
5. Active/relict floodplain	0	1 ✓	2	3
6. Depositional bars or benches	0 ✓	1	2	3
7. Recent alluvial deposits	0 ✓	1	2	3
8. Headcuts	0 ✓	1	2	3
9. Grade control	0	0.5 ✓	1	1.5
10. Natural valley	0	0.5 ✓	1	1.5
11. Second or greater order channel	No = 0 ✓		Yes = 3	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 3.00)				
12. Presence of Baseflow	0 ✓	1	2	3
13. Iron oxidizing bacteria	0	1 ✓	2	3
14. Leaf litter	1.5	1 ✓	0.5	0
15. Sediment on plants or debris	0	0.5 ✓	1	1.5
16. Organic debris lines or piles	0	0.5 ✓	1	1.5
17. Soil-based evidence of high water table?	No = 0 ✓		Yes = 3	

C. Biology (Subtotal = 7.00)				
18. Fibrous roots in streambed	3	2 ✓	1	0
19. Rooted upland plants in streambed	3	2	1 ✓	0
20. Macrobenthos (note diversity and abundance)	0	1 ✓	2	3
21. Aquatic Mollusks	0 ✓	1	2	3
22. Fish	0	0.5 ✓	1	1.5
23. Crayfish	0	0.5 ✓	1	1.5
24. Amphibians	0	0.5 ✓	1	1.5
25. Algae	0 ✓	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75	✓ OBL = 1.5	Other = 0	

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

NC DWQ Stream Identification Form Version 4.11

Stream ID: S11i

Date: 03/21/2019	**Project/Site:** Adirondack Tract	**Latitude:** 30.528600692749
Evaluator: TTL, Inc./C. Terrell	**County:** Charlton	**Longitude:** -82.0904006958007
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 20.00	**Stream Determination:** Intermittent	*e.g. Quad Name*: St. George, GA

A. Geomorphology (Subtotal = 7.00)	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1 ✓	2	3
2. Sinuosity of channel along thalweg	0	1 ✓	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1 ✓	2	3
4. Particle size of stream substrate	0	1 ✓	2	3
5. Active/relict floodplain	0	1 ✓	2	3
6. Depositional bars or benches	0 ✓	1	2	3
7. Recent alluvial deposits	0	1 ✓	2	3
8. Headcuts	0 ✓	1	2	3
9. Grade control	0	0.5 ✓	1	1.5
10. Natural valley	0	0.5 ✓	1	1.5
11. Second or greater order channel	No = 0 ✓		Yes = 3	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 4.00)				
12. Presence of Baseflow	0	1 ✓	2	3
13. Iron oxidizing bacteria	0	1 ✓	2	3
14. Leaf litter	1.5	1 ✓	0.5	0
15. Sediment on plants or debris	0	0.5 ✓	1	1.5
16. Organic debris lines or piles	0	0.5 ✓	1	1.5
17. Soil-based evidence of high water table?	No = 0 ✓		Yes = 3	

C. Biology (Subtotal = 9.00)				
18. Fibrous roots in streambed	3	2 ✓	1	0
19. Rooted upland plants in streambed	3	2 ✓	1	0
20. Macrobenthos (note diversity and abundance)	0	1 ✓	2	3
21. Aquatic Mollusks	0 ✓	1	2	3
22. Fish	0	0.5 ✓	1	1.5
23. Crayfish	0	0.5 ✓	1	1.5
24. Amphibians	0	0.5 ✓	1	1.5
25. Algae	0	0.5	1 ✓	1.5
26. Wetland plants in streambed	FACW = 0.75	✓ OBL = 1.5	Other = 0	

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

APPENDIX E

USACE Savannah District Request for Corps of Engineers Jurisdictional Determination (JD) and/or Delineation Review Form

US Army Corps
of Engineers
Savannah District

SAS APPENDIX 1: Request for Corps of Engineers Jurisdictional Determination (JD) and/or Delineation Review

I. Reason for request: (check as many as applicable)

☐ I intend to construct/develop a project or perform activities on this parcel which would be designed to avoid all aquatic resources.

☐ I intend to construct/develop a project or perform activities on this parcel which would be designed to avoid all jurisdictional aquatic resources under Corps authority.

☑ I intend to construct/develop a project or perform activities on this parcel which may require authorization from the Corps, and the JD would be used to avoid and minimize impacts to jurisdictional aquatic resources and as an initial step in a future permitting process.

☐ I intend to construct/develop a project or perform activities on this parcel which may require authorization from the Corps; this request is accompanied by my permit application and the JD is to be used in the permitting process.

☐ I intend to construct/develop a project or perform activities in a navigable water of the U.S. which is included on the district Section 1O list and/or is subject to the ebb and flow of the tide.

☐ A Corps JD is required in order to obtain my local/state authorization.

☐ I intend to contest jurisdiction over a particular aquatic resource and request the Corps confirm that jurisdiction does/does not exist over the aquatic resource on the parcel.

☐ I believe that the site may be comprised entirely of dry land.

☐ Other: _____

II. I am requesting that the U.S. Army Corps of Engineers, Savannah District, provide me with the following:

☑ **Delineation Review of Aquatic Resources** - Concurrence with an aquatic resource delineation is a written notification from the Corps concurring, not concurring, or commenting on the aquatic resource boundaries, or limits, delineated on a property.

☐ **Preliminary Jurisdictional Determination** - (PJD). A PJD is defined in Corps regulations at 33 CFR 331.2, as "written indications that there may be waters of the United States on a parcel". When the Corps provides a PJD, the Corps is making no legally binding determination of any type regarding whether jurisdiction exists over the particular aquatic resource in question.

☐ **Approved Jurisdictional Determination** - (AJD) An AJD is defined in Corps regulations at 33 CFR 331.2. A definitive, official determination that there are, or that there are not, jurisdictional aquatic resources on a parcel.

☐ I am unclear as to what I would like to request and require additional information to inform my decision.

SECTION 1

Parcel Number of Property:

Lat. 30.537849 Long. - 82.099831 (in decimal degrees)

Parcel Address:

Parcel City : Saint George Parcel County: Charlton Zip:

Size of Review Area: 551.1 Acre(s) Variable Linear feet

SECTION 2

LANDOWNER NAME

First: Steven

Last: Ingle

Company: Twin Pines Minerals, LLC

Email Address: single@greenfuelsenergy.com

Address: 2100 Southbridge Parkway, Ste. 540

City: Birmingham

State: AL Zip: 35209

Phone: 205-545-8759

AUTHORIZED AGENT'S NAME

First: Cindy

Last: House-Pearson

Company: TTL, Inc.

Email Address: chpearson@ttlusa.com

Address: 3516 Greensboro Avenue

City: Tuscaloosa

State: AL Zip: 35401

Phone: 251-327-6153

PROPERTY ACCESS PERMISSION, AKNOWLEDGEMENT OF 18 U.S.C. SECTION 10001 AND STATEMENT OF AGENT AUTHORIZATION

Initial ONLY One:

SI By signing below, I certify that I am the owner of record of the property referenced in III, Section 1 above, and I hereby authorize representatives of the U.S. Army Corps of Engineers, Savannah District, to enter the property for purposes of conducting on-site inspections, and issuing an aquatic resource delineation concurrence and/or a jurisdictional determination. My signature shall also be an affirmation that I possess the requisite property rights to request a delineation review and/or a jurisdictional determination on the property referenced in III - Section 1. Further, I authorize the agent in III - Section 2, to act on my behalf in the processing of this request and to furnish supplemental information in support of this request.

N/A By signing below, I certify that I am acting as the duly authorized agent of the owner of record of the property referenced in III, Section 1 above, and have been given the authority to: 1) request a delineation review and/or a jurisdictional determination (JD) on the property referenced in III - Section 1, and 2) authorize representatives of the U.S. Army Corps of Engineers, Savannah District, to enter the property for purposes of conducting on-site inspections, and issuing an aquatic resource delineation concurrence and/or a jurisdictional determination. I understand that I may be required to provide documentary evidence of my authority to request a delineation review and/or JD, and/or to grant Corps of Engineers personnel access to the property.

Please Print Name Legibly: Steven R. Ingle

Signature

Date: 07/03/2019

* Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Program of the U.S. Army Corps of Engineers; Final Rule for 33 CFR Parts 320-332.

Principal Purpose: The information that you provide will be used in evaluating your request to determine whether there are any aquatic resources within the project area subject to federal jurisdiction under the regulatory authorities referenced above.

Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public, and may be made

US Army Corps of Engineers
Savannah District, Regulatory Division
Global Positioning Systems (GPS) Datasheet
Delineation of Wetlands, Streams and Other Waters
Within the State of Georgia

USACE File Number SAS-2018-00554 Date of Delineation 3/8-3/22/2019

Name of Delineator Present Chris Terrell & Chris Stanford

Make and Model of GPS Device Used (must be capable of sub-meter accuracy)

Trimble Geo7x GPS (model 88161)

Geographic Coordinate System Used US State Plane GA East - NAD 1983 (Conus)

Name of Continually Operated Reference Station Used for Post-processing

CORS, Jacksonville 1 (ZJX1), Florida

Date Post-processing Performed 5/23/2019

Percent Dilution of Position (PDOP) (6 or less is required) NA (use Trimble Smart Settings)

Name and Coordinates of Known Property Corner and/or Monument

Frequency of Waypoints Taken During Survey as needed per field observations

Note: GPS data must be provided, if requested. If GPS data and/or a GPS delineation is determined unacceptable by the Savannah District, a survey sealed by a surveyor licensed in Georgia will be required.

WATERS OF THE UNITED STATES DELINEATION REPORT

APPROXIMATELY 1,143-ACRE TIAA TRACT SAINT GEORGE, CHARLTON COUNTY, GEORGIA

Submitted to:

Twin Pines Minerals, LLC
Attn: Mr. Steve Ingle, P.E.
2100 Southbridge Parkway
Birmingham, Alabama 35209

Prepared by:

TTL, Inc.
2743-B Gunter Park Drive West
Montgomery, Alabama 36109

Project No. 000180200804.00

July 3, 2019

SIGNATURE OF ENVIRONMENTAL PROFESSIONALS

TTL, Inc. has performed a waters of the United States (U.S.) delineation in general conformance with the scope and limitations of the *U. S. Army Corps of Engineers Wetland Delineation Manual, 1987 Edition*, and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region Version 2.0* (2010). Identification of ephemeral, intermittent and perennial streams has been performed in general conformance with methodology outlined in *Methodology for Identification of Intermittent and Perennial Streams and their Origins, Version 4.11* (2010).

July 3, 2019

Christopher Terrell
Environmental Professional

Date

July 3, 2019

Cindy House-Pearson
Senior Natural Resources
Client Manager

Date

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1.0 INTRODUCTION

TTL, Inc. (TTL) was contracted by Twin Pines Minerals, LLC (Twin Pines) to perform a delineation of the waters of the United States (WOTUS) associated with a proposed development of a heavy mineral mining operation in Saint George, Charlton County, Georgia (Figure 1). TTL conducted the field activities for this project from March 23- April 10, 2019.

Activities within jurisdictional waters of the U.S. are regulated by the U.S. Army Corps of Engineers (USACE). Authority to permit discharges (fill) within jurisdictional wetlands or non-navigable waters of the U.S. is granted under Section 404 of the Clean Water Act (CWA) of 1972. Authority to permit work and placement of structures in navigable waters of the U.S. is granted under Sections 9 and 10 of the Rivers and Harbors Act of 1899. For regulatory purposes under the CWA, wetlands are defined by the USACE as:

> Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.

2.0 SITE DESCRIPTION

The site is an approximately 1,143-acre area depicted on the U.S. Geological Survey (USGS) 7.5-minute Topographic Maps of Moniac, Georgia and Saint George, Georgia (Figure 1). The center of the site is located near latitude 30.526268 and longitude -82.14322. According to the USGS Topographic Map, the elevation at the site ranges from approximately 120 to 165 feet above mean sea level.

The delineation area is located just north of GA-94. The eastern delineation area boundary follows a portion of T-Model Road. Although not well-defined, the historic Trail Ridge is located to the east of the delineation area. The delineation area has historically been used for silvicultural activities. The primary sources of hydrology for the delineation area are onsite rainfall and surface water flow.

Driving directions to the site are as follows: from the intersection of GA-23 and GA-94 (in St. George, GA), travel west along GA-94 for approximately 3.9 miles to the intersection of GA-94 and Boggy Break Road (dirt road). This location is near the southeast corner of the delineation area.

3.0 LITERATURE AND RECORDS REVIEW

Prior to conducting the field effort, TTL performed a literature and records review to develop an understanding of the potential for the presence of waters of the U.S. on the subject site or surrounding properties. These data sources and the review findings are described below.

3.1 Hydric Soils

The Natural Resources Conservation Service (NRCS) maintains a database of soil types (map units) for most areas of the U.S. (NRCS, 2017). The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit which represents a large area dominated by one or more major types of soil. Map units are further classified with a rating of hydric, partially hydric or non-hydric. Map units are useful for planning purposes to provide an overall understanding of the soils that occur in a general area. However, due to the natural variability of the landscape, direct observation of the soils profile is necessary to identify hydric soil indicators.

A classification of hydric means that the soil components listed for a given map unit are rated as being hydric. “Predominantly hydric” means that more than 66 percent to less than 100 percent of soil components are hydric. "Partially hydric" means that more than 33 percent to less than 65 percent of soil components are hydric. “Predominantly non-hydric” means that more than 0 percent and less than 32 percent of soil components are hydric. "Not hydric" means that all soil components are rated as not hydric. "Unknown hydric" indicates that at least one component is not rated so a definitive rating for the map unit cannot be made. A NRCS map of the soils located on the site with the associated hydric rating is presented in Figure 3 and summarized in Table 1 below.

Table 1: Soil Map Units Classifications

Map Unit Symbol	Description	Hydric Rating
LeA	Leon fine sand, 0 to 2 percent slopes	Predominantly Hydric
LoA	Leon fine sand, frequently ponded, 0 to 2 percent slopes	Hydric
LvA	Lynn Haven fine sand, 0 to 2 percent slopes	Predominantly Hydric
LYA	Lynn Haven, Allanton and Kingsferry soils, ponded, 0 to 1 percent slopes	Predominantly Hydric
MaA	Mandarin fine sand, 0 to 2 percent slopes	Predominantly Nonhydric
McA	Mascotte fine sand, 0 to 2 percent slopes	Predominantly Hydric
PhA	Pelham fine sand, ponded, 0 to 2 percent slopes	Predominantly Hydric
PmB	Pelham loamy fine sand, 0 to 5 percent slopes	Predominantly Hydric
SuA	Surrency mucky fine sand, frequently ponded, 0 to 1 percent slopes	Hydric

3.2 National Wetland Inventory

The U.S. Fish and Wildlife Service (USFWS) created and maintains the National Wetland Inventory (NWI) database of information on the characteristics, extent, and status of the wetlands and deepwater habitats within the U.S. This information is useful for planning purposes and provides an overall understanding of the habitats that may be present in or around the site. The NWI classifies habitat types as marine, estuarine, riverine, lacustrine or palustrine with additional modifiers as appropriate to identify the water regime, water chemistry, soil or other characteristics based on *Classification of Wetlands and Deepwater Habitats of the U.S.* (Cowardin, 1979).

TTL reviewed the NWI data for the site using the USFWS NWI Wetlands Mapper web-based tool to determine the potential for wetlands to exist on the site. The USFWS NWI Mapper identified numerous wetland, stream, and open water features within the delineation area boundary. Figure 4 depicts the NWI Map, and Table 2 summarizes the habitat below.

Table 2: NWI Classifications

Map Unit Symbol	Description of Habitat
PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
PEM1C	Palustrine, Emergent, Persistent, Seasonally Flooded
PEM1F	Palustrine, Emergent, Persistent, Semipermanently Flooded
PFO3/4C	Palustrine, Forested, Broad-Leaved Evergreen/Needle- Leaved Evergreen, Seasonally Flooded
PFO3C	Palustrine, Forested, Broad-Leaved Evergreen, Seasonally Flooded
PFO4/6C	Palustrine, Forested, Needle-Leaved Evergreen/Deciduous, Seasonally Flooded
PFO4B	Palustrine, Forested, Needle-Leaved Evergreen, Seasonally Saturated
PFO6/3C	Palustrine, Forested, Deciduous/Needle-Leaved Evergreen, Seasonally Flooded
PFO6/4C	Palustrine, Forested, Deciduous/Broad-Leaved Evergreen, Seasonally Flooded
PFO6C	Palustrine, Forested, Deciduous, Seasonally Flooded
PFO6F	Palustrine, Forested, Deciduous, Semipermanently Flooded
PSS6F	Palustrine, Scrub-Shrub, Deciduous, Semipermanently Flooded
PSS7/EM1C	Palustrine, Scrub-Shrub, Evergreen/Emergent, Persistent, Seasonally Flooded
PUBHx	Palustrine, Unconsolidated Bottom, Permanently Flooded, Excavated
R4SBC	Riverine, Intermittent, Streambed, Seasonally Flooded
R5UBH	Riverine, Unconsolidated Bottom, Permanently Flooded

3.3 Hydrologic Unit Code

The U.S. is divided and sub-divided into successively smaller hydrologic units which are classified into six levels: regions, sub-regions, accounting units, watershed, sub-watershed, and cataloging units. The hydrologic units are arranged within each other, from the smallest (cataloging unit) to the largest (regions). Each hydrologic unit is identified by a unique hydrologic unit code (HUC) consisting of two to 12 digits based on the six levels of classification in the hydrologic system (Seaber, Kapinos, Knapp, 1987). The delineation area is located within the Soldiers Camp Island cataloging unit 12-Digit HUC 030702040303. This cataloging unit is within the North Prong St. Mary's River sub-watershed, 10-Digit HUC 0307020403. This is located within the St Mary's watershed, 8-Digit HUC 03070204 (Figure 5).

3.4 Normal Weather Conditions

TTL calculates a subject site's normal weather conditions before performing site work to understand whether aquatic features in the landscape may exhibit certain characteristics related to current and near past hydrologic regime. TTL calculates data obtained from an on-line NRCS climactic database, Agricultural Applied Climate Information System (AgACIS), and derives its calculation method from

the Tennessee Department of Environment and Conservation's guide for making hydrologic determinations (TDEC, 2011). An evaluation of weather conditions was performed for the three-month period prior to the field activities. Calculations for the site indicate that the weather conditions were normal for the time of year that field work was performed.

The Palmer Drought Severity Index provided by National Oceanic and Atmospheric Administration (NOAA) is accessed at http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/palmer.html and was used to cross-reference the results calculated. The Palmer Drought Severity Index indicates that the region of the site experienced "mid-range" conditions during the weeks prior to the site visit.

As an additional cross-reference, the U.S. Drought Monitor was accessed and evaluated. The U.S. Drought Monitor is produced through a partnership between the National Drought Mitigation Center at the University of Nebraska-Lincoln, the United States Department of Agriculture (USDA), and NOAA. The most recent update of the U.S. Drought Monitor (March 26, 2019) Map of Georgia exhibited no drought conditions in the vicinity of the review area.

The Normal Weather Conditions Table, AgACIS data, Palmer Drought Severity Index Map, and U.S Drought Monitor Map of Georgia and are included in Appendix A.

4.0 WETLAND AND WATERS DELINEATION

4.1 Wetland Identification Methodology

TTL utilizes the *U.S. Army Corps of Engineers Wetland Delineation Manual* (USACE, 1987) and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region* (USACE, 2010) technical guidelines for determining the presence of wetlands. This determination requires that a positive wetland indicator be present for each of the three parameters (hydrology, soil, and vegetation), with the exception of areas altered by recent human activities or natural events. During field activities, TTL assessed the project area for the presence of hydrophytic vegetation and used a Dutch hand-auger to evaluate the project area for the presence of hydric soils. TTL examined the soil for hydric soil indicators as identified in the *Field Indicators of Hydric Soils in the United States, V. 8.1* (NRCS, 2017). Additionally, TTL observed the project area for indications of inundated or saturated soils, water marks, drift lines, crayfish burrows, sediment deposits and other wetland hydrology indicators. TTL used *Wetland Determination Data Forms – Atlantic and Gulf Coastal Plain Region* (2010) to record field conditions for the soil, vegetation and hydrology for wetlands and uplands located on the site. At least one data point was established in each habitat type observed within the review area.

TTL traversed the project area on foot and placed orange flagging labeled with Upland Data Point (UDP) or Wetland Data Point (WDP) identification at the data point location. The location of the data point flagging was mapped with a Trimble Geo7x Global Positioning System (GPS) unit, which was set to sub-meter tolerances. Field data was post-processed using Trimble PathfinderOffice V 5.3 and exported to ESRI's ArcMap 10.2. Area features were manually digitized in ArcGIS using the flag locations; geographic coordinates and area quantities were calculated using ArcGIS "area" function.

4.2 Wetland Findings

The project area contains three wetland areas (WA-WC) consisting of approximately 662.712 acres. The boundaries of the wetland areas and data point locations are depicted on Figure 6. Selected photographs of our field observations are provided in Appendix B. Wetland Determination Data Forms are included in Appendix C. Table 3 summarizes the wetland findings below.

Table 3: Wetland Summary

Wetland ID	Cowardin Habitat Description	Area (acres)
WA	Palustrine; Emergent, Persistent; Seasonally Flooded	1.254
WB	Palustrine; Emergent, Persistent; Seasonally Flooded	2.051
WC	Palustrine; Forested, Scrub-Shrub, Emergent, Broad-Leaved Evergreen/Needle-Leaved Evergreen; Seasonally Flooded	659.407

Wetland C is the largest wetland and is located throughout the delineation area. Wetlands A and B are located in the northern portion of the delineation area. The soils textures within the wetland areas are comprised of a sand content that meets hydric soil indicators S6 - Stripped Matrix, and/or A7 - 5cm Mucky Mineral. The hydrology for this area is supported by localized stormwater and a shallow water table. The wetland vegetation communities within the delineation area vary from large areas of hipped and benched, planted pine habitat [dominated by slash pine (*Pinus elliottii*), inkberry (*Ilex glabra*), Carolina redroot (*Lachnanthes caroliniana*), and Virginia chain fern (*Woodwardia virginica*)] to forested pocosin habitat that exhibited no signs of silvicultural activities [dominated by pond pine (*Pinus serotina*), pond cypress (*Taxodium ascendens*), loblolly bay (*Gordonia lasianthus*), swamp tupelo (*Nyssa biflora*), large gallberry (*Ilex coriacea*), and Virginia chain fern.

4.3 Streams Identification and Methodology

TTL used the *North Carolina Division of Water Quality – Methodology for Identification of Intermittent and Perennial Streams and Their Origins v. 4.11, September 1, 2010 (NC Method)* technical

guideline to determine the most appropriate classification of each subject stream. This technical guideline for stream identification is the preferred methodology for distinguishing between intermittent and perennial streams in the southeast United States and requires evaluation of 26 attributes of the stream and assigning a numeric score to each on the *NC DWQ Stream Identification Form Version 4.11*. A four-tiered, weighted scale is utilized for evaluating and scoring the features categorized in sets of geomorphic, hydrologic, and biological attributes. Additionally, TTL utilized the *Regulatory Guidance Letter No. 05-05*: *Ordinary High Water Mark Identification* (USACE, 2005) as the basis for the delineation, mapping, and linear footage/areal estimations of on-site streams.

Identified streams were mapped using the method described in Section 4.1. Stream Identification Forms (v. 4.11) were used to classify streams that were not clearly perennial (i.e. flowing water at greater than 48 hours since rainfall, strong morphology and obvious biological presence). TTL traversed the stream channels on foot and placed blue flagging labeled with stream data point identifications near the observed ordinary high water mark (OHWM). The locations of the boundary flags were mapped with a Trimble Geo7x Global Positioning System (GPS) unit, which was set to sub-meter tolerances. Field data was post-processed using Trimble Pathfinder Office V 5.3 and exported to ESRI's ArcMap 10.2. Area features were manually digitized in ArcGIS using the flag locations; geographic coordinates and area quantities were calculated using ArcGIS "area" function.

4.4 Streams and Ditches Findings

TTL identified ten ditches within the delineation area consisting of approximately 7,807 linear feet of ditches (D1-D10). These ditches are jurisdictional where they are located within wetlands. In these areas, their acreage has been included within the wetland acreage. No jurisdictional streams were identified within the delineation area. The River Styx is shown in the western portion of the delineation area on aerial photographs for the site (Figure 2) but the channel of this stream was not identified within the delineation area. Table 4 summarizes the ditch findings below.

Table 4: Ditch Summary

Wetland ID	Cowardin Habitat Description	Length (linear feet)/ Area (acres)
D1	Ditch	0.028
D2	Ditch	0.022
D3	Ditch	0.122
D4	Ditch	0.012
D5	Ditch	0.011
D6	Ditch	0.091
D7	Ditch	0.072
D8	Ditch	0.120
D9	Ditch	0.064
D10	Ditch	0.722

4.5 Jurisdictional Determination Request

The USACE has the sole authority to determine whether wetlands or water features are "jurisdictional." Under certain circumstances, wetland areas are considered non-jurisdictional because they lack a significant nexus with other wetlands or waters of the U.S. TTL utilized the *USACE Jurisdictional Determination Form Instructional Guidebook* (USACE and EPA, 2007) to complete a *SAS APPENDIX 1: Request for Corps of Engineers Jurisdictional Determination (JD) and/or Delineation Review Form* (Appendix E).

It is TTL's opinion that all observed wetlands, and ditches within the wetlands are jurisdictional features due to their significant nexus to nearby relatively permanent waters. The ditches that occur within wetlands have been included and calculated as part of the wetland total acreage.

TTL recommends that a delineation review of aquatic resources of the potentially jurisdictional site features be requested from the USACE Savannah District. If the USACE is not engaged regarding a jurisdictional determination or delineation review of aquatic resources, TTL is neither responsible for the final determination of jurisdictional features within the review corridor, nor responsible for violations associated with unauthorized activities that may occur within areas deemed jurisdictional by the USACE at a later time.

5.0 CONCLUSIONS

- Approximately 659.407 acres of forested wetland were identified within the delineation area.
- Approximately 3.305 acres of emergent wetland were identified within the delineation area.
- No jurisdictional streams were identified within the delineation area.
- Approximately 7,807 linear feet of ditches were identified within the delineation area. These ditches are jurisdictional where they are located within wetlands and have been included in the wetland total acreage.
- Upon approval by the client, TTL will submit a request for a delineation review of aquatic resources from the USACE of all aquatic features within the site.

6.0 REFERENCES

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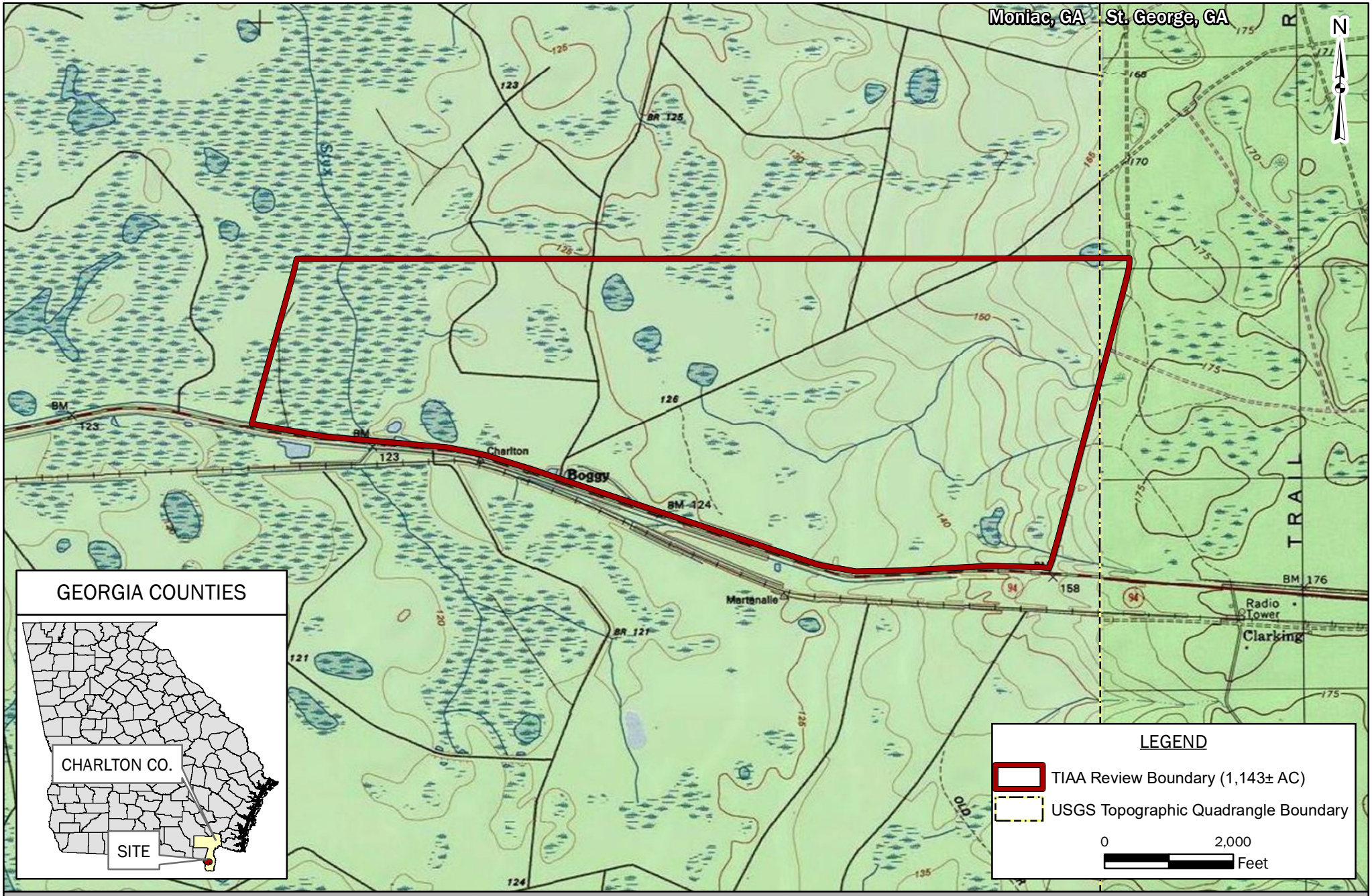
FIGURES

Figure 1 Project Location and Topographic Map
Figure 2 Site Location & Aerial Photograph
Figure 3 Natural Resources Conservation Service (NRCS) Soil Map w/Hydric Rating
Figure 4 National Wetland Inventory (NWI) Classification Map
Figure 5 Hydrologic Unit Code (HUC) Map
Figure 6 Waters of the U.S. Delineation Map



TTL

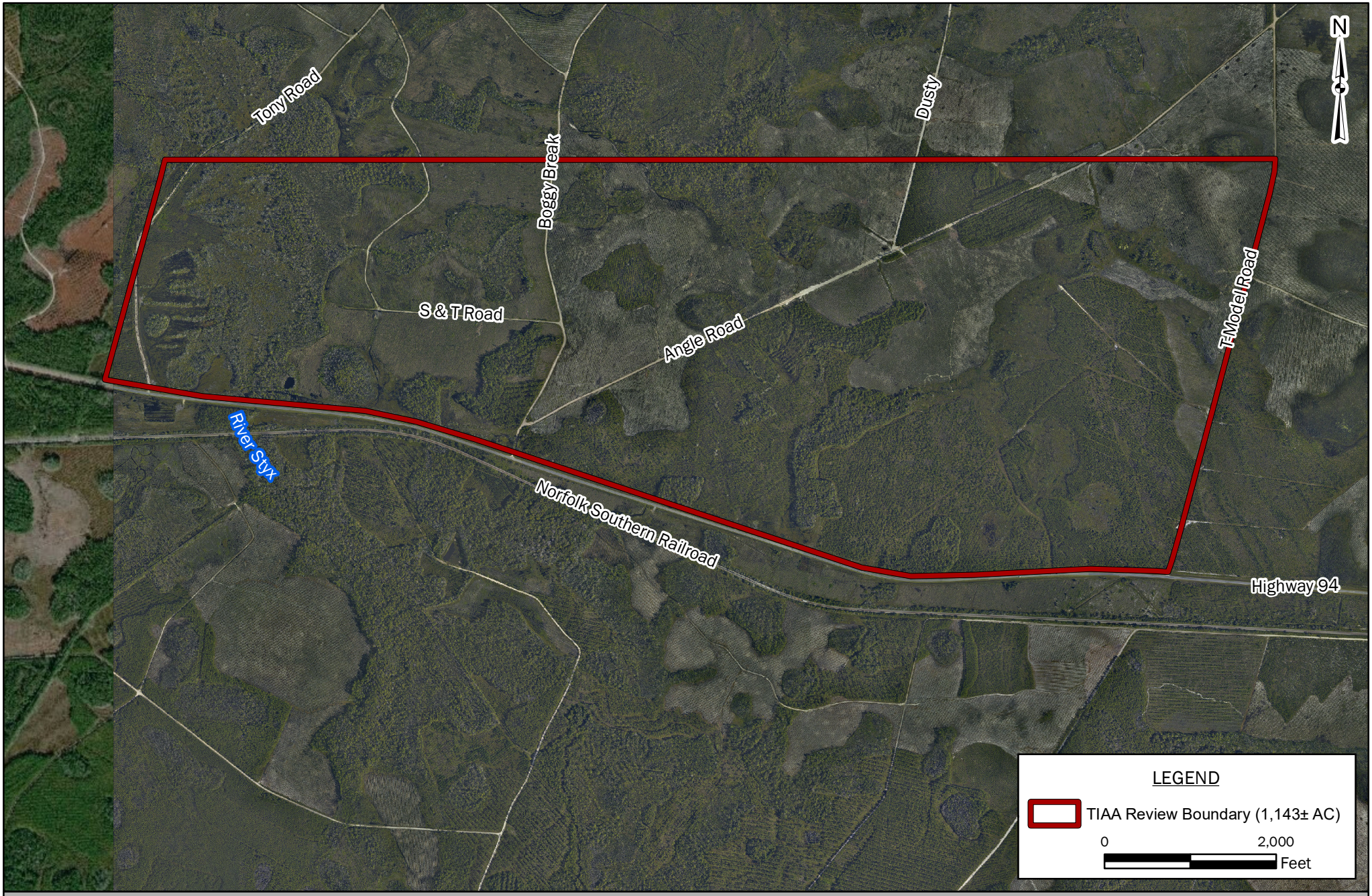
FIGURE 1: SITE LOCATION & TOPOGRAPHIC MAP

TWIN PINES MINERALS - TIAA TRACT

WATERS OF THE U.S. DELINEATION

BASEMAP: Moniac, Georgia and Saint George, Georgia USGS 7.5 Minute Quadrangle Maps, 1994.

