

GEORGIA COUNTIES

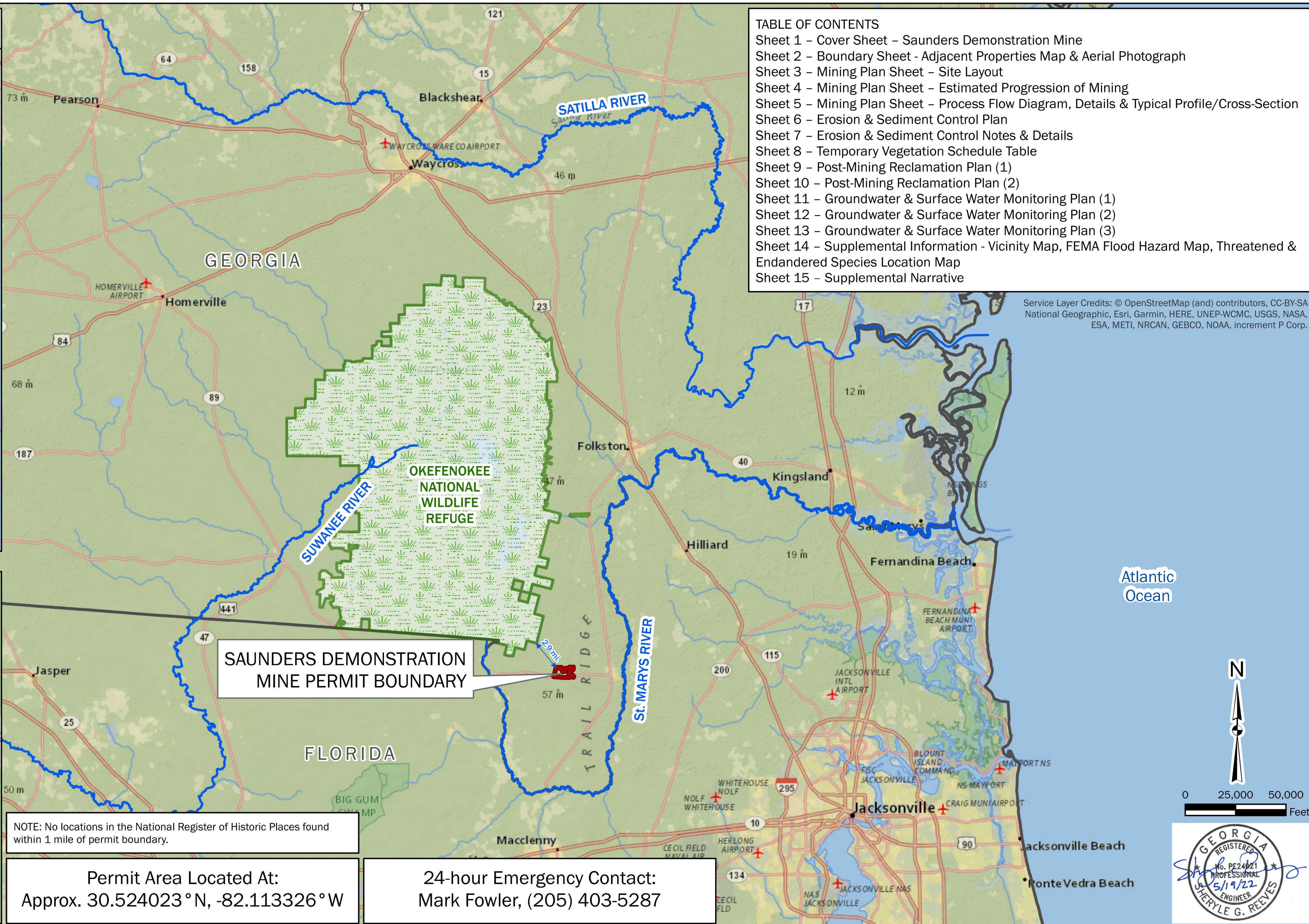
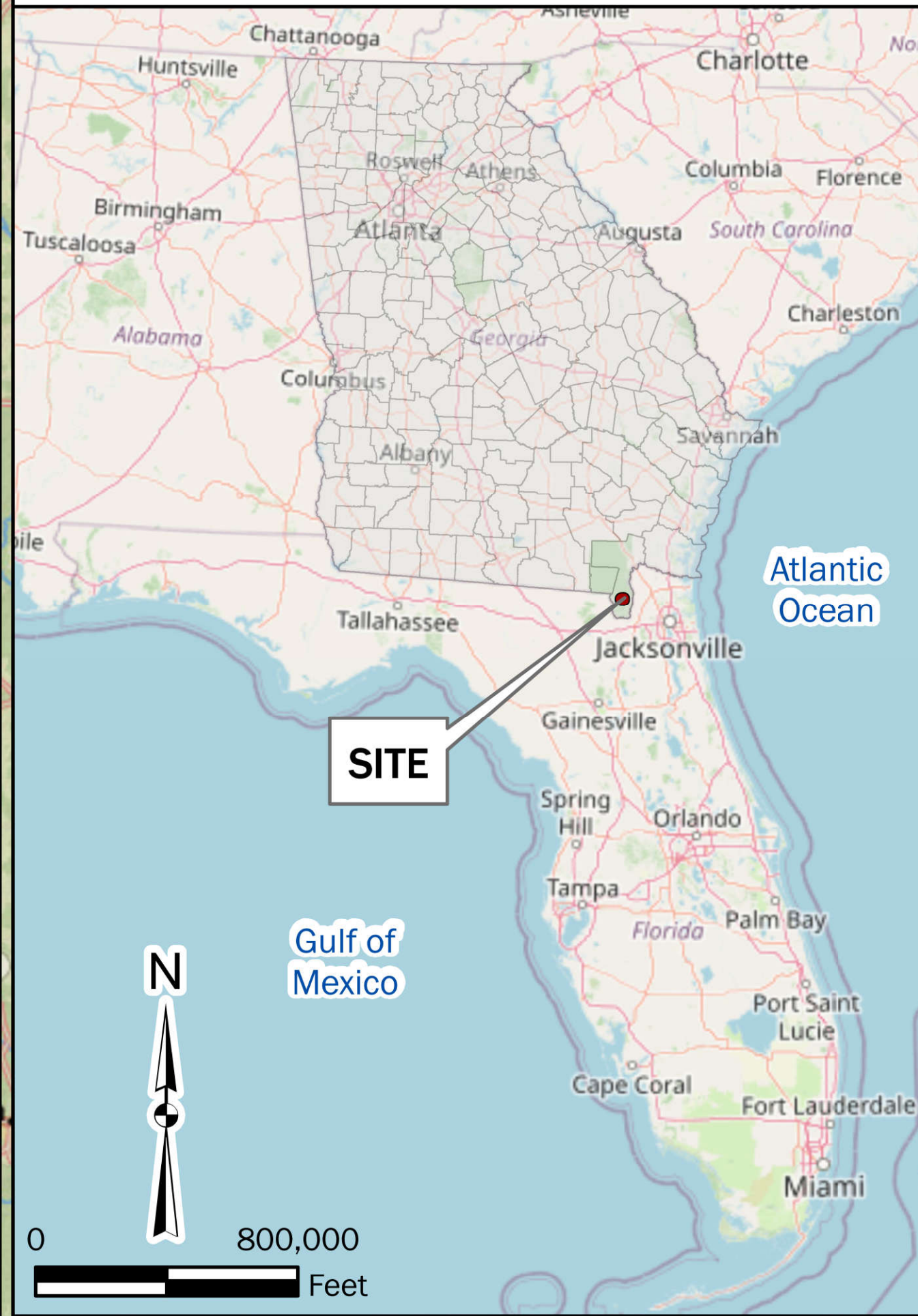


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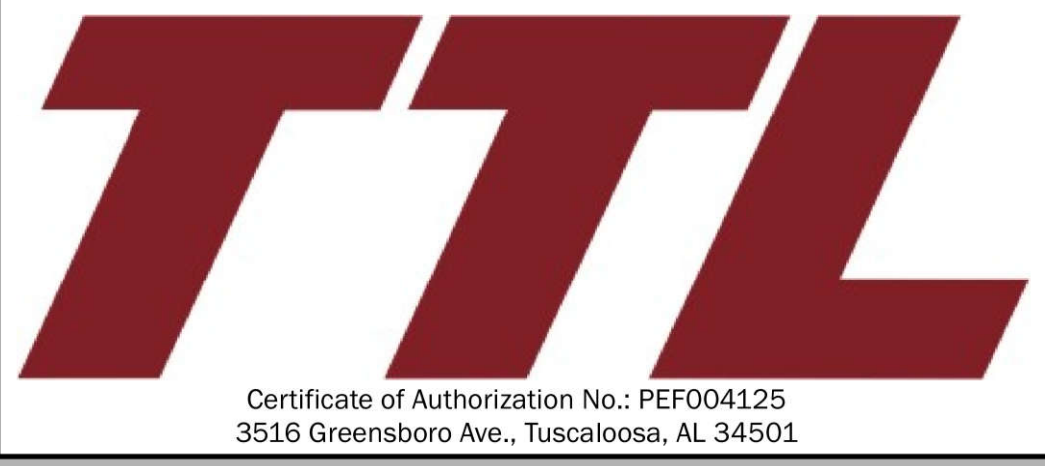
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Service Layer Credits: © OpenStreetMap (and) contributors, CC-BY-SA
 National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

NOTE: No locations in the National Register of Historic Places found within 1 mile of permit boundary.

Permit Area Located At:
 Approx. 30.524023° N, -82.113326° W

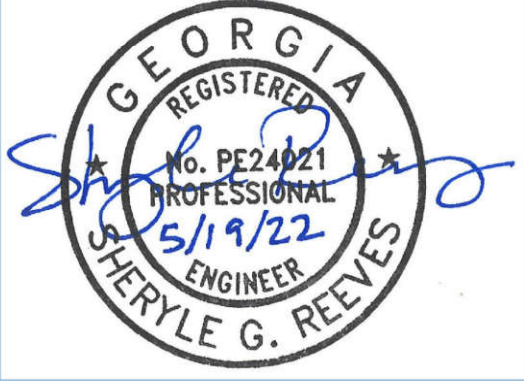
24-hour Emergency Contact:
 Mark Fowler, (205) 403-5287

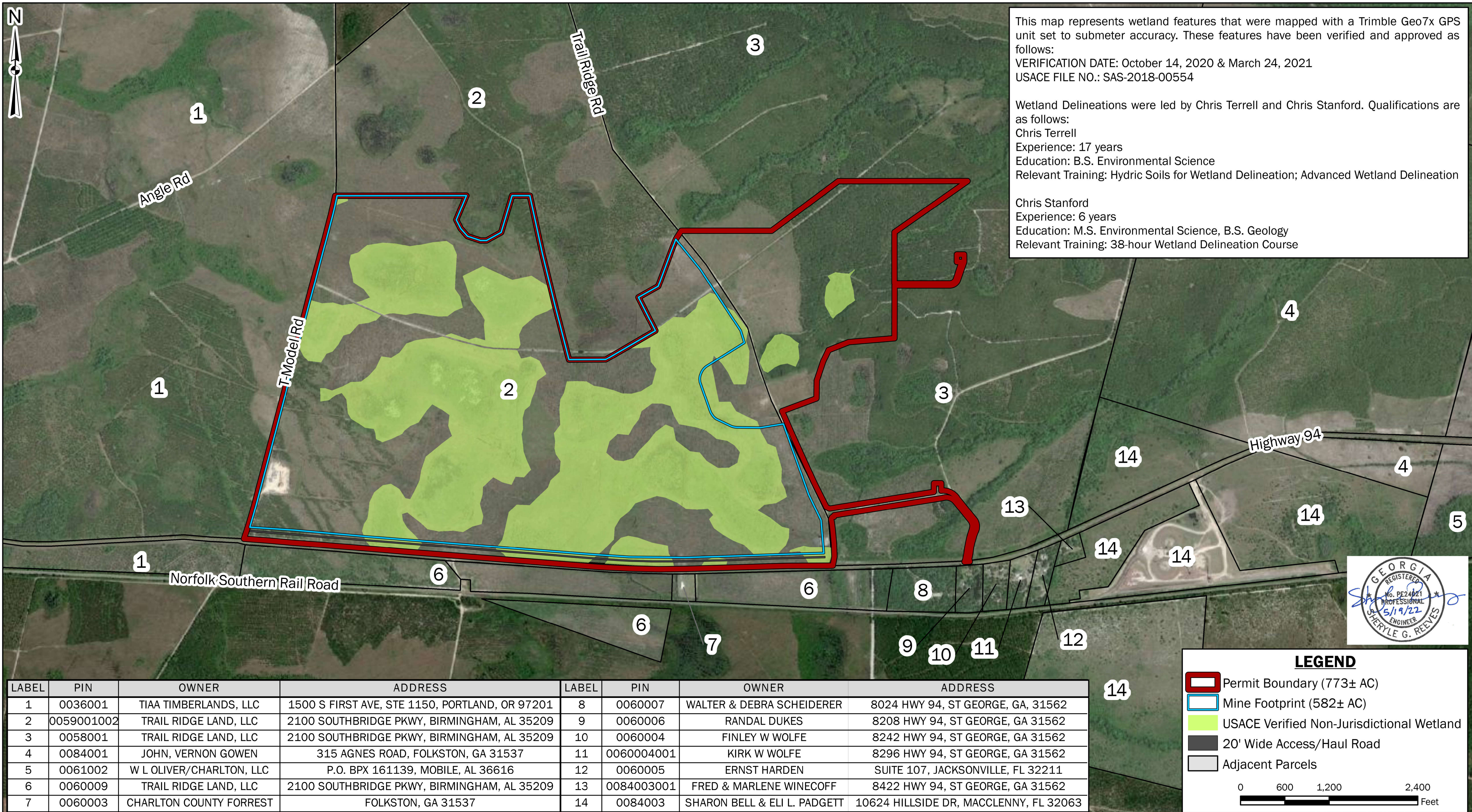


SHEET 1: COVER SHEET - SAUNDERS DEMONSTRATION MINE
 TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE (ID NO. 2073)
 ST. GEORGE, CHARLTON COUNTY, GEORGIA

INSET BASEMAP: Open Street Map; BASEMAP: National Geographic World Map (See Service Layer Credits).

| |
|---------------------------------|
| DRAWN BY: DEK |
| CHECKED BY: SGR |
| DRAWING DATE: 11/13/2020 |
| REVISION DATE: 5/19/2022 |
| TTL JOB NO.: 18-02-00804.00 |
| APPROX. SCALE: 1 in = 25,000 ft |





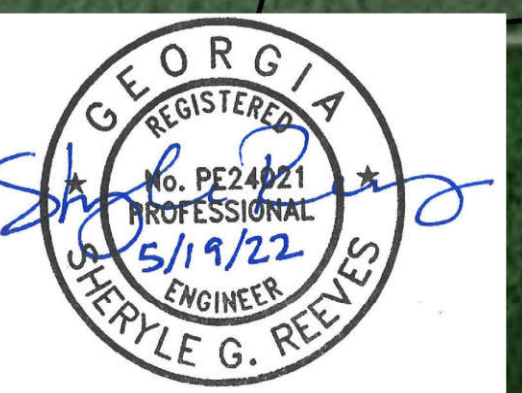
This map represents wetland features that were mapped with a Trimble Geo7x GPS unit set to submeter accuracy. These features have been verified and approved as follows:

VERIFICATION DATE: October 14, 2020 & March 24, 2021
 USACE FILE NO.: SAS-2018-00554

Wetland Delineations were led by Chris Terrell and Chris Stanford. Qualifications are as follows:

Chris Terrell
 Experience: 17 years
 Education: B.S. Environmental Science
 Relevant Training: Hydric Soils for Wetland Delineation; Advanced Wetland Delineation

Chris Stanford
 Experience: 6 years
 Education: M.S. Environmental Science, B.S. Geology
 Relevant Training: 38-hour Wetland Delineation Course



LEGEND

- Permit Boundary (773± AC)
- Mine Footprint (582± AC)
- USACE Verified Non-Jurisdictional Wetland
- 20' Wide Access/Haul Road
- Adjacent Parcels



| LABEL | PIN | OWNER | ADDRESS | LABEL | PIN | OWNER | ADDRESS |
|-------|------------|--------------------------|--|-------|------------|------------------------------|--|
| 1 | 0036001 | TIAA TIMBERLANDS, LLC | 1500 S FIRST AVE, STE 1150, PORTLAND, OR 97201 | 8 | 0060007 | WALTER & DEBRA SCHEIDERER | 8024 HWY 94, ST GEORGE, GA, 31562 |
| 2 | 0059001002 | TRAIL RIDGE LAND, LLC | 2100 SOUTHBRIDGE PKWY, BIRMINGHAM, AL 35209 | 9 | 0060006 | RANDAL DUKES | 8208 HWY 94, ST GEORGE, GA 31562 |
| 3 | 0058001 | TRAIL RIDGE LAND, LLC | 2100 SOUTHBRIDGE PKWY, BIRMINGHAM, AL 35209 | 10 | 0060004 | FINLEY W WOLFE | 8242 HWY 94, ST GEORGE, GA 31562 |
| 4 | 0084001 | JOHN, VERNON GOWEN | 315 AGNES ROAD, FOLKSTON, GA 31537 | 11 | 0060004001 | KIRK W WOLFE | 8296 HWY 94, ST GEORGE, GA 31562 |
| 5 | 0061002 | W L OLIVER/CHARLTON, LLC | P.O. BPX 161139, MOBILE, AL 36616 | 12 | 0060005 | ERNST HARDEN | SUITE 107, JACKSONVILLE, FL 32211 |
| 6 | 0060009 | TRAIL RIDGE LAND, LLC | 2100 SOUTHBRIDGE PKWY, BIRMINGHAM, AL 35209 | 13 | 0084003001 | FRED & MARLENE WINECOFF | 8422 HWY 94, ST GEORGE, GA 31562 |
| 7 | 0060003 | CHARLTON COUNTY FORREST | FOLKSTON, GA 31537 | 14 | 0084003 | SHARON BELL & ELI L. PADGETT | 10624 HILLSIDE DR, MACCLENNY, FL 32063 |



Certificate of Authorization No.: PEF004125
 3516 Greensboro Ave., Tuscaloosa, AL 35401

SHEET 2: BOUNDARY SHEET - ADJACENT PROPERTIES MAP & AERIAL PHOTOGRAPH

TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE (ID NO. 2073)

ST. GEORGE, CHARLTON COUNTY, GEORGIA

BASEMAP: Maxar Technologies, Vivid Imagery, 5/7/2021 (0.5 m Resolution).

DRAWN BY: DEK

CHECKED BY: SGR

DRAWING DATE: 11/13/2020

REVISION DATE: 5/19/2022

TTL JOB NO.: 18-02-00804.00

APPROX. SCALE: 1 in = 600 ft

SURVEY SOURCE INFORMATION:
 As a part of the field data acquisition activities, two separate surveys were conducted within the project study area. Southern Resource Mapping, located in Tuscaloosa Alabama, was subcontracted by Twin Pines Minerals, LLC, to perform an aerial topographic survey using a Riegl LIDAR 780i (digital ortho) sensor. The LIDAR configuration included an Applanix AP60 IMU coupled with an AirBourne GPS and was affixed to a Cessna 206 fixed-wing aircraft. A flight plan was generated that produced 18 points-per-square meter(s), and was flown at an elevation of 1,700 feet above ground surface (ags). This resulted in a total of 17 flight lines which included one cross line. From the data collected by Southern Resource Mapping, a topographic map layer containing one-foot contour intervals was generated and used as a workable base map for the majority of the project area (shown at five foot interval).