DRAWN BY:	CMS
CHECKED BY:	AGW
DRAWING DATE:	6/5/2019
REVISION DATE:	N/A
TTL JOB NO.:	000180200804.00
APPROXIMATE SCALE:	1" = 2,000'



TTL

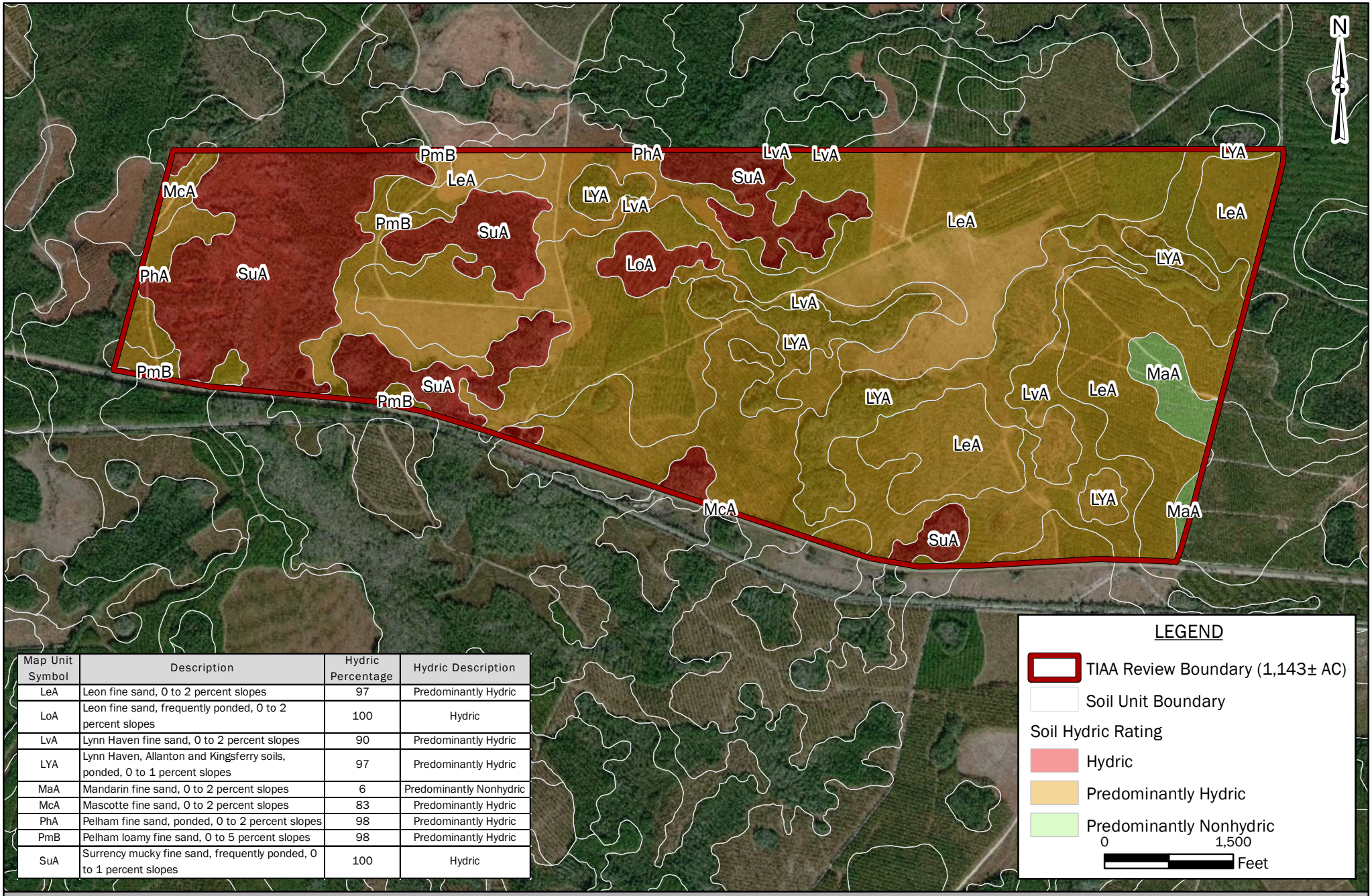
FIGURE 2: SITE LOCATION & AERIAL PHOTOGRAPH

TWIN PINES MINERALS - TIAA TRACT

WATERS OF THE U.S. DELINEATION

BASEMAP: DigitalGlobe, 1/24/2016 & Twin Pines Orthoimagery, 09/2018

DRAWN BY: CMS
CHECKED BY: AGW
DRAWING DATE: 6/5/2019
REVISION DATE: N/A
TTL JOB NO.: 000180200804.00
APPROXIMATE SCALE: 1" = 2,000'



Map Unit Symbol	Description	Hydric Percentage	Hydric Description
LeA	Leon fine sand, 0 to 2 percent slopes	97	Predominantly Hydric
LoA	Leon fine sand, frequently ponded, 0 to 2 percent slopes	100	Hydric
LvA	Lynn Haven fine sand, 0 to 2 percent slopes	90	Predominantly Hydric
LYA	Lynn Haven, Allanton and Kingsferry soils, ponded, 0 to 1 percent slopes	97	Predominantly Hydric
MaA	Mandarin fine sand, 0 to 2 percent slopes	6	Predominantly Nonhydric
McA	Mascotte fine sand, 0 to 2 percent slopes	83	Predominantly Hydric
PhA	Pelham fine sand, ponded, 0 to 2 percent slopes	98	Predominantly Hydric
PmB	Pelham loamy fine sand, 0 to 5 percent slopes	98	Predominantly Hydric
SuA	Surrency mucky fine sand, frequently ponded, 0 to 1 percent slopes	100	Hydric

TTL

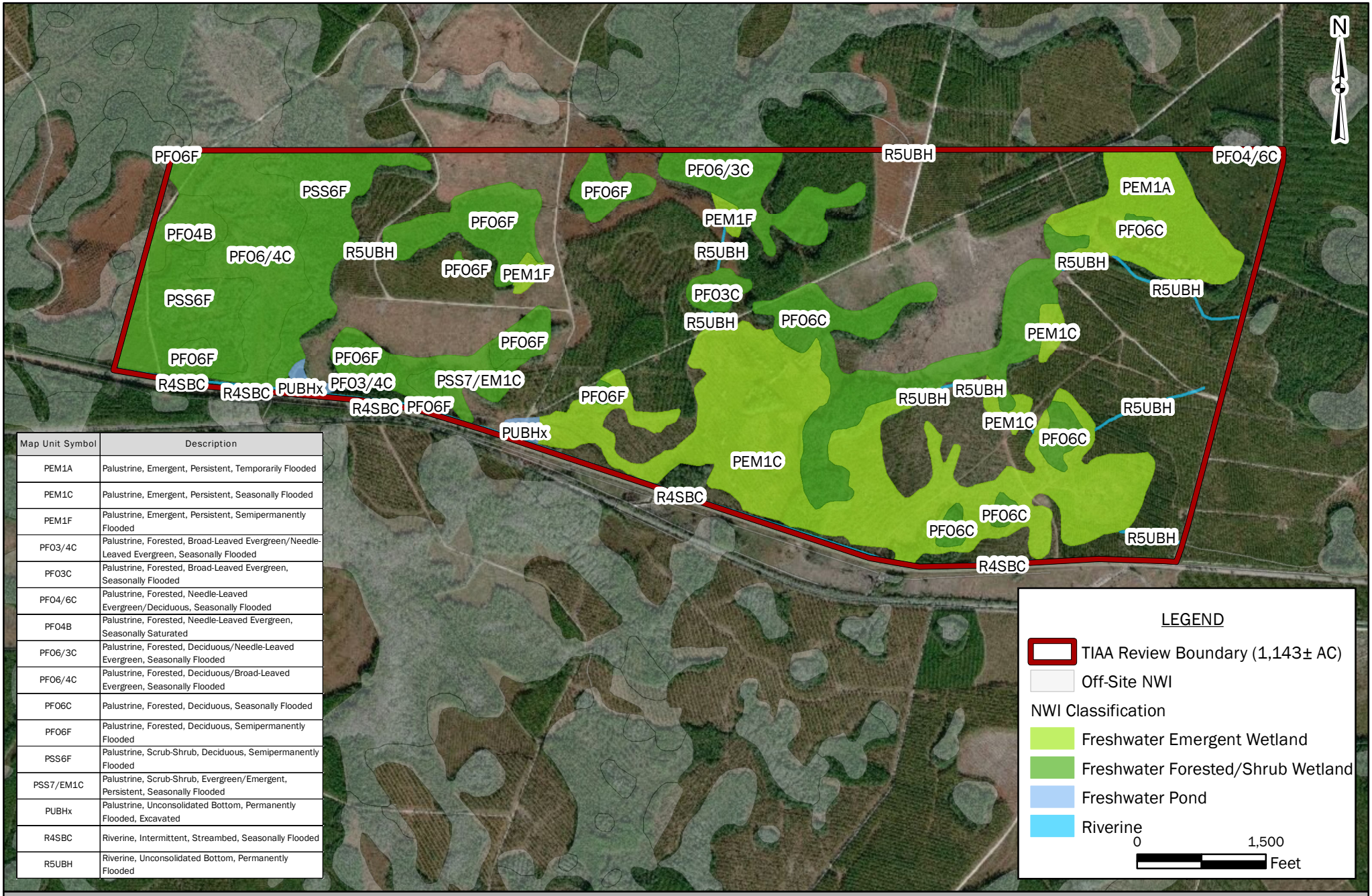
FIGURE 3: NATURAL RESOURCES CONSERVATION SERVICE (NRCS) SOIL MAP WITH HYDRIC RATING

TWIN PINES MINERALS - TIAA TRACT

WATERS OF THE U.S. DELINEATION

BASEMAP: DigitalGlobe, 1/24/2017

DRAWN BY: CMS
CHECKED BY: AGW
DRAWING DATE: 6/5/2019
REVISION DATE: N/A
TTL JOB NO.: 000180200804.00
APPROXIMATE SCALE: 1" = 1,500'



Map Unit Symbol	Description
PEM1A	Palustrine, Emergent, Persistent, Temporarily Flooded
PEM1C	Palustrine, Emergent, Persistent, Seasonally Flooded
PEM1F	Palustrine, Emergent, Persistent, Semipermanently Flooded
PFO3/4C	Palustrine, Forested, Broad-Leaved Evergreen/Needle-Leaved Evergreen, Seasonally Flooded
PFO3C	Palustrine, Forested, Broad-Leaved Evergreen, Seasonally Flooded
PFO4/6C	Palustrine, Forested, Needle-Leaved Evergreen/Deciduous, Seasonally Flooded
PFO4B	Palustrine, Forested, Needle-Leaved Evergreen, Seasonally Saturated
PFO6/3C	Palustrine, Forested, Deciduous/Needle-Leaved Evergreen, Seasonally Flooded
PFO6/4C	Palustrine, Forested, Deciduous/Broad-Leaved Evergreen, Seasonally Flooded
PFO6C	Palustrine, Forested, Deciduous, Seasonally Flooded
PFO6F	Palustrine, Forested, Deciduous, Semipermanently Flooded
PSS6F	Palustrine, Scrub-Shrub, Deciduous, Semipermanently Flooded
PSS7/EM1C	Palustrine, Scrub-Shrub, Evergreen/Emergent, Persistent, Seasonally Flooded
PUBHx	Palustrine, Unconsolidated Bottom, Permanently Flooded, Excavated
R4SBC	Riverine, Intermittent, Streambed, Seasonally Flooded
R5UBH	Riverine, Unconsolidated Bottom, Permanently Flooded

TTL

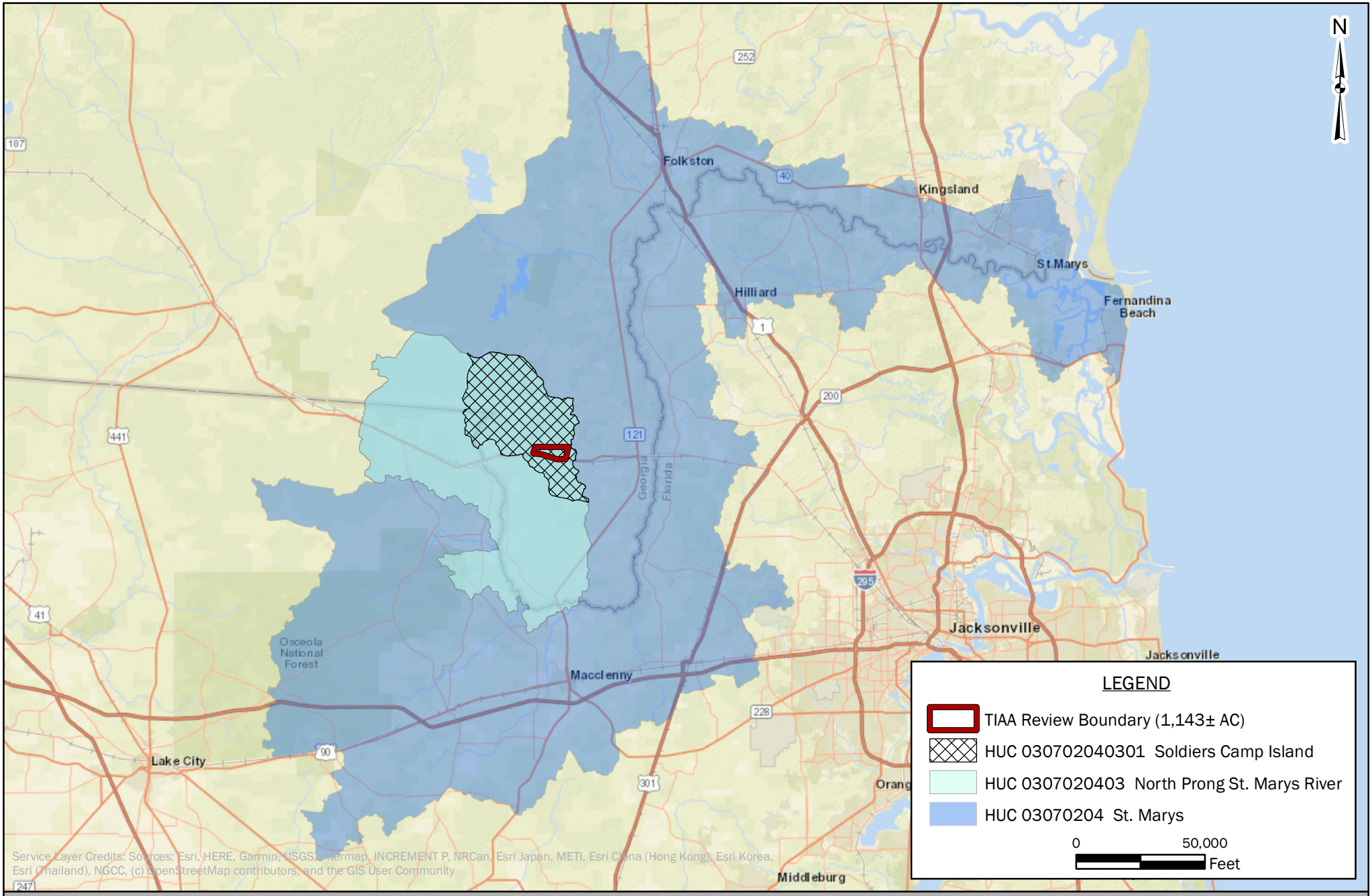
FIGURE 4: NATIONAL WETLAND INVENTORY (NWI) MAP

TWIN PINES MINERALS - TIAA TRACT

WATERS OF THE U.S. DELINEATION

BASEMAP: DigitalGlobe, 1/24/2017

DRAWN BY: CMS
CHECKED BY: AGW
DRAWING DATE: 6/5/2019
REVISION DATE: N/A
TTL JOB NO.: 000180200804.00
APPROXIMATE SCALE: 1" = 1,500'



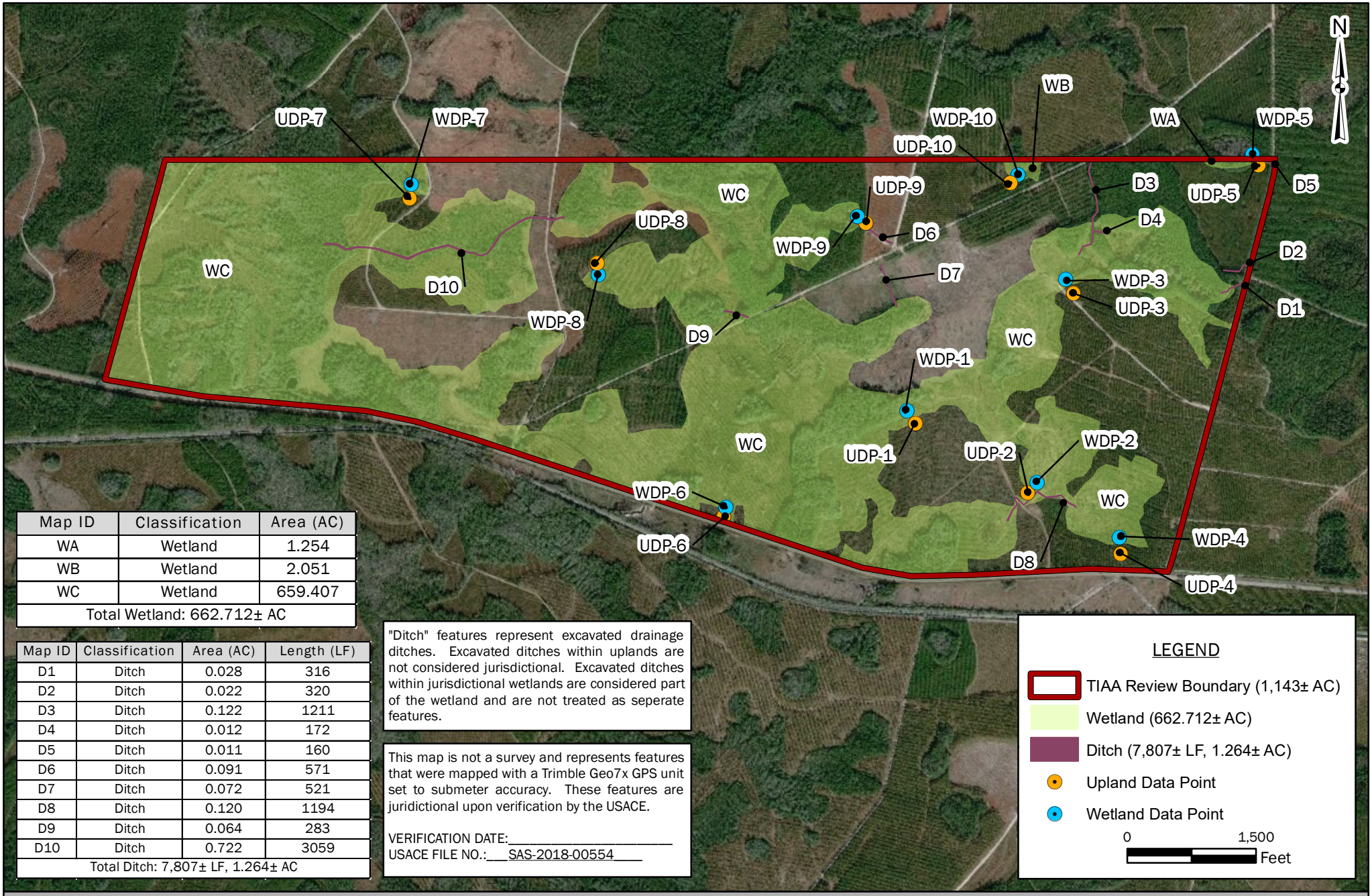
TTL

FIGURE 5: HYRDOLOGIC UNIT CODE (HUC) MAP

TWIN PINES MINERALS - TIAA TRACT

WATERS OF THE U.S. DELINEATION

DRAWN BY: CMS
CHECKED BY: AGW
DRAWING DATE: 6/5/2019
REVISION DATE: N/A
TTL JOB NO.: 000180200804.00
APPROXIMATE SCALE: 1" = 50,000'



Map ID	Classification	Area (AC)
WA	Wetland	1.254
WB	Wetland	2.051
WC	Wetland	659.407
Total Wetland: 662.712± AC		

Map ID	Classification	Area (AC)	Length (LF)
D1	Ditch	0.028	316
D2	Ditch	0.022	320
D3	Ditch	0.122	1211
D4	Ditch	0.012	172
D5	Ditch	0.011	160
D6	Ditch	0.091	571
D7	Ditch	0.072	521
D8	Ditch	0.120	1194
D9	Ditch	0.064	283
D10	Ditch	0.722	3059
Total Ditch: 7,807± LF, 1.264± AC			

"Ditch" features represent excavated drainage ditches. Excavated ditches within uplands are not considered jurisdictional. Excavated ditches within jurisdictional wetlands are considered part of the wetland and are not treated as seperate features.

This map is not a survey and represents features that were mapped with a Trimble Geo7x GPS unit set to submeter accuracy. These features are juridictional upon verification by the USACE.

VERIFICATION DATE:_____
USACE FILE NO.:___SAS-2018-00554____

LEGEND

- TIAA Review Boundary (1,143± AC)
- Wetland (662.712± AC)
- Ditch (7,807± LF, 1.264± AC)
- Upland Data Point
- Wetland Data Point

0 1,500 Feet

TTL

FIGURE 6: WATERS OF THE U.S. DELINEATION MAP

TWIN PINES MINERALS - TIAA TRACT

WATERS OF THE U.S. DELINEATION

BASEMAP: DigitalGlobe, 1/24/2016

DRAWN BY: CMS
CHECKED BY: AGW
DRAWING DATE: 6/7/2019
REVISION DATE: N/A
TTL JOB NO.: 000180200804.00
APPROXIMATE SCALE: 1" = 1,500'

APPENDIX A

Normal Weather Conditions Table
AgACIS Data
U.S. Drought Monitor – Georgia
Palmer Drought Index

Calculation of Normal Weather Conditions
General Project Location: Folkston, Georgia
Analysis for March 2019 Site Visits

			Long-Term Rainfall Records							
	Month	Standard Deviation*	Minus One Standard Deviation (Dry)	Normal* (Mean Inches)	Plus One Standard Deviation (Wet)	Actual Rainfall**	Condition (wet, normal, dry)	Condition Value***	Month Weight Value	Weighted Value
1st prior month	3/23/2019 - 2/23/2019	2.62	1.29	3.91	6.53	1.38	Normal	2	3	6
2nd prior month	2/22/2019 - 1/22/2019	2.14	1.56	3.70	5.84	2.27	Normal	2	2	4
3rd prior month	1/21/2019 - 12/21/2018	2.18	1.24	3.42	5.60	0.31	dry	1	1	1
									Sum:	11

Sum:	Conclusion:
6-9	prior period has been drier than normal
10-14	**prior period has been normal**
15-18	prior period has been wetter than normal

* Standard Deviation and Mean Values can be found through the National Oceanic and Atmospheric Associations Earth System Research Laboratory: http://www.esrl.noaa.gov/psd/data/usstation/

** Rainfall data can be found through Weather Source Consultants: www.weathersource.com

*** Condition Values: 1 = dry, 2 = normal, 3 = wet

Climatological Data for FARGO 17 NE, GA - December 2018

Date	Max Temperature	Min Temperature	Avg Temperature	GDD Base 40	GDD Base 50	Precipitation	Snowfall	Snow Depth
2018-12-01	72	46	59.0	19	9	0.12	M	M
2018-12-02	M	M	M	M	M	M	M	M
2018-12-03	M	M	M	M	M	M	M	M
2018-12-04	M	M	M	M	M	M	M	M
2018-12-05	64	42	53.0	13	3	0.00	M	M
2018-12-06	56	38	47.0	7	0	0.00	M	M
2018-12-07	M	M	M	M	M	M	M	M
2018-12-08	M	M	M	M	M	M	M	M
2018-12-09	66	54	60.0	20	10	0.91	M	M
2018-12-10	73	43	58.0	18	8	0.02	M	M
2018-12-11	M	M	M	M	M	M	M	M
2018-12-12	55	39	47.0	7	0	0.00	M	M
2018-12-13	61	45	53.0	13	3	0.00	M	M
2018-12-14	67	45	56.0	16	6	0.86	M	M
2018-12-15	M	M	M	M	M	M	M	M
2018-12-16	68	51	59.5	20	10	0.06	M	M
2018-12-17	M	M	M	M	M	M	M	M
2018-12-18	M	M	M	M	M	M	M	M
2018-12-19	65	44	54.5	15	5	0.00	M	M
2018-12-20	64	52	58.0	18	8	0.02	M	M
2018-12-21	64	56	60.0	20	10	0.15	M	M
2018-12-22	M	M	M	M	M	M	M	M
2018-12-23	M	M	M	M	M	M	M	M
2018-12-24	64	47	55.5	16	6	0.00	M	M
2018-12-25	M	M	M	M	M	M	M	M
2018-12-26	64	44	54.0	14	4	0.00	M	M
2018-12-27	66	52	59.0	19	9	0.00	M	M
2018-12-28	M	M	M	M	M	M	M	M
2018-12-29	M	M	M	M	M	M	M	M
2018-12-30	79	61	70.0	30	20	0.01	M	M
2018-12-31	M	M	M	M	M	M	M	M
Average|Sum	65.5	47.4	56.5	265	111	2.15	M	M

Climatological Data for FARGO 17 NE, GA - January 2019

Date	Max Temperature	Min Temperature	Avg Temperature	GDD Base 40	GDD Base 50	Precipitation	Snowfall	Snow Depth
2019-01-01	M	M	M	M	M	M	M	M
2019-01-02	M	M	M	M	M	M	M	M
2019-01-03	77	62	69.5	30	20	0.00	M	M
2019-01-04	76	63	69.5	30	20	0.15	M	M
2019-01-05	M	M	M	M	M	M	M	M
2019-01-06	M	M	M	M	M	M	M	M
2019-01-07	M	M	M	M	M	M	M	M
2019-01-08	75	52	63.5	24	14	0.00	M	M
2019-01-09	M	M	M	M	M	M	M	M
2019-01-10	61	42	51.5	12	2	0.00	M	M
2019-01-11	M	M	M	M	M	M	M	M
2019-01-12	62	35	48.5	9	0	T	M	M
2019-01-13	M	M	M	M	M	M	M	M
2019-01-14	M	M	M	M	M	M	M	M
2019-01-15	52	47	49.5	10	0	0.00	M	M
2019-01-16	M	M	M	M	M	M	M	M
2019-01-17	M	M	M	M	M	M	M	M
2019-01-18	67	48	57.5	18	8	0.00	M	M
2019-01-19	M	M	M	M	M	M	M	M
2019-01-20	M	M	M	M	M	M	M	M
2019-01-21	M	M	M	M	M	M	M	M
2019-01-22	M	M	M	M	M	M	M	M
2019-01-23	66	48	57.0	17	7	0.01	M	M
2019-01-24	78	58	68.0	28	18	1.60	M	M
2019-01-25	M	M	M	M	M	M	M	M
2019-01-26	M	M	M	M	M	M	M	M
2019-01-27	57	44	50.5	11	1	0.00	M	M
2019-01-28	M	M	M	M	M	M	M	M
2019-01-29	M	M	M	M	M	M	M	M
2019-01-30	M	M	M	M	M	0.03	M	M
2019-01-31	47	34	40.5	1	0	0.00	M	M
Average|Sum	65.3	48.5	56.9	190	90	1.79	M	M

Climatological Data for FARGO 17 NE, GA - February 2019

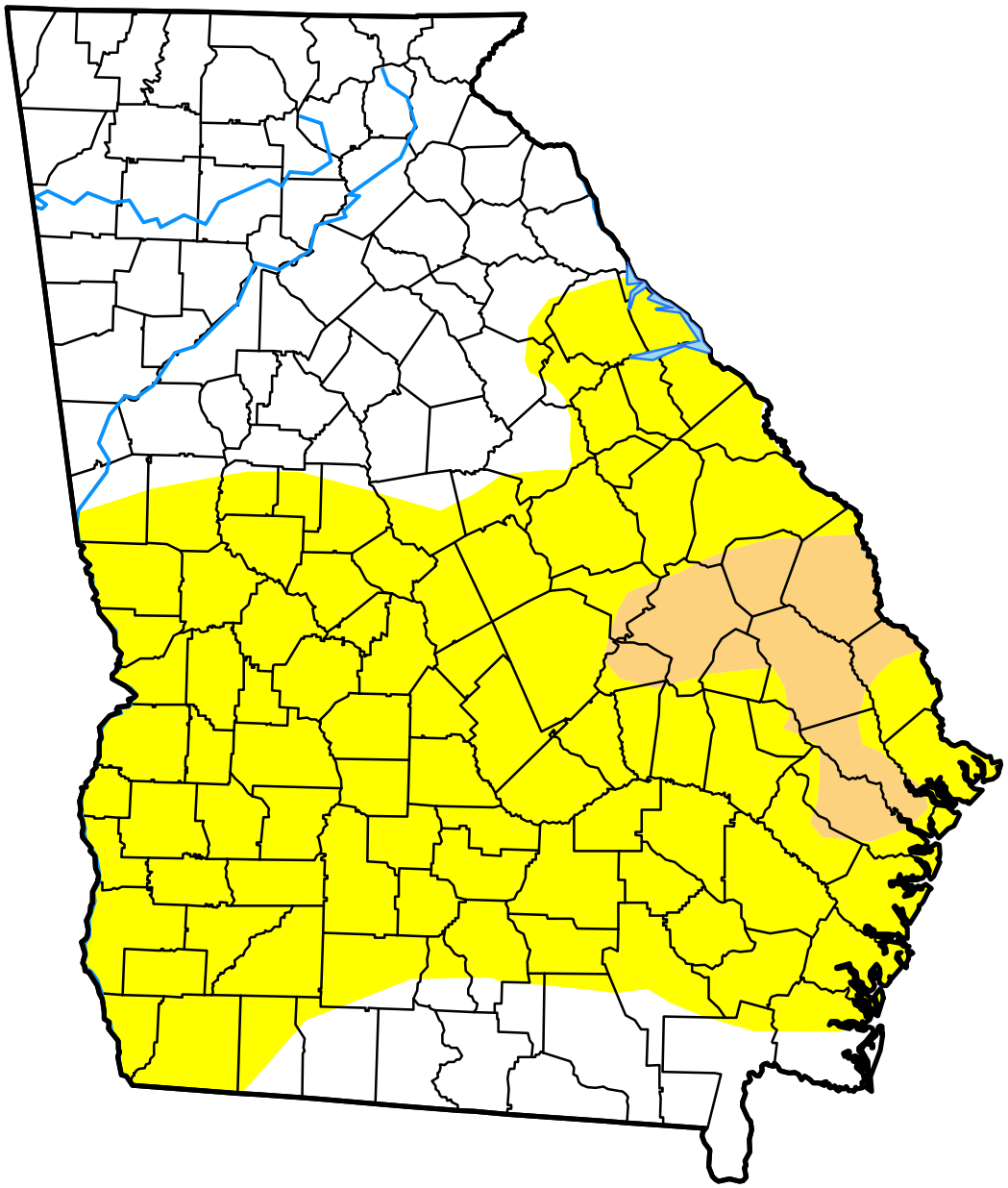
Date	Max Temperature	Min Temperature	Avg Temperature	GDD Base 40	GDD Base 50	Precipitation	Snowfall	Snow Depth
2019-02-01	M	M	M	M	M	M	M	M
2019-02-02	61	52	56.5	17	7	0.19	M	M
2019-02-03	M	M	M	M	M	M	M	M
2019-02-04	64	55	59.5	20	10	0.24	M	M
2019-02-05	70	50	60.0	20	10	0.00	M	M
2019-02-06	M	M	M	M	M	M	M	M
2019-02-07	M	M	M	M	M	M	M	M
2019-02-08	M	M	M	M	M	M	M	M
2019-02-09	M	M	M	M	M	M	M	M
2019-02-10	M	M	M	M	M	M	M	M
2019-02-11	M	M	M	M	M	M	M	M
2019-02-12	M	M	M	M	M	0.00	M	M
2019-02-13	82	50	66.0	26	16	0.13	M	M
2019-02-14	M	M	M	M	M	M	M	M
2019-02-15	M	M	M	M	M	M	M	M
2019-02-16	73	41	57.0	17	7	0.00	M	M
2019-02-17	M	M	M	M	M	M	M	M
2019-02-18	M	M	M	M	M	M	M	M
2019-02-19	M	M	M	M	M	M	M	M
2019-02-20	79	51	65.0	25	15	0.07	M	M
2019-02-21	M	M	M	M	M	M	M	M
2019-02-22	M	M	M	M	M	M	M	M
2019-02-23	M	M	M	M	M	M	M	M
2019-02-24	M	M	M	M	M	M	M	M
2019-02-25	M	M	M	M	M	M	M	M
2019-02-26	M	M	M	M	M	M	M	M
2019-02-27	M	M	M	M	M	M	M	M
2019-02-28	74	57	65.5	26	16	0.13	M	M
Average|Sum	71.9	50.9	61.4	151	81	0.76	M	M

Climatological Data for FARGO 17 NE, GA - March 2019

Date	Max Temperature	Min Temperature	Avg Temperature	GDD Base 40	GDD Base 50	Precipitation	Snowfall	Snow Depth
2019-03-01	M	M	M	M	M	M	M	M
2019-03-02	76	59	67.5	28	18	0.96	M	M
2019-03-03	M	M	M	M	M	M	M	M
2019-03-04	81	53	67.0	27	17	0.29	M	M
2019-03-05	M	M	M	M	M	M	M	M
2019-03-06	M	M	M	M	M	M	M	M
2019-03-07	M	M	M	M	M	M	M	M
2019-03-08	M	M	M	M	M	M	M	M
2019-03-09	78	52	65.0	25	15	0.00	M	M
2019-03-10	83	61	72.0	32	22	0.00	M	M
2019-03-11	M	M	M	M	M	M	M	M
2019-03-12	M	M	M	M	M	M	M	M
2019-03-13	86	54	70.0	30	20	0.00	M	M
2019-03-14	M	M	M	M	M	M	M	M
2019-03-15	M	M	M	M	M	M	M	M
2019-03-16	M	M	M	M	M	M	M	M
2019-03-17	M	M	M	M	M	M	M	M
2019-03-18	M	M	M	M	M	M	M	M
2019-03-19	M	M	M	M	M	M	M	M
2019-03-20	M	M	M	M	M	M	M	M
2019-03-21	M	M	M	M	M	M	M	M
2019-03-22	M	M	M	M	M	M	M	M
2019-03-23	M	M	M	M	M	M	M	M
2019-03-24	M	M	M	M	M	M	M	M
2019-03-25	M	M	M	M	M	M	M	M
2019-03-26	M	M	M	M	M	M	M	M
2019-03-27	M	M	M	M	M	M	M	M
2019-03-28	M	M	M	M	M	M	M	M
2019-03-29	M	M	M	M	M	M	M	M
2019-03-30	M	M	M	M	M	M	M	M
2019-03-31	M	M	M	M	M	M	M	M
Average|Sum	80.8	55.8	68.3	142	92	1.25	M	M

U.S. Drought Monitor

Georgia



March 26, 2019

(Released Thursday, Mar. 28, 2019)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	39.33	60.67	6.01	0.00	0.00	0.00
Last Week *03-19-2019*	66.71	33.29	1.27	0.00	0.00	0.00
3 Months Ago *12-25-2018*	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year *01-01-2019*	100.00	0.00	0.00	0.00	0.00	0.00
Start of Water Year *09-25-2018*	70.95	29.05	6.72	0.00	0.00	0.00
One Year Ago *03-27-2018*	31.15	68.85	50.54	10.42	0.00	0.00

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:

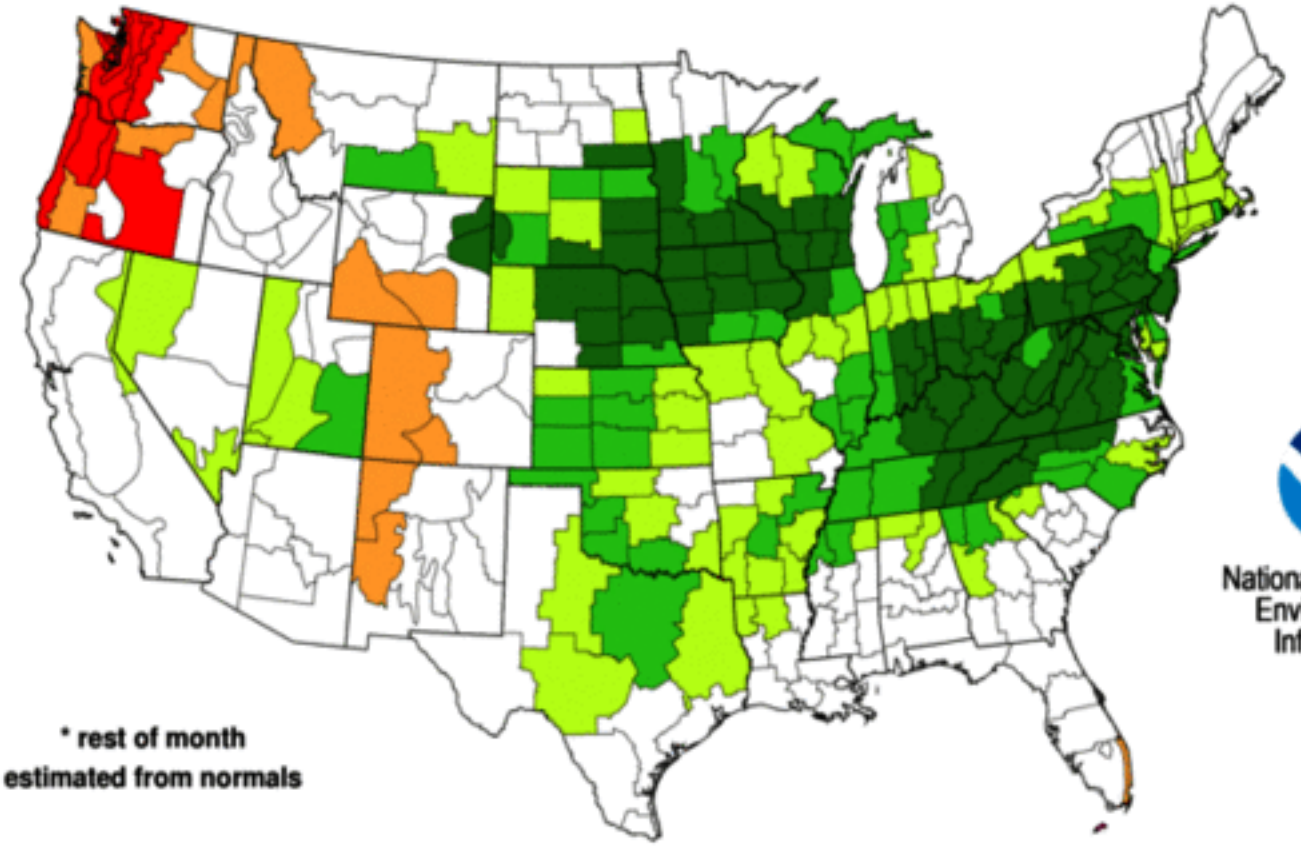
Eric Luebehusen

U.S. Department of Agriculture

http://droughtmonitor.unl.edu/

Palmer Hydrological Drought Index
Long–Term (Hydrological) Conditions

March 2019: through March 23 2019*



National Centers for Environmental Information

* rest of month estimated from normals

extreme drought	severe drought	moderate drought	mid–range	moderately moist	very moist	extremely moist
–4.00 and below	–3.00 to –3.99	–2.00 to –2.99	–1.99 to +1.99	+2.00 to +2.99	+3.00 to +3.99	+4.00 and above

APPENDIX B

Site Photographs

Site Photographs

Waters of the U.S. Delineation: TIAA Tract — TTL Project No. 000180200804.00
Twin Pines Minerals ● Charlton County, Georgia
Photos taken March 23, 2019 – April 10, 2019

Photograph 1: View of Ditch 1 (D1).

Photograph 2: View of Ditch 2 (D2).

Photograph 3: View of Ditch 3 (D3).

Photograph 4: View of Ditch 4 (D4).

Photograph 5: View of Ditch 5 (D5).

Photograph 6: View of Ditch 9 (D9).

Photograph 7: View Ditch 10 (D10).

Photograph 8: View of the Wetland Data Point 1 (WDP-1) location.

Photograph 9: View of the Upland Data Point 1 (UDP-1) location.

Photograph 10: View of the Wetland Data Point 2 (WDP-2) location.

Photograph 11: View of View of the Upland Data Point 2 (UDP-2) location.

Photograph 12: View of the Wetland Data Point 3 (WDP-3) location.

Photograph 13: View of the Upland Data Point 3 (UDP-3) location.

Photograph 14: View of the Wetland Data Point 4 (WDP-4) location.

Photograph 15: View of the Upland Data Point 4 (UDP-4) location.

Photograph 16: View of the Wetland Data Point 5 (WDP-5) location.

Photograph 17: View of the Upland Data Point 5 (UDP-5) location.

Photograph 18: View of the Wetland Data Point 6 (WDP-6) location.

Photograph 19: View of the Upland Data Point 6 (UDP-6) location.

Photograph 20: View of the Wetland Data Point 7 (WDP-7) location.

Photograph 21: View of the Upland Data Point 7 (UDP-7) location.

Photograph 22: View of the Wetland Data Point 8 (WDP-8) location.

Photograph 23: View of the Upland Data Point 8 (UDP-8) location.

Photograph 24: View of the Wetland Data Point 9 (WDP-9) location.

Photograph 25: View of the Upland Data Point 9 (UDP-9) location.

Photograph 26: View of the Wetland Data Point 10 (WDP-10) location.

Photograph 27: View of the Upland Data Point 10 (UDP-10) location.

APPENDIX C

U.S. Army Corps of Engineers Wetland Determination Data Forms

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: TIAA Tract City/County: Charlton County Sampling Date: 04/09/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: UDP-1

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Flatwoods Local relief (concave, convex, none): None Slope (%): 0-2%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.523331 Long: -82.136851 Datum: NAD83

Soil Map Unit Name: Leon fine sand, 0-2% slopes NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation Yes, Soil Yes, or Hydrology Yes significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:

- Vegetation historically impacted by silvicultural activities (planted pine).
- Soils/Hydrology historically impacted by silvicultural activities (bedding for planted pine).

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes ____	No ✓	Depth (inches): ____
Water Table Present?	Yes ✓	No ____	Depth (inches): 30
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 24

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Positive FACW and OBL: 6 to FACU and UPL: 1

VEGETATION – Use scientific names of plants.

Sampling Point: UDP-1

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus elliottii*	40.0	yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 20.00 20% of total cover: 8.00	40.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1. *Pinus elliottii*	30.0	yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 15.00 20% of total cover: 6.00	30.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1. *Ilex glabra*	15.0	yes	FACW
2. *Ilex coriacea*	15.0	yes	FACW
3. *Serenoa repens*	15.0	yes	FACU
4.			
5.			
6.			
7.			
50% of total cover: 22.50 20% of total cover: 9.00	45.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Andropogon virginicus*	20.0	yes	FAC
2. *Anchistea virginica*	10.0	yes	OBL
3. *Scleria triglomerata*	10.0	yes	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 22.50 20% of total cover: 9.00	40.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1. *Vitis rotundifolia*	10.0	yes	FAC
2.			
3.			
4.			
5.			
50% of total cover: 5.00 20% of total cover: 2.00	10.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 8 (A)

Total Number of Dominant Species Across All Strata: 9 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 89% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

SOIL

Sampling Point: UDP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-4"	10YR 3/1	50					Sa	masked sand grains
	10YR 7/1	50					Sa	unmasked sand grains
4-18"	10YR 4/1	70					Sa	masked sand grains
	10YR 6/1	30					Sa	unmasked sand grains

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ **No** ✓

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: TIAA Tract City/County: Charlton County Sampling Date: 04/09/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: WDP-1

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-1%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.523742 Long: -82.137174 Datum: NAD83

Soil Map Unit Name: Lynn Haven, Allanton and Kingsferry soils, ponded, 0-1% slopes NWI classification: PFO6C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ✓ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes ____	No ✓	Depth (inches): ____
Water Table Present?	Yes ✓	No ____	Depth (inches): 2"
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 0"

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Positive FACW and OBL: 12 to FACU and UPL: 0

Buttressed bases and multiply-trunkated bases of numerous canopy trees.

VEGETATION – Use scientific names of plants.

Sampling Point: WDP-1

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Taxodium ascendens*	25.0	yes	OBL
2. *Nyssa biflora*	25.0	yes	OBL
3. *Acer rubrum*	20.0	yes	FAC
4. *Magnolia virginiana*	10.0	no	FACW
5. *Pinus elliottii*	10.0	no	FACW
6.			
7.			
50% of total cover: 12.50 20% of total cover: 18.00	90.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1. *Magnolia virginana*	10.0	yes	FACW
2. *Acer rubrum*	10.0	yes	FAC
3.			
4.			
5.			
6.			
7.			
50% of total cover: 10.00 20% of total cover: 4.00	20.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1. *Itea virginica*	10.0	yes	FACW
2. *Lyonia lucida*	10.0	yes	FACW
3. *Baccharis halimifolia*	5.0	yes	FAC
4.			
5.			
6.			
7.			
50% of total cover: 12.50 20% of total cover: 5.00	25.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Carex intumescens*	25.0	yes	FACW
2. *Carex louisianica*	15.0	yes	OBL
3. *Anchistea virginica*	10.0	no	OBL
4. *Carex glaucescens*	10.0	no	OBL
5. *Bidens mitis*	10.0	no	OBL
6.			
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 35.00 20% of total cover: 14.00	70.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1. *Vitis rotundifolia*	10.0	yes	FAC
2.			
3.			
4.			
5.			
50% of total cover: 5.00 20% of total cover: 2.00	10.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 10 (A)

Total Number of Dominant Species Across All Strata: 10 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

SOIL

Sampling Point: WDP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-18"	10YR 2/1	100					Mu Mi	

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ✓ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** ___

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mi=Mineral; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: TIAA Tract City/County: Charlton County Sampling Date: 04/09/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: UDP-2

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Flatwoods Local relief (concave, convex, none): None Slope (%): 0-2%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.521102 Long: -82.132706 Datum: NAD83

Soil Map Unit Name: Leon fine sand, 0-2% slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation Yes, Soil Yes, or Hydrology Yes significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:

- Vegetation historically impacted by silvicultural activities (planted pine).
- Soils/Hydrology historically impacted by silvicultural activities (bedding for planted pine).

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes ____	No ✓	Depth (inches): ____
Water Table Present?	Yes ✓	No ____	Depth (inches): 40
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 36

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Positive FACW and OBL: 4 to FACU and UPL: 2

VEGETATION – Use scientific names of plants.

Sampling Point: UDP-2

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus elliottii*	60.0	yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 20.00 20% of total cover: 8.00	60.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 20% of total cover:	0.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1. *Ilex glabra*	10.0	yes	FACW
2. *Kalmia hirsuta*	10.0	yes	FACW
3. *Serenoa repens*	10.0	yes	FACU
4. *Asimina pygmea*	5.0	no	FACU
5.			
6.			
7.			
50% of total cover: 17.50 20% of total cover: 7.00	35.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Andropogon virginicus*	20.0	yes	FAC
2. *Anchistea virginica*	10.0	yes	OBL
3. *Xyris sp.*	10.0		NI
4. *Smilax bona-nox*	5.0	no	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 22.50 20% of total cover: 9.00	45.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1. *Vitis rotundifolia*	10.0	yes	FAC
2.			
3.			
4.			
5.			
50% of total cover: 5.00 20% of total cover: 2.00	10.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 8 (A)

Total Number of Dominant Species Across All Strata: 9 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 89% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

SOIL

Sampling Point: UDP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-4"	10YR 4/1	20					Sa	masked sand grains
	10YR 8/1	80					Sa	unmasked sand grains
4-7"	10YR 4/1	50					Sa	masked sand grains
	10YR 8/1	50					Sa	unmasked sand grains
7-18"	10YR 7/1	100					Sa	

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

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Organic Bodies (A6) **(LRR P, T, U)**
___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
___ Muck Presence (A8) **(LRR U)**
___ 1 cm Muck (A9) **(LRR P, T)**
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Coast Prairie Redox (A16) **(MLRA 150A)**
___ Sandy Mucky Mineral (S1) **(LRR O, S)**
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) **(LRR P, S, T, U)**
___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
___ Thin Dark Surface (S9) **(LRR S, T, U)**
___ Loamy Mucky Mineral (F1) **(LRR O)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Marl (F10) **(LRR U)**
___ Depleted Ochric (F11) **(MLRA 151)**
___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
___ Umbric Surface (F13) **(LRR P, T, U)**
___ Delta Ochric (F17) **(MLRA 151)**
___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) **(LRR O)**
___ 2 cm Muck (A10) **(LRR S)**
___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ **No** ✓

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: TIAA Tract City/County: Charlton County Sampling Date: 04/09/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: WDP-2

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-1%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.521442 Long: -82.132359 Datum: NAD83

Soil Map Unit Name: Lynn Haven, Allanton and Kingsferry soils, ponded, 0-1% slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ✓ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes ____	No ✓	Depth (inches): ____
Water Table Present?	Yes ✓	No ____	Depth (inches): 0"
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 0"

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Positive FACW and OBL: 11 to FACU and UPL: 0

Organic bodies

VEGETATION – Use scientific names of plants.

Sampling Point: WDP-2

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Taxodium ascendens*	10.0	yes	OBL
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 5.00 20% of total cover: 2.00	10.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 20% of total cover:	0.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1. *Vaccinium elliottii*	20.0	yes	FACW
2. *Styrax americanus*	20.0	yes	FACW
3. *Ilex myrtifolia*	20.0	yes	FACW
4. *Hypericum fasciculatum*	15.0	yes	FACW
5.			
6.			
7.			
50% of total cover: 37.50 20% of total cover: 15.00	75.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Dichanthelium scabriusculum*	35.0	yes	FACW
2. *Rubus argutus*	25.0	yes	FAC
3. *Anchistea virginica*	10.0	no	OBL
4. *Lorinseria areolata*	10.0	no	OBL
5. *Scirpus cyperinus*	10.0	no	OBL
6. *Rhynchospora fascicularis*	10.0	no	FACW
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 50.00 20% of total cover: 20.00	100.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
50% of total cover: 20% of total cover:	0.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

SOIL

Sampling Point: WDP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18"	10YR 2/1	100					Mu Mi	

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ✓ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mi=Mineral; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: TIAA Tract City/County: Charlton County Sampling Date: 04/09/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: UDP-3

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Flatwoods Local relief (concave, convex, none): None Slope (%): 0-2%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.527498 Long: -82.131007 Datum: NAD83

Soil Map Unit Name: Leon fine sand, 0-2% slopes NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation Yes, Soil Yes, or Hydrology Yes significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ____ No ✓
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:

- Vegetation historically impacted by silvicultural activities (planted pine).
- Soils/Hydrology historically impacted by silvicultural activities (bedding for planted pine).

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes ____	No ✓	Depth (inches): ____
Water Table Present?	Yes ✓	No ____	Depth (inches): 20
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 18

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Positive FACW and OBL: 7 to FACU and UPL: 2

VEGETATION – Use scientific names of plants.

Sampling Point: UDP-3

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus elliottii*	60.0	yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 30.00 20% of total cover: 12.00	60.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 20% of total cover:	0.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1. *Serenoa repens*	25.0	yes	FACU
2. *Rhus copallinum*	10.0	no	UPL
3. *Ilex coriacea*	10.0	no	FACW
4. *Lyonia lucida*	5.0	no	FACW
5. *Hypericum tetrapetulum*	5.0	no	OBL
6.			
7.			
50% of total cover: 22.50 20% of total cover: 11.00	55.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Andropogon virginicus*	10.0	yes	FAC
2. *Anchistea virginica*	10.0	yes	OBL
3. *Xyris sp.*	5.0	yes	NI
4. *Smilax bona-nox*	5.0	yes	FAC
5. *Rhynchospora fascicularis*	5.0	yes	FACW
6. *Scleria triglomerata*	5.0	yes	FACW
7. *Eupatorium compositifolium*	5.0	yes	FAC
8.			
9.			
10.			
11.			
12.			
50% of total cover: 22.50 20% of total cover: 9.00	45.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
50% of total cover: 20% of total cover:	0.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 86% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

SOIL

Sampling Point: UDP-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-8"	10YR 3/1	50					Sa	masked sand grains
	10YR 6/1	50					Sa	unmasked sand grains
3-8"	10YR 3/1	50					Sa	masked sand grains
8-18"	10YR 3/1	80					Sa	unmasked sand grains
	10YR 6/1	20					Sa	stripped areas

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ✓ Stripped Matrix (S6)
- ✓ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: TIAA Tract City/County: Charlton County Sampling Date: 04/09/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: WDP-3

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-1%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.527953 Long: -82.131286 Datum: NAD83

Soil Map Unit Name: Lynn Haven fine sand, 0-2% slopes NWI classification: PFO6C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ✓ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): 2"
Water Table Present?	Yes ✓	No _____	Depth (inches): 0"
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): 0"

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Positive FACW and OBL: 10 to FACU and UPL: 0

VEGETATION – Use scientific names of plants.

Sampling Point: WDP-3

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus elliottii*	10.0	yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 5.00 20% of total cover: 2.00	10.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 20% of total cover:	0.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1. *Ilex glabra*	15.0	yes	FACW
2. *Ilex coriacea*	15.0	yes	FACW
3. *Aronia arbutifolia*	15.0	yes	FACW
4. *Hypericum brachyphyllum*	15.0	yes	FACW
5.			
6.			
7.			
50% of total cover: 37.50 20% of total cover: 15.00	60.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Anchistea virginica*	20.0	yes	OBL
2. *Lorinseria areolata*	20.0	yes	OBL
3. *Eriocaulon compressum*	15.0	yes	OBL
4. *Smilax laurifolia*	15.0	yes	FACW
5. *Andropogon virginicus*	10.0	no	FAC
6. *Bidens mitis*	10.0	no	OBL
7. *Xyris sp.*			NI
8.			
9.			
10.			
11.			
12.			
50% of total cover: 45.00 20% of total cover: 18.00	90.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1. *Vitis rotundifolia*	10.0	yes	FAC
2.			
3.			
4.			
5.			
50% of total cover: 5.00 20% of total cover: 2.00	10.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 9 (A)

Total Number of Dominant Species Across All Strata: 9 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

SOIL

Sampling Point: WDP-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-18"	10YR 2/1	60					Sa	Masked Sand Grains
	10YR 5/1	40					Sa	Stripped Areas

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ✓ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mi=Mineral; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: TIAA Tract City/County: Charlton County Sampling Date: 04/09/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: UDP-4

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Flatwoods Local relief (concave, convex, none): None Slope (%): 0-2%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.519159 Long: -82.129260 Datum: NAD83

Soil Map Unit Name: Lynn Haven fine sand, 0-2% slopes NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation Yes, Soil Yes, or Hydrology Yes significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ____ No ✓
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:

- Vegetation historically impacted by silvicultural activities (planted pine).
- Soils/Hydrology historically impacted by silvicultural activities (bedding for planted pine).

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes ____	No ✓	Depth (inches): ____
Water Table Present?	Yes ✓	No ____	Depth (inches): 24
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 20

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Positive FACW and OBL: 7 to FACU and UPL: 2

VEGETATION – Use scientific names of plants.

Sampling Point: UDP-4

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus elliottii*	60.0	yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 30.00 20% of total cover: 12.00	60.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 20% of total cover:	0.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1. *Ilex coriacea*	10.0	yes	FACW
2. *Rhus copallinum*	5.0	yes	UPL
3. *Morella cerifera*	5.0	yes	FAC
4.			
5.			
6.			
7.			
50% of total cover: 10.00 20% of total cover: 4.00	20.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Anchistea virginica*	10.0	yes	OBL
2. *Pteridium aquilinum*	10.0	yes	OBL
3. *Xyris sp.*	5.0	yes	NI
4. *Polygala lutea*	5.0	yes	FACW
5. *Rhynchospora fascicularis*	5.0	yes	FACW
6. *Scleria triglomerata*	5.0	yes	FACW
7. *Lachnacaulon anceps*	5.0	yes	FACW
8.			
9.			
10.			
11.			
12.			
50% of total cover: 22.50 20% of total cover: 9.00	45.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
50% of total cover: 20% of total cover:	0.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 86% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

SOIL

Sampling Point: UDP-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18"	10YR 2/1	50					Sa	masked sand grains
	10YR 6/1	50					Sa	unmasked sand grains

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: TIAA Tract City/County: Charlton County Sampling Date: 04/09/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: WDP-4

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-1%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.519681 Long: -82.129304 Datum: NAD83

Soil Map Unit Name: Lynn Haven fine sand, 0-2% slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation Yes, Soil Yes, or Hydrology Yes significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks:

- Vegetation historically impacted by silvicultural activities (planted pine).
- Soils/Hydrology historically impacted by silvicultural activities (bedding for planted pine).

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes ____	No ✓	Depth (inches): ____
Water Table Present?	Yes ✓	No ____	Depth (inches): 6"
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 0"

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Positive FACW and OBL: 11 to FACU and UPL: 0

VEGETATION – Use scientific names of plants.

Sampling Point: WDP-4

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus elliottii*	70.0	yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 35.00 20% of total cover: 14.00	70.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1. *Magnolia virginiana*	10.0	yes	FACW
2. *Acer rubrum*	10.0	yes	FAC
3.			
4.			
5.			
6.			
7.			
50% of total cover: 10.00 20% of total cover: 4.00	20.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1. *Ilex glabra*	15.0	yes	FACW
2. *Morella caroliniana*	15.0	yes	FACW
3. *Hypericum brachyphyllum*	15.0	yes	FACW
4.			
5.			
6.			
7.			
50% of total cover: 22.50 20% of total cover: 9.00	45.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Anchistea virginica*	20.0	yes	OBL
2. *Lorinseria areolata*	20.0	yes	OBL
3. *Eriocaulon compressum*	15.0	yes	OBL
4. *Juncus effusus*	15.0	yes	OBL
5. *Scleria triglomerata*	10.0	no	FACW
6. *Rhynchospora fascicularis*	10.0	no	FACW
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 45.00 20% of total cover: 18.00	90.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
50% of total cover: 20% of total cover:	0.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 10 (A)

Total Number of Dominant Species Across All Strata: 10 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

SOIL

Sampling Point: WDP-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-18"	10YR 3/1	70					Sa	Masked Sand Grains
	10YR 6/1	40					Sa	Stripped Areas

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ✓ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mi=Mineral; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: TIAA Tract City/County: Charlton County Sampling Date: 04/09/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: UDP-5

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Flatwoods Local relief (concave, convex, none): None Slope (%): 0-2%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.531590 Long: -82.124166 Datum: NAD83

Soil Map Unit Name: Leon fine sand, 0-2% slopes NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation Yes, Soil Yes, or Hydrology Yes significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:

- Vegetation historically impacted by silvicultural activities (planted pine).
- Soils/Hydrology historically impacted by silvicultural activities (bedding for planted pine).

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes ____	No ✓	Depth (inches): ____
Water Table Present?	Yes ✓	No ____	Depth (inches): 20
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 16

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Positive FACW and OBL: 3 to FACU and UPL: 1

VEGETATION – Use scientific names of plants.

Sampling Point: UDP-5

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 30.00 20% of total cover: 12.00	0.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1. *Pinus elliottii*	25.0	yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 12.50 20% of total cover: 5.00	25.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: ____ 20% of total cover: ____	0.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Eupatorium capillifolium*	15.0	yes	FACU
2. *Cyperus flavescens*	10.0	yes	OBL
3. *Andropogon virginicus*	10.0	yes	FAC
4. *Pluchea odorata*	10.0	yes	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 22.50 20% of total cover: 9.00	45.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
50% of total cover: ____ 20% of total cover: ____	0.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

SOIL

Sampling Point: UDP-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18"	10YR 2/1	70					Sa	masked sand grains
	10YR 6/1	30					Sa	unmasked sand grains

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: TIAA Tract City/County: Charlton County Sampling Date: 04/09/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: WDP-5

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-1%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.531937 Long: -82.124384 Datum: NAD83

Soil Map Unit Name: Lynn Haven fine sand, 0-2% slopes NWI classification: PFO4/6C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation Yes, Soil Yes, or Hydrology Yes significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks:

- Vegetation historically impacted by silvicultural activities (planted pine).
- Soils/Hydrology historically impacted by silvicultural activities (bedding for planted pine).

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes ____	No ✓	Depth (inches): ____
Water Table Present?	Yes ✓	No ____	Depth (inches): 0"
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 0"

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Positive FACW and OBL: 8 to FACU and UPL: 0

VEGETATION – Use scientific names of plants.

Sampling Point: WDP-5

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: ____ 20% of total cover: ____	0.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1. *Magnolia virginiana*	10.0	yes	FACW
2. *Acer rubrum*	10.0	yes	FAC
3.			
4.			
5.			
6.			
7.			
50% of total cover: 10.00 20% of total cover: 4.00	20.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1. *Morella caroliniana*	15.0	yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 7.50 20% of total cover: 3.00	15.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Anchistea virginica*	20.0	yes	OBL
2. *Pluchea odorata*	15.0	yes	FACW
3. *Mikania scandens*	15.0	yes	FACW
4. *Juncus polycephalos*	15.0	yes	OBL
5. *Typha latifolia*	15.0	yes	OBL
6. *Carex louisianica*	10.0	no	OBL
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 45.00 20% of total cover: 18.00	90.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1. *Vitis rotundifolia*	10.0	yes	FAC
2.			
3.			
4.			
5.			
50% of total cover: ____ 20% of total cover: ____	10.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 8 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ____

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

SOIL

Sampling Point: WDP-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-5"	10YR 2/1	100					Mu Mi	
5-18"	10YR 3/1	80					Sa	Masked sand grains
	10YR 6/1	20					Sa	Stripped Areas

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ✓ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ✓ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** ___

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mi=Mineral; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: TIAA Tract City/County: Charlton County Sampling Date: 04/09/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: UDP-6

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Flatwoods Local relief (concave, convex, none): None Slope (%): 0-2%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.520355 Long: -82.143949 Datum: NAD83

Soil Map Unit Name: Mascotte fine sand, 0-2% slopes NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation Yes, Soil Yes, or Hydrology Yes significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:

- Vegetation historically impacted by silvicultural activities (planted pine).
- Soils/Hydrology historically impacted by silvicultural activities (bedding for planted pine).

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes ____	No ✓	Depth (inches): ____
Water Table Present?	Yes ✓	No ____	Depth (inches): 28
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 24

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Positive FACW and OBL: 6 to FACU and UPL: 2

VEGETATION – Use scientific names of plants.

Sampling Point: UDP-6

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus elliottii*	25.0	yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 12.50 20% of total cover: 5.00	25.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1.	25.0	yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 12.50 20% of total cover: 5.00	25.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1. *Serenoa repens*	15.0	yes	FACU
2. *Morella cerifera*	15.0	yes	FAC
3. *Ilex glabra*	15.0	yes	FACW
4.			
5.			
6.			
7.			
50% of total cover: 22.50 20% of total cover: 9.00	45.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Anchistea virginica*	35.0	yes	OBL
2. *Pteridium aquilinum*	15.0	yes	FACU
3. *Andropogon virginicus*	15.0	yes	FAC
4. *Lachnanthes caroliniana*	10.0	no	OBL
5. *Polygala nana*	10.0	no	FACW
6. *Dichanthelium aciculare*	10.0	no	FACU
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 47.50 20% of total cover: 19.00	95.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
50% of total cover: 20% of total cover:	0.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

SOIL

Sampling Point: UDP-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-18"	10YR 3/1	65					Sa	masked sand grains
	10YR 6/1	35					Sa	unmasked sand grains

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: TIAA Tract City/County: Charlton County Sampling Date: 04/09/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: WDP-6

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-1%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.520660 Long: -82.143875 Datum: NAD83

Soil Map Unit Name: Leon fine sand, 0-2% slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation Yes, Soil Yes, or Hydrology Yes significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks:

- Vegetation historically impacted by silvicultural activities (planted pine).
- Soils/Hydrology historically impacted by silvicultural activities (bedding for planted pine).

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes ✓	No ____	Depth (inches): 2"
Water Table Present?	Yes ✓	No ____	Depth (inches): 12"
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 8"

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Positive FACW and OBL: 8 to FACU and UPL: 0

VEGETATION – Use scientific names of plants.

Sampling Point: WDP-6

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus elliottii*	30.0	yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 15.00 20% of total cover: 6.00	30.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover:____ 20% of total cover:_____	0.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1. *Styrax americanus*	15.0	yes	FACW
2. *Itea virginica*	10.0	yes	FACW
3. *Ilex glabra*	10.0	yes	FACW
4. *Hypericum brachyphyllum*	10.0	yes	FACW
5.			
6.			
7.			
50% of total cover: 22.50 20% of total cover: 9.00	45.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Anchistea virginica*	25.0	yes	OBL
2. *Rhynchospora fascicularis*	15.0	yes	FACW
3. *Rubus argutus*	15.0	yes	FACW
4. *Andropogon virginicus*	15.0	yes	OBL
5. *Xyris elliottii*	10.0	no	OBL
6.			
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 40.00 20% of total cover: 16.00	80.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
50% of total cover:____ 20% of total cover:_____	0.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 8 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

SOIL

Sampling Point: WDP-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-4"	10YR 2/1	100					Sa	
4-18"	10YR 3/1	50					Sa	Masked sand grains
	10YR 5/1	50					Sa	Stripped Areas

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ✓ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mi=Mineral; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: TIAA Tract City/County: Charlton County Sampling Date: 04/09/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: UDP-7

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Flatwoods Local relief (concave, convex, none): None Slope (%): 0-2%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.530547 Long: -82.155568 Datum: NAD83

Soil Map Unit Name: Leon fine sand, 0-2% slopes NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation Yes, Soil Yes, or Hydrology Yes significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:

- Vegetation historically impacted by silvicultural activities (planted pine).
- Soils/Hydrology historically impacted by silvicultural activities (bedding for planted pine).

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes ____	No ✓	Depth (inches): ____
Water Table Present?	Yes ✓	No ____	Depth (inches): 28
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 24

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Negative FACW and OBL: 2 to FACU and UPL: 5

VEGETATION – Use scientific names of plants.

Sampling Point: UDP-7

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: ____ 20% of total cover: ____	0.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 12.50 20% of total cover: 5.00	0.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1. *Ilex glabra*	25.0	yes	FACW
2. *Vaccinium mysinites*	15.0	yes	FACU
3. *Serenoa repens*	15.0	yes	FACU
4.			
5.			
6.			
7.			
50% of total cover: 27.50 20% of total cover: 11.00	55.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Andropogon virginicus*	25.0	yes	FAC
2. *Pteridium aquilinum*	15.0	yes	FACU
3. *Anchistea virginica*	15.0	yes	OBL
4. *Dichanthelium aciculare*	10.0	no	FACU
5. *Rubus argutus*	10.0	no	FAC
6. *Toxicodendron radicans*	10.0	no	FACU
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 42.50 20% of total cover: 17.00	85.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1. *Vitis rotundifolia*	10.0	yes	FAC
2.			
3.			
4.			
5.			
50% of total cover: 5.00 20% of total cover: 2.00	10.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 57% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

SOIL

Sampling Point: UDP-7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-8"	10YR 3/1	50					Sa	masked sand grains
	10YR 7/1	50					Sa	unmasked sand grains
8-18"	10YR 5/1	70					Sa	masked sand grains
	10YR 6/1	30					Sa	unmasked sand grains

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: TIAA Tract City/County: Charlton County Sampling Date: 04/09/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: WDP-7

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-1%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.530989 Long: -82.155516 Datum: NAD83

Soil Map Unit Name: Surrency mucky fine sand, frequently ponded, 0-1% slopes NWI classification: PSS6F

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes ✓	No ____	Depth (inches): 3"
Water Table Present?	Yes ✓	No ____	Depth (inches): 0"
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 0"

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Positive FACW and OBL: 12 to FACU and UPL: 0

VEGETATION – Use scientific names of plants.