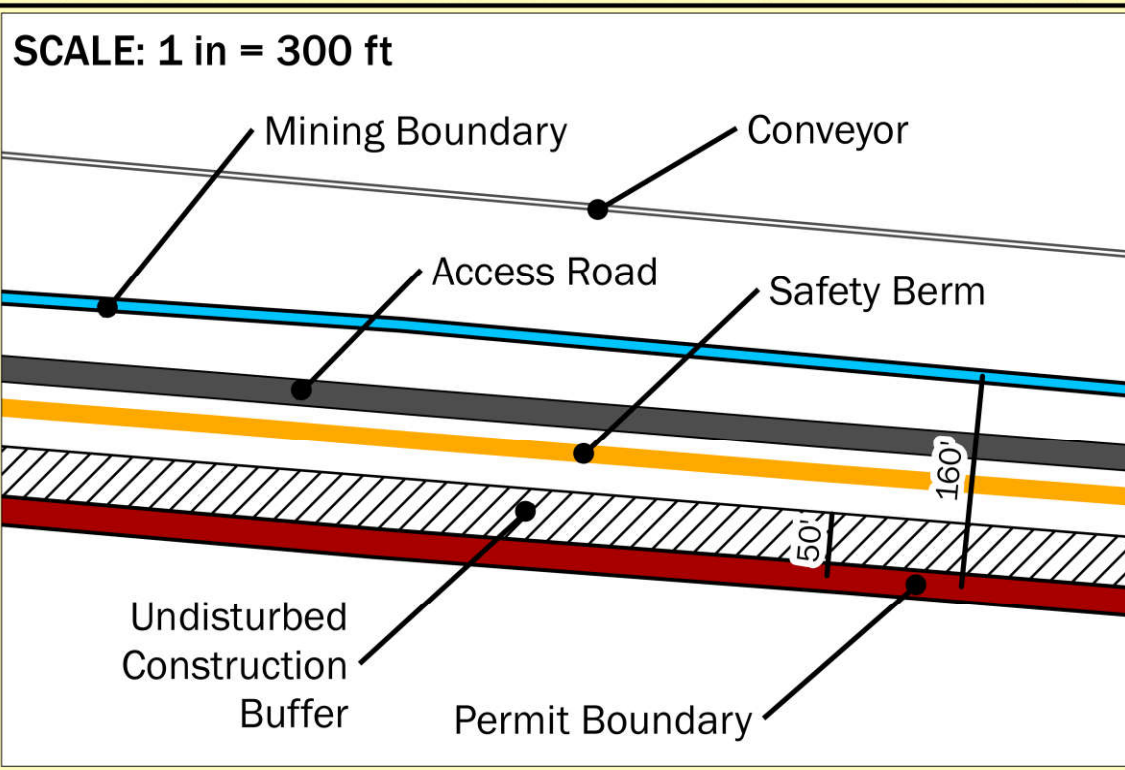
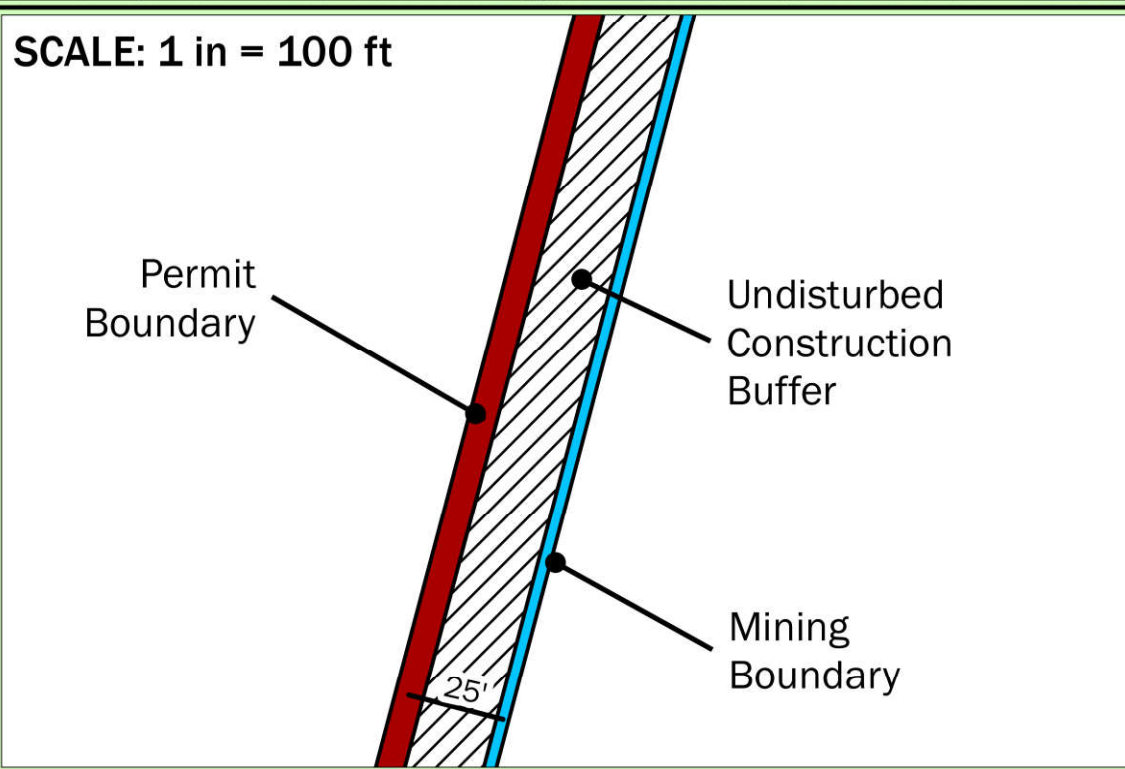
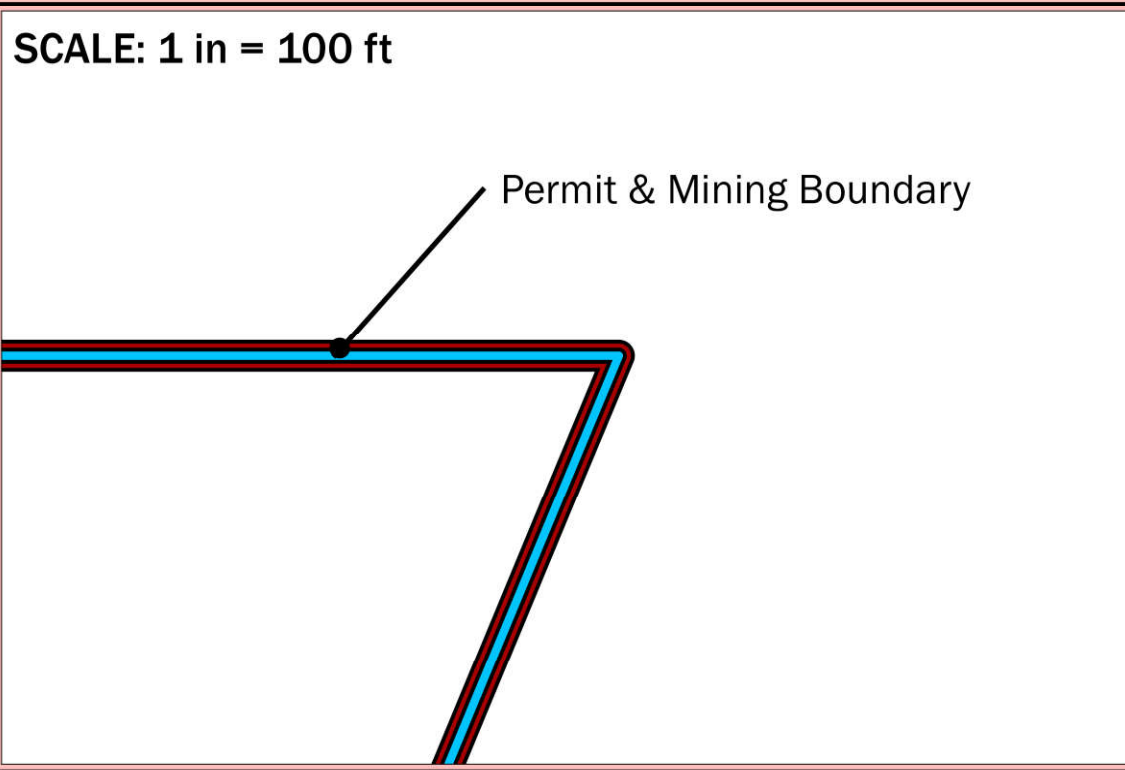
| Site Survey Control | | |
|----------------------------------|---------------------------|-----------------------------|
| Type | Identifier | Location |
| Property Boundary | Fence Post/Stake - Red | Property Corners |
| Mining Permit Boundary | Fence Post/Stake - Green | Approx. 200-foot intervals* |
| Buffer Boundary | Fence Post/Stake - Blue | Approx. 200-foot intervals* |
| Mining Pit Boundary | Fence Post/Stake - Orange | Approx. 200-foot intervals* |
| Permanent Survey Control Markers | Fence Post/Stake - Yellow | To be determined |

*Intervals may be adjusted based on site conditions.

LEGEND

- Permit Boundary (773± AC)
- Mine Footprint (582± AC)
- USACE Verified Non-Jurisdictional Wetland
- 20' Wide Access Road
- Safety Berm
- Undisturbed Construction Buffer
- Process Water/Stormwater Management Pond
- PCP/WCP Pre-Concentration Plant / Wet Concentration Plant
- 5 ft Elevation Contour (See Survey Source Information)
- Permit Boundary Corner Coordinates

0 600 1,200 2,400 Feet

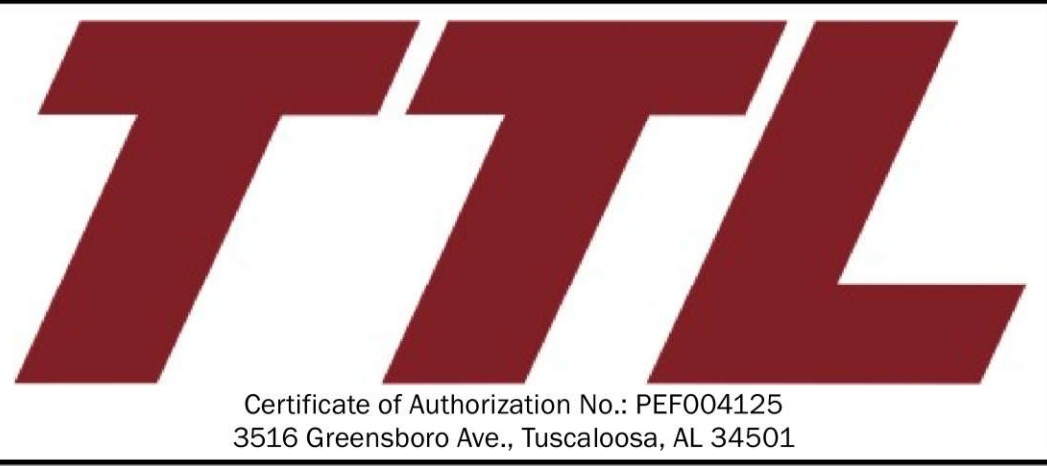


[OPERATOR'S NAME]
 [MINE NAME]
 [PERMIT NUMBER]
 [CONTACT INFORMATION]

IDENTIFICATION SIGN (Typical)

NOTES:

- Access road will be installed between the safety berm and the mining area.
- Undisturbed construction buffer will be located between the safety berm and Highway 94.
- See Sheet 5 for plan view, cross-sections and details of the typical dragline mining operation.
- Tails stockpile and conveyors will move in accordance with the moving mine pit and are not permanent features; runoff will be controlled by berms, silt fence, hay bales or any combination thereof (see Sheet 6 for erosion & sediment control plan).
- Process water will be piped to the Mineral Separation Plant from the southernmost well (FPW-01). Any wastewater from the Mineral Separation Plant will be hauled, by tanked trucks, to the Wet Concentration Plant for re-use. See Exhibit J for design and details related to management ponds.