Sampling Point: WDP-7

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	30.0	yes	FAC
2. *Nyssa biflora*	20.0	yes	OBL
3. *Taxodium ascendens*	20.0	yes	OBL
4. *Pinus elliottii*	15.0	no	FACW
5.			
6.			
7.			
50% of total cover: 42.50 20% of total cover: 17.00	85.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1. *Acer rubrum*	10.0	yes	FAC
2. *Nyssa biflora*	5.0	yes	OBL
3. *Liquidambar styraciflua*	5.0	yes	FAC
4.			
5.			
6.			
7.			
50% of total cover: 10.00 20% of total cover: 4.00	20.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1. *Morella caroliniana*	15.0	yes	FACW
2. *Itea virginica*	15.0	yes	FACW
3. *Ilex myrtifolia*	15.0	yes	FACW
4.			
5.			
6.			
7.			
50% of total cover: 22.50 20% of total cover: 9.00	45.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Carex louisianica*	25.0	yes	OBL
2. *Dichanthelium scabriusculum*	25.0	yes	OBL
3. *Osmunda regalis var. spectabilis*	20.0	yes	OBL
4. *Anchistea virginica*	15.0	no	OBL
5. *Lorinseria areolata*	10.0	no	OBL
6.			
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 47.50 20% of total cover: 19.00	95.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
50% of total cover: ____ 20% of total cover: ____	0.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 12 (A)

Total Number of Dominant Species Across All Strata: 12 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

SOIL

Sampling Point: WDP-7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18"	10YR 2/1	100					Mu Mi	

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ✓ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mi=Mineral; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: TIAA Tract City/County: Charlton County Sampling Date: 04/10/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: UDP-8

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Flatwoods Local relief (concave, convex, none): None Slope (%): 0-2%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.528467 Long: -82.148634 Datum: NAD83

Soil Map Unit Name: Leon fine sand, 0-2% slopes NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation Yes, Soil Yes, or Hydrology Yes significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:

- Vegetation historically impacted by silvicultural activities (planted pine).
- Soils/Hydrology historically impacted by silvicultural activities (bedding for planted pine).

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ____

Water Table Present? Yes ✓ No ____ Depth (inches): 24

Saturation Present? (includes capillary fringe) Yes ✓ No ____ Depth (inches): 18

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Positive FACW and OBL: 6 to FACU and UPL: 0

VEGETATION – Use scientific names of plants.

Sampling Point: UDP-8

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: ____ 20% of total cover: ____	0.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1. *Pinus elliottii*	15.0	yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 7.50 20% of total cover: 3.00	15.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: ____ 20% of total cover: ____	0.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Andropogon virginicus*	35.0	yes	FAC
2. *Lachnanthes caroliniana*	15.0	yes	OBL
3. *Anchistea virginica*	10.0	no	OBL
4. *Polygala lutea*	5.0	no	FACW
5. *Lachnocaulon anceps*	5.0	no	FACW
6. *Osmunda cinnamomea*	5.0	no	FACW
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 37.50 20% of total cover: 15.00	75.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
50% of total cover: ____ 20% of total cover: ____	0.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals: (A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ____

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

SOIL

Sampling Point: UDP-8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-18"	10YR 3/1	50					Sa	masked sand grains
	10YR 7/1	50					Sa	unmasked sand grains

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ **No** ✓

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: TIAA Tract City/County: Charlton County Sampling Date: 04/10/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: WDP-8

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-1%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.528096 Long: -82.148594 Datum: NAD83

Soil Map Unit Name: Leon fine sand, 0-2% slopes NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation Yes, Soil Yes, or Hydrology Yes significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks:

- Vegetation historically impacted by silvicultural activities (planted pine).
- Soils/Hydrology historically impacted by silvicultural activities (bedding for planted pine).

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes ✓	No ____	Depth (inches): ____
Water Table Present?	Yes ✓	No ____	Depth (inches): 15"
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 11"

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Positive FACW and OBL: 8 to FACU and UPL: 0

VEGETATION – Use scientific names of plants.

Sampling Point: WDP-8

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus elliottii*	40.0	yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 20.00 20% of total cover: 8.00	40.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 20% of total cover:	0.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1. *Ilex glabra*	10.0	yes	FACW
2. *Persea palustris*	10.0	yes	FACW
3. *Ilex myrtifolia*	10.0	yes	FACW
4.			
5.			
6.			
7.			
50% of total cover: 15.00 20% of total cover: 6.00	30.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Andropogon virginicus*	25.0	yes	FAC
2. *Rhynchospora fascicularis*	15.0	yes	FACW
3. *Lycopodiella appressa*	15.0	yes	OBL
4. *Anchistea virginica*	15.0	yes	OBL
5. *Lachnanthes caroliniana*	10.0	no	OBL
6. *Rhexia alifanus*	5.0	no	FACW
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 42.50 20% of total cover: 17.00	85.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
50% of total cover: 20% of total cover:	0.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 8 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

SOIL

Sampling Point: WDP-8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-18"	10YR 2/1	70					Sa	masked sand grains
	10YR 5/1	30					Sa	stripped areas

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ✓ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mi=Mineral; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: TIAA Tract City/County: Charlton County Sampling Date: 04/10/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: WDP-9

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-1%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.529958 Long: -82.138997 Datum: NAD83

Soil Map Unit Name: Surrency mucky fine sand, frequently ponded, 0-1% slopes NWI classification: PFO6/3C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** **Yes ✓** **No ____**
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes ✓	No ____	Depth (inches): ____	
Water Table Present?	Yes ✓	No ____	Depth (inches): 8"	
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 0"	**Wetland Hydrology Present? Yes ✓ No ____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Positive FACW and OBL: 6 to FACU and UPL: 0

VEGETATION – Use scientific names of plants.

Sampling Point: WDP-9

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Taxodium ascendens*	30.0	yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 15.00 20% of total cover: 6.00	30.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1. *Magnolia virginiana*	10.0	yes	FACW
2. *Taxodium ascendens*	10.0	yes	OBL
3. *Acer rubrum*	10.0	yes	FAC
4.			
5.			
6.			
7.			
50% of total cover: 15.00 20% of total cover: 6.00	30.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1. *Ilex glabra*	40.0	yes	FACW
2. *Ilex coriacea*	30.0	yes	FACW
3.			
4.			
5.			
6.			
7.			
50% of total cover: 15.00 20% of total cover: 6.00	70.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Anchistea virginica*	10.0	yes	OBL
2. *Rhynchospora fascicularis*	5.0	yes	FACW
3. *Andropogon virginicus*	5.0	yes	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 10.00 20% of total cover: 4.00	20.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
50% of total cover: 20% of total cover:	0.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 9 (A)

Total Number of Dominant Species Across All Strata: 9 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

Majority of the historic canopy strata killed during forest fire in the last 10 years (West Mims Fire).

SOIL

Sampling Point: WDP-9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-18"	10YR 3/1	80					Sa	masked sand grains
	10YR 5/1	20					Sa	stripped areas

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ✓ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mi=Mineral; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: TIAA Tract City/County: Charlton County Sampling Date: 04/10/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: UDP-10

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Flatwoods Local relief (concave, convex, none): None Slope (%): 0-2%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.531032 Long: -82.133336 Datum: NAD83

Soil Map Unit Name: Leon fine sand, 0-2% slopes NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation Yes, Soil Yes, or Hydrology Yes significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:

- Vegetation historically impacted by silvicultural activities (planted pine).
- Soils/Hydrology historically impacted by silvicultural activities (bedding for planted pine).

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): ____

Water Table Present? Yes ✓ No ____ Depth (inches): 18"

Saturation Present? (includes capillary fringe) Yes ✓ No ____ Depth (inches): 14"

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Positive FACW and OBL: 7 to FACU and UPL: 0

VEGETATION – Use scientific names of plants.

Sampling Point: UDP-10

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus elliottii*	40.0	yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: 20.00 20% of total cover: 8.00	40.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1. *Pinus elliottii*	20.0	yes	FACW
2. *Acer rubrum*	5.0	no	FAC
3. *Quercus nigra*	5.0	no	FAC
4.			
5.			
6.			
7.			
50% of total cover: 15.00 20% of total cover: 6.00	30.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1. *Ilex glabra*	25.0	yes	FACW
2. *Vaccineum elliottii*	10.0	yes	FACW
3. *Lyonia lucida*	10.0	yes	FACW
4.			
5.			
6.			
7.			
50% of total cover: 22.50 20% of total cover: 9.00	45.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Andropogon virginicus*	35.0	yes	FAC
2. *Lachnocaulon anceps*	10.0	no	FACW
3. *Rhynchospora fascicularis*	10.0	no	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 27.50 20% of total cover: 11.00	55.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
50% of total cover: 20% of total cover:	0.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

SOIL

Sampling Point: UDP-10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-18"	10YR 3/1	90					Sa	masked sand grains
	10YR 5/1	10					Sa	unmasked sand grains

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ **No** ✓

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: TIAA Tract City/County: Charlton County Sampling Date: 04/10/2019

Applicant/Owner: Twin Pines Minerals, LLC State: GA Sampling Point: WDP-10

Investigator(s): C. Terrell / C. Stanford (TTL) Section, Township, Range: Not Available

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-1%

Subregion (LRR or MLRA): LRR T / MLRA 153A Lat: 30.531296 Long: -82.133047 Datum: NAD83

Soil Map Unit Name: Leon fine sand, 0-2% slopes NWI classification: PFO6C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation Yes, Soil Yes, or Hydrology Yes significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks:

- Vegetation historically impacted by silvicultural activities (planted pine).
- Soils/Hydrology historically impacted by silvicultural activities (bedding for planted pine).

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T,U)

Field Observations:

Surface Water Present?	Yes ✓	No ____	Depth (inches): ____
Water Table Present?	Yes ✓	No ____	Depth (inches): 12"
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 6"

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: FAC-Neutral Test Results: Positive FACW and OBL: 11 to FACU and UPL: 0

VEGETATION – Use scientific names of plants.

Sampling Point: WDP-10

Tree Stratum (Plot sizes: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
50% of total cover: ____ 20% of total cover: ____	0.0	= Total Cover	
Sapling Stratum (30 ft radius)			
1. *Magnolia virginiana*	10.0	yes	FACW
2. *Persea borbonia*	5.0	yes	FACW
3. *Acer rubrum*	5.0	yes	FAC
4.			
5.			
6.			
7.			
50% of total cover: 10.00 20% of total cover: 4.00	20.0	= Total Cover	
Shrub Stratum (30 ft radius)			
1. *Hypericum brachyphyllum*	25.0	yes	FACW
2. *Vaccinium elliottii*	10.0	yes	FACW
3. *Hypericum tetrapetalum*	10.0	yes	OBL
4.			
5.			
6.			
7.			
50% of total cover: 22.50 20% of total cover: 9.00	45.0	= Total Cover	
Herb Stratum (30 ft radius)			
1. *Rhynchospora fascicularis*	50.0	yes	FACW
2. *Ludwigia alternifolia*	10.0	no	OBL
3. *Scirpus cyperinus*	10.0	no	OBL
4. *Scleria triglomerata*	10.0	no	FACW
5. *Diodia virginiana*	10.0	no	FACW
6. *Xyris ambigua*	5.0	no	OBL
7.			
8.			
9.			
10.			
11.			
12.			
50% of total cover: 47.50 20% of total cover: 19.00	95.0	= Total Cover	
Woody Vine Stratum (30 ft radius)			
1.			
2.			
3.			
4.			
5.			
50% of total cover: ____ 20% of total cover: ____	0.0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size AND woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (If observed, list morphological adaptations below). *Plants not idendified to species are not used in dominance calculations.

Majority of the historic canopy strata killed during forest fire in the last 10 years (West Mims Fire).

SOIL

Sampling Point: WDP-10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18"	10YR 2/1	70					Sa	masked sand grains
	10YR 5/1	30					Sa	stripped areas

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ✓ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks: *Soil abbreviations: Cl=Clay; Lo=Loam; Mi=Mineral; Mu=Muck; Pe- Peat; Sa= Sand; Si=Silt

APPENDIX D

USACE Savannah District Request for Corps of Engineers Jurisdictional Determination (JD) and/or Delineation Review Form

US Army Corps
of Engineers
Savannah District

SAS APPENDIX 1: Request for Corps of Engineers Jurisdictional Determination (JD) and/or Delineation Review

I. Reason for request: (check as many as applicable)

☐ I intend to construct/develop a project or perform activities on this parcel which would be designed to avoid all aquatic resources.

☐ I intend to construct/develop a project or perform activities on this parcel which would be designed to avoid all jurisdictional aquatic resources under Corps authority.

☑ I intend to construct/develop a project or perform activities on this parcel which may require authorization from the Corps, and the JD would be used to avoid and minimize impacts to jurisdictional aquatic resources and as an initial step in a future permitting process.

☐ I intend to construct/develop a project or perform activities on this parcel which may require authorization from the Corps; this request is accompanied by my permit application and the JD is to be used in the permitting process.

☐ I intend to construct/develop a project or perform activities in a navigable water of the U.S. which is included on the district Section 1O list and/or is subject to the ebb and flow of the tide.

☐ A Corps JD is required in order to obtain my local/state authorization.

☐ I intend to contest jurisdiction over a particular aquatic resource and request the Corps confirm that jurisdiction does/does not exist over the aquatic resource on the parcel.

☐ I believe that the site may be comprised entirely of dry land.

☐ Other:_____

II. I am requesting that the U.S. Army Corps of Engineers, Savannah District, provide me with the following:

☑ **Delineation Review of Aquatic Resources** - Concurrence with an aquatic resource delineation is a written notification from the Corps concurring, not concurring, or commenting on the aquatic resource boundaries, or limits, delineated on a property.

☐ **Preliminary Jurisdictional Determination** - (PJD). A PJD is defined in Corps regulations at 33 CFR 331.2, as "written indications that there may be waters of the United States on a parcel". When the Corps provides a PJD, the Corps is making no legally binding determination of any type regarding whether jurisdiction exists over the particular aquatic resource in question.

☐ **Approved Jurisdictional Determination** - (AJD) An AJD is defined in Corps regulations at 33 CFR 331.2. A definitive, official determination that there are, or that there are not, jurisdictional aquatic resources on a parcel.

☐ I am unclear as to what I would like to request and require additional information to inform my decision.

SECTION 1

Parcel Number of Property:

Lat. 30.526268 Long. - -82.143220 (in decimal degrees)

Parcel Address:

Parcel City : Saint George Parcel County: Charlton Zip:

Size of Review Area: 1143 Acre(s) Variable Linear feet

SECTION 2

LANDOWNER NAME

First: Steven

Last: Ingle

Company: Twin Pines Minerals, LLC

Email Address: single@greenfuelsenergy.com

Address: 2100 Southbridge Parkway, Ste. 540

City: Birmingham

State: AL Zip: 35209

Phone: 205-545-8759

AUTHORIZED AGENT'S NAME

First: Cindy

Last: House-Pearson

Company: TTL, Inc.

Email Address: chpearson@ttlusa.com

Address: 3516 Greensboro Avenue

City: Tuscaloosa

State: AL Zip: 35401

Phone: 251-327-6153

PROPERTY ACCESS PERMISSION, AKNOWLEDGEMENT OF 18 U.S.C. SECTION 10001 AND STATEMENT OF AGENT AUTHORIZATION

Initial ONLY One:

SI By signing below, I certify that I am the owner of record of the property referenced in III, Section 1 above, and I hereby authorize representatives of the U.S. Army Corps of Engineers, Savannah District, to enter the property for purposes of conducting on-site inspections, and issuing an aquatic resource delineation concurrence and/or a jurisdictional determination. My signature shall also be an affirmation that I possess the requisite property rights to request a delineation review and/or a jurisdictional determination on the property referenced in III - Section 1. Further, I authorize the agent in III - Section 2, to act on my behalf in the processing of this request and to furnish supplemental information in support of this request.

N/A By signing below, I certify that I am acting as the duly authorized agent of the owner of record of the property referenced in III, Section 1 above, and have been given the authority to: 1) request a delineation review and/or a jurisdictional determination (JD) on the property referenced in III - Section 1, and 2) authorize representatives of the U.S. Army Corps of Engineers, Savannah District, to enter the property for purposes of conducting on-site inspections, and issuing an aquatic resource delineation concurrence and/or a jurisdictional determination. I understand that I may be required to provide documentary evidence of my authority to request a delineation review and/or JD, and/or to grant Corps of Engineers personnel access to the property.

Please Print Name Legibly: Steven R. Ingle

Signature Date: 07/03/2019

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Program of the U.S. Army Corps of Engineers; Final Rule for 33 CFR Parts 320-332.

Principal Purpose: The information that you provide will be used in evaluating your request to determine whether there are any aquatic resources within the project area subject to federal jurisdiction under the regulatory authorities referenced above.

Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public, and may be made

US Army Corps of Engineers
Savannah District, Regulatory Division
Global Positioning Systems (GPS) Datasheet
Delineation of Wetlands, Streams and Other Waters
Within the State of Georgia

USACE File Number SAS-2018-00554 Date of Delineation Mar 23-Apr 10, 2019

Name of Delineator Present Chris Terrell & Chris Stanford

Make and Model of GPS Device Used (must be capable of sub-meter accuracy)

Trimble Geo7x GPS (model 88161)

Geographic Coordinate System Used US State Plane GA East - NAD 1983 (Conus)

Name of Continually Operated Reference Station Used for Post-processing

CORS, Jacksonville, 1 (ZJX1), Florida

Date Post-processing Performed 6-6-2019

Percent Dilution of Position (PDOP) (6 or less is required) NA (use Trimble Smart Settings)

Name and Coordinates of Known Property Corner and/or Monument

Name and Coordinates of Known Property Corner and/or Monument

GPS Reading of Known Property Corner and/or Monument

GPS Reading of Known Property Corner and/or Monument

Frequency of Waypoints Taken During Survey as needed per field observations

Note: GPS data must be provided, if requested. If GPS data and/or a GPS delineation is determined unacceptable by the Savannah District, a survey sealed by a surveyor licensed in Georgia will be required.

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
SAVANNAH DISTRICT
100 W. OGLETHORPE AVENUE
SAVANNAH, GEORGIA 31401-3604

December 18, 2018

Regulatory Branch
SAS-2018-00554

Mr. Steve Ingle
Twin Pines Minerals, LLC
2100 Southbridge Parkway, Ste. 540
Birmingham, Alabama 35209

Dear Mr. Ingle:

I refer to a letter dated October 3, 2018, submitted on your behalf by Ms. Cindy House-Pearson of Resource and TTL Inc., requesting a delineation of aquatic resources for your 1,034 acre and 1,012 acre sites located in Charlton County, Georgia (Latitude 30.5266, Longitude -81.1157). This project has been assigned number SAS-2018-00554 and it is important that you refer to this number in all communication concerning this matter.

The enclosed exhibits entitled "Figure 6: Waters of the U.S. Delineation Map, Twin Pines Minerals - Loncala Tract, Charlton County, Georgia" and "Figure 6: Waters of the US Delineation Map - Keystone Properties, Waters of the U.S. Delineation", dated December 6, 2018, identifies the delineation limits of all aquatic resources within the review area. The wetlands were delineated in accordance with criteria contained in the 1987 "Corps of Engineers Wetland Delineation Manual," as amended by the most recent regional supplements to the manual. This delineation will remain valid for a period of 5-years unless new information warrants revision prior to that date.

If you intend to sell property that is part of a project that requires Department of the Army Authorization, it may be subject to the Interstate Land Sales Full Disclosure Act. The Property Report required by Housing and Urban Development Regulation must state whether, or not a permit for the development has been applied for, issued or denied by the U.S. Army Corps of Engineers (Part 320.3(h) of Title 33 of the Code of Federal Regulations).

This communication does not convey any property rights, either in real estate or material, or any exclusive privileges. It does not authorize any injury to property, invasion of rights, or any infringement of federal, state or local laws, or regulations. It does not obviate your requirement to obtain state or local assent required by law for the development of this property. If the information you have submitted, and on which the U.S. Army Corps of Engineers has based its determination is later found to be in error, this decision may be revoked.

A copy of this letter is being provided to the following party:
Ms. Cindy House-Pearson of TTL Inc., 3516 Greensboro Avenue, Tuscaloosa, Alabama 35401.

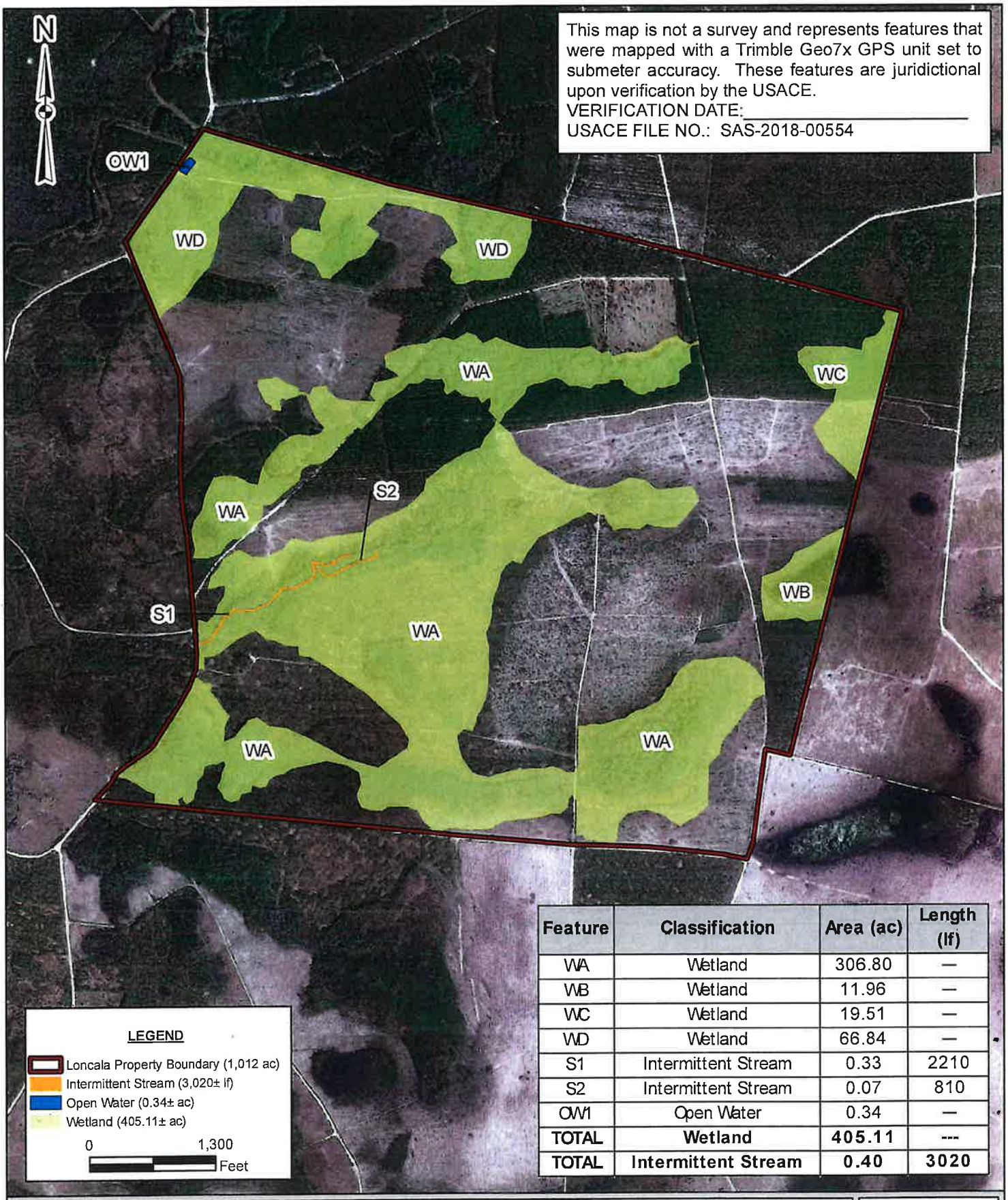
Thank you in advance for completing our on-line Customer Survey Form located at http://corpsmapu.usace.army.mil/cm_apex/f?p=regulatory_survey. We value your comments and appreciate your taking the time to complete a survey each time you have interaction with our office.

If you have any questions, please call me at [redacted]

Sincerely,

[redacted]

Enclosures



Feature	Classification	Area (ac)	Length (lf)
WA	Wetland	306.80	—
WB	Wetland	11.96	—
WC	Wetland	19.51	—
WD	Wetland	66.84	—
S1	Intermittent Stream	0.33	2210
S2	Intermittent Stream	0.07	810
OW1	Open Water	0.34	—
TOTAL	**Wetland**	**405.11**	**---**
TOTAL	**Intermittent Stream**	**0.40**	**3020**

TTL

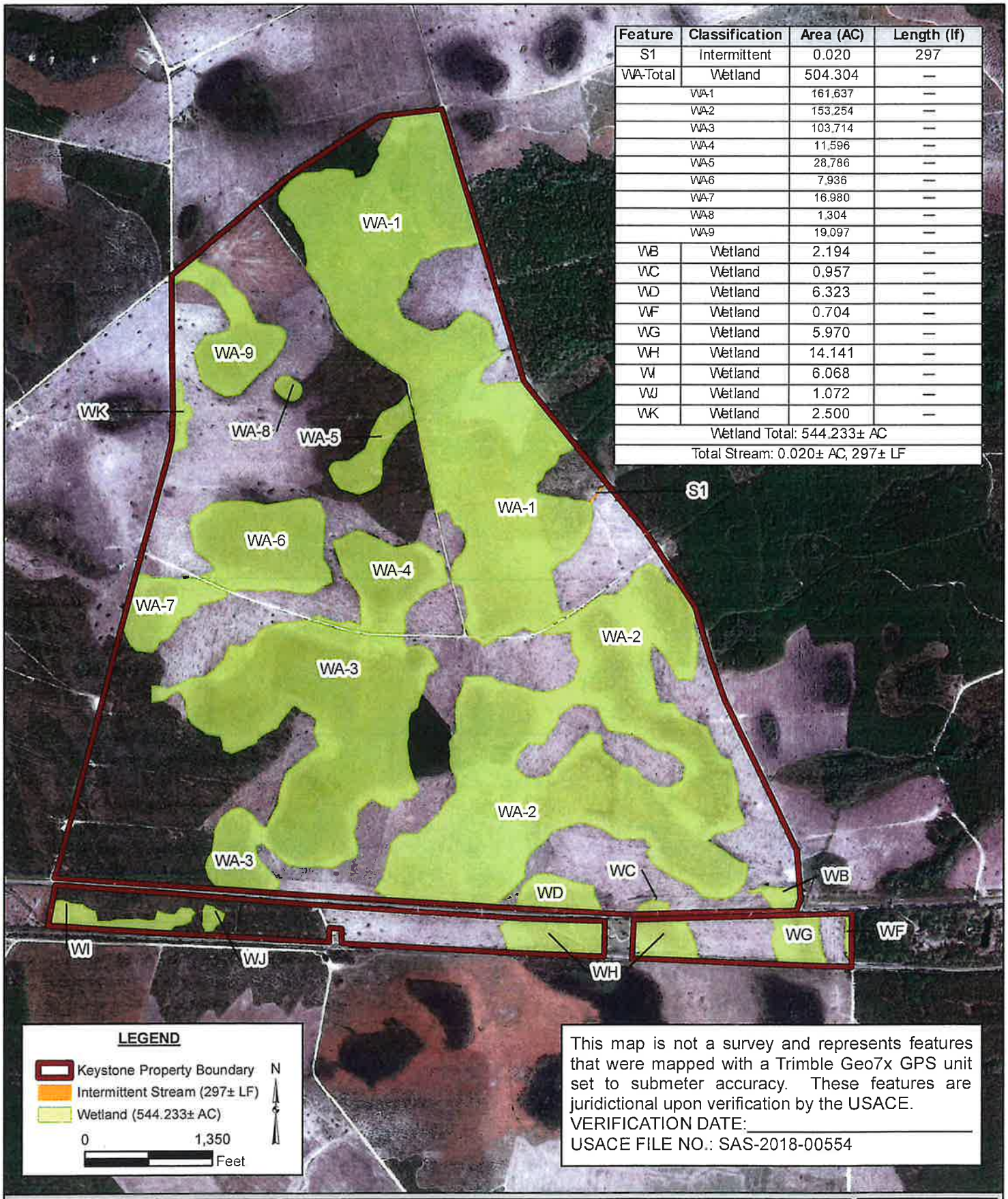
FIGURE 6: WATERS OF THE US DELINEATION MAP

TWIN PINES MINERALS - LONCALA TRACT

CHARLTON COUNTY, GEORGIA

BASEMAP: Google Earth & Europa Technologies (3/6/2018)

DRAWN BY: CMS	
CHECKED BY: CGT	
DRAWING DATE: 07/30/2018	
REVISION DATE: 12/06/2018	
TTL JOB NO. 000180200804.00	
APPROX SCALE: 1" = 1,300'	



Feature	Classification	Area (AC)	Length (lf)
S1	Intermittent	0.020	297
WA-Total	Wetland	504.304	—
WA-1		161.637	—
WA-2		153.254	—
WA-3		103.714	—
WA-4		11.596	—
WA-5		28.786	—
WA-6		7.936	—
WA-7		16.980	—
WA-8		1.304	—
WA-9		19.097	—
WB	Wetland	2.194	—
WC	Wetland	0.957	—
WD	Wetland	6.323	—
WF	Wetland	0.704	—
WG	Wetland	5.970	—
WH	Wetland	14.141	—
WI	Wetland	6.068	—
WJ	Wetland	1.072	—
WK	Wetland	2.500	—
Wetland Total: 544.233± AC			
Total Stream: 0.020± AC, 297± LF			

LEGEND

- Keystone Property Boundary
- Intermittent Stream (297± LF)
- Wetland (544.233± AC)

N

0 1,350 Feet

This map is not a survey and represents features that were mapped with a Trimble Geo7x GPS unit set to submeter accuracy. These features are juridictional upon verification by the USACE.
VERIFICATION DATE:_____
USACE FILE NO.: SAS-2018-00554

TTL

FIGURE 6: WATERS OF THE US DELINEATION MAP

TWIN PINES MINERALS - KEYSTONE PROPERTIES
WATERS OF THE U.S. DELINEATION

BASEMAP: Google Earth, Europa Technologies (C) 2018. Image Date: 3/6/2018

DRAWN BY:	CMS
CHECKED BY:	CGT
DRAWING DATE:	09/18/2018
REVISION DATE:	12/06/2018
TTL JOB NO.	000180200804.00
APPROX. SCALE:	1" = 2,000'

Appendix B:
Plan & Profile Drawings for First Phase

LEGEND

- Approximate Property Boundary
- Mining Permit Boundary
- Mining Impact Area
- Piezometer Location and ID
- Piezometer Location and ID
- Undisturbed Sample Location and ID
- Exploratory Boring Location and ID
- Pumping Well Location and ID
- Observation Well Location and ID
- Staff Gauge Location and ID
- TIAA Client Borings

PZ-04 PZ-20S/D EB-13 PZ-38 PZ-49 SG09 OWA2S/D OWA1S/D OWA3S/D PW-A PZ-39S/D EB-14 UD-67 SG04 PZ-21 UD-126 PZ-05 EB-04 SG08 DALLAS POLICE & FIRE PROPERTY PZ-45S/D PZ-50 UD-65 PZ-52 PZ-06 EB-05 PZ-11 SG20 PZ36 SG10 UD-34 PZ-22S/D PZ-40 ADIRONDACK PROPERTY PZ-07 UD-128 PZ-12S/D E SG11 PZ35 I SG21 PZ-46 EB-16 PZ-23 EB-06 TIAA PROPERTY PZ-08 EB-07 19-295 19-296 19-294 PZ-13 19-298 UD-231 PZ56 TIAA-1' C PZ-41 UD-51 PZ-24 K PZ34 19-297 SG03 PZ58 E' PZ-51S/D 19-293 PZ32 L A TIAA-2' 19-283 19-284 SG02 G SG26 19-292 O PZ-42 PZ-25S/D PZ29 19-285 PZ-14 19-291 19-286 19-287 Permit Area UD-238 PZ57 PZ-47 19-288 D PZ33 PZ31 19-289 19-290 TIAA-1 P 19-279 PZ-15 SG12 19-280 OWBEB OWB1D/S PW-B 19-281 UD-338 D' PZ-48S/D 19-299 OWB3D/S OWB2D/S 19-278 19-282 PZ-43 EB-08 PZ-28S/D 19-277 SG-27 M' 19-300 UD-43 19-276 SG01 EB-18 UD-25 PZ-26 19-270 PZ30 SG22 KEYSTONE PROPERTY 19-271 M PZ37 19-272 19-275 PZ-44 19-274 PZ-16S/D I' 19-273 PZ54 PZ55 PZ-27 K' L' TIAA-2 A' O' C' G' GA HWY 94 GA HWY 94

0 850 1700
SCALE IN FEET

Drawn By: ACP
Checked By: JMT/JRS
Date: 07/03/2019
Proj. No.: 00018020080400
File Name:General Map_client

FIGURE 1.

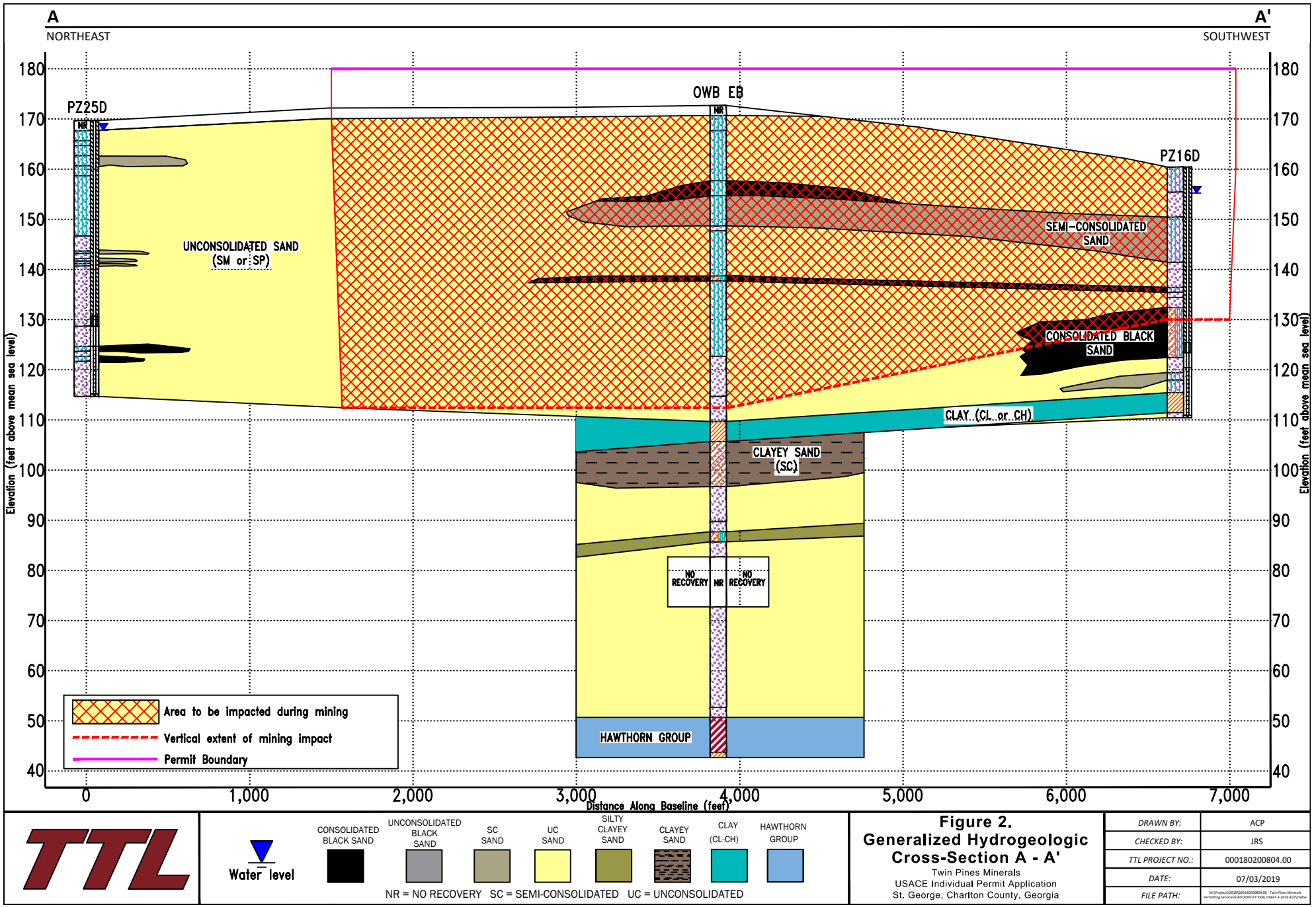
LINES OF CROSS-SECTIONS MAP

TWIN PINES MINERALS

USACE INDIVIDUAL PERMIT APPLICATION

ST. GEORGE, CHARLTON COUNTY, GEORGIA

TTL
3516 Greensboro Avenue | Tuscaloosa, AL 35401
205.345.0816 | www.ttlusa.com



TTL

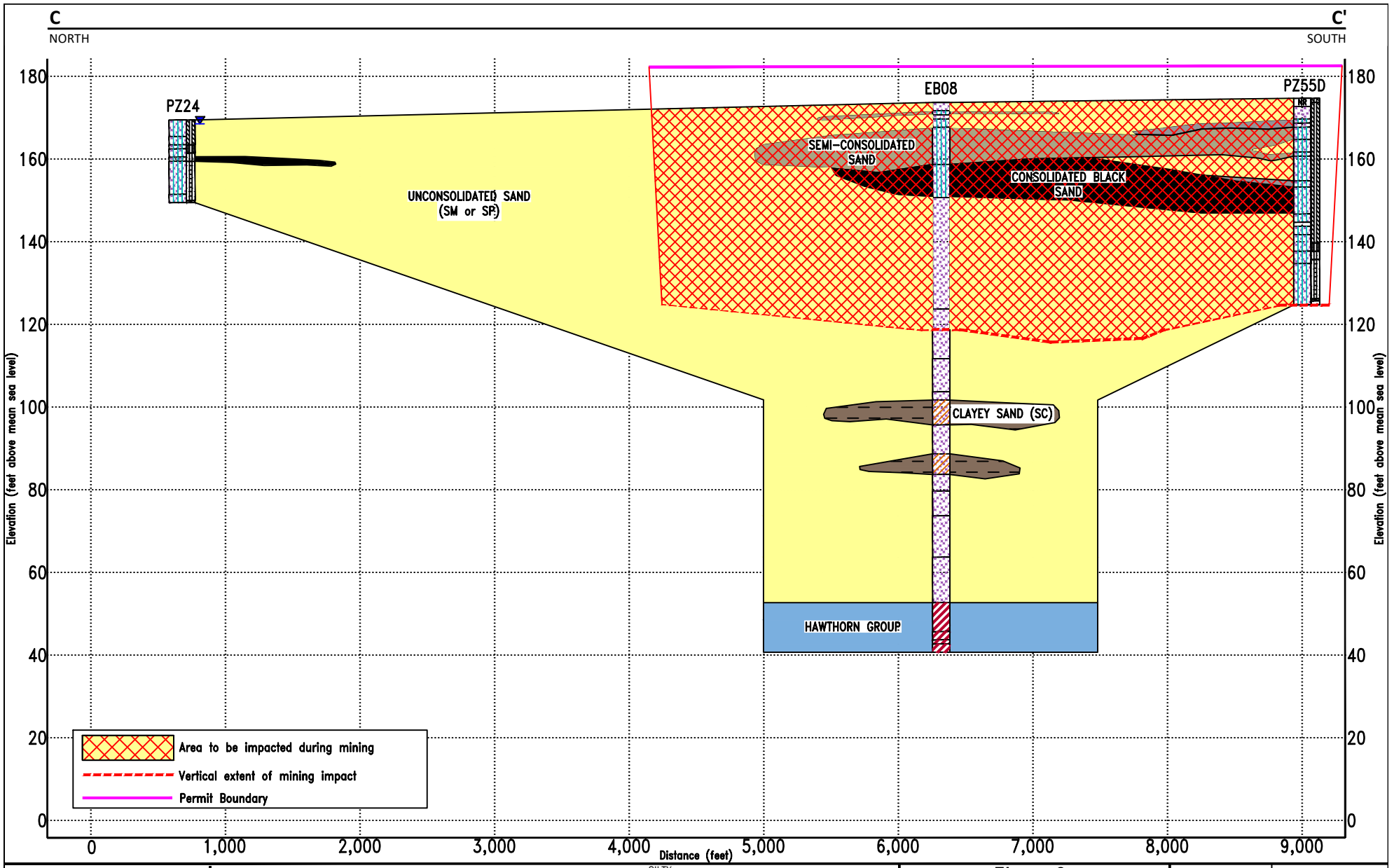
Water level

CONSOLIDATED BLACK SAND | UNCONSOLIDATED BLACK SAND | SC SAND | UC SAND | SILTY CLAYEY SAND | CLAYEY SAND | CLAY (CL-CH) | HAWTHORN GROUP

NR = NO RECOVERY SC = SEMI-CONSOLIDATED UC = UNCONSOLIDATED

Figure 2.
Generalized Hydrogeologic Cross-Section A - A'
Twin Pines Minerals
USACE Individual Permit Application
St. George, Charlton County, Georgia

DRAWN BY:	ACP
CHECKED BY:	JRS
TTL PROJECT NO.:	000180200804.00
DATE:	07/03/2019
FILE PATH:	M:\Projects\2018\P000180200804.00 - Twin Pines Minerals Permitting Services\CAD\dgn\TP XSSec DRAFT 4-2019 ACP.DWGs



TTL

Water level

CONSOLIDATED BLACK SAND	UNCONSOLIDATED BLACK SAND	SC SAND	UC SAND	SILTY CLAYEY SAND	CLAYEY SAND	CLAY (CL-CH)	HAWTHORN GROUP

NR = NO RECOVERY SC = SEMI-CONSOLIDATED UC = UNCONSOLIDATED

Figure 3.
Generalized Hydrogeologic Cross-Section C - C'
Twin Pines Minerals
USACE Individual Permit Application
St. George, Charlton County, Georgia

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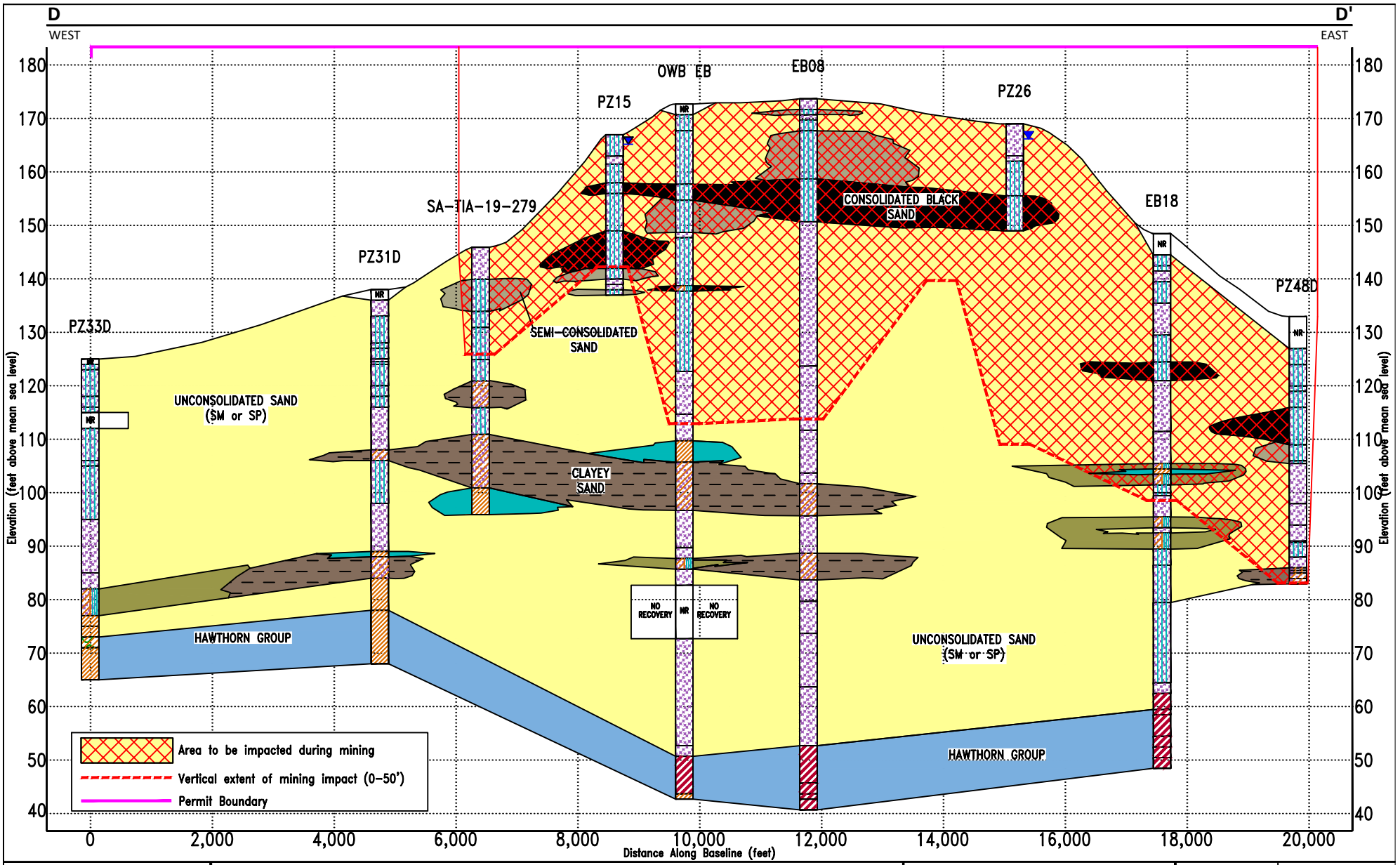
TTL PROJECT NO.:	000180200804.00
DATE:	07/03/2019
FILE PATH:	M:\Projects\2018\[000180200804.00 - Twin Pines Minerals Permitting Services]\CAD\dgn\TP XSec DRAFT 4-2019 ACP.DWGs



TTL

Water level

CONSOLIDATED BLACK SAND | SC SAND | UC SAND | SILTY CLAYEY SAND | CLAYEY SAND | CLAY (CL-CH) | HAWTHORN GROUP

NR = NO RECOVERY SC = SEMI-CONSOLIDATED UC = UNCONSOLIDATED

Figure 4.
Generalized Hydrogeologic Cross-Section D - D'
Twin Pines Minerals
USACE Individual Permit Application
St. George, Charlton County, Georgia

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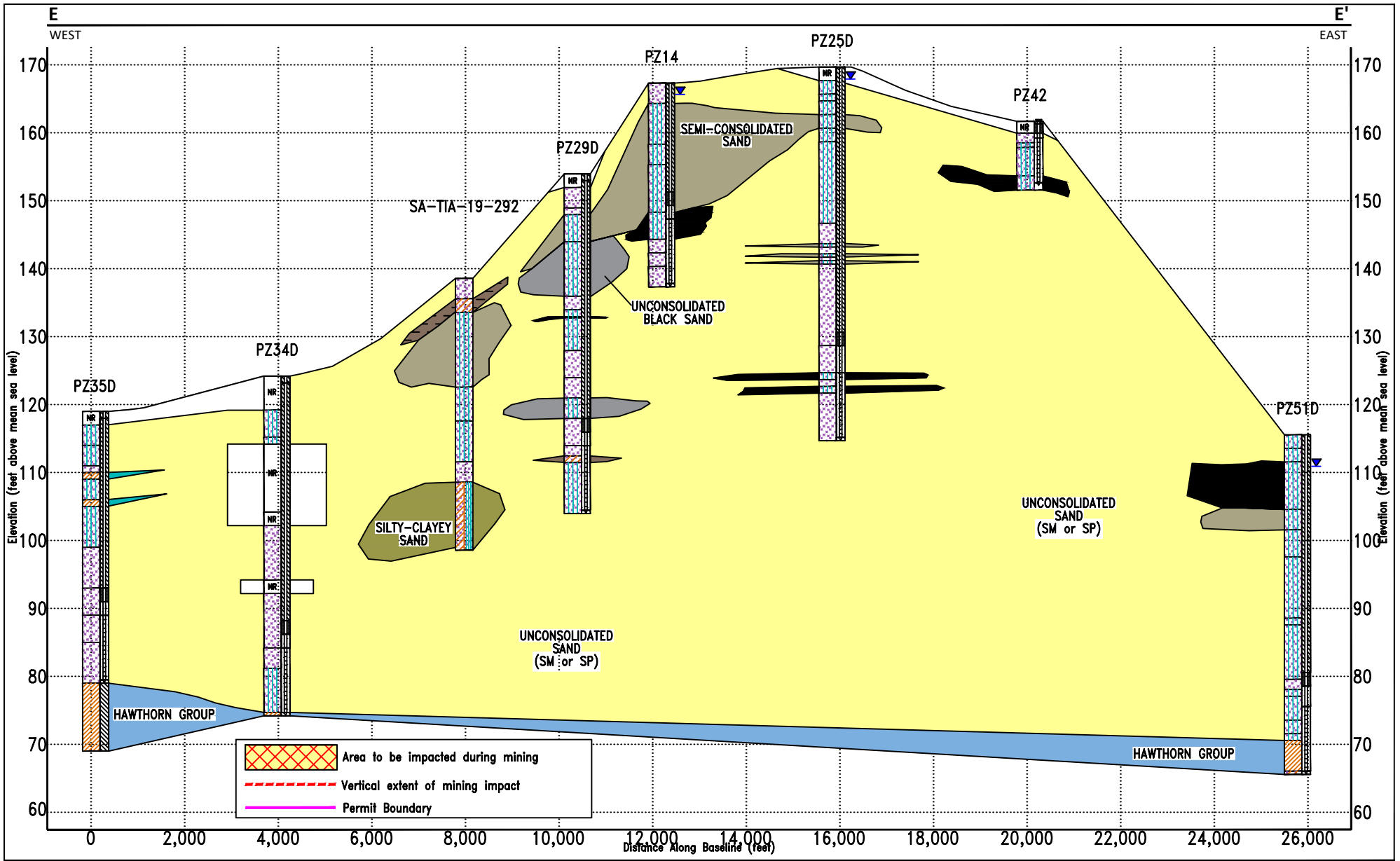
TTL PROJECT NO.:	000180200804.00
DATE:	07/03/2019
FILE PATH:	M:\Projects\2018\000180200804.00 - Twin Pines Minerals Permitting Services\CAD\XSNs\TP XSNs DRAFT 4-2019 ACP\DWGs



TTL

Water level

CONSOLIDATED BLACK SAND | UNCONSOLIDATED BLACK SAND | SC SAND | UC SAND | SILTY CLAYEY SAND | CLAYEY SAND | CLAY (CL-CH) | HAWTHORN GROUP

NR = NO RECOVERY SC = SEMI-CONSOLIDATED UC = UNCONSOLIDATED

Figure 5.
Generalized Hydrogeologic Cross-Section E - E'
Twin Pines Minerals
USACE Individual Permit Application
St. George, Charlton County, Georgia

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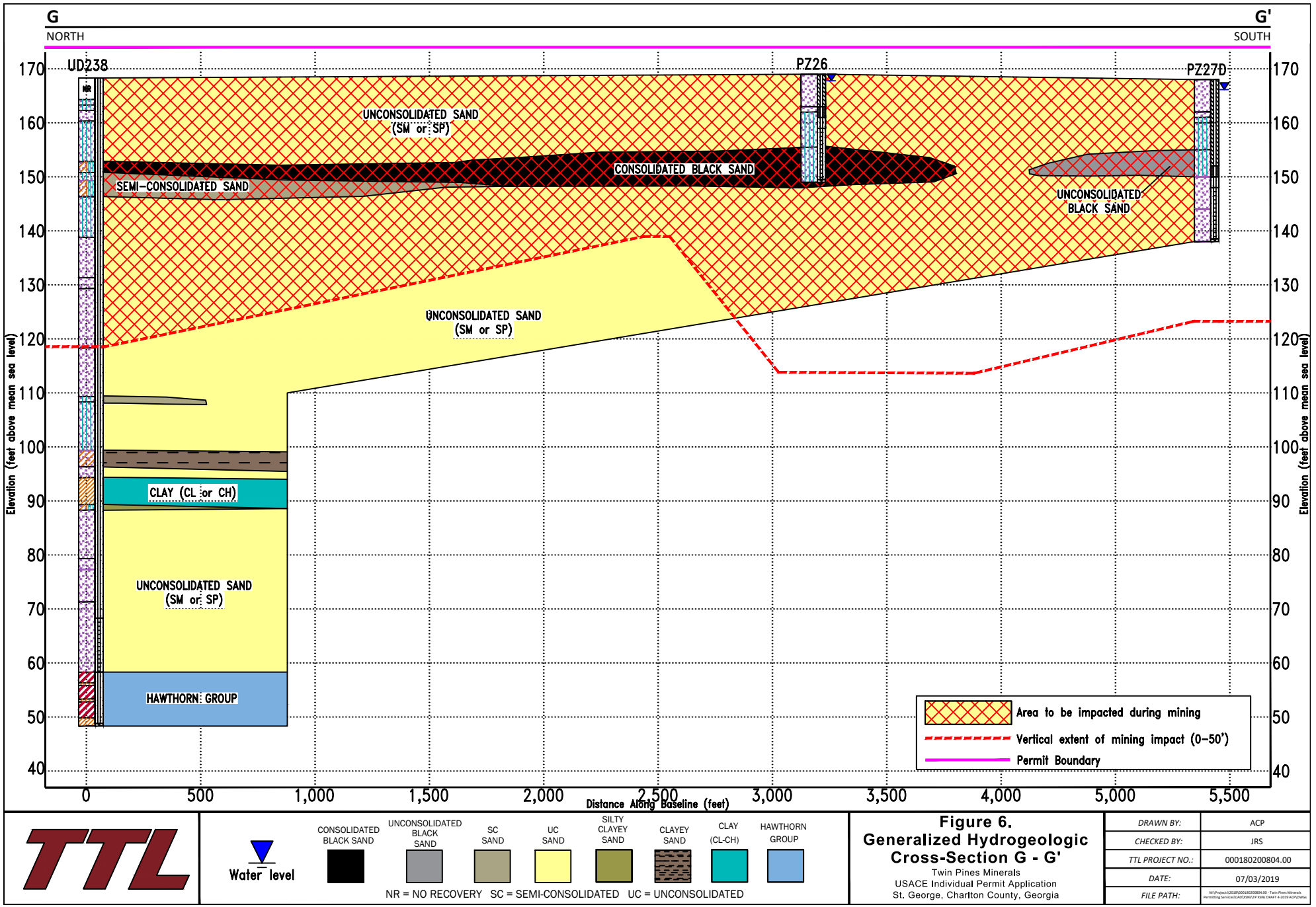
CHECKED BY:	JRS
TTL PROJECT NO.:	000180200804.00
DATE:	07/03/2019
FILE PATH:	M:\Projects\2018\000180200804.00 - Twin Pines Minerals Permitting Services\CAD\GSN\[TP XSNs DRAFT 4-2019 ACP].DWGs



TTL

Water level

CONSOLIDATED BLACK SAND | UNCONSOLIDATED BLACK SAND | SC SAND | UC SAND | SILTY CLAYEY SAND | CLAYEY SAND | CLAY (CL-CH) | HAWTHORN GROUP

NR = NO RECOVERY SC = SEMI-CONSOLIDATED UC = UNCONSOLIDATED

Figure 6.
Generalized Hydrogeologic Cross-Section G - G'
Twin Pines Minerals
USACE Individual Permit Application
St. George, Charlton County, Georgia

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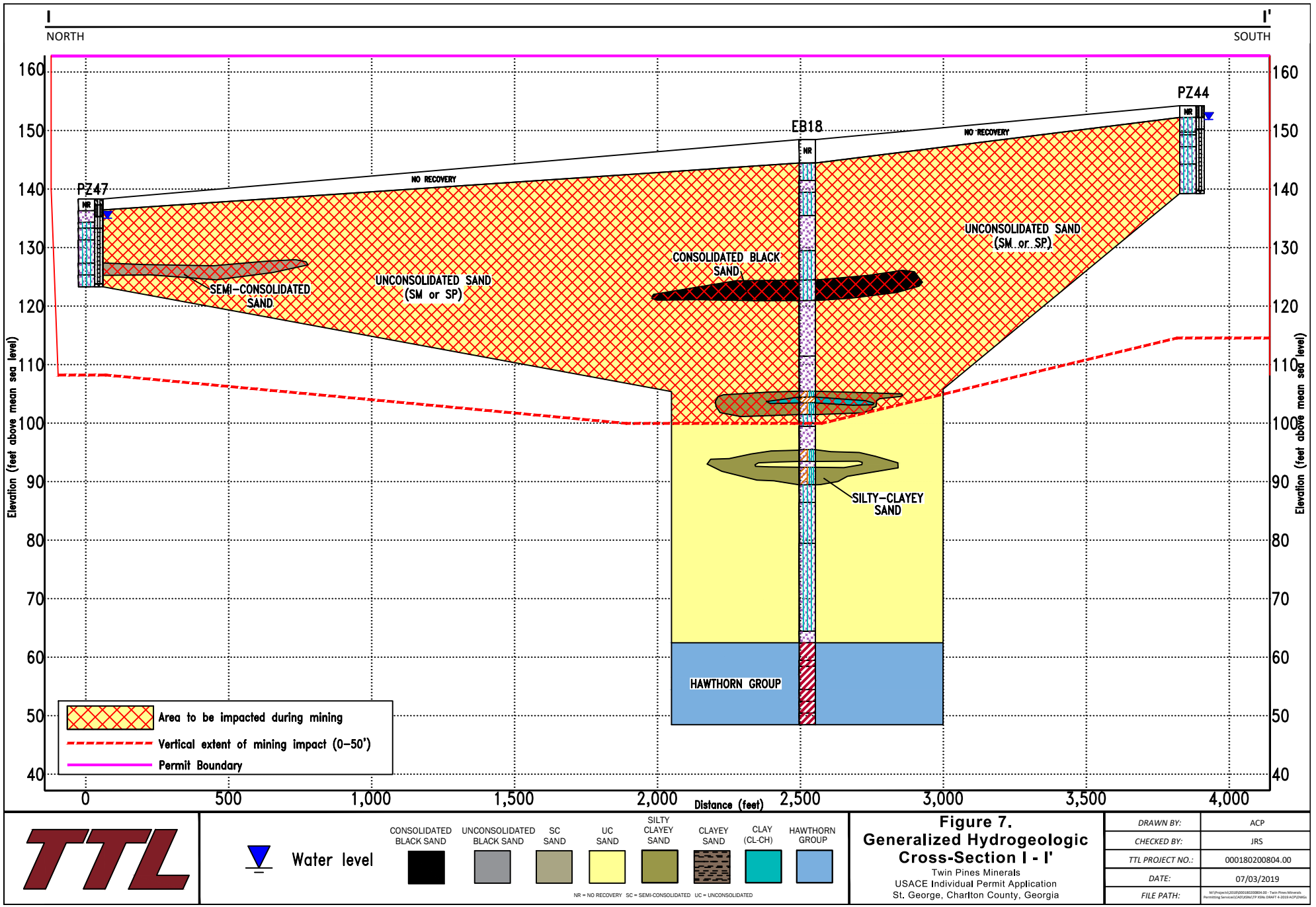
TTL PROJECT NO.:	000180200804.00
DATE:	07/03/2019
FILE PATH:	M:\Projects\2018\[000180200804.00 - Twin Pines Minerals Permitting Services]\CAD\JSNA\TP XSNs DRAFT 4-2019 ACP].DWGs



TTL

Water level

CONSOLIDATED BLACK SAND | UNCONSOLIDATED BLACK SAND | SC SAND | UC SAND | SILTY CLAYEY SAND | CLAYEY SAND | CLAY (CL-CH) | HAWTHORN GROUP

NR = NO RECOVERY SC = SEMI-CONSOLIDATED UC = UNCONSOLIDATED

Figure 7.
Generalized Hydrogeologic Cross-Section I - I'
Twin Pines Minerals
USACE Individual Permit Application
St. George, Charlton County, Georgia

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TTL PROJECT NO.:	000180200804.00
DATE:	07/03/2019
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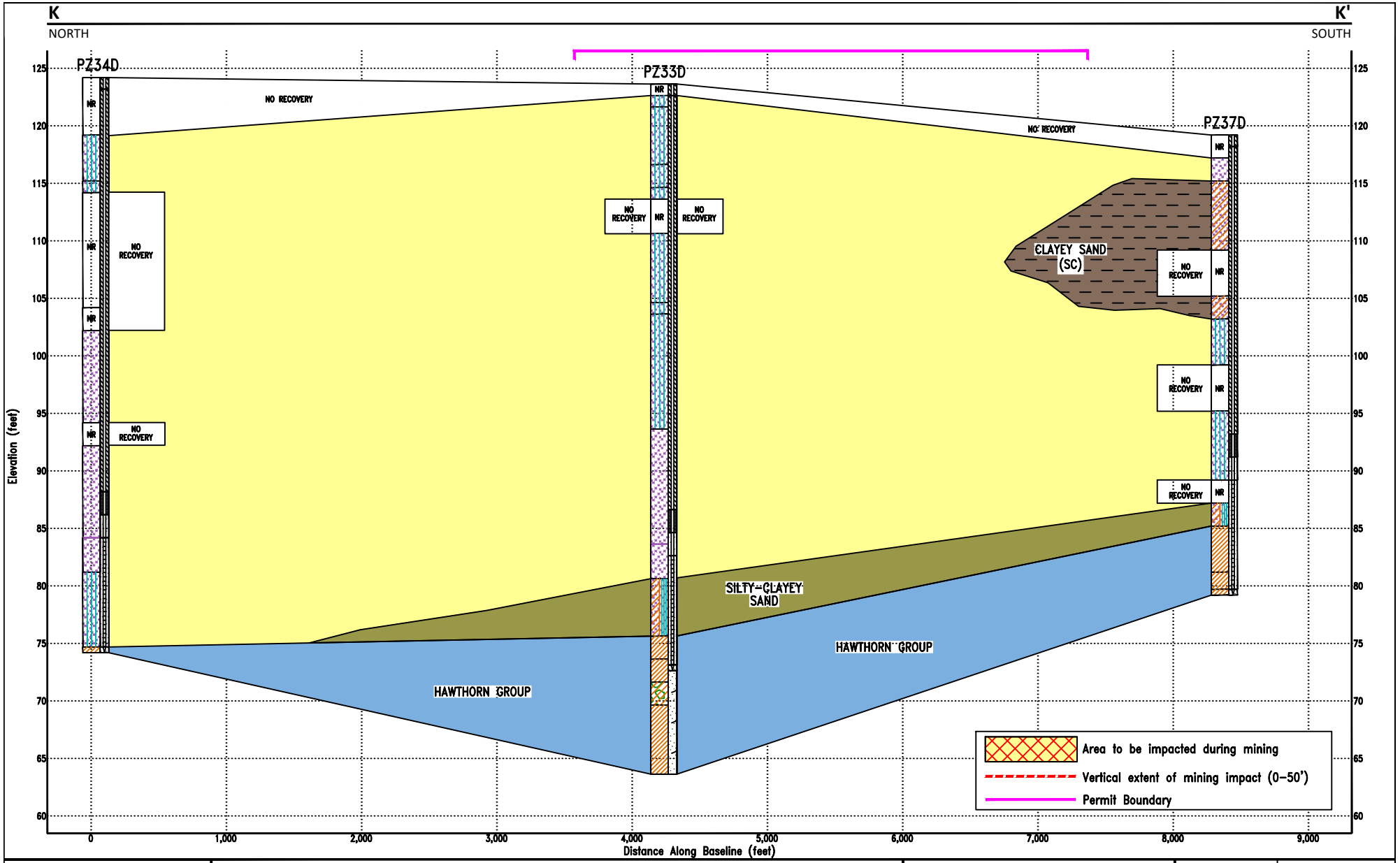

TTL

Water level

CONSOLIDATED BLACK SAND | UNCONSOLIDATED BLACK SAND | SC SAND | UC SAND | SILTY CLAYEY SAND | CLAYEY SAND | (CL-CH) | HAWTHORN GROUP

NR = NO RECOVERY SC = SEMI-CONSOLIDATED UC = UNCONSOLIDATED

Figure 8.
Generalized Hydrogeologic Cross-Section K - K'
Twin Pines Minerals
USACE Individual Permit Application
St. George, Charlton County, Georgia

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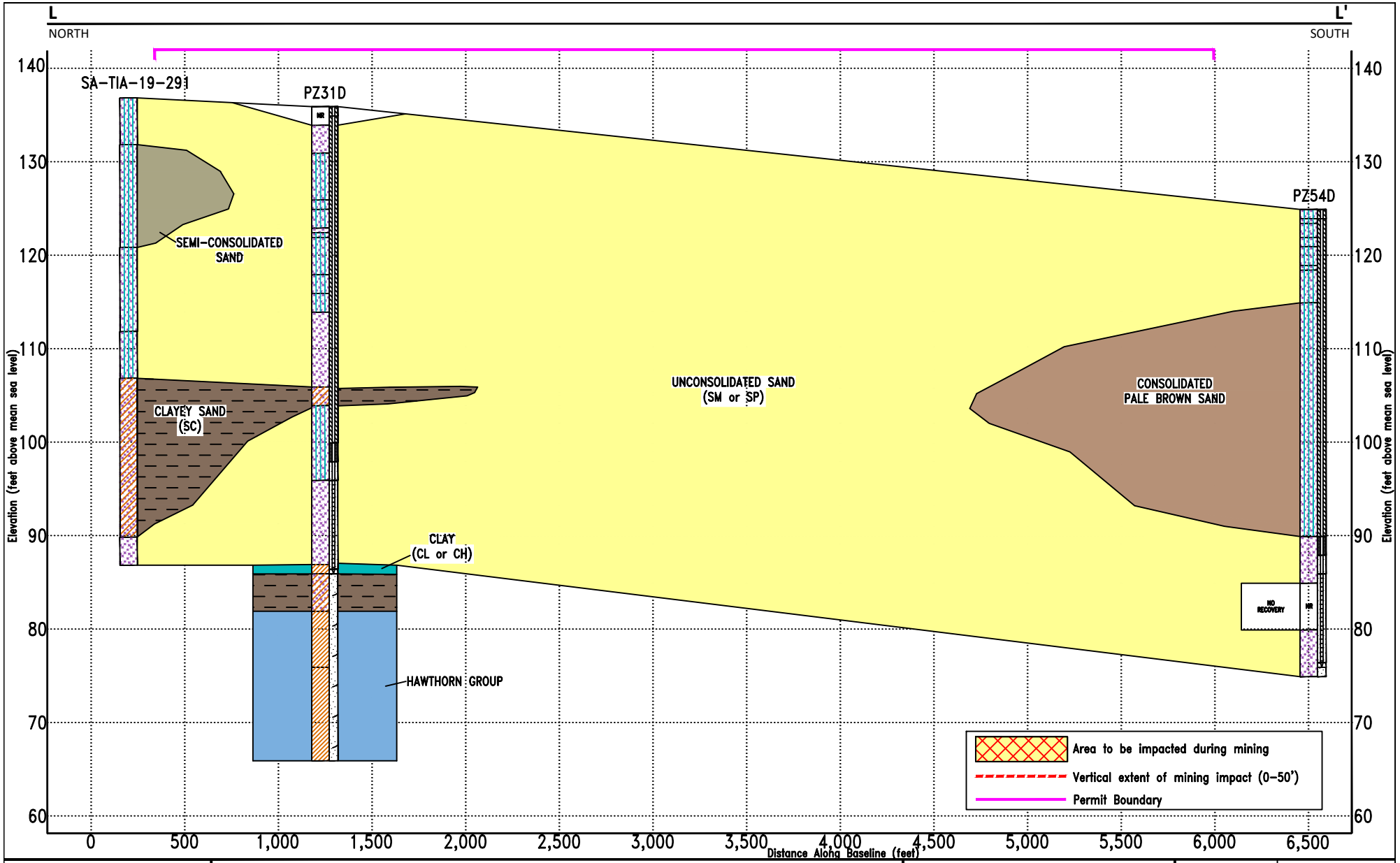
TTL PROJECT NO.:	000180200804.00
DATE:	07/03/2019
FILE PATH:	M:\Projects\2018\000180200804.00 - Twin Pines Minerals Permitting Services\CAD\USACE\TP XSSs DRAFT 4-2019 ACP.DWGs