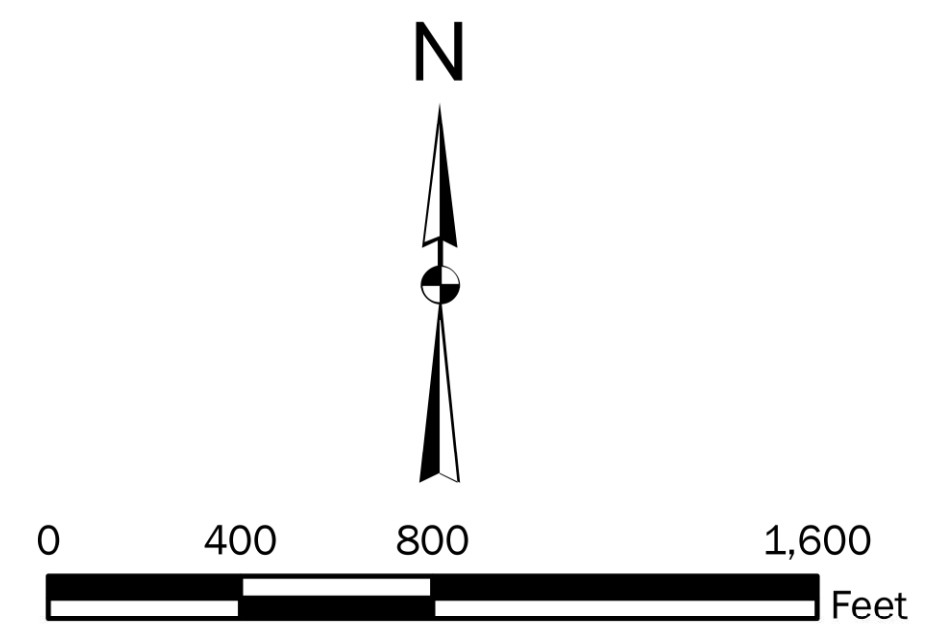
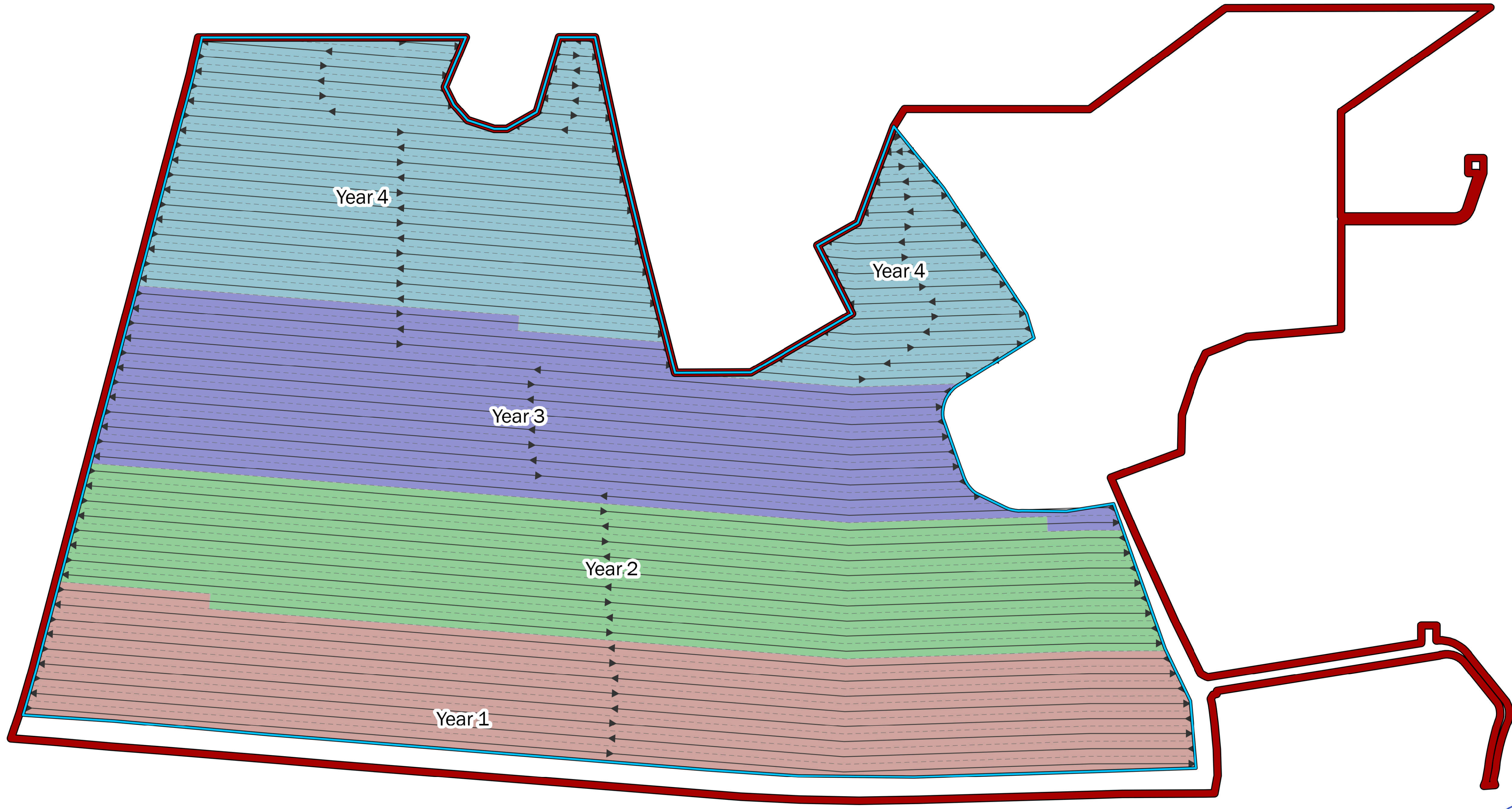
SHEET 3: MINING PLAN SHEET - SITE LAYOUT
 TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE (ID NO. 2073)
 ST. GEORGE, CHARLTON COUNTY, GEORGIA

BASEMAP: Maxar Technologies, Vivid Imagery, 5/7/2021 (0.5 m Resolution).

| |
|------------------------------|
| DRAWN BY: DEK |
| CHECKED BY: SGR |
| DRAWING DATE: 11/13/2020 |
| REVISION DATE: 5/19/2022 |
| TTL JOB NO.: 18-02-00804.00 |
| APPROX. SCALE: 1 in = 600 ft |



NOTES:
 - Estimated timing is based on a mining progress rate of 10-15 acres per month. The illustration represents the average of those values (170 feet per day). Actual timing for extraction of heavy mineral sands is expected to range from 4 to 5 years.
 - See Sheet 5 for plan view, cross-sections and details of the typical dragline mining operation.
 - Tails stockpile and conveyors will move in accordance with the moving mine pit and are not permanent features.
 - See Sheet 7 for information regarding dust control.
 - See Sheet 14 for additional information regarding flood prone areas and threatened and endangered species locations.



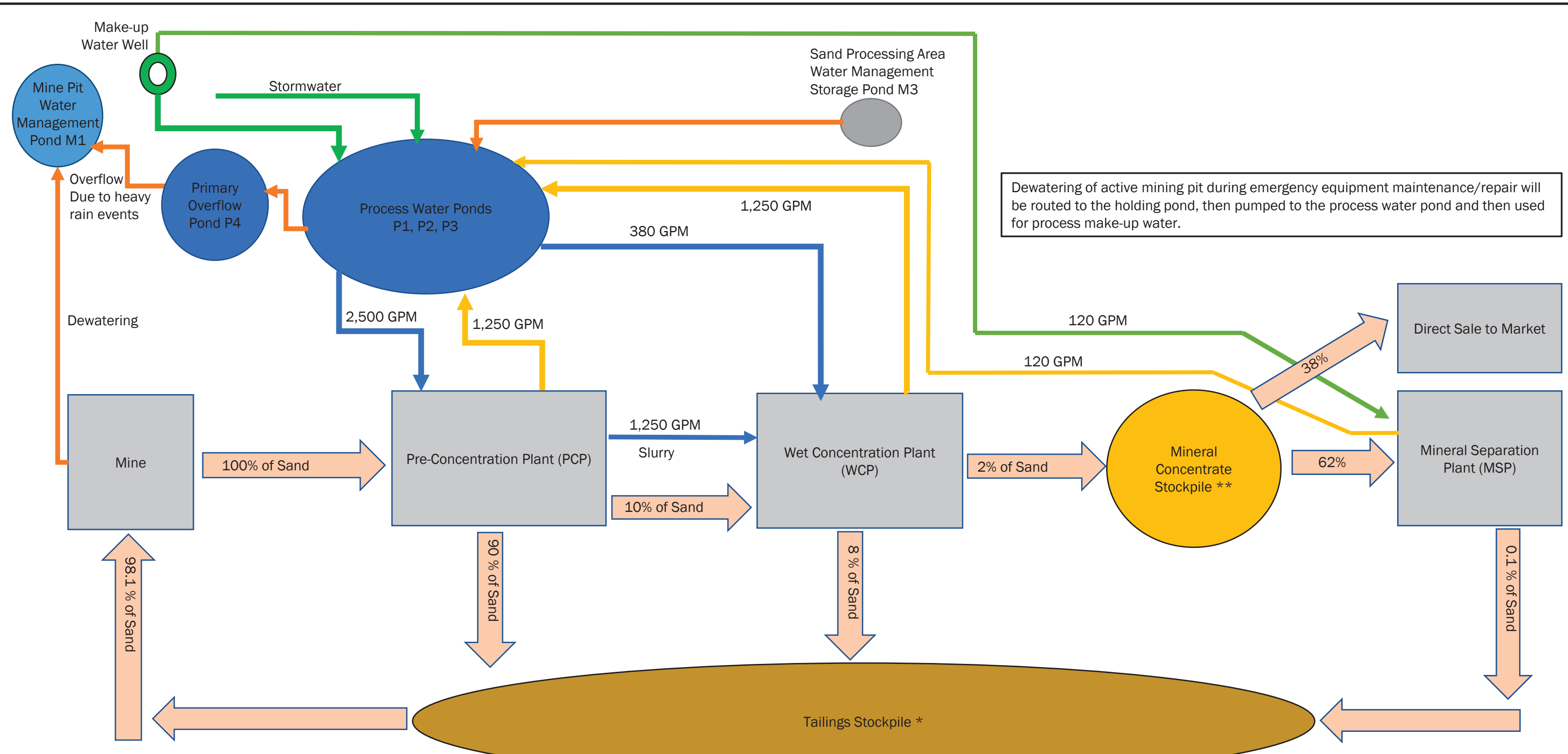
LEGEND

- Permit Boundary (773± AC)
- Mine Footprint (582± AC)
- Year 1
- Year 2
- Year 3
- Year 4
- ←←← East-to-West Dragline Center
- West-to-East Dragline Center
- Edge of Dragline Pass



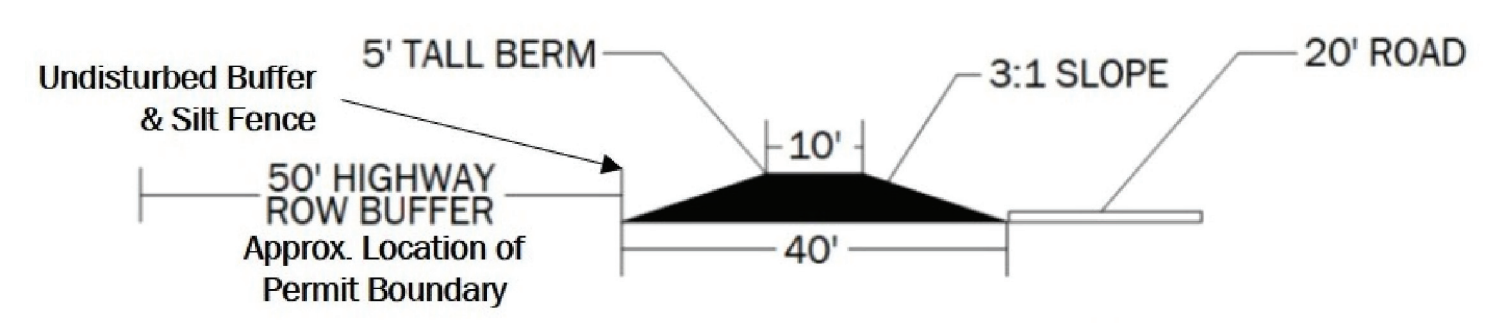
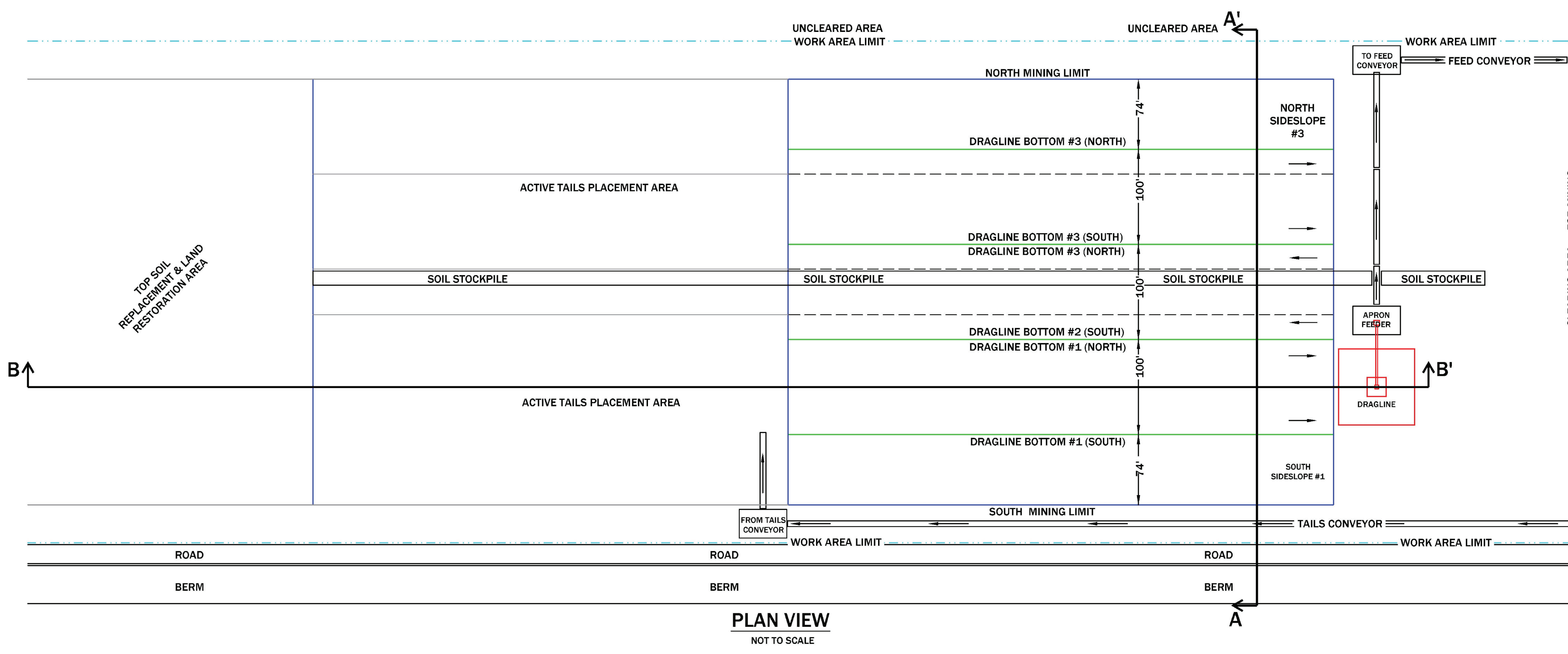
SHEET 4: MINING PLAN SHEET - ESTIMATED PROGRESSION OF MINING
 TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE (ID NO. 2073)
 ST. GEORGE, CHARLTON COUNTY, GEORGIA