TTL

Water level

CONSOLIDATED PALE BROWN SAND | CONSOLIDATED BLACK SAND | UNCONSOLIDATED BLACK SAND | SC SAND | UC SAND | SILTY CLAYEY SAND | CLAYEY SAND | CLAY (CL-CH) | HAWTHORN GROUP

NR = NO RECOVERY SC = SEMI-CONSOLIDATED UC = UNCONSOLIDATED

Figure 9.
Generalized Hydrogeologic Cross-Section L - L'
Twin Pines Minerals
USACE Individual Permit Application
St. George, Charlton County, Georgia

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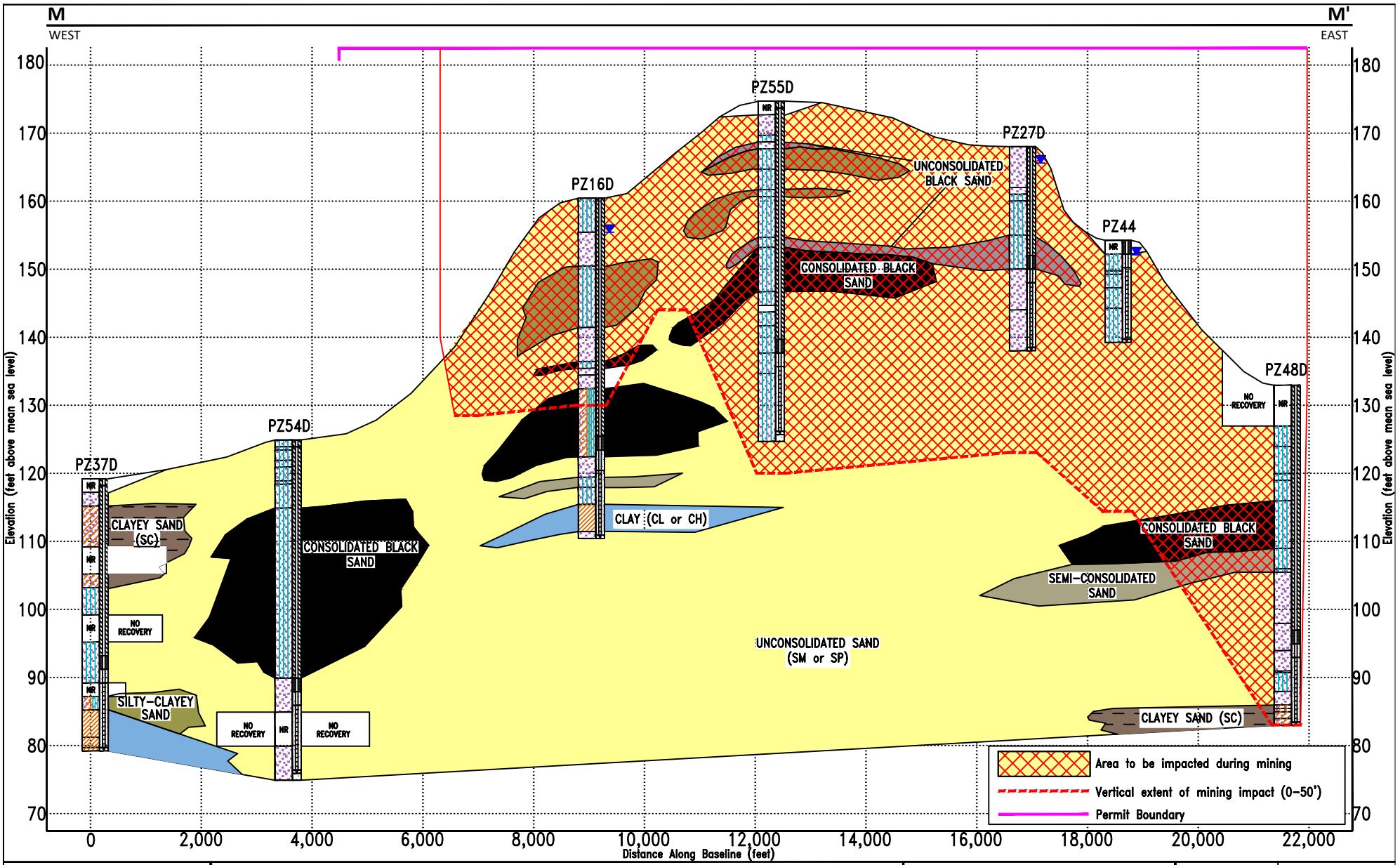
TTL PROJECT NO.:	000180200804.00
DATE:	07/03/2019
FILE PATH:	M:\Projects\2018\000180200804.00 - Twin Pines Minerals Permitting Services\CAD\USACE\TP XSSs\DRAFT 4-2019 ACP\DWGs



TTL

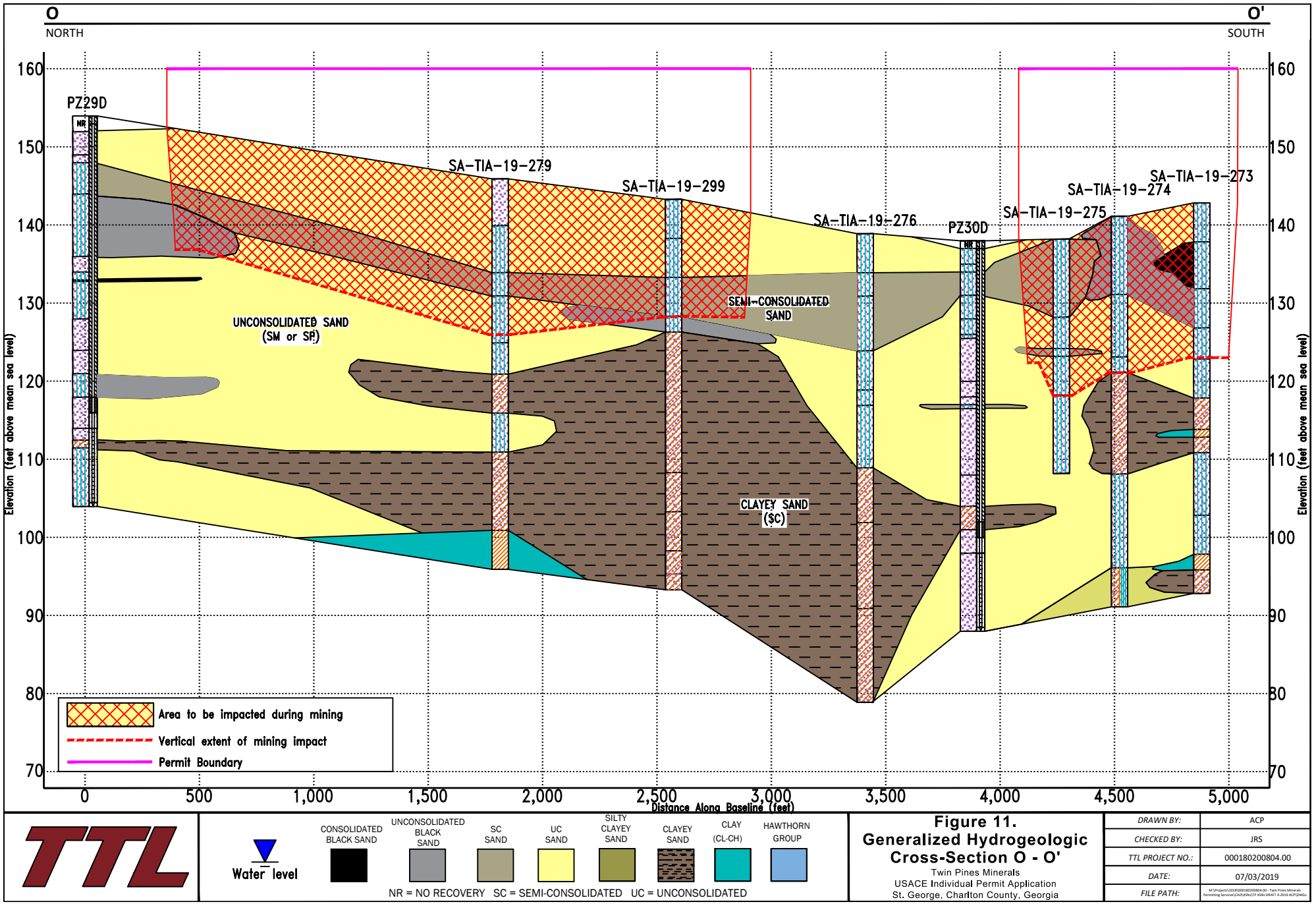
Water level

CONSOLIDATED BLACK SAND | UNCONSOLIDATED BLACK SAND | SC SAND | UC SAND | SILTY CLAYEY SAND | CLAYEY SAND | CLAY (CL-CH) | HAWTHORN GROUP

NR = NO RECOVERY SC = SEMI-CONSOLIDATED UC = UNCONSOLIDATED

Figure 10.
Generalized Hydrogeologic Cross-Section M - M'
Twin Pines Minerals
USACE Individual Permit Application
St. George, Charlton County, Georgia

DRAWN BY:	ACP
CHECKED BY:	JRS
TTL PROJECT NO.:	000180200804.00
DATE:	07/03/2019
FILE PATH:	M:\Projects\2018\[000180200804.00 - Twin Pines Minerals Permitting Services\CAD\KMs\TP KMs DRAFT 4-2019 ACP].DWGs



TTL

Figure 11.
Generalized Hydrogeologic Cross-Section O - O'
Twin Pines Minerals
USACE Individual Permit Application
St. George, Charlton County, Georgia

DRAWN BY:	ACP
CHECKED BY:	JRS
TTL PROJECT NO.:	000180200804.00
DATE:	07/03/2019
FILE PATH:	M:\Projects\2018\[000180200804.00 - Twin Pines Minerals Permitting Services\CAD\GSN\[TP XSNs DRAFT 4-2019 ACP].DWG

Appendix C:
Qualitative Resource Assessments for Adverse Impacts Worksheets

Qualitative Worksheet Summary For Wetland Adverse Impacts						
Worksheet Number	**Name of Wetland**	**Wetland Type**	**Acres of Impact (ac.)**	**Impact Duration**	**2018 Credits**	**Grandfathered Credits**
1	Adirondack WA	Riverine/Lacustrine Fringe Wetlands	5.51	Permanent/Reoccurring	2.76	22.08
2	Adirondack WB	Riverine/Lacustrine Fringe Wetlands	1.16	Permanent/Reoccurring	0.58	4.64
3	Adirondack WD	Riverine/Lacustrine Fringe Wetlands	5.99	Permanent/Reoccurring	3.00	24.00
4	Keystone WA-2	Depressional/Flat Wetlands	14.16	Permanent/Reoccurring	7.08	56.64
5	Keystone WA-3	Depressional/Flat Wetlands	4.00	Permanent/Reoccurring	2.00	16.00
6	Keystone WA-7	Depressional/Flat Wetlands	0.91	Permanent/Reoccurring	0.45	3.60
7	Keystone WB	Depressional/Flat Wetlands	0.82	Permanent/Reoccurring	0.41	3.28
8	Keystone WC	Depressional/Flat Wetlands	0.53	Permanent/Reoccurring	0.27	2.16
9	Keystone WD	Depressional/Flat Wetlands	4.34	Permanent/Reoccurring	2.17	17.36
10	Keystone WF	Riverine/Lacustrine Fringe Wetlands	0.70	Permanent/Reoccurring	0.35	2.80

Summary of Credits Owed			
Wetland Type	**Acres of Impact (ac.)**	**2018 Credits**	**Grandfathered Credits**
Freshwater Tidal Wetlands	0.00	0.00	0.00
Saltwater Tidal Wetlands	0.00	0.00	0.00
Riverine/Lacustrine Fringe Wetlands	13.37	6.69	53.52
Slope Wetlands	0.00	0.00	0.00
Depressional/Flat Wetlands	24.76	12.38	99.04
Open Water/Ditch/Canal	0.00	0.00	0.00

Worksheet 1: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Adirondack WA
Acres of Impact (Acres):	5.51
Wetland Type:	Riverine/Lacustrine Fringe Wetlands
Date:	March 22, 2019

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Hydrologic Alteration - Impound	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Permanent/Reoccurring	1.00
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.50
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**2.76**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**22.08**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 2: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Adirondack WB
Acres of Impact (Acres):	1.16
Wetland Type:	Riverine/Lacustrine Fringe Wetlands
Date:	March 22, 2019

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Hydrologic Alteration - Impound	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Permanent/Reoccurring	1.00
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.50
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**0.58**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**4.64**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 3: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Adirondack WD
Acres of Impact (Acres):	5.99
Wetland Type:	Riverine/Lacustrine Fringe Wetlands
Date:	March 13, 2019

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Hydrologic Alteration - Impound	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Permanent/Reoccurring	1.00
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.50
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**3.00**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**24.00**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 4: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WA-2
Acres of Impact (Acres):	14.16
Wetland Type:	Depressional/Flat Wetlands
Date:	August 27, 2018

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Permanent/Reoccurring	1.00
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.50
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**7.08**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**56.64**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 5: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WA-3
Acres of Impact (Acres):	4.00
Wetland Type:	Depressional/Flat Wetlands
Date:	August 27, 2018

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Hydrologic Alteration - Impound	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Permanent/Reoccurring	1.00
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.50
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**2.00**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**16.00**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 6: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WA-7
Acres of Impact (Acres):	0.91
Wetland Type:	Depressional/Flat Wetlands
Date:	August 27, 2018

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Permanent/Reoccurring	1.00
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.50
6. Product of Total WQFC Impact and Acres (***Total 2018 Wetland Credits Owed***) =		**0.45**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits (***Grandfathered Wetland Credits Owed***) =		**3.60**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 7: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WB
Acres of Impact (Acres):	0.82
Wetland Type:	Depressional/Flat Wetlands
Date:	August 28, 2019

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Hydrologic Alteration - Impound	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Permanent/Reoccurring	1.00
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.50
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**0.41**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**3.28**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 8: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WC
Acres of Impact (Acres):	0.53
Wetland Type:	Depressional/Flat Wetlands
Date:	August 29, 2018

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Permanent/Reoccurring	1.00
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.50
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**0.27**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**2.16**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 9: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WD
Acres of Impact (Acres):	4.34
Wetland Type:	Depressional/Flat Wetlands
Date:	August 29, 2018

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Permanent/Reoccurring	1.00
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.50
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**2.17**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**17.36**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 10: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WF
Acres of Impact (Acres):	0.70
Wetland Type:	Riverine/Lacustrine Fringe Wetlands
Date:	August 29, 2018

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Permanent/Reoccurring	1.00
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.50
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**0.35**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**2.80**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Qualitative Worksheet Summary For Wetland Adverse Impacts						
Worksheet Number	**Name of Wetland**	**Wetland Type**	**Acres of Impact (ac.)**	**Impact Duration**	**2018 Credits**	**Grandfathered Credits**
1	Keystone WG	Depressional/Flat Wetlands	5.66	Permanent/Reoccurring	2.83	22.64
2	Keystone WH	Depressional/Flat Wetlands	13.41	Permanent/Reoccurring	6.71	53.68
3	Keystone WK	Depressional/Flat Wetlands	0.22	Permanent/Reoccurring	0.11	0.88
4	TIAA WC	Depressional/Flat Wetlands	7.71	Permanent/Reoccurring	3.85	30.80
5	TIAA WC	Depressional/Flat Wetlands	77.26	Less than 90 Days	19.32	154.56
6	TIAA WB	Depressional/Flat Wetlands	0.02	Less than 90 Days	0.00	0.00
7	Keystone WD	Riverine/Lacustrine Fringe Wetlands	1.87	Less than 90 Days	0.47	3.76
8	Keystone WB	Depressional/Flat Wetlands	0.92	Less than 90 Days	0.23	1.84
9	Keystone WA-7	Depressional/Flat Wetlands	10.69	Less than 90 Days	2.67	21.36
10	Keystone WA-6	Depressional/Flat Wetlands	28.79	Less than 90 Days	7.20	57.60

Summary of Credits Owed			
Wetland Type	**Acres of Impact (ac.)**	**2018 Credits**	**Grandfathered Credits**
Freshwater Tidal Wetlands	0.00	0.00	0.00
Saltwater Tidal Wetlands	0.00	0.00	0.00
Riverine/Lacustrine Fringe Wetlands	1.87	0.47	3.76
Slope Wetlands	0.00	0.00	0.00
Depressional/Flat Wetlands	144.68	42.92	343.36
Open Water/Ditch/Canal	0.00	0.00	0.00

Worksheet 1: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WG
Acres of Impact (Acres):	5.66
Wetland Type:	Depressional/Flat Wetlands
Date:	August 29, 2018

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Permanent/Reoccurring	1.00
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.50
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**2.83**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**22.64**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 2: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WH
Acres of Impact (Acres):	13.41
Wetland Type:	Depressional/Flat Wetlands
Date:	August 29, 2018

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Permanent/Reoccurring	1.00
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.50
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**6.71**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**53.68**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 3: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WK
Acres of Impact (Acres):	0.22
Wetland Type:	Depressional/Flat Wetlands
Date:	August 29, 2018

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Permanent/Reoccurring	1.00
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.50
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**0.11**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**0.88**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 4: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	TIAA WC
Acres of Impact (Acres):	7.71
Wetland Type:	Depressional/Flat Wetlands
Date:	April 9, 2019

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Hydrologic Alteration - Impound	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Permanent/Reoccurring	1.00
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.50
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**3.85**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**30.80**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 5: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	TIAA WC
Acres of Impact (Acres):	77.26
Wetland Type:	Depressional/Flat Wetlands
Date:	April 9, 2019

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Less than 90 Days	0.50
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.25
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**19.32**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**154.56**

Legend

Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 6: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	TIAA WB
Acres of Impact (Acres):	0.02
Wetland Type:	Depressional/Flat Wetlands
Date:	April 9, 2019

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Less than 90 Days	0.50
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.25
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**0.00**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**0.00**

Legend

Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 7: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WD
Acres of Impact (Acres):	1.87
Wetland Type:	Riverine/Lacustrine Fringe Wetlands
Date:	August 29, 2018

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Less than 90 Days	0.50
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.25
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**0.47**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**3.76**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 8: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WB
Acres of Impact (Acres):	0.92
Wetland Type:	Depressional/Flat Wetlands
Date:	August 28, 2019

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Less than 90 Days	0.50
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.25
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**0.23**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**1.84**

Legend

Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 9: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WA-7
Acres of Impact (Acres):	10.69
Wetland Type:	Depressional/Flat Wetlands
Date:	August 27, 2018

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Less than 90 Days	0.50
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.25
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**2.67**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**21.36**

Legend

Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 10: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WA-6
Acres of Impact (Acres):	28.79
Wetland Type:	Depressional/Flat Wetlands
Date:	August 28, 2018

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Less than 90 Days	0.50
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.25
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**7.20**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**57.60**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 10: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Adirondack WF
Acres of Impact (Acres):	4.06
Wetland Type:	Depressional/Flat Wetlands
Date:	March 23, 2019

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Less than 90 Days	0.50
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.25
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**1.01**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**8.08**

Legend

Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Qualitative Worksheet Summary For Wetland Adverse Impacts						
Worksheet Number	**Name of Wetland**	**Wetland Type**	**Acres of Impact (ac.)**	**Impact Duration**	**2018 Credits**	**Grandfathered Credits**
1	Adirondack WA	Riverine/Lacustrine Fringe Wetlands	57.67	Less than 90 Days	14.42	115.36
2	Adirondack WB	Riverine/Lacustrine Fringe Wetlands	6.27	Less than 90 Days	1.57	12.56
3	Adirondack WD	Riverine/Lacustrine Fringe Wetlands	3.77	Less than 90 Days	0.94	7.52
4	Keystone WA-2	Depressional/Flat Wetlands	135.57	Less than 90 Days	33.89	271.12
5	Keystone WA-3	Depressional/Flat Wetlands	98.96	Less than 90 Days	24.74	197.92
6	Keystone WA-4	Depressional/Flat Wetlands	19.10	Less than 90 Days	4.77	38.16
7	Keystone WA-5	Depressional/Flat Wetlands	5.16	Less than 90 Days	1.29	10.32
8	Adirondack WC	Depressional/Flat Wetlands	2.56	Less than 90 Days	0.64	5.12
9	Adirondack WE	Depressional/Flat Wetlands	4.23	Less than 90 Days	1.06	8.48
10	Adirondack WF	Depressional/Flat Wetlands	4.06	Less than 90 Days	1.01	8.08

Summary of Credits Owed			
Wetland Type	**Acres of Impact (ac.)**	**2018 Credits**	**Grandfathered Credits**
Freshwater Tidal Wetlands	0.00	0.00	0.00
Saltwater Tidal Wetlands	0.00	0.00	0.00
Riverine/Lacustrine Fringe Wetlands	67.70	16.93	135.44
Slope Wetlands	0.00	0.00	0.00
Depressional/Flat Wetlands	269.64	67.40	539.20
Open Water/Ditch/Canal	0.00	0.00	0.00

Worksheet 1: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Adirondack WA
Acres of Impact (Acres):	57.67
Wetland Type:	Riverine/Lacustrine Fringe Wetlands
Date:	March 22, 2019

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Less than 90 Days	0.50
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.25
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**14.42**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**115.36**

Legend

Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 2: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Adirondack WB
Acres of Impact (Acres):	6.27
Wetland Type:	Riverine/Lacustrine Fringe Wetlands
Date:	March 22, 2019

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Less than 90 Days	0.50
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.25
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**1.57**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**12.56**

Legend

Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 3: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Adirondack WD
Acres of Impact (Acres):	3.77
Wetland Type:	Riverine/Lacustrine Fringe Wetlands
Date:	March 13, 2019

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Less than 90 Days	0.50
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.25
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**0.94**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**7.52**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 4: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WA-2
Acres of Impact (Acres):	135.57
Wetland Type:	Depressional/Flat Wetlands
Date:	August 27, 2018

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Less than 90 Days	0.50
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.25
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**33.89**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**271.12**

Legend

Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 5: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WA-3
Acres of Impact (Acres):	98.96
Wetland Type:	Depressional/Flat Wetlands
Date:	August 27, 2018

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Less than 90 Days	0.50
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.25
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**24.74**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**197.92**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 6: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WA-4
Acres of Impact (Acres):	19.10
Wetland Type:	Depressional/Flat Wetlands
Date:	August 27, 2018

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Less than 90 Days	0.50
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.25
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**4.77**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**38.16**

Legend

Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 7: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WA-5
Acres of Impact (Acres):	5.16
Wetland Type:	Depressional/Flat Wetlands
Date:	August 28, 2018

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Less than 90 Days	0.50
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.25
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**1.29**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**10.32**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 8: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Adirondack WC
Acres of Impact (Acres):	2.56
Wetland Type:	Depressional/Flat Wetlands
Date:	March 22, 2019

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Less than 90 Days	0.50
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.25
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**0.64**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**5.12**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 9: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Adirondack WE
Acres of Impact (Acres):	4.23
Wetland Type:	Depressional/Flat Wetlands
Date:	March 23, 2019

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Less than 90 Days	0.50
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.25
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**1.06**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**8.48**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Qualitative Worksheet Summary For Wetland Adverse Impacts						
Worksheet Number	**Name of Wetland**	**Wetland Type**	**Acres of Impact (ac.)**	**Impact Duration**	**2018 Credits**	**Grandfathered Credits**
1	Adirondack WH	Depressional/Flat Wetlands	3.18	Less than 90 Days	0.80	6.40
2	Keystone WK	Depressional/Flat Wetlands	0.19	Less than 90 Days	0.05	0.40
3	Keystone WA-1	Depressional/Flat Wetlands	58.66	Less than 90 Days	14.67	117.36
4			0.00	Choose Duration	Credits Owed	Grandfathered Credits Owed
5			0.00	Choose Duration	Credits Owed	Grandfathered Credits Owed
6			0.00	Choose Duration	Credits Owed	Grandfathered Credits Owed
7			0.00	Choose Duration	Credits Owed	Grandfathered Credits Owed
8			0.00	Choose Duration	Credits Owed	Grandfathered Credits Owed
9			0.00	Choose Duration	Credits Owed	Grandfathered Credits Owed
10			0.00	Choose Duration	Credits Owed	Grandfathered Credits Owed

Summary of Credits Owed			
Wetland Type	**Acres of Impact (ac.)**	**2018 Credits**	**Grandfathered Credits**
Freshwater Tidal Wetlands	0.00	0.00	0.00
Saltwater Tidal Wetlands	0.00	0.00	0.00
Riverine/Lacustrine Fringe Wetlands	0.00	0.00	0.00
Slope Wetlands	0.00	0.00	0.00
Depressional/Flat Wetlands	62.03	15.52	124.16
Open Water/Ditch/Canal	0.00	0.00	0.00

Worksheet 1: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Adirondack WH
Acres of Impact (Acres):	3.18
Wetland Type:	Depressional/Flat Wetlands
Date:	March 22, 2019

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Less than 90 Days	0.50
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.25
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**0.80**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**6.40**

Legend

Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 2: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WK
Acres of Impact (Acres):	0.19
Wetland Type:	Depressional/Flat Wetlands
Date:	August 27, 2018

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Less than 90 Days	0.50
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.25
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**0.05**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**0.40**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 3: Qualitative Worksheet for Wetland Adverse Impacts

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WA-1
Acres of Impact (Acres):	58.66
Wetland Type:	Depressional/Flat Wetlands
Date:	August 27, 2018

Impact Factors	**Index Description**	**Index Value**
1. Wetland Qualitative Functional Capacity Score (*WQFC*)	Low	0.50
2. Impact Category Description (*Impact Category*)	Discharge of Fill	1.00
3. Product of WQFC and Impact (*WQFC Impact*) =		0.50
4. Duration of Impact (*Duration*)	Less than 90 Days	0.50
5. Product of WQFC Impact and Duration (*Total WQFC Impact*) =		0.25
6. Product of Total WQFC Impact and Acres **(*Total 2018 Wetland Credits Owed*)** =		**14.67**
7. Conversion of Total 2018 Wetland Compensation to Grandfathered Credits **(*Grandfathered Wetland Credits Owed*)** =		**117.36**

Legend

Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

RIVERINE - LACUSTRINE FRINGE - FRESHWATER TIDAL WETLAND QUALITATIVE ASSESSMENT

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Adirondack WA
Wetland Type:	Riverine
WAA Center Coordinates:	30.522524, -82.095133
Date:	3/22/2019

Water Storage -1

Answer		Questions
Yes		Are there above grade fills or structures obstructing hydrologic flows into or out of the wetland, or are there drainage structures, ditches, or man-made impoundments within 100 feet of the assessment area that are hydrologically affecting the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

BioGeoChemical Cycling - 2

Answer		Questions
No		Is there large woody debris (LWD) in the wetland? (Y/N)
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
Yes		Is the wetland hydrologically connected to the adjacent tributary at bankfull events? If the wetland is Lacustrine Fringe and is associated with a man-made impoundment, then the response to this assessment question should be "No". (Y/N)
FUNCTION SCORE	Low	

Maintain Characteristic Wetland Community - 3

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there greater than 10 percent invasive cover (i.e., cumulative absolute cover across all strata)? (Y/N)
FUNCTION SCORE	Moderate	

Maintain Faunal Habitat - 4

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there woody debris in the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

WETLAND QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Low**

Legend

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RIVERINE - LACUSTRINE FRINGE - FRESHWATER TIDAL WETLAND QUALITATIVE ASSESSMENT

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Adirondack WB
Wetland Type:	Riverine
WAA Center Coordinates:	30.530818, -82.09683
Date:	3/22/2019

Water Storage -1

Answer		Questions
Yes		Are there above grade fills or structures obstructing hydrologic flows into or out of the wetland, or are there drainage structures, ditches, or man-made impoundments within 100 feet of the assessment area that are hydrologically affecting the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

BioGeoChemical Cycling - 2

Answer		Questions
No		Is there large woody debris (LWD) in the wetland? (Y/N)
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
Yes		Is the wetland hydrologically connected to the adjacent tributary at bankfull events? If the wetland is Lacustrine Fringe and is associated with a man-made impoundment, then the response to this assessment question should be "No". (Y/N)
FUNCTION SCORE	Low	

Maintain Characteristic Wetland Community - 3

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there greater than 10 percent invasive cover (i.e., cumulative absolute cover across all strata)? (Y/N)
FUNCTION SCORE	Moderate	

Maintain Faunal Habitat - 4

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there woody debris in the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

WETLAND QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Low**

Legend

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NON-RIVERINE WETLAND QUALITATIVE ASSESSMENT

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Adirondack WC
Wetland Type:	Depression
WAA Center Coordinates:	30.518461, -82.101319
Date:	3/22/2019

Water Storage -1

Answer		Questions
Yes		Are there above grade fills or structures obstructing hydrologic flows into or out of the wetland, or are there drainage structures, ditches, or man-made impoundments within 100 feet of the assessment area and within the catchment that are hydrologically affecting the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

BioGeoChemical Cycling - 2

Answer		Questions
No		Is there large woody debris (LWD) in the wetland? (Y/N)
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
FUNCTION SCORE	Low	

Maintain Characteristic Wetland Community - 3

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there greater than 10 percent invasive cover (i.e., cummulative absolute cover across all strata)? (Y/N)
FUNCTION SCORE	Moderate	

Maintain Faunal Habitat - 4

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there woody debris in the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

WETLAND QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Low**

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NON-RIVERINE WETLAND QUALITATIVE ASSESSMENT

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Adirondack WE
Wetland Type:	Depression
WAA Center Coordinates:	30.525800704956, -82.1039962768554
Date:	3/22/2019

Water Storage -1

Answer		Questions
Yes		Are there above grade fills or structures obstructing hydrologic flows into or out of the wetland, or are there drainage structures, ditches, or man-made impoundments within 100 feet of the assessment area and within the catchment that are hydrologically affecting the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

BioGeoChemical Cycling - 2

Answer		Questions
No		Is there large woody debris (LWD) in the wetland? (Y/N)
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
FUNCTION SCORE	Low	

Maintain Characteristic Wetland Community - 3

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there greater than 10 percent invasive cover (i.e., cummulative absolute cover across all strata)? (Y/N)
FUNCTION SCORE	Moderate	

Maintain Faunal Habitat - 4

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there woody debris in the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

WETLAND QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Low**

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NON-RIVERINE WETLAND QUALITATIVE ASSESSMENT

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Adirondack WF
Wetland Type:	Depression
WAA Center Coordinates:	30.527753, -82.101695
Date:	3/22/2019

Water Storage -1

Answer		Questions
Yes		Are there above grade fills or structures obstructing hydrologic flows into or out of the wetland, or are there drainage structures, ditches, or man-made impoundments within 100 feet of the assessment area and within the catchment that are hydrologically affecting the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

BioGeoChemical Cycling - 2

Answer		Questions
No		Is there large woody debris (LWD) in the wetland? (Y/N)
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
FUNCTION SCORE	Low	

Maintain Characteristic Wetland Community - 3

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there greater than 10 percent invasive cover (i.e., cummulative absolute cover across all strata)? (Y/N)
FUNCTION SCORE	Moderate	

Maintain Faunal Habitat - 4

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there woody debris in the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

WETLAND QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Low**

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NON-RIVERINE WETLAND QUALITATIVE ASSESSMENT

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Adirondack WH
Wetland Type:	Depression
WAA Center Coordinates:	30.5282001495361,-82.0951995849609
Date:	3/22/2019

Water Storage -1

Answer		Questions
Yes		Are there above grade fills or structures obstructing hydrologic flows into or out of the wetland, or are there drainage structures, ditches, or man-made impoundments within 100 feet of the assessment area and within the catchment that are hydrologically affecting the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

BioGeoChemical Cycling - 2

Answer		Questions
No		Is there large woody debris (LWD) in the wetland? (Y/N)
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
FUNCTION SCORE	Low	

Maintain Characteristic Wetland Community - 3

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there greater than 10 percent invasive cover (i.e., cummulative absolute cover across all strata)? (Y/N)
FUNCTION SCORE	Moderate	

Maintain Faunal Habitat - 4

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there woody debris in the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

WETLAND QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Low**

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NON-RIVERINE WETLAND QUALITATIVE ASSESSMENT

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WA-1
Wetland Type:	Depression
WAA Center Coordinates:	30.533427, -82.113963
Date:	8/28/2018

Water Storage -1

Answer		Questions
Yes		Are there above grade fills or structures obstructing hydrologic flows into or out of the wetland, or are there drainage structures, ditches, or man-made impoundments within 100 feet of the assessment area and within the catchment that are hydrologically affecting the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

BioGeoChemical Cycling - 2

Answer		Questions
No		Is there large woody debris (LWD) in the wetland? (Y/N)
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
FUNCTION SCORE	Low	

Maintain Characteristic Wetland Community - 3

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there greater than 10 percent invasive cover (i.e., cummulative absolute cover across all strata)? (Y/N)
FUNCTION SCORE	Moderate	

Maintain Faunal Habitat - 4

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there woody debris in the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

WETLAND QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Low**

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NON-RIVERINE WETLAND QUALITATIVE ASSESSMENT

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WA-2
Wetland Type:	Depression
WAA Center Coordinates:	30.522594, -82.110055
Date:	8/27/2018