| |
|------------------------------|
| DRAWN BY: DEK |
| CHECKED BY: SGR |
| DRAWING DATE: 11/13/2020 |
| REVISION DATE: 5/19/2022 |
| TTL JOB NO.: 18-02-00804.00 |
| APPROX. SCALE: 1 in = 400 ft |

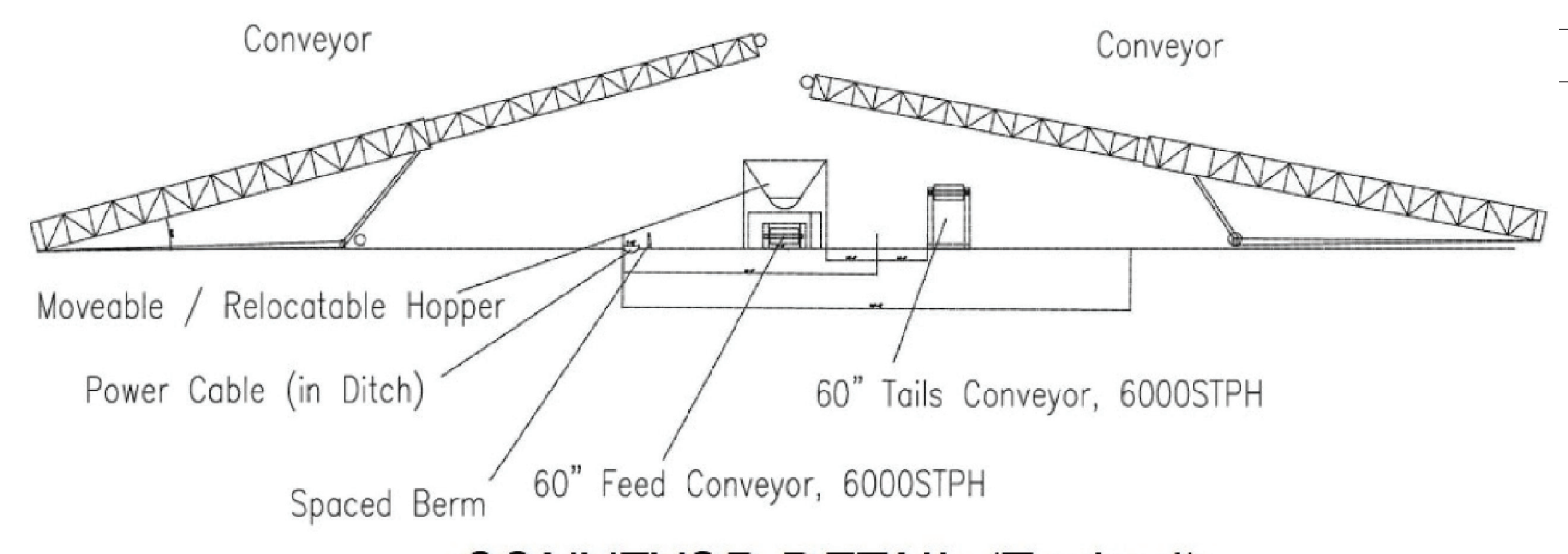


NOTES:
 1. All material shall be hauled, utilizing trucks, between the permitted mine, wet processing areas, and Mineral Separation Plant south of Highway 94.
 2. Process water shall be piped to the Mineral Separation Plant from the southernmost well (FPW-01). Any wastewater from the Mineral Separation Plant shall be hauled, by tanked trucks, to the Wet Concentration Plant for re-use.

MINING PROCESS FLOW DIAGRAM



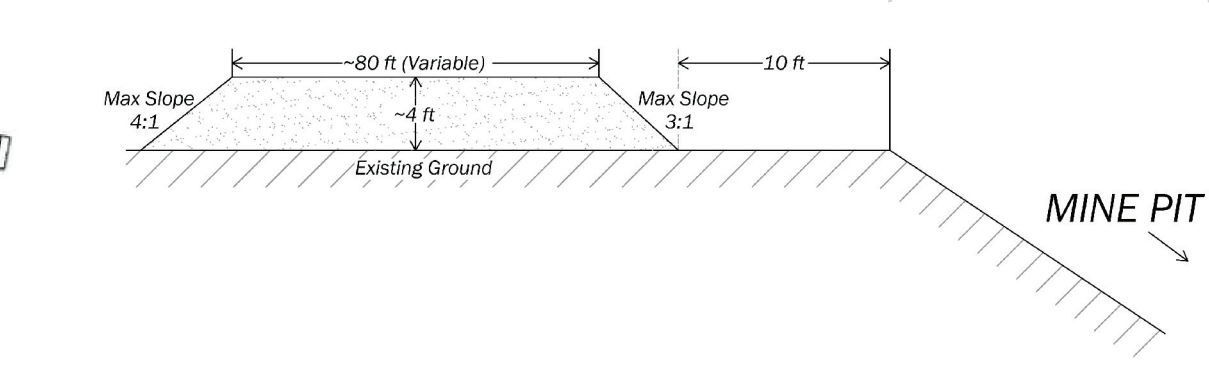
EXCAVATION PERIMETER & SAFETY BERM (Typ.)
NOT TO SCALE



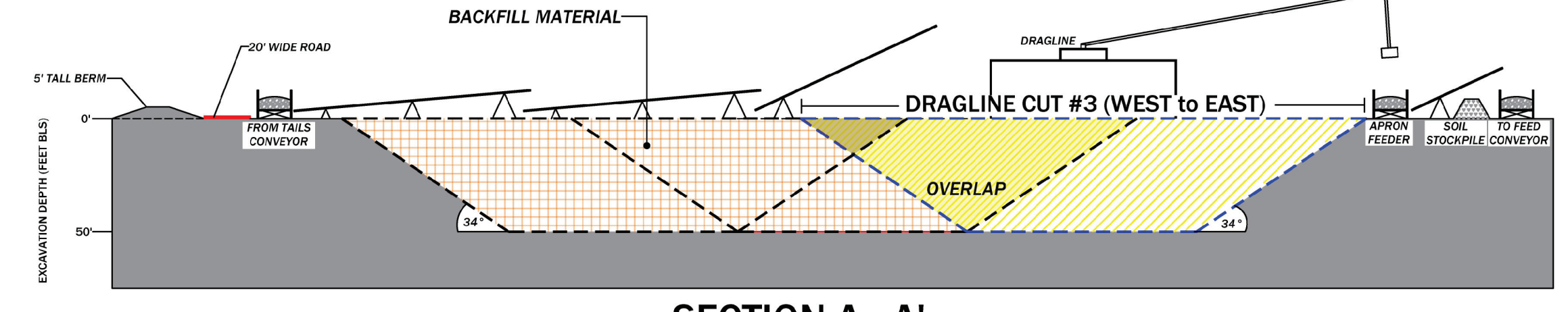
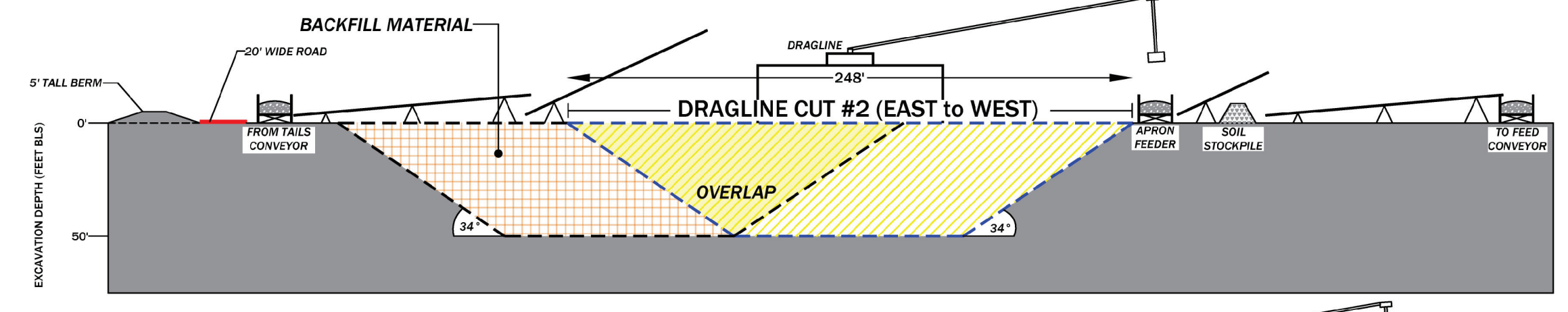
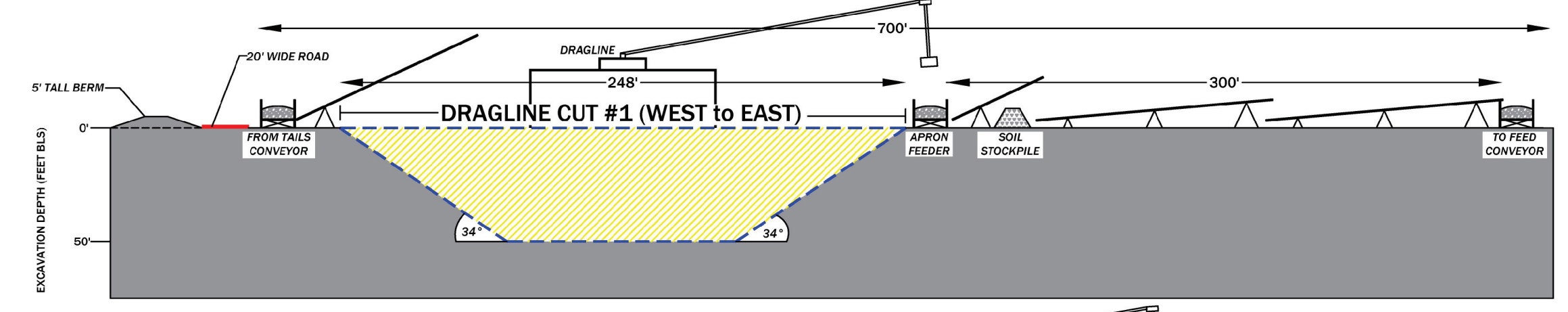
CONVEYOR DETAIL (Typical)

NOTES
 - Dragline advancement will be 100 to 200 feet per day; backfilling shall proceed no more than 50 feet (i.e. 5 to 7 days) behind the progressing mine pit.
 - See Sheet 15 for a more in-depth narrative regarding the mining process.

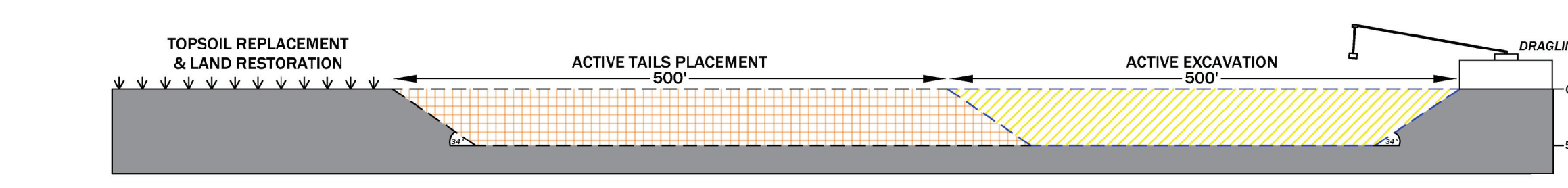
| | Max Allowable |
|---|---------------|
| Mine Pit Sidewall Slope | 34° |
| Mine Pit Depth | 50 ft |
| Topsoil Stockpile Slope (Mine Pit Side) | 3:1 |
| Topsoil Stockpile Slope (Upgradient Side) | 4:1 |
| Topsoil Stockpile Height | Variable |



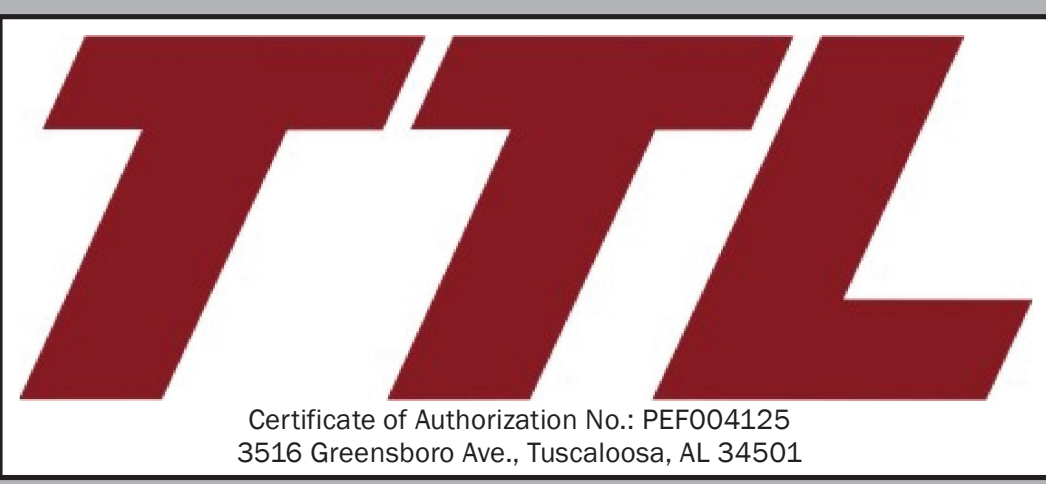
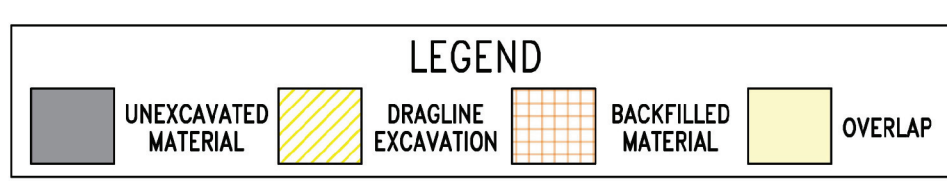
TOPSOIL STOCKPILE DUE TO MINING (Typical)



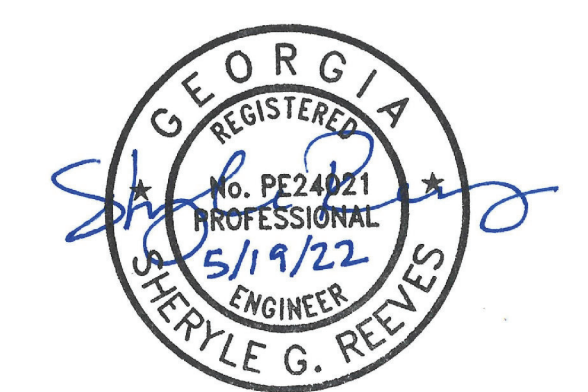
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SECTION B - B'
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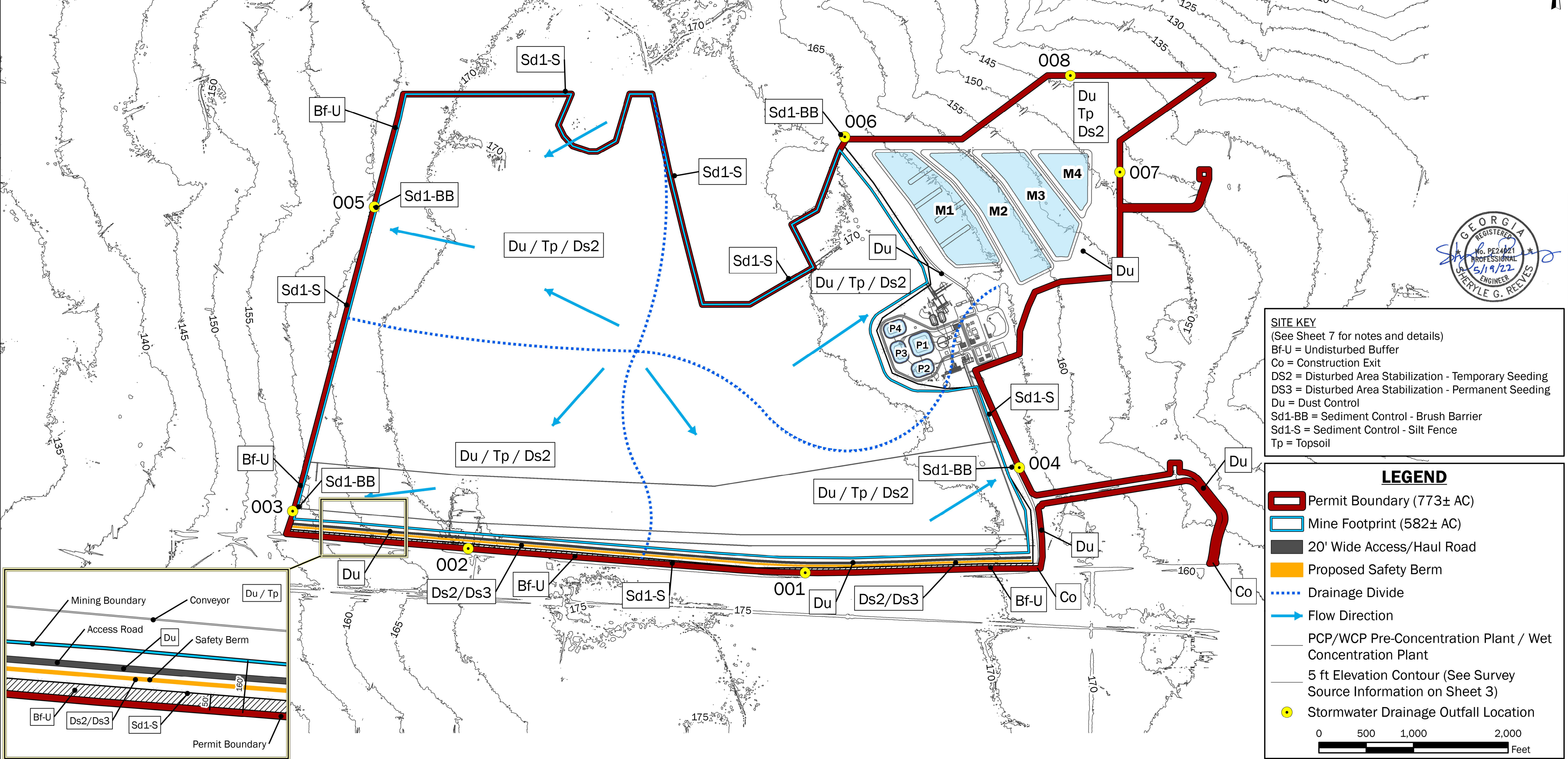


SHEET 5: MINING PLAN SHEET - PROCESS FLOW DIAGRAM, DETAILS & TYPICAL PROFILE/CROSS-SECTION
 TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE (ID NO. 2073)
 ST. GEORGE, CHARLTON COUNTY, GEORGIA



| |
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| DRAWN BY: DEK |
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| TTL JOB NO.: 18-02-00804.00 |
| APPROX. SCALE: N.T.S. |

| STORMWATER DRAINAGE OUTFALLS | | | | | |
|------------------------------|-----------|------------|-----|-----------|------------|
| ID | LATITUDE | LONGITUDE | ID | LATITUDE | LONGITUDE |
| 001 | 30.517381 | -82.110128 | 005 | 30.528021 | -82.124600 |
| 002 | 30.518087 | -82.121451 | 006 | 30.530052 | -82.108792 |
| 003 | 30.519178 | -82.127356 | 007 | 30.529024 | -82.099545 |
| 004 | 30.520431 | -82.102924 | 008 | 30.531834 | -82.101202 |

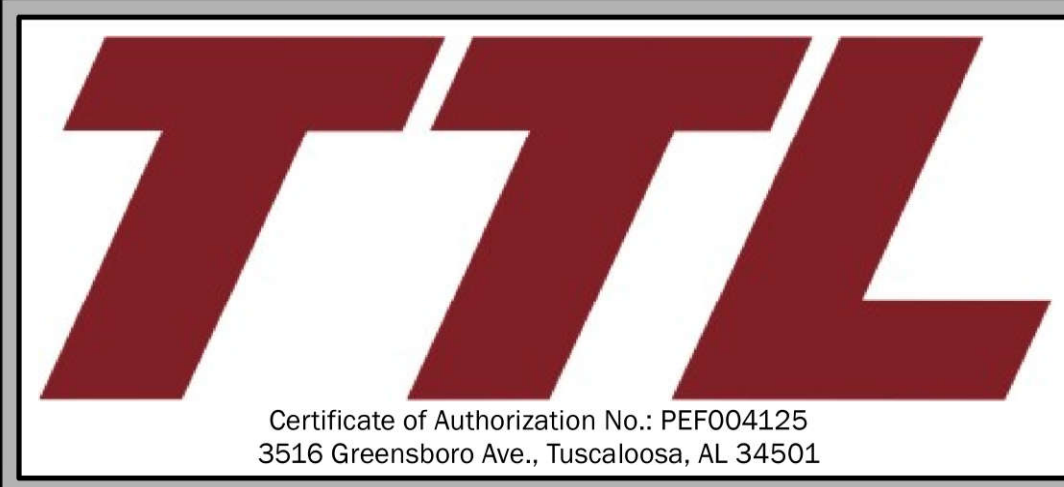
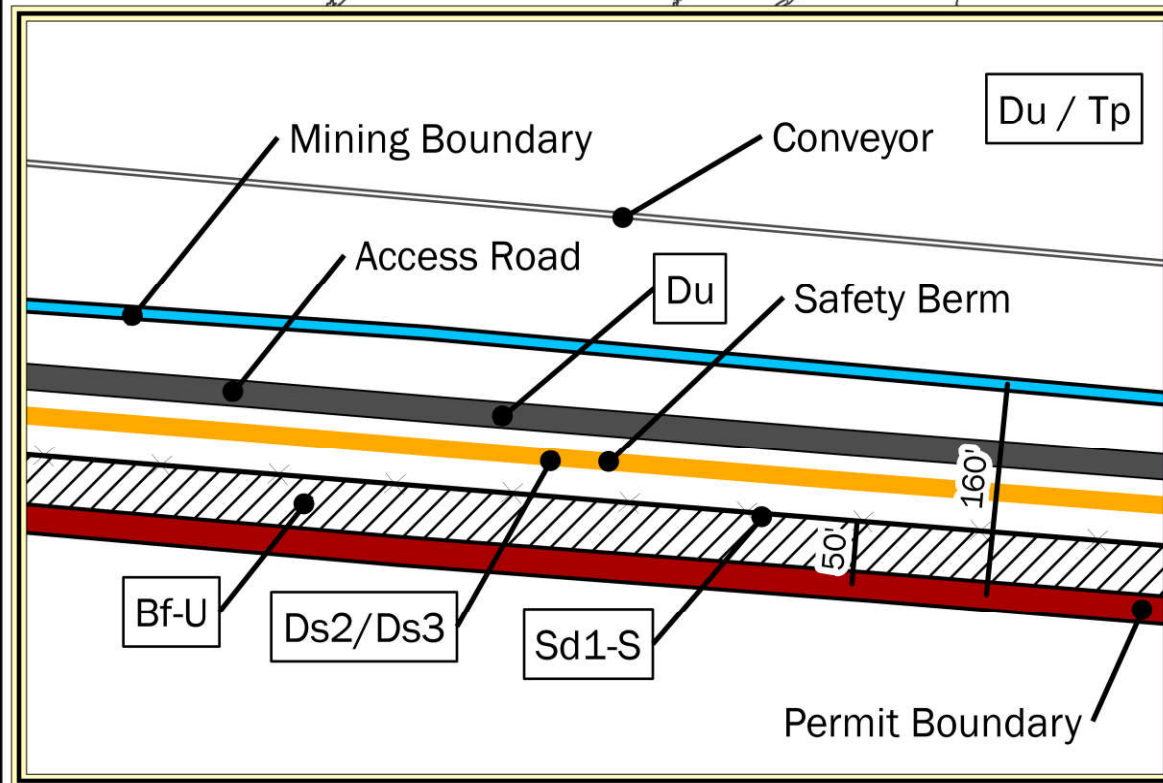


SITE KEY
 (See Sheet 7 for notes and details)
 Bf-U = Undisturbed Buffer
 Co = Construction Exit
 DS2 = Disturbed Area Stabilization - Temporary Seeding
 DS3 = Disturbed Area Stabilization - Permanent Seeding
 Du = Dust Control
 Sd1-BB = Sediment Control - Brush Barrier
 Sd1-S = Sediment Control - Silt Fence
 Tp = Topsoil

LEGEND

- Permit Boundary (773± AC)
- Mine Footprint (582± AC)
- 20' Wide Access/Haul Road
- Proposed Safety Berm
- Drainage Divide
- Flow Direction
- PCP/WCP Pre-Concentration Plant / Wet Concentration Plant
- 5 ft Elevation Contour (See Survey Source Information on Sheet 3)
- Stormwater Drainage Outfall Location

0 500 1,000 2,000 Feet



SHEET 6: EROSION & SEDIMENT CONTROL PLAN
 TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE (ID NO. 2073)
 ST. GEORGE, CHARLTON COUNTY, GEORGIA

| |
|------------------------------|
| DRAWN BY: DEK |
| CHECKED BY: SGR |
| DRAWING DATE: 11/13/2020 |
| REVISION DATE: 5/19/2022 |
| TTL JOB NO.: 18-02-00804.00 |
| APPROX. SCALE: 1 in = 500 ft |

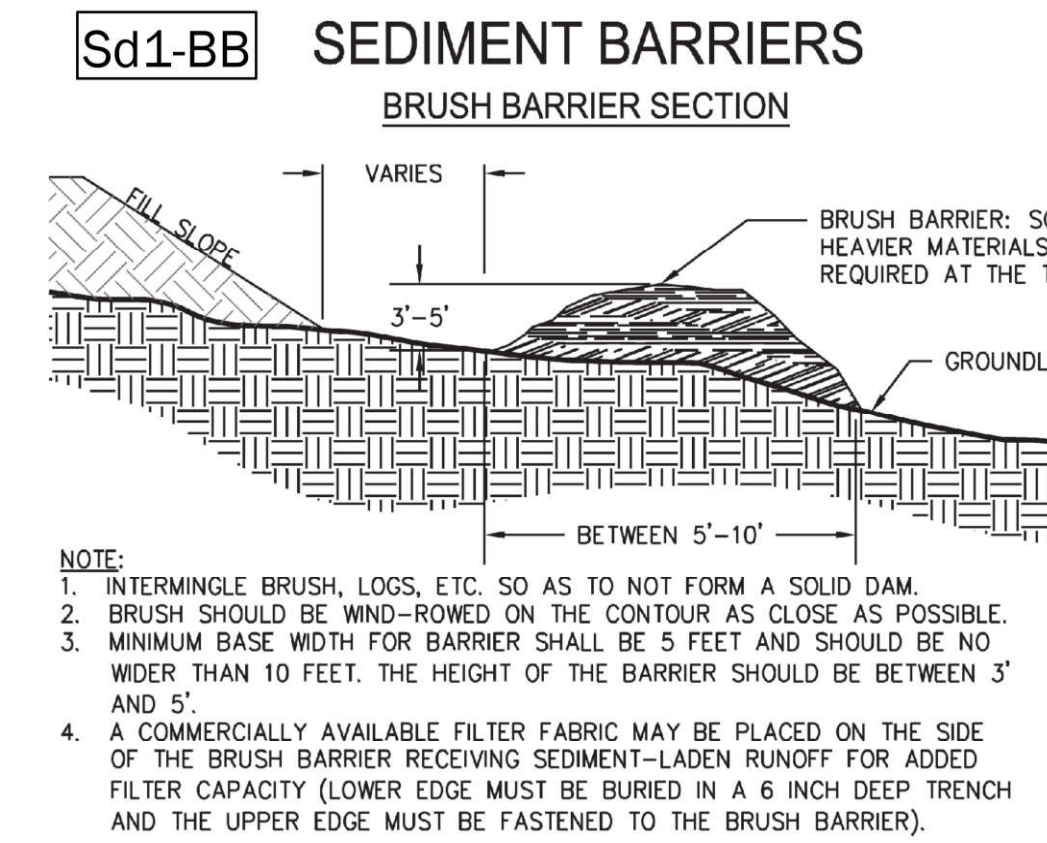
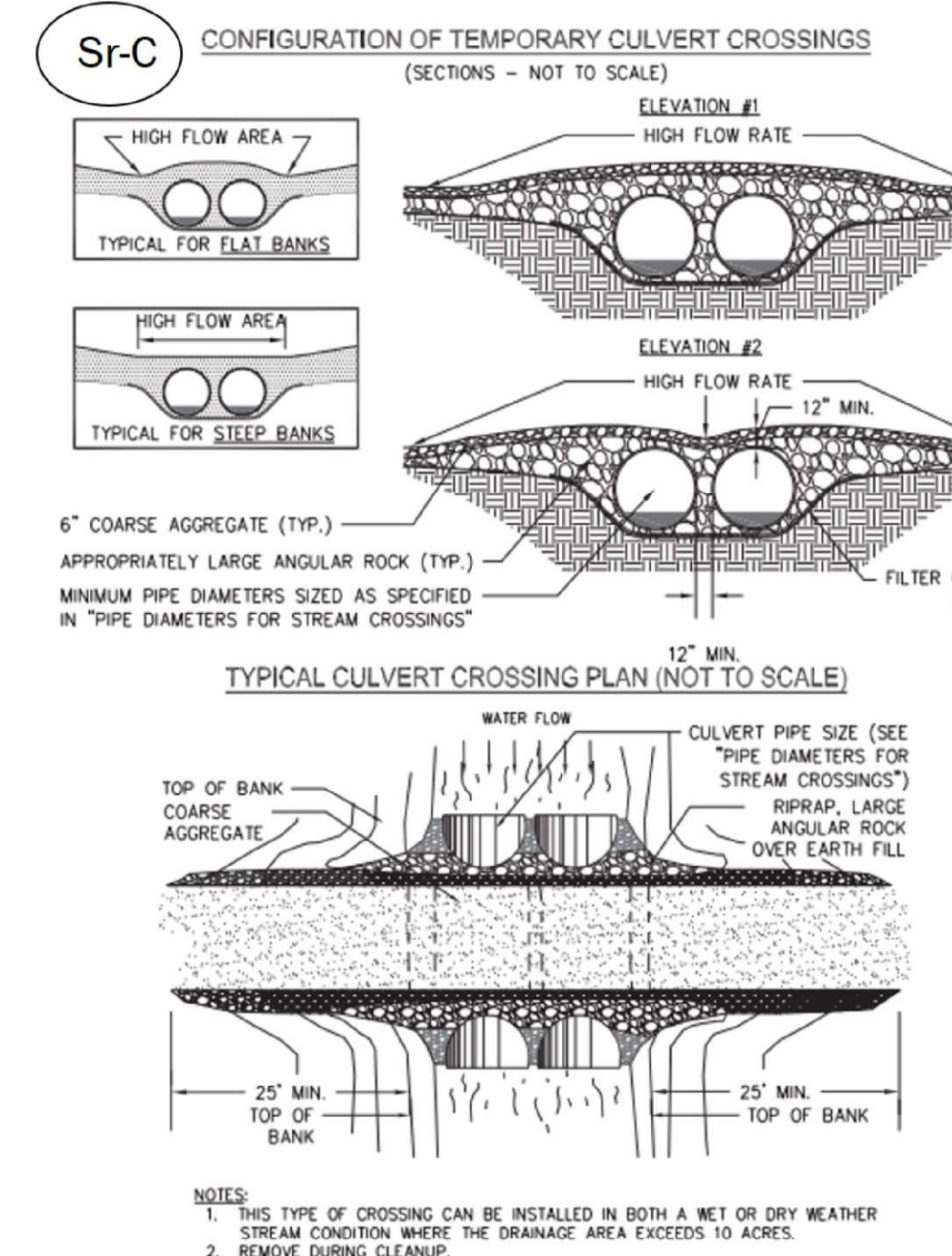
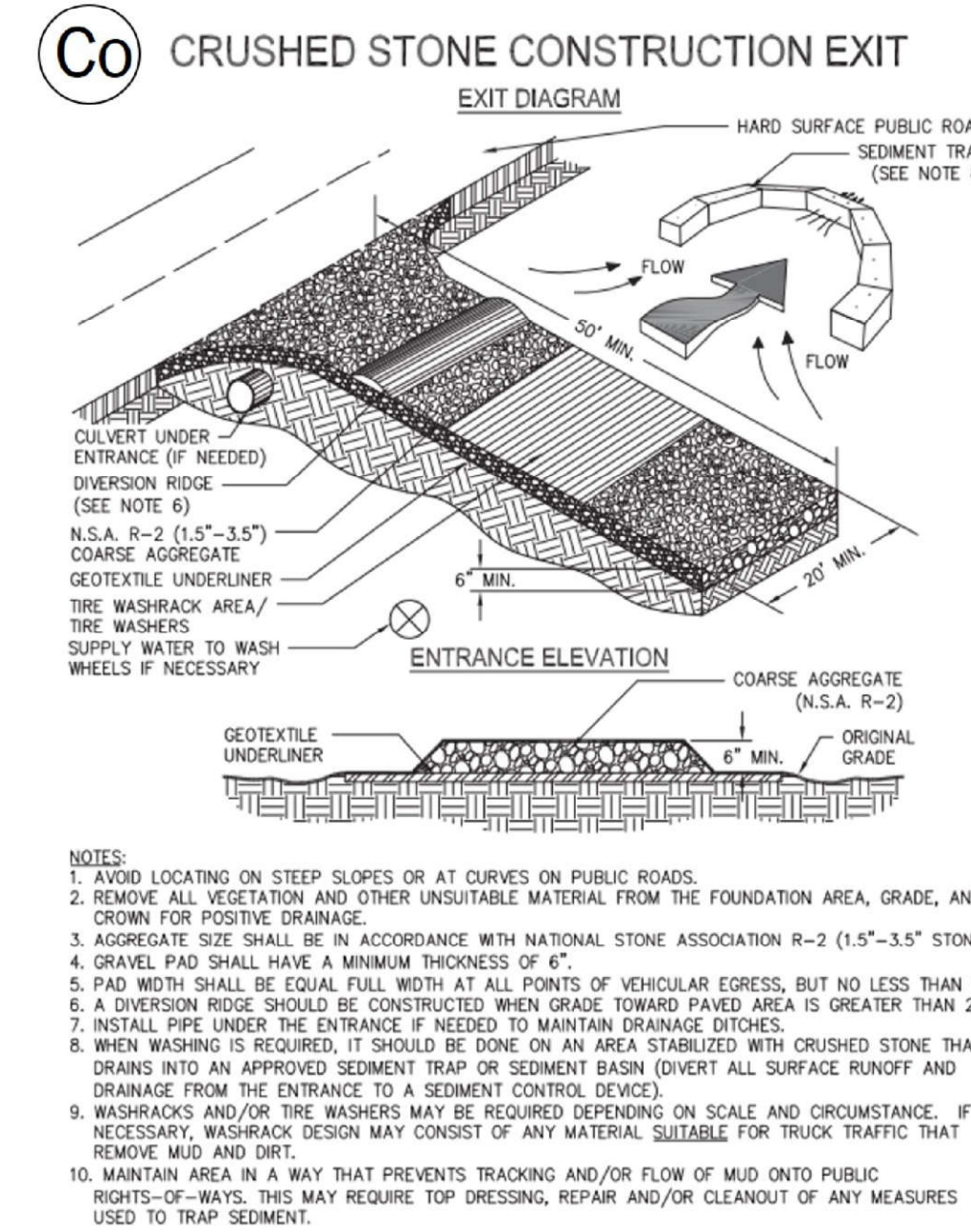
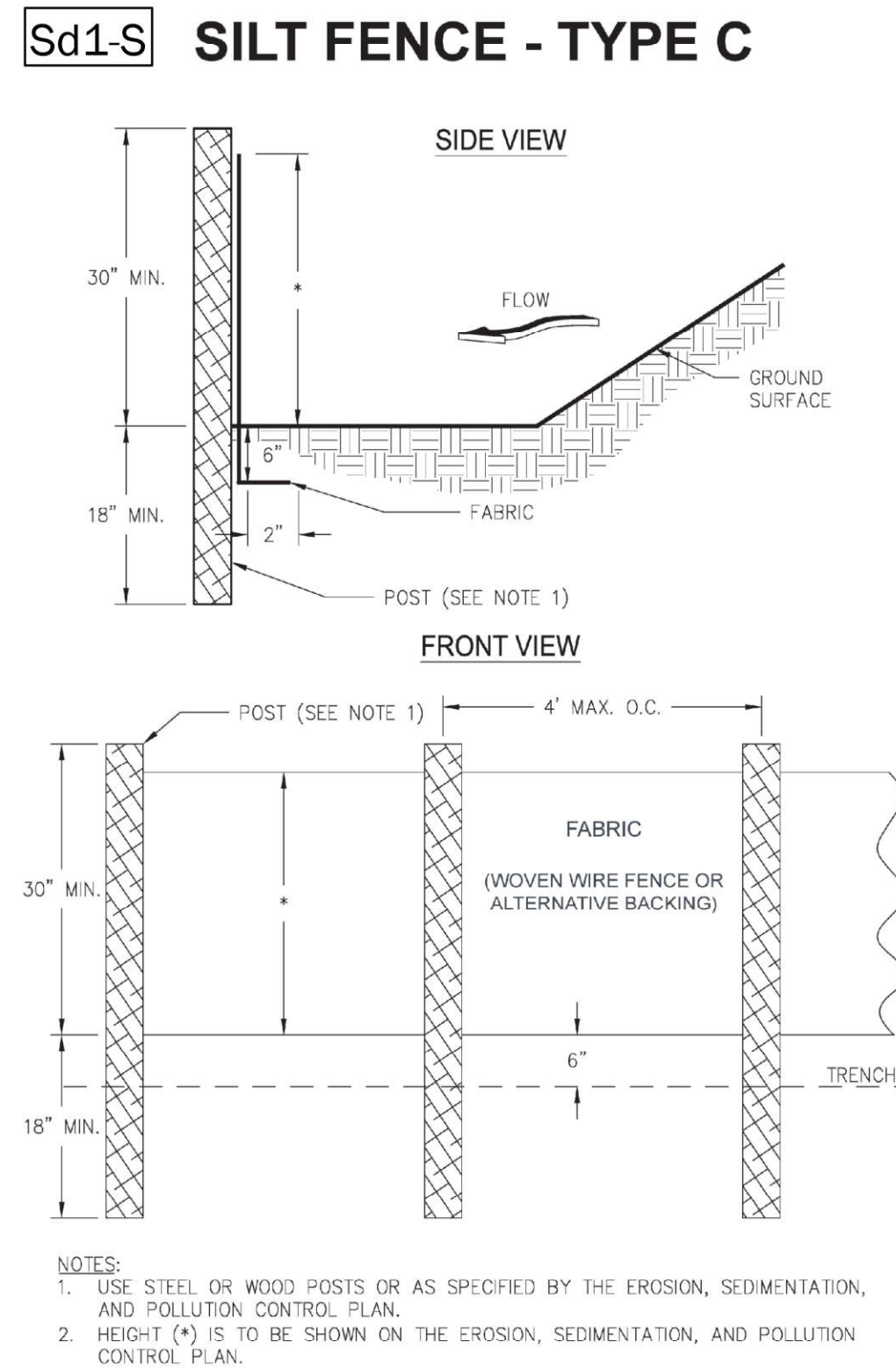
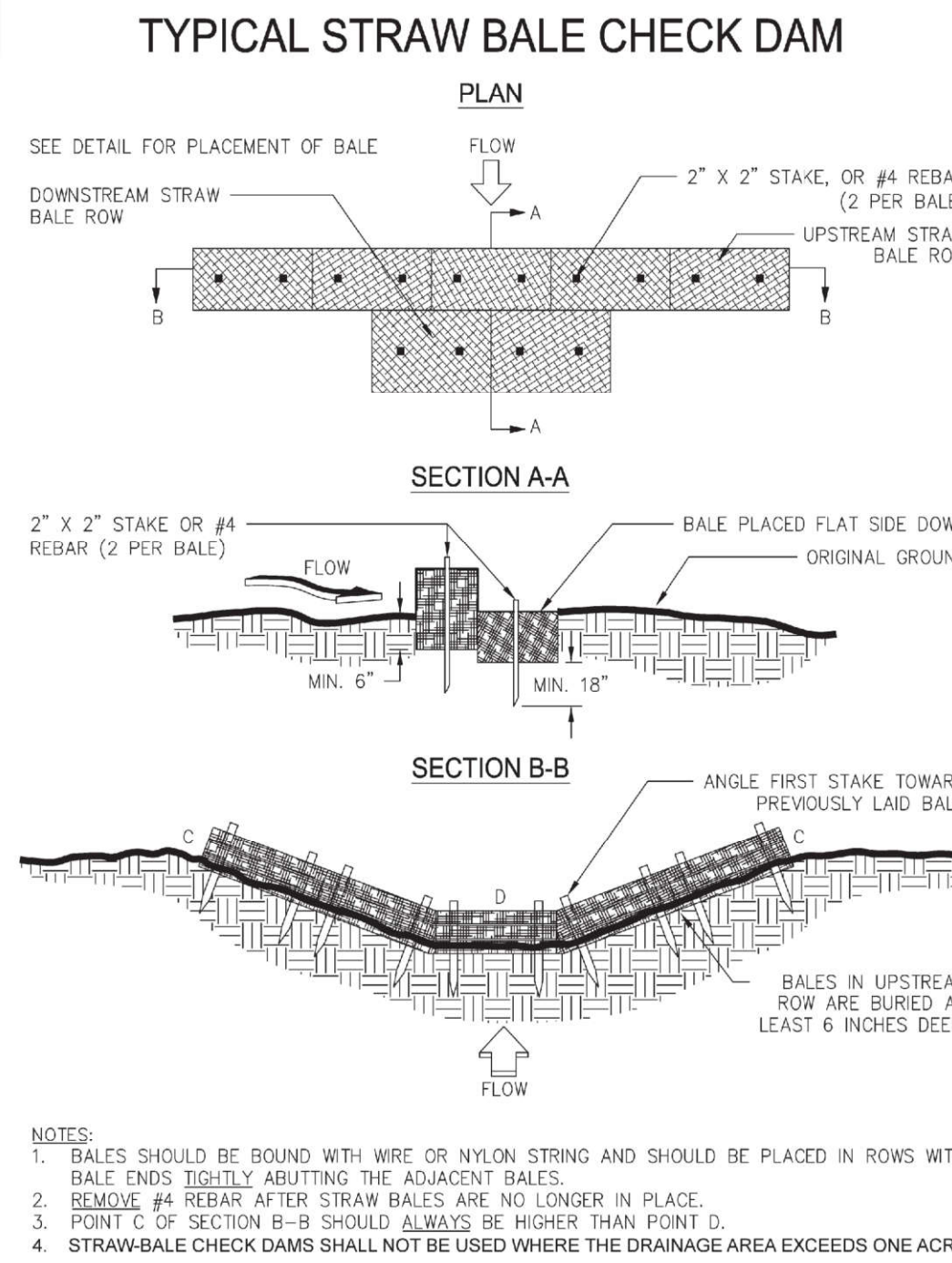