Water Storage -1

Answer		Questions
Yes		Are there above grade fills or structures obstructing hydrologic flows into or out of the wetland, or are there drainage structures, ditches, or man-made impoundments within 100 feet of the assessment area and within the catchment that are hydrologically affecting the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

BioGeoChemical Cycling - 2

Answer		Questions
No		Is there large woody debris (LWD) in the wetland? (Y/N)
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
FUNCTION SCORE	Low	

Maintain Characteristic Wetland Community - 3

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there greater than 10 percent invasive cover (i.e., cummulative absolute cover across all strata)? (Y/N)
FUNCTION SCORE	Moderate	

Maintain Faunal Habitat - 4

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there woody debris in the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

WETLAND QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Low**

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NON-RIVERINE WETLAND QUALITATIVE ASSESSMENT

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WA-3
Wetland Type:	Depression
WAA Center Coordinates:	30.518706, -82.121223
Date:	8/27/2018

Water Storage -1

Answer		Questions
Yes		Are there above grade fills or structures obstructing hydrologic flows into or out of the wetland, or are there drainage structures, ditches, or man-made impoundments within 100 feet of the assessment area and within the catchment that are hydrologically affecting the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

BioGeoChemical Cycling - 2

Answer		Questions
No		Is there large woody debris (LWD) in the wetland? (Y/N)
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
FUNCTION SCORE	Low	

Maintain Characteristic Wetland Community - 3

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there greater than 10 percent invasive cover (i.e., cummulative absolute cover across all strata)? (Y/N)
FUNCTION SCORE	Moderate	

Maintain Faunal Habitat - 4

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there woody debris in the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

WETLAND QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Low**

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NON-RIVERINE WETLAND QUALITATIVE ASSESSMENT

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WA-4
Wetland Type:	Depression
WAA Center Coordinates:	30.527381, -82.116402
Date:	8/28/2019

Water Storage -1

Answer		Questions
Yes		Are there above grade fills or structures obstructing hydrologic flows into or out of the wetland, or are there drainage structures, ditches, or man-made impoundments within 100 feet of the assessment area and within the catchment that are hydrologically affecting the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

BioGeoChemical Cycling - 2

Answer		Questions
No		Is there large woody debris (LWD) in the wetland? (Y/N)
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
FUNCTION SCORE	Low	

Maintain Characteristic Wetland Community - 3

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there greater than 10 percent invasive cover (i.e., cummulative absolute cover across all strata)? (Y/N)
FUNCTION SCORE	Moderate	

Maintain Faunal Habitat - 4

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there woody debris in the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

WETLAND QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Low**

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NON-RIVERINE WETLAND QUALITATIVE ASSESSMENT

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WA-5
Wetland Type:	Depression
WAA Center Coordinates:	30.531168, -82.116639
Date:	8/28/2019

Water Storage -1

Answer		Questions
Yes		Are there above grade fills or structures obstructing hydrologic flows into or out of the wetland, or are there drainage structures, ditches, or man-made impoundments within 100 feet of the assessment area and within the catchment that are hydrologically affecting the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

BioGeoChemical Cycling - 2

Answer		Questions
No		Is there large woody debris (LWD) in the wetland? (Y/N)
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
FUNCTION SCORE	Low	

Maintain Characteristic Wetland Community - 3

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there greater than 10 percent invasive cover (i.e., cummulative absolute cover across all strata)? (Y/N)
FUNCTION SCORE	Moderate	

Maintain Faunal Habitat - 4

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there woody debris in the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

WETLAND QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Low**

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NON-RIVERINE WETLAND QUALITATIVE ASSESSMENT

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WA-6
Wetland Type:	Depression
WAA Center Coordinates:	30.528521, -82.120319
Date:	8/28/2019

Water Storage -1

Answer		Questions
Yes		Are there above grade fills or structures obstructing hydrologic flows into or out of the wetland, or are there drainage structures, ditches, or man-made impoundments within 100 feet of the assessment area and within the catchment that are hydrologically affecting the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

BioGeoChemical Cycling - 2

Answer		Questions
No		Is there large woody debris (LWD) in the wetland? (Y/N)
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
FUNCTION SCORE	Low	

Maintain Characteristic Wetland Community - 3

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there greater than 10 percent invasive cover (i.e., cummulative absolute cover across all strata)? (Y/N)
FUNCTION SCORE	Moderate	

Maintain Faunal Habitat - 4

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there woody debris in the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

WETLAND QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Low**

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NON-RIVERINE WETLAND QUALITATIVE ASSESSMENT

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WA-7
Wetland Type:	Depression
WAA Center Coordinates:	30.526562, -82.124897
Date:	8/27/2019

Water Storage -1

Answer		Questions
Yes		Are there above grade fills or structures obstructing hydrologic flows into or out of the wetland, or are there drainage structures, ditches, or man-made impoundments within 100 feet of the assessment area and within the catchment that are hydrologically affecting the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

BioGeoChemical Cycling - 2

Answer		Questions
No		Is there large woody debris (LWD) in the wetland? (Y/N)
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
FUNCTION SCORE	Low	

Maintain Characteristic Wetland Community - 3

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there greater than 10 percent invasive cover (i.e., cummulative absolute cover across all strata)? (Y/N)
FUNCTION SCORE	Moderate	

Maintain Faunal Habitat - 4

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there woody debris in the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

WETLAND QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Low**

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NON-RIVERINE WETLAND QUALITATIVE ASSESSMENT

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WB
Wetland Type:	Depression
WAA Center Coordinates:	30.517829, -82.102881
Date:	8/27/2018

Water Storage -1

Answer		Questions
Yes		Are there above grade fills or structures obstructing hydrologic flows into or out of the wetland, or are there drainage structures, ditches, or man-made impoundments within 100 feet of the assessment area and within the catchment that are hydrologically affecting the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

BioGeoChemical Cycling - 2

Answer		Questions
No		Is there large woody debris (LWD) in the wetland? (Y/N)
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
FUNCTION SCORE	Low	

Maintain Characteristic Wetland Community - 3

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there greater than 10 percent invasive cover (i.e., cummulative absolute cover across all strata)? (Y/N)
FUNCTION SCORE	Moderate	

Maintain Faunal Habitat - 4

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there woody debris in the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

WETLAND QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Low**

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NON-RIVERINE WETLAND QUALITATIVE ASSESSMENT

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WC
Wetland Type:	Depression
WAA Center Coordinates:	30.517680, -82.107293
Date:	8/28/2019

Water Storage -1

Answer		Questions
Yes		Are there above grade fills or structures obstructing hydrologic flows into or out of the wetland, or are there drainage structures, ditches, or man-made impoundments within 100 feet of the assessment area and within the catchment that are hydrologically affecting the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

BioGeoChemical Cycling - 2

Answer		Questions
No		Is there large woody debris (LWD) in the wetland? (Y/N)
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
FUNCTION SCORE	Low	

Maintain Characteristic Wetland Community - 3

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there greater than 10 percent invasive cover (i.e., cummulative absolute cover across all strata)? (Y/N)
FUNCTION SCORE	Moderate	

Maintain Faunal Habitat - 4

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there woody debris in the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

WETLAND QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Low**

Legend

Green Cell = User must manually input information.
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Grey Cells = The calculation of these cells is automated.
Dark Grey Cells = These cells do not require input. The corresponding value is populated from the user input to a previous question.

NON-RIVERINE WETLAND QUALITATIVE ASSESSMENT

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WD
Wetland Type:	Depression
WAA Center Coordinates:	30.517872, -82.110259
Date:	8/29/2019

Water Storage -1

Answer		Questions
Yes		Are there above grade fills or structures obstructing hydrologic flows into or out of the wetland, or are there drainage structures, ditches, or man-made impoundments within 100 feet of the assessment area and within the catchment that are hydrologically affecting the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

BioGeoChemical Cycling - 2

Answer		Questions
No		Is there large woody debris (LWD) in the wetland? (Y/N)
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
FUNCTION SCORE	Low	

Maintain Characteristic Wetland Community - 3

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there greater than 10 percent invasive cover (i.e., cummulative absolute cover across all strata)? (Y/N)
FUNCTION SCORE	Moderate	

Maintain Faunal Habitat - 4

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there woody debris in the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

WETLAND QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Low**

Legend

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RIVERINE - LACUSTRINE FRINGE - FRESHWATER TIDAL WETLAND QUALITATIVE ASSESSMENT

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WF
Wetland Type:	Riverine
WAA Center Coordinates:	30.516719, -82.100659
Date:	8/29/2018

Water Storage -1

Answer		Questions
Yes		Are there above grade fills or structures obstructing hydrologic flows into or out of the wetland, or are there drainage structures, ditches, or man-made impoundments within 100 feet of the assessment area that are hydrologically affecting the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

BioGeoChemical Cycling - 2

Answer		Questions
No		Is there large woody debris (LWD) in the wetland? (Y/N)
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
Yes		Is the wetland hydrologically connected to the adjacent tributary at bankfull events? If the wetland is Lacustrine Fringe and is associated with a man-made impoundment, then the response to this assessment question should be "No". (Y/N)
FUNCTION SCORE	Low	

Maintain Characteristic Wetland Community - 3

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there greater than 10 percent invasive cover (i.e., cumulative absolute cover across all strata)? (Y/N)
FUNCTION SCORE	Moderate	

Maintain Faunal Habitat - 4

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there woody debris in the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

WETLAND QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Low**

Legend

Green Cell = User must manually input information.
Orange Cells = User must select the answer from the drop-down list.
Grey Cells = The calculation of these cells is automated.
Dark Grey Cells = These cells do not require input. The corresponding value is populated from the user input to a previous question.

NON-RIVERINE WETLAND QUALITATIVE ASSESSMENT

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WG
Wetland Type:	Depression
WAA Center Coordinates:	30.516658, -82.102380
Date:	8/29/2018

Water Storage -1

Answer		Questions
Yes		Are there above grade fills or structures obstructing hydrologic flows into or out of the wetland, or are there drainage structures, ditches, or man-made impoundments within 100 feet of the assessment area and within the catchment that are hydrologically affecting the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

BioGeoChemical Cycling - 2

Answer		Questions
No		Is there large woody debris (LWD) in the wetland? (Y/N)
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
FUNCTION SCORE	Low	

Maintain Characteristic Wetland Community - 3

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there greater than 10 percent invasive cover (i.e., cummulative absolute cover across all strata)? (Y/N)
FUNCTION SCORE	Moderate	

Maintain Faunal Habitat - 4

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there woody debris in the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

WETLAND QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Low**

Legend

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Grey Cells = The calculation of these cells is automated.
Dark Grey Cells = These cells do not require input. The corresponding value is populated from the user input to a previous question.

NON-RIVERINE WETLAND QUALITATIVE ASSESSMENT

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WH
Wetland Type:	Depression
WAA Center Coordinates:	30.516734, -82.110320
Date:	8/29/2018

Water Storage -1

Answer		Questions
Yes		Are there above grade fills or structures obstructing hydrologic flows into or out of the wetland, or are there drainage structures, ditches, or man-made impoundments within 100 feet of the assessment area and within the catchment that are hydrologically affecting the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

BioGeoChemical Cycling - 2

Answer		Questions
No		Is there large woody debris (LWD) in the wetland? (Y/N)
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
FUNCTION SCORE	Low	

Maintain Characteristic Wetland Community - 3

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there greater than 10 percent invasive cover (i.e., cummulative absolute cover across all strata)? (Y/N)
FUNCTION SCORE	Moderate	

Maintain Faunal Habitat - 4

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there woody debris in the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

WETLAND QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Low**

Legend

Green Cell = User must manually input information.
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NON-RIVERINE WETLAND QUALITATIVE ASSESSMENT

Project Name:	Twin Pines Minerals
Impact Wetland Name:	Keystone WK
Wetland Type:	Depression
WAA Center Coordinates:	30.533119, -82.123414
Date:	8/29/2018

Water Storage -1

Answer		Questions
Yes		Are there above grade fills or structures obstructing hydrologic flows into or out of the wetland, or are there drainage structures, ditches, or man-made impoundments within 100 feet of the assessment area and within the catchment that are hydrologically affecting the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

BioGeoChemical Cycling - 2

Answer		Questions
No		Is there large woody debris (LWD) in the wetland? (Y/N)
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
FUNCTION SCORE	Low	

Maintain Characteristic Wetland Community - 3

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there greater than 10 percent invasive cover (i.e., cummulative absolute cover across all strata)? (Y/N)
FUNCTION SCORE	Moderate	

Maintain Faunal Habitat - 4

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there woody debris in the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

WETLAND QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Low**

Legend

Green Cell = User must manually input information.
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Dark Grey Cells = These cells do not require input. The corresponding value is populated from the user input to a previous question.

NON-RIVERINE WETLAND QUALITATIVE ASSESSMENT

Project Name:	Twin Pines Minerals
Impact Wetland Name:	TIAA WC
Wetland Type:	Depression
WAA Center Coordinates:	30.525263, -82.131962
Date:	4/9/2019

Water Storage -1

Answer		Questions
Yes		Are there above grade fills or structures obstructing hydrologic flows into or out of the wetland, or are there drainage structures, ditches, or man-made impoundments within 100 feet of the assessment area and within the catchment that are hydrologically affecting the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

BioGeoChemical Cycling - 2

Answer		Questions
No		Is there large woody debris (LWD) in the wetland? (Y/N)
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
FUNCTION SCORE	Low	

Maintain Characteristic Wetland Community - 3

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there greater than 10 percent invasive cover (i.e., cummulative absolute cover across all strata)? (Y/N)
FUNCTION SCORE	Moderate	

Maintain Faunal Habitat - 4

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there woody debris in the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

WETLAND QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Low**

Legend

Green Cell = User must manually input information.
Orange Cells = User must select the choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.
Dark Grey Cells = These cells do not require input. The corresponding value is populated from the user input to a previous question.

NON-RIVERINE WETLAND QUALITATIVE ASSESSMENT

Project Name:	Twin Pines Minerals
Impact Wetland Name:	TIAA WB
Wetland Type:	Depression
WAA Center Coordinates:	30.531296, -82.133047
Date:	4/10/2019

Water Storage -1

Answer		Questions
Yes		Are there above grade fills or structures obstructing hydrologic flows into or out of the wetland, or are there drainage structures, ditches, or man-made impoundments within 100 feet of the assessment area and within the catchment that are hydrologically affecting the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

BioGeoChemical Cycling - 2

Answer		Questions
No		Is there large woody debris (LWD) in the wetland? (Y/N)
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
FUNCTION SCORE	Low	

Maintain Characteristic Wetland Community - 3

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there greater than 10 percent invasive cover (i.e., cummulative absolute cover across all strata)? (Y/N)
FUNCTION SCORE	Moderate	

Maintain Faunal Habitat - 4

Answer		Questions
Yes		Has the vegetative community been adversely altered within the last 20 years? (Y/N)
No		Is there woody debris in the wetland? (Y/N)
No		Is the contributing drainage basin at least 50 percent forested? (Y/N)
FUNCTION SCORE	Low	

WETLAND QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Low**

Legend

Green Cell = User must manually input information.
Orange Cells = User must select the choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.
Dark Grey Cells = These cells do not require input. The corresponding value is populated from the user input to a previous question.

Qualitative Worksheet Summary For Stream Adverse Impacts						
Worksheet Number	**Name of Stream**	**Stream Type**	**Length of Impact (L.F.)**	**Impact Duration**	**2018 Credits**	**Grandfathered Credits**
1	S1i	Intermittent	2238	Permanent/Reoccurring	1007	12085
2	5	Intermittent	639	Permanent/Reoccurring	288	3451
3	S6	Intermittent	315	Permanent/Reoccurring	142	1701
4	S6A	Intermittent	486	Permanent/Reoccurring	219	2624
5	S7	Intermittent	485	Permanent/Reoccurring	218	2619
6	S10	Intermittent	198	Permanent/Reoccurring	67	802
						#N/A

Summary of Credits Owed			
Stream Type	**Length of Impact (L.F.)**	**2018 Credits**	**Grandfathered Credits**
Intermittent/Ephemeral Streams	4361	**1940**	**23282**
Perennial Streams (less than 3 square miles)			
Perennial Streams (greater than 3 square miles)			
Open Water/Ditch/Canal			

Worksheet 1: Qualitative Worksheet for Stream Adverse Impacts

Project Name:	Twin Pines Heavy Minerals Mine - Adirondack
Impact Reach Name:	S1i
Linear Feet of Impact (*Feet*):	2,238
Stream Type:	Intermittent/Ephemeral Streams
Date:	July 1, 2019

Impact Factors	**Index Description**	**Index Value**
1. Stream Qualitative Functional Capacity Score (*SQFC*)	Moderate	0.75
2. Type of Impact (*Impact*)	Discharge of Fill (Including Culverts)	1.00
3. Product of SQFC and Impact (*SQFC Impact*) =		0.75
4. Duration of Impact (*Duration*)	Permanent/Reoccurring	1.00
5. Product of SQFC Impact and Duration (*Total SQFC Impact*) =		0.75
6. Product of Total SQFC Impact and Linear Feet **(*Total 2018 Stream Credits Owed*)** =		**1,007.10**
7. Conversion of Total 2018 Stream Compensation to Grandfathered Credits **(*Grandfathered Stream Credits Owed*)** =		**12,085.20**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 2: Qualitative Worksheet for Stream Adverse Impacts

Project Name:	Twin Pines Heavy Minerals Mine - Adirondack
Impact Reach Name:	S5
Linear Feet of Impact (*Feet*):	639
Stream Type:	Intermittent/Ephemeral Streams
Date:	July 1, 2019

Impact Factors	**Index Description**	**Index Value**
1. Stream Qualitative Functional Capacity Score (*SQFC*)	Moderate	0.75
2. Type of Impact (*Impact*)	Discharge of Fill (Including Culverts)	1.00
3. Product of SQFC and Impact (*SQFC Impact*) =		0.75
4. Duration of Impact (*Duration*)	Permanent/Reoccurring	1.00
5. Product of SQFC Impact and Duration (*Total SQFC Impact*) =		0.75
6. Product of Total SQFC Impact and Linear Feet **(*Total 2018 Stream Credits Owed*)** =		**287.55**
7. Conversion of Total 2018 Stream Compensation to Grandfathered Credits **(*Grandfathered Stream Credits Owed*)** =		**3,450.60**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 3: Qualitative Worksheet for Stream Adverse Impacts

Project Name:	Twin Pines Heavy Minerals Mine - Adirondack
Impact Reach Name:	S6
Linear Feet of Impact (*Feet*):	315
Stream Type:	Intermittent/Ephemeral Streams
Date:	July 1, 2019

Impact Factors	**Index Description**	**Index Value**
1. Stream Qualitative Functional Capacity Score (*SQFC*)	Moderate	0.75
2. Type of Impact (*Impact*)	Discharge of Fill (Including Culverts)	1.00
3. Product of SQFC and Impact (*SQFC Impact*) =		0.75
4. Duration of Impact (*Duration*)	Permanent/Reoccurring	1.00
5. Product of SQFC Impact and Duration (*Total SQFC Impact*) =		0.75
6. Product of Total SQFC Impact and Linear Feet (***Total 2018 Stream Credits Owed***) =		**141.75**
7. Conversion of Total 2018 Stream Compensation to Grandfathered Credits (***Grandfathered Stream Credits Owed***) =		**1,701.00**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 4: Qualitative Worksheet for Stream Adverse Impacts

Project Name:	Twin Pines Heavy Minerals Mine - Adirondack
Impact Reach Name:	S6A
Linear Feet of Impact (*Feet*):	486
Stream Type:	Intermittent/Ephemeral Streams
Date:	July 1, 2019

Impact Factors	**Index Description**	**Index Value**
1. Stream Qualitative Functional Capacity Score (*SQFC*)	Moderate	0.75
2. Type of Impact (*Impact*)	Discharge of Fill (Including Culverts)	1.00
3. Product of SQFC and Impact (*SQFC Impact*) =		0.75
4. Duration of Impact (*Duration*)	Permanent/Reoccurring	1.00
5. Product of SQFC Impact and Duration (*Total SQFC Impact*) =		0.75
6. Product of Total SQFC Impact and Linear Feet (***Total 2018 Stream Credits Owed***) =		**218.70**
7. Conversion of Total 2018 Stream Compensation to Grandfathered Credits (***Grandfathered Stream Credits Owed***) =		**2,624.40**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 5: Qualitative Worksheet for Stream Adverse Impacts

Project Name:	Heavy Minerals Mine - Adirondack
Impact Reach Name:	S7
Linear Feet of Impact (*Feet*):	485
Stream Type:	Intermittent/Ephemeral Streams
Date:	July 1, 2019

Impact Factors	**Index Description**	**Index Value**
1. Stream Qualitative Functional Capacity Score (*SQFC*)	Moderate	0.75
2. Type of Impact (*Impact*)	Discharge of Fill (Including Culverts)	1.00
3. Product of SQFC and Impact (*SQFC Impact*) =		0.75
4. Duration of Impact (*Duration*)	Permanent/Reoccurring	1.00
5. Product of SQFC Impact and Duration (*Total SQFC Impact*) =		0.75
6. Product of Total SQFC Impact and Linear Feet (***Total 2018 Stream Credits Owed***) =		**218.25**
7. Conversion of Total 2018 Stream Compensation to Grandfathered Credits (***Grandfathered Stream Credits Owed***) =		**2,619.00**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 6: Qualitative Worksheet for Stream Adverse Impacts

Project Name:	Twin Pines Heavy Minerals Mining - Adirondack
Impact Reach Name:	S10
Linear Feet of Impact (*Feet*):	198
Stream Type:	Intermittent/Ephemeral Streams
Date:	July 1, 2019

Impact Factors	**Index Description**	**Index Value**
1. Stream Qualitative Functional Capacity Score (*SQFC*)	Moderate	0.75
2. Type of Impact (*Impact*)	Discharge of Fill (Including Culverts)	1.00
3. Product of SQFC and Impact (*SQFC Impact*) =		0.75
4. Duration of Impact (*Duration*)	Short Term - Less than 1 Year	0.75
5. Product of SQFC Impact and Duration (*Total SQFC Impact*) =		0.56
6. Product of Total SQFC Impact and Linear Feet (***Total 2018 Stream Credits Owed***) =		**66.83**
7. Conversion of Total 2018 Stream Compensation to Grandfathered Credits (***Grandfathered Stream Credits Owed***) =		**801.90**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 7: Qualitative Worksheet for Stream Adverse Impacts

Project Name:	Twin Pines Heavy Minerals Mine - Keystone
Impact Reach Name:	S1
Linear Feet of Impact (*Feet*):	297
Stream Type:	Intermittent/Ephemeral Streams
Date:	July 1, 2019

Impact Factors	**Index Description**	**Index Value**
1. Stream Qualitative Functional Capacity Score (*SQFC*)	Moderate	0.75
2. Type of Impact (*Impact*)	Discharge of Fill (Including Culverts)	1.00
3. Product of SQFC and Impact (*SQFC Impact*) =		0.75
4. Duration of Impact (*Duration*)	Permanent/Reoccurring	1.00
5. Product of SQFC Impact and Duration (*Total SQFC Impact*) =		0.75
6. Product of Total SQFC Impact and Linear Feet (***Total 2018 Stream Credits Owed***) =		**133.65**
7. Conversion of Total 2018 Stream Compensation to Grandfathered Credits (***Grandfathered Stream Credits Owed***) =		**1,603.80**

Legend

Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 8: Qualitative Worksheet for Stream Adverse Impacts

Project Name:	
Impact Reach Name:	
Linear Feet of Impact (*Feet*):	
Stream Type:	
Date:	

Impact Factors	**Index Description**	**Index Value**
1. Stream Qualitative Functional Capacity Score (*SQFC*)		#N/A
2. Type of Impact (*Impact*)		#N/A
3. Product of SQFC and Impact (*SQFC Impact*) =		#N/A
4. Duration of Impact (*Duration*)		#N/A
5. Product of SQFC Impact and Duration (*Total SQFC Impact*) =		#N/A
6. Product of Total SQFC Impact and Linear Feet **(*Total 2018 Stream Credits Owed*)** =		**#N/A**
7. Conversion of Total 2018 Stream Compensation to Grandfathered Credits **(*Grandfathered Stream Credits Owed*)** =		**#N/A**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 9: Qualitative Worksheet for Stream Adverse Impacts

Project Name:	
Impact Reach Name:	
Linear Feet of Impact (*Feet*):	
Stream Type:	
Date:	

Impact Factors	**Index Description**	**Index Value**
1. Stream Qualitative Functional Capacity Score (*SQFC*)		#N/A
2. Type of Impact (*Impact*)		#N/A
3. Product of SQFC and Impact (*SQFC Impact*) =		#N/A
4. Duration of Impact (*Duration*)		#N/A
5. Product of SQFC Impact and Duration (*Total SQFC Impact*) =		#N/A
6. Product of Total SQFC Impact and Linear Feet **(*Total 2018 Stream Credits Owed*)** =		**#N/A**
7. Conversion of Total 2018 Stream Compensation to Grandfathered Credits **(*Grandfathered Stream Credits Owed*)** =		**#N/A**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

Worksheet 10: Qualitative Worksheet for Stream Adverse Impacts

Project Name:	
Impact Reach Name:	
Linear Feet of Impact (*Feet*):	
Stream Type:	
Date:	

Impact Factors	**Index Description**	**Index Value**
1. Stream Qualitative Functional Capacity Score (*SQFC*)		#N/A
2. Type of Impact (*Impact*)		#N/A
3. Product of SQFC and Impact (*SQFC Impact*) =		#N/A
4. Duration of Impact (*Duration*)		#N/A
5. Product of SQFC Impact and Duration (*Total SQFC Impact*) =		#N/A
6. Product of Total SQFC Impact and Linear Feet **(*Total 2018 Stream Credits Owed*)** =		**#N/A**
7. Conversion of Total 2018 Stream Compensation to Grandfathered Credits **(*Grandfathered Stream Credits Owed*)** =		**#N/A**

Legend
Green Cells = User must manually input information.
Orange Cells = User must select the index choice from the drop-down list.
Grey Cells = The calculation of these cells is automated.

COASTAL PLAIN QUALITATIVE STREAM ASSESSMENT

Project Name:	Twin Pines Heavy Minerals Mine		
Impact Reach Name:	S1i		
Stream Type:	Ephemeral/Intermittent		
Catchment Size (in Acres):	132.00	Sq. Mi.:	0.21
SAR Center Coordinates:	30.52219963, -82.09580231		
Date:	7/1/2019		

Hydrology - 1

Value		Questions
Yes		The surface and groundwater hydrology of the assessment reach are free of upstream catchment impairments (e.g., diversions, stormwater management structures, wastewater facilities, agricultural ditches)? (Y/N)
No		Is the contributing drainage basin of the assessment reach at least 50 percent forested? (Y/N)
FUNCTION SCORE	**Moderate**	

Hydraulics - 2

Value		Questions
Yes		Is the assessment reach connected to it's floodplain at bankfull event? (Y/N)
No		Are there headcuts in the assessment reach? (Y/N)
No		Has the assessment reach been previously straightened? (Y/N)
FUNCTION SCORE	**High**	

Geomorphology - 3

Value		Questions
Yes		Does the assessment reach have bedform diversity (i.e., the presence of riffle/pool or step/pool complexes)? (Y/N)
No		Is there high bank erosion present throughout the assessment reach? (Y/N)
Yes		Is there large woody debris (LWD) in the assessment reach? (Y/N)
Yes		Is there a woody riparian buffer (i.e., 25 feet in width) adjacent to both sides of the assessment reach? (Y/N)
FUNCTION SCORE	**High**	

Chemistry - 4

Value		Questions
No		Is the contributing drainage basin of the assessment reach at least 50 percent of the forested? (Y/N)
No		Is the assessment reach designated as an impaired water on the most recent 303(D)/305(b) list?
FUNCTION SCORE	**Moderate**	

Biology - 5

Value		Questions
Yes		Is there habitat diversity in the assessment reach (i.e., at least 3 of the following: riffles, pools, steps, overhangs, leaf packs, woody debris)?
No		Is the contributing drainage basin of the assessment reach at least 50 percent of the forested? (Y/N)
SUM	**Moderate**	

STREAM QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Moderate**

Legend

- Green Cell = User must manually input information.
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- Dark Grey Cells = These cells do not require input. The corresponding index value is populated from the user input to a previous question.

COASTAL PLAIN QUALITATIVE STREAM ASSESSMENT

Project Name:	Twin Pines Heavy Minerals Mine		
Impact Reach Name:	S5		
Stream Type:	Ephemeral/Intermittent		
Catchment Size (in Acres):	23.50	Sq. Mi.:	0.04
SAR Center Coordinates:	30.52330017, -82.09670258		
Date:	7/1/2019		

Hydrology - 1

Value		Questions
Yes		The surface and groundwater hydrology of the assessment reach are free of upstream catchment impairments (e.g., diversions, stormwater management structures, wastewater facilities, agricultural ditches)? (Y/N)
No		Is the contributing drainage basin of the assessment reach at least 50 percent forested? (Y/N)
FUNCTION SCORE	**Moderate**	

Hydraulics - 2

Value		Questions
Yes		Is the assessment reach connected to it's floodplain at bankfull event? (Y/N)
No		Are there headcuts in the assessment reach? (Y/N)
Yes		Has the assessment reach been previously straightened? (Y/N)
FUNCTION SCORE	**Moderate**	

Geomorphology - 3

Value		Questions
No		Does the assessment reach have bedform diversity (i.e., the presence of riffle/pool or step/pool complexes)? (Y/N)
No		Is there high bank erosion present throughout the assessment reach? (Y/N)
No		Is there large woody debris (LWD) in the assessment reach? (Y/N)
No		Is there a woody riparian buffer (i.e., 25 feet in width) adjacent to both sides of the assessment reach? (Y/N)
FUNCTION SCORE	**Low**	

Chemistry - 4

Value		Questions
No		Is the contributing drainage basin of the assessment reach at least 50 percent of the forested? (Y/N)
No		Is the assessment reach designated as an impaired water on the most recent 303(D)/305(b) list?
FUNCTION SCORE	**Moderate**	

Biology - 5

Value		Questions
No		Is there habitat diversity in the assessment reach (i.e., at least 3 of the following: riffles, pools, steps, overhangs, leaf packs, woody debris)?
No		Is the contributing drainage basin of the assessment reach at least 50 percent of the forested? (Y/N)
SUM	**Low**	

STREAM QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Moderate**

Legend

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COASTAL PLAIN QUALITATIVE STREAM ASSESSMENT

Project Name:	Twin Pines Heavy Minerals Mine		
Impact Reach Name:	S6		
Stream Type:	Ephemeral/Intermittent		
Catchment Size (in Acres):	98.00	Sq. Mi.:	0.15
SAR Center Coordinates:	30.53129959, -82.09629822		
Date:	7/1/2019		

Hydrology - 1

Value		Questions
No		The surface and groundwater hydrology of the assessment reach are free of upstream catchment impairments (e.g., diversions, stormwater management structures, wastewater facilities, agricultural ditches)? (Y/N)
No		Is the contributing drainage basin of the assessment reach at least 50 percent forested? (Y/N)
FUNCTION SCORE	**Low**	

Hydraulics - 2

Value		Questions
Yes		Is the assessment reach connected to it's floodplain at bankfull event? (Y/N)
No		Are there headcuts in the assessment reach? (Y/N)
No		Has the assessment reach been previously straightened? (Y/N)
FUNCTION SCORE	**High**	

Geomorphology - 3

Value		Questions
Yes		Does the assessment reach have bedform diversity (i.e., the presence of riffle/pool or step/pool complexes)? (Y/N)
No		Is there high bank erosion present throughout the assessment reach? (Y/N)
Yes		Is there large woody debris (LWD) in the assessment reach? (Y/N)
Yes		Is there a woody riparian buffer (i.e., 25 feet in width) adjacent to both sides of the assessment reach? (Y/N)
FUNCTION SCORE	**High**	

Chemistry - 4

Value		Questions
No		Is the contributing drainage basin of the assessment reach at least 50 percent of the forested? (Y/N)
No		Is the assessment reach designated as an impaired water on the most recent 303(D)/305(b) list?
FUNCTION SCORE	**Moderate**	

Biology - 5

Value		Questions
Yes		Is there habitat diversity in the assessment reach (i.e., at least 3 of the following: riffles, pools, steps, overhangs, leaf packs, woody debris)?
No		Is the contributing drainage basin of the assessment reach at least 50 percent of the forested? (Y/N)
SUM	**Moderate**	

STREAM QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Moderate**

Legend
Green Cell = User must manually input information.
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COASTAL PLAIN QUALITATIVE STREAM ASSESSMENT

Project Name:	Twin Pines Heavy Minerals Mine		
Impact Reach Name:	S6A		
Stream Type:	Ephemeral/Intermittent		
Catchment Size (in Acres):	82.50	Sq. Mi.:	0.13
SAR Center Coordinates:	30.53000069, -82.09790039		
Date:	7/1/2019		

Hydrology - 1

Value		Questions
No		The surface and groundwater hydrology of the assessment reach are free of upstream catchment impairments (e.g., diversions, stormwater management structures, wastewater facilities, agricultural ditches)? (Y/N)
No		Is the contributing drainage basin of the assessment reach at least 50 percent forested? (Y/N)
FUNCTION SCORE	**Low**	

Hydraulics - 2

Value		Questions
Yes		Is the assessment reach connected to it's floodplain at bankfull event? (Y/N)
No		Are there headcuts in the assessment reach? (Y/N)
No		Has the assessment reach been previously straightened? (Y/N)
FUNCTION SCORE	**High**	

Geomorphology - 3

Value		Questions
Yes		Does the assessment reach have bedform diversity (i.e., the presence of riffle/pool or step/pool complexes)? (Y/N)
No		Is there high bank erosion present throughout the assessment reach? (Y/N)
Yes		Is there large woody debris (LWD) in the assessment reach? (Y/N)
Yes		Is there a woody riparian buffer (i.e., 25 feet in width) adjacent to both sides of the assessment reach? (Y/N)
FUNCTION SCORE	**High**	

Chemistry - 4

Value		Questions
No		Is the contributing drainage basin of the assessment reach at least 50 percent of the forested? (Y/N)
No		Is the assessment reach designated as an impaired water on the most recent 303(D)/305(b) list?
FUNCTION SCORE	**Moderate**	

Biology - 5

Value		Questions
Yes		Is there habitat diversity in the assessment reach (i.e., at least 3 of the following: riffles, pools, steps, overhangs, leaf packs, woody debris)?
No		Is the contributing drainage basin of the assessment reach at least 50 percent of the forested? (Y/N)
SUM	**Moderate**	

STREAM QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Moderate**

Legend
Green Cell = User must manually input information.
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COASTAL PLAIN QUALITATIVE STREAM ASSESSMENT

Project Name:	Twin Pines Heavy Minerals Mine		
Impact Reach Name:	S7		
Stream Type:	Ephemeral/Intermittent		
Catchment Size (in Acres):	28.00	Sq. Mi.:	0.04
SAR Center Coordinates:	30.53129959, -82.10669708		
Date:	7/1/2019		

Hydrology - 1

Value		Questions
Yes		The surface and groundwater hydrology of the assessment reach are free of upstream catchment impairments (e.g., diversions, stormwater management structures, wastewater facilities, agricultural ditches)? (Y/N)
No		Is the contributing drainage basin of the assessment reach at least 50 percent forested? (Y/N)
FUNCTION SCORE	**Moderate**	

Hydraulics - 2

Value		Questions
Yes		Is the assessment reach connected to it's floodplain at bankfull event? (Y/N)
No		Are there headcuts in the assessment reach? (Y/N)
No		Has the assessment reach been previously straightened? (Y/N)
FUNCTION SCORE	**High**	

Geomorphology - 3

Value		Questions
Yes		Does the assessment reach have bedform diversity (i.e., the presence of riffle/pool or step/pool complexes)? (Y/N)
No		Is there high bank erosion present throughout the assessment reach? (Y/N)
Yes		Is there large woody debris (LWD) in the assessment reach? (Y/N)
Yes		Is there a woody riparian buffer (i.e., 25 feet in width) adjacent to both sides of the assessment reach? (Y/N)
FUNCTION SCORE	**High**	

Chemistry - 4

Value		Questions
No		Is the contributing drainage basin of the assessment reach at least 50 percent of the forested? (Y/N)
No		Is the assessment reach designated as an impaired water on the most recent 303(D)/305(b) list?
FUNCTION SCORE	**Moderate**	

Biology - 5

Value		Questions
Yes		Is there habitat diversity in the assessment reach (i.e., at least 3 of the following: riffles, pools, steps, overhangs, leaf packs, woody debris)?
No		Is the contributing drainage basin of the assessment reach at least 50 percent of the forested? (Y/N)
SUM	**Moderate**	

STREAM QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Moderate**

Legend

Green Cell = User must manually input information.
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COASTAL PLAIN QUALITATIVE STREAM ASSESSMENT

Project Name:	Twin Pines Heavy Minerals Mine		
Impact Reach Name:	S7		
Stream Type:	Ephemeral/Intermittent		
Catchment Size (in Acres):	9.84	Sq. Mi.:	0.02
SAR Center Coordinates:	30.53019905, -82.10870361		
Date:	7/1/2019		

Hydrology - 1

Value		Questions
No		The surface and groundwater hydrology of the assessment reach are free of upstream catchment impairments (e.g., diversions, stormwater management structures, wastewater facilities, agricultural ditches)? (Y/N)
No		Is the contributing drainage basin of the assessment reach at least 50 percent forested? (Y/N)
FUNCTION SCORE	**Low**	

Hydraulics - 2

Value		Questions
Yes		Is the assessment reach connected to it's floodplain at bankfull event? (Y/N)
No		Are there headcuts in the assessment reach? (Y/N)
Yes		Has the assessment reach been previously straightened? (Y/N)
FUNCTION SCORE	**Moderate**	

Geomorphology - 3

Value		Questions
No		Does the assessment reach have bedform diversity (i.e., the presence of riffle/pool or step/pool complexes)? (Y/N)
No		Is there high bank erosion present throughout the assessment reach? (Y/N)
No		Is there large woody debris (LWD) in the assessment reach? (Y/N)
No		Is there a woody riparian buffer (i.e., 25 feet in width) adjacent to both sides of the assessment reach? (Y/N)
FUNCTION SCORE	**Low**	

Chemistry - 4

Value		Questions
No		Is the contributing drainage basin of the assessment reach at least 50 percent of the forested? (Y/N)
No		Is the assessment reach designated as an impaired water on the most recent 303(D)/305(b) list?
FUNCTION SCORE	**Moderate**	

Biology - 5

Value		Questions
No		Is there habitat diversity in the assessment reach (i.e., at least 3 of the following: riffles, pools, steps, overhangs, leaf packs, woody debris)?
No		Is the contributing drainage basin of the assessment reach at least 50 percent of the forested? (Y/N)
SUM	**Low**	

STREAM QUALITATIVE FUNCTIONAL CAPACITY SCORE	**Low**

Legend

- Green Cell = User must manually input information.
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Appendix F:
Supplemental Information

- List of Project Hydrogeologic Tasks Completed or In Progress
- General Mining Information
- Mining / Reclamation Discussion

List of Project Hydrogeologic Tasks Completed or in Progress

TTL, Inc. (TTL) was contracted by Twin Pines Minerals, Inc. (Twin Pines) to perform a hydrogeological investigation of the proposed mine area and the adjacent properties owned by either Trail Ridge Land, LLC and TIAA Timberlands, LLC. The objectives of these studies are to 1) characterize the pre-mining conditions along Trail Ridge, 2) predict the impact of mining operations on groundwater discharge to wetlands adjacent to the proposed mine, and 3) evaluate the post-mining hydrogeologic conditions to inform reclamation/restoration efforts. The list provided below itemizes the investigative tasks either completed or currently underway at the site.

Please note that in order to evaluate the subsurface geology and hydrogeology, data acquisition field activities were performed both within the proposed mining area and on adjacent properties outside of the proposed mining area footprint. Reference to "study area" in the text below refers to field activities conducted within the proposed mining area and adjacent properties.

1. A reference list of 51 reports and technical publications was compiled and reviewed as part of the research for the project. A brief summary of the reviewed data indicates that the site is underlain by the surficial aquifer system which is comprised of post-Miocene age, unconsolidated sand and some clay. Underlying the surficial aquifer is the upper confining unit of the Floridian Aquifer System which consists primarily of the Hawthorn Group of late and middle Miocene age. The upper confining unit is reported to be greater than 100 feet thick and unbreached in the general vicinity of the site. Rocks of the upper Eocene (Ocala Limestone) represent the top of the Floridan Aquifer system and underly the Hawthorn Group. The elevation of the top of the Floridan Aquifer System is estimated to be about 400 to 500 feet below ground surface (or -300 to -400 feet below mean sea level) near the site. A north-south trending ridge known as Trail Ridge is also present at the site. Trail Ridge is about 0.5 to 1 mile wide and extends from northeastern Florida to southeastern Georgia and is generally composed of a fine to medium grained quartzose sand body. The Okefenokee National Wildlife Refuge is located approximately 3 miles northwest of the proposed mining area.

2. To evaluate the subsurface geology, TTL drilled a total of 18 exploratory soil borings to depths ranging from 60 to 135 feet below ground surface (bgs) across the study area. Each of the exploratory soil borings were terminated approximately 10 to 20 feet into the Hawthorn Group. In addition, 108 piezometers/observation wells were drilled and constructed to varying depths across the study area to investigate geologic and hydrologic conditions. Data obtained from these borings indicates that the study area is underlain by the surficial aquifer which ranges in thickness from about 45 to 120 feet. The surficial aquifer is predominantly comprised of a thick sequence of fine to medium grained sand and a lower sand that is often, but not always, slightly coarser grained in its lower part. Discontinuous layers of consolidated to semi-consolidated humate-cemented sands and silty clayey sands were observed in the upper 40 feet of soil within the study area. Clayey sands and clays were also observed in borings across

the study area generally at depths of 40 feet or greater below ground surface. Clays of the Hawthorn Group were encountered at depths ranging from 40 to 70 feet bgs along the eastern and western edges of the study area and to a depth of 122 feet bgs beneath Trail Ridge. Results of undisturbed samples collected from the top of the Hawthorn Group indicate hydraulic conductivities ranging from 3.69×10^{-5} to 9.3×10^{-9} centimeters per second (or 3.69×10^{-2} to 2.64×10^{-5} feet per day). Figure 1 is a conceptual site model for the hydrogeologic conditions at the site.

3. In addition to the above-referenced borings and piezometers, TTL reviewed 387 logs prepared by Twin Pines as part of their mineral exploration investigations within the study area. A TTL geologist was present to log an additional 70 mineral exploration borings performed by Twin Pines within the proposed mining area. Figure 1 provided the locations of borings drilled by Twin Pines and TTL as well as piezometers installed by TTL. Figure 2 provides locations of borings drilled by both TTL and Twin Pines.

4. TTL performed down-hole geophysical logging (formation conductivity and natural gamma logs) in a total of 15 boreholes located within the study area. These boreholes were drilled to the top of the Hawthorn Formation, at depths ranging from 90 to 130 feet bgs. The data obtained from the geophysical logs were compared to the geologist's logs to assist with evaluating site stratigraphy.

5. Data obtained from the above-referenced borings and piezometers were used to generate geologic cross sections of the study area. Additionally, numerous laboratory tests (gradation, moisture, density, porosity, permeability, soil moisture retention curves, etc.) were performed on soil samples collected from the boreholes to characterize surficial and subsurface soil properties at the site. The purpose of this data is to assist in the development of a conceptual site model for the proposed mining area (see Figure 1). Groundwater samples were also collected from six piezometers and two surface water locations within the study area and submitted for laboratory analysis of select metals, cations/anions, alkalinity, total dissolved solids, total organic carbon, phosphorous, and organic acids.

6. TTL performed a total of 24 slug and bail tests in piezometers located within the proposed mining area or on adjacent properties. The purpose of the slug and bail tests was to evaluate the horizontal hydraulic conductivity of the surficial aquifer at the site. The data from each test was independently analyzed by Hydro Geo Chem, Inc. (HGC) of Phoenix, Arizona using Aqtesolv™ computer software (KGS and Bouwer-Rice Methods for unconfined aquifers). Results of the data analyses indicated horizontal hydraulic conductivity values ranging from about 0.2 feet per day (ft/day) to 174 ft per day.

7. In addition to construction of piezometers to monitor groundwater levels, a total of 22 staff gages were installed to monitor surface water points within the study area.

8. To date, TTL has installed a total 74 In-Situ data loggers in piezometers and at staff gage locations within the study area. Baro-Trolls were also installed to monitor barometric pressure changes at the site. The purpose of the data loggers is to continuously monitor fluctuations in surface water and groundwater elevations at the site. Additionally, three rain gages were installed on and near the site to collect a continuous record of rainfall.

9. Depths to groundwater within the study area generally range from 1 to 3 feet bgs depending on seasonal fluctuations observed to date. Based on data obtained from the piezometers, potentiometric surface maps were generated for the study area (see Figure 3). Review of the maps indicates that Trail Ridge represents a hydrogeologic divide between the Okefenokee National Wildlife Refuge and the St. Mary's River resulting in groundwater along Trail Ridge flowing west towards the swamp and east to the St. Mary's River.

10. In order to evaluate background water quality at the site, TTL sampled groundwater from six piezometer and two surface water locations for select cations, anions, metals, organic and volatile acids, alkalinity (total and bicarbonate), total organic content, total dissolved solids, nitrogen, phosphate, uranium and thorium.

11. Data obtained during subsurface investigations identified the occurrence of a humate-cemented sand (Black Sand). The Black Sand unit, where present, comprises a lower permeability zone than the surrounding unconsolidated sand unit. This Black Sand unit also appears to support near surface shallow groundwater in portions of the study area. The occurrence and characteristics of the Black Sand lead to a series of specific studies in order to evaluate the significance of the Black Sand relative to the hydrology of the site.

12. TTL contracted with Geohazards Engineering Geology, Inc. of Gainesville, Florida to conduct a geophysical survey pilot study using three different geophysical methods (electrical resistivity, ground penetrating radar and seismic refraction). The purpose of the pilot study was to evaluate the effectiveness of these three methods in mapping both the top and the bottom of the Black Sand. The pilot study indicated ambiguous results between the individual geophysical methods as well as inconsistencies in the depth of the Black Sand when compared to field data collected from borings at the site. As a result, it was determined that geophysical surveys were not appropriate for mapping the Black Sand unit.

13. Because geophysical surveys were not capable of mapping the subsurface continuity of the Black Sand, 50 additional soil borings were drilled and described to further define the subsurface extent of Black Sand units.

14. The permeability of sands returned to the mine pit during reclamation/restoration may need to be reduced to ensure that groundwater levels are appropriate for maintaining wetlands. Bench-scale studies were conducted to evaluate methods for decreasing the permeability of sands returned to the mining pit. TTL drilled 14 soil borings across the

study area and collected bulk sand samples from ground surface to 50 feet bgs, which represents the proposed mining impact depth. The bulk sand samples from 0 to 50 feet bgs sands were drummed by individual boring location and transported to Minerals Technologies in Stark, Florida to process the material in the same manner as the proposed mining extraction process (i.e. extraction of the humate, clays, and heavy minerals). The post-processed sands (minus humate, clays, and heavy minerals) were drummed by individual boring location and delivered to TTL for permeability testing. TTL then performed permeability testing of remolded samples with various percent mixtures of bentonite.

15. A pumping test was performed at a location near the crest of Trail Ridge and in the central portion of the proposed mine area. A total of 11 observation wells (eight shallow and three deep) were installed for the pumping test. In addition, one large diameter pumping well was drilled and installed to the top of the Hawthorn Formation (a depth of 115 feet bgs). The pumping test was conducted as a step test with 24 hours of pumping with the final rate of pumping set at 120 gallons per minute (GPM). HGC analyzed the data from the from pumping and observation wells separately, and by considering pairs of observation wells to provide estimates of transmissivity (T) and storage coefficient (S). Estimates of T and S from pumping well data range from 530 ft^2/day to 697 ft^2/day and from 2.4 x 10^{-3} to 0.11, respectively. T estimates from the shallowest water table well data that range from 5455 ft^2/day to 9500 ft^2/day based on Neuman unconfined analysis are considered unreasonably large and unreliable. Excluding these estimates, observation well data yield T estimates ranging from approximately 53 ft^2/day to 1100 ft^2/day; however, the majority of the estimates are lower than for the pumping well and average 432 ft^2/day. Estimates of S from observation well data range from approximately 1 x 10^{-10} to 5 x 10^{-3}; estimates of horizontal hydraulic conductivity (Kh) range from <1 to 11 ft/day; estimates of vertical hydraulic conductivity (Kv) range from 8.6 x 10^{-5} ft/day to 1.5 ft/day; and estimates of aquitard vertical hydraulic conductivity range from 1.1 x 10^{-6} ft/day to 0.3 ft/day.

16. TTL has partnered with The University of Alabama and a professor at The University of Mississippi for groundwater modeling services. Two independent groundwater flow models will be developed from the laboratory and field data collected in the Twin Pines study area. the data collected to complete two independent groundwater flow models. One model will be a steady-state model using U.S. Geological Survey (USGS) codes in the MODFLOW family. A second transient surface-groundwater flow model (GSFLOW) will also be completed for the site. This model will couple both precipitation, infiltration, recharge, and surface water processes with groundwater flow to evaluate hydrology and hydrogeology for the site.

TTL will document the efforts described above in a series of reports, including:

- "Pumping Tests Conducted in the Twin Pines Project Area" – This report will describe the activities associated with and interpretation of two pumping tests conducted in the study area.

- "Subsurface Hydrogeology of the Twin Pines Project Area, Trail Ridge, Georgia" – This report will summarize the regional geology and hydrology of the Trail Ridge area, document drilling efforts (including boring logs), identify subsurface hydrogeologic units, present cross-sections and subsurface maps of hydrogeologic units, define the potentiometric surface of the surficial aquifer system, and develop a conceptual hydrogeological model of the study area.
- "Hydraulic Properties of Subsurface Soils in the Twin Pines Project Area, Trail Ridge, Georgia" – Measured hydraulic and other properties of the subsurface soils will be documented in this report.
- "Groundwater Models of the Twin Pines Project Area, Trail Ridge, Georgia" – This report will document the groundwater models produced to evaluate the pre-mining conditions, the impact of mining activities on groundwater flow, and the post-mining groundwater conditions.

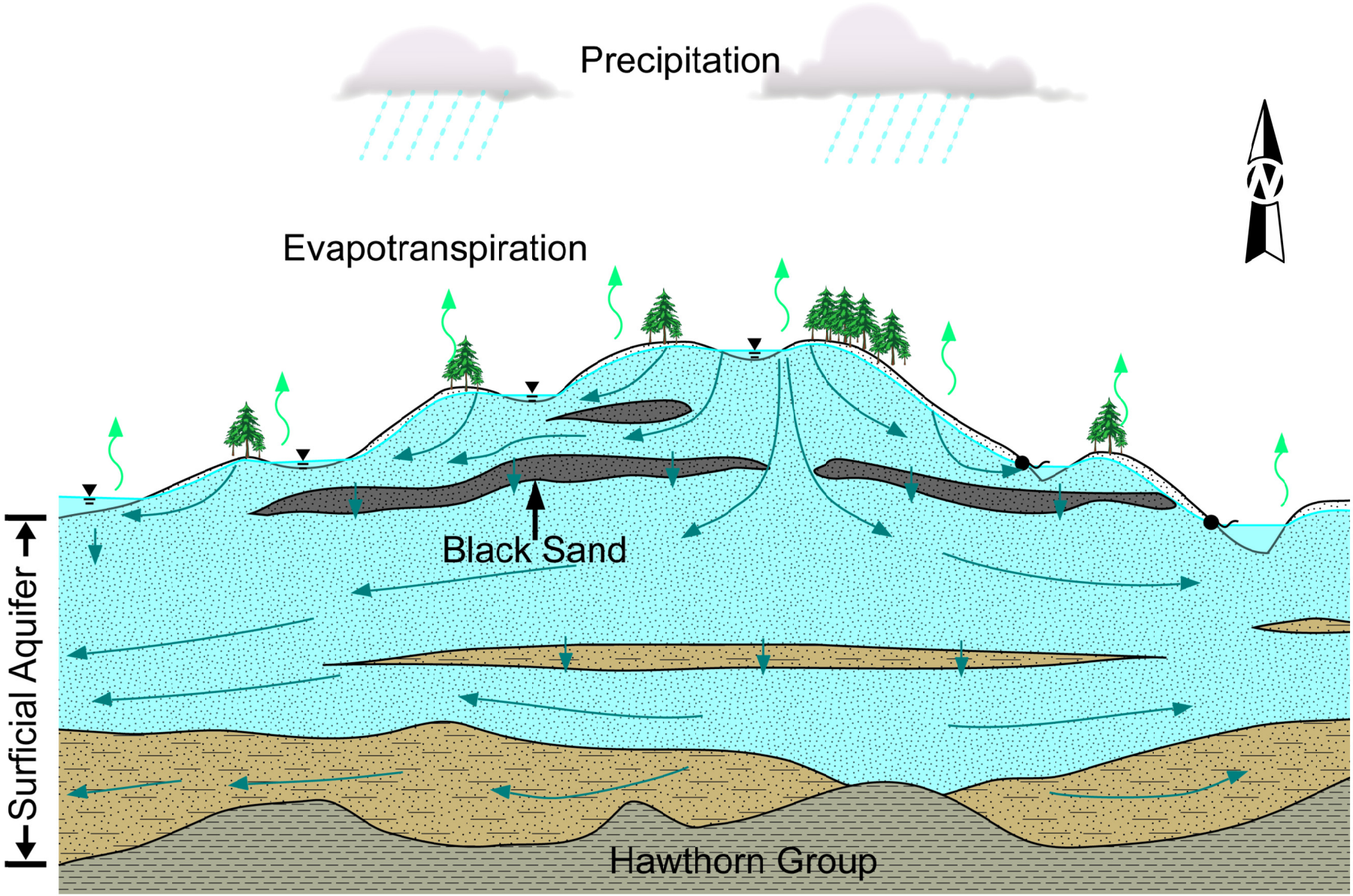
General Mining Information

Figure 4 provides an estimated mining production timeline for the proposed project. Mining will begin on the TIAA property initially followed by mining of the Keystone property and then the Adirondack property. Mining of the three properties will be performed utilizing doziers and track-hoes on the TIAA property and drag-line extraction on the Keystone and Adirondack properties. As shown in Figure 5, mining is estimated to be completed on the TIAA property within three years of the start of mining. Mining of the Adirondack property is estimated to be completed in approximately year eight from the start of mining on the TIAA property. Mining on Keystone is estimated to be completed within these mining timeframes. Figure 5 provides a layout of proposed facility structures. Figure 6 illustrates the progression of mining in cross section format.

Mining/Reclamation Discussion

On the Keystone and Adirondack Properties (Figure XX), Twin Pines will use a mobile drag line to excavate mineralized sands from a small mine pit (maximum size: 500 ft long, 100 feet wide, and 25 – 70 feet deep). On the TIAA Property (Figure XX), the mineralized zone is much shallower (10 – 20 ft), and mining will be performed using dozers and tracked excavator (maximum pit size: 500 ft long, 100 ft wide [BH1], and 10 – 20 ft deep). On all properties, the excavated materials will be moved to an onsite processing facility using a mobile conveyor, where the heavy minerals will be removed from the other sand. 98% of the mined sand will then be returned as spoils to the inactive portion of the mine pit. The mine pits will advance approximately 100 feet per day. As the pit advances into unmined areas, the inactive portion of the pit will be filled with spoil at the same rate as the pit advances. The average time that a portion of the pit will remain open is approximately 5 days.

The mine pit will be continuously advancing, and reclamation of the pit will occur simultaneously. Following the return of spoils to the mine pit, piezometers will be installed to monitor the recovery of groundwater levels. If needed, soil amendments will be included with the spoils to reduce the vertical permeability of the spoils to maintain groundwater levels needed for wetlands. The topography of the reclaimed mine spoils will be returned as close to pre-project elevations as possible, with the final elevations determined from recovered groundwater levels. The post-project wetland area will be equivalent to the pre-project wetland area, and upland areas will be constructed for Long-Leaf Pine.



TTL

CONCEPTUAL SITE MODEL
TWIN PINES MINERALS
USACE INDIVIDUAL PERMIT APPLICATION

ST. GEORGE, CHARLTON COUNTY, GEORGIA

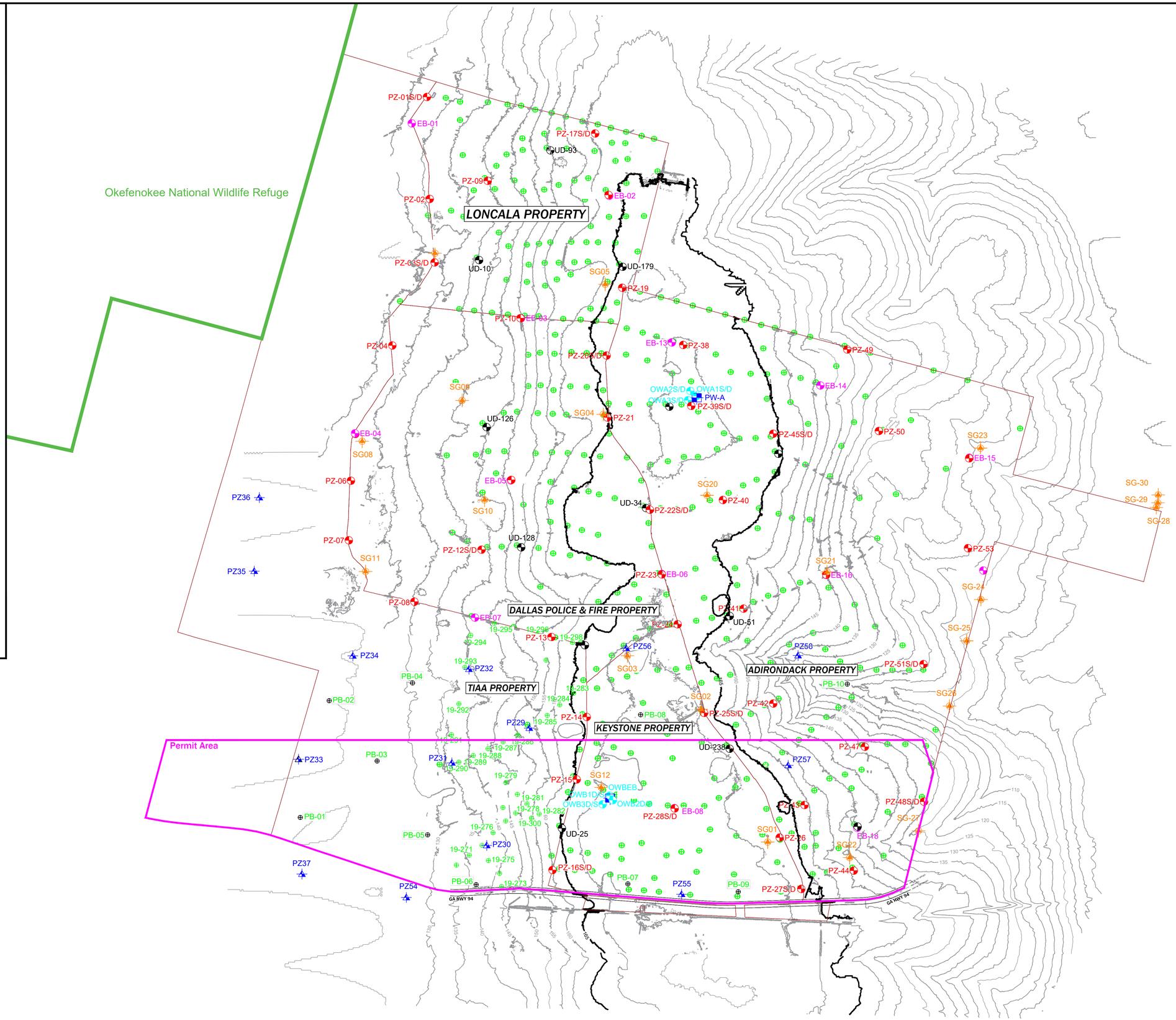
Drawn By:	RMH
Checked By:	RMH
Date:	06/01/2019
Proj. No.	000180200804.00
File Name:	CSM Trail Ridge.dwg

Sheet Title

FIGURE 1.

LEGEND

- Approximate Property Boundary
- Mining Permit Boundary
- Mining Impact Area
- Piezometer Location and ID
- Piezometer Location and ID
- Undisturbed Sample Location and ID
- Exploratory Boring Location and ID
- Pumping Well Location and ID
- Observation Well Location and ID
- Staff Gauge Location and ID
- TIAA Client Borings
- TTL Proposed Borings



0 900 1800
SCALE IN FEET

Drawn By: ACP
Checked By: JMT/JRS
Date: 06/28/2019
Proj. No.: 000180200804.00
File Name:General Map_client

FIGURE 2.

SITE MAP SHOWING BORING LOCATIONS

TWIN PINES MINERALS

USACE INDIVIDUAL PERMIT APPLICATION

ST. GEORGE, CHARLTON COUNTY, GEORGIA

TTL
3516 Greensboro Avenue | Tuscaloosa, AL 35401
205.345.0816 | www.ttlusa.com

LEGEND

- Approximate Property Boundary
- Mining Permit Boundary
- Mining Impact Area
- Piezometer Location and ID
- Staff Gauge Location and ID
- Groundwater Contour of Potentiometric Surface (c.i. = 5 ft. AMSL)
- 127.39 Groundwater Elevation (ft. AMSL)
- Groundwater Flow Direction

Okefenokee National Wildlife Refuge

Permit Area

GA HWY 94

0 1300 2600
SCALE IN FEET

Drawn By: ACP
Checked By: JMT/JRS
Date: 07/03/2019
Proj. No.: 00018020080400
File Name:General Map_client

FIGURE 3.

POTENTIOMETRIC SURFACE MAP 04-26-2019

TWIN PINES MINERALS

USACE INDIVIDUAL PERMIT APPLICATION

ST. GEORGE, CHARLTON COUNTY, GEORGIA

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LEGEND

- Approximate Property Boundary
- Mining Permit Boundary
- Mining Impact Area
- Year One Estimate
- Year Two Estimate
- Year Three Estimate
- Year Four Estimate
- Year Five Estimate
- Year Six Estimate
- Year Seven Estimate
- Year Eight Estimate

DALLAS POLICE & FIRE PROPERTY

TIAA PROPERTY

ADIRONDACK PROPERTY

KEYSTONE PROPERTY

100' buffer around mining infrastructure

100' wide dragline cuts

HWY 94 100' OFFSET

HWY 94 CL

HWY 94 100' OFFSET

GA HWY 94

GA HWY 94

Avoidance areas

0 550 1,100

SCALE IN FEET

Drawn By: ACP
Checked By: JMT/JRS
Date: 07/03/2019
Proj. No.: 00018020080 4.00
File Name:General Map_client

FIGURE 4.

ESTIMATED MINING PRODUCTION TIMELINE

TWIN PINES MINERALS

USACE INDIVIDUAL PERMIT APPLICATION

ST. GEORGE, CHARLTON COUNTY, GEORGIA

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3516 Greensboro Avenue | Tuscaloosa, AL 35401
205.345.0816 | www.ttlusa.com

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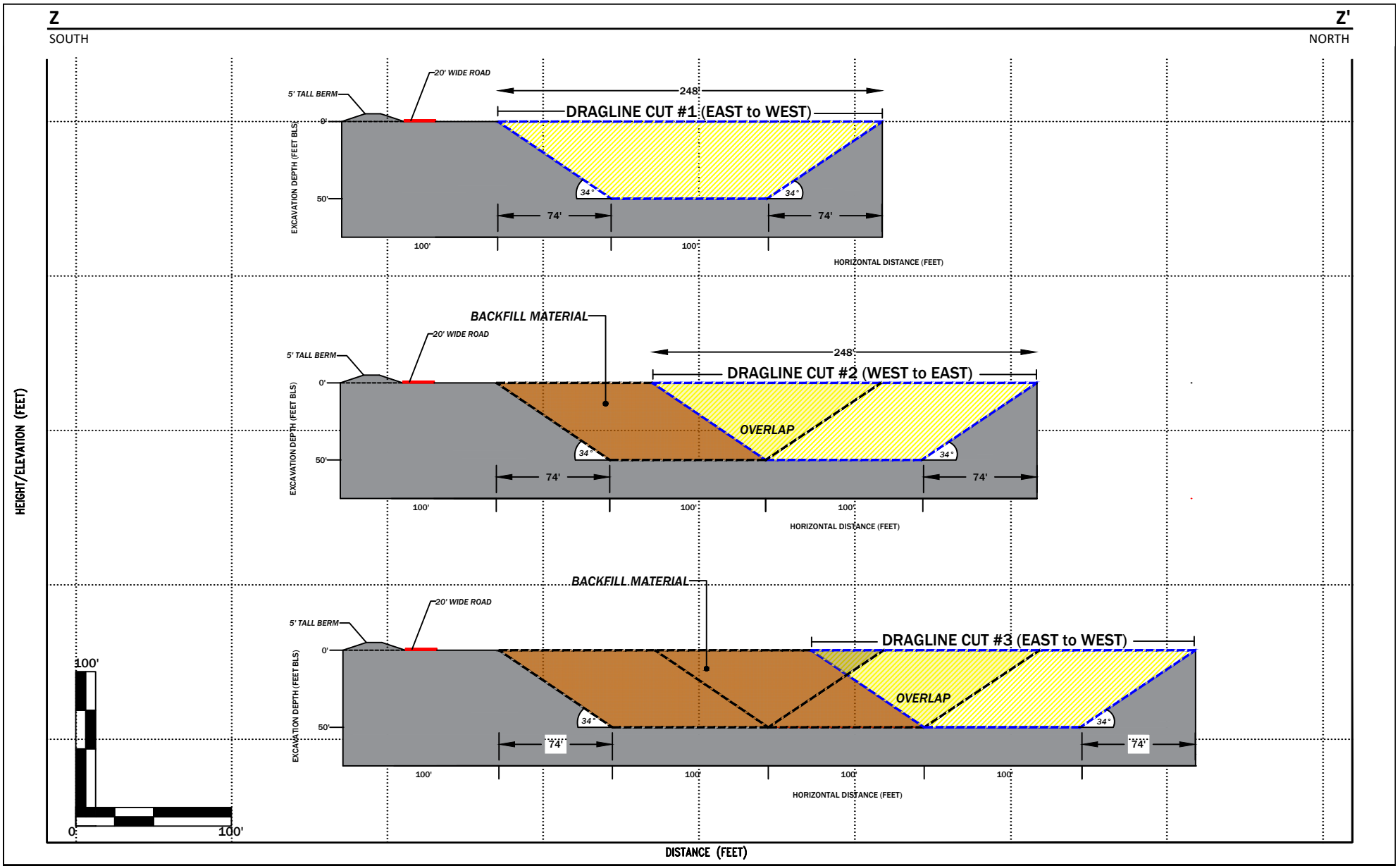
FIGURE 5: PROPOSED SITE LAYOUT MAP

TWIN PINES MINERALS

USACE INDIVIDUAL PERMIT APPLICATION

BASEMAP: DigitalGlobe, 1/24/2016 & 9/17/2017.

DRAWN BY: CMS
CHECKED BY: AGW
DRAWING DATE: 6/29/2019
REVISION DATE: N/A
TTL JOB NO.: 000180200804.00
APPROXIMATE SCALE: 1" = 1,500'



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LEGEND:

UNEXCAVATED MATERIAL | DRAGLINE EXCAVATION | BACKFILLED MATERIAL | OVERLAP

Figure 6.
Impact Excavation Design
Cross-Section Z - Z'
Twin Pines Minerals
USACE Individual Permit Application
St. George, Charlton County, Georgia

DRAWN BY:	ACP
CHECKED BY:	JMT
TTL PROJECT NO.:	000180200804.00
DATE:	07/03/2019
FILE PATH:	M:\Projects\2018\[000180200804.00 - Twin Pines Minerals Permitting Services\CAD\dwg\TP XSNs DRAFT 4-2019 ACP].DWGs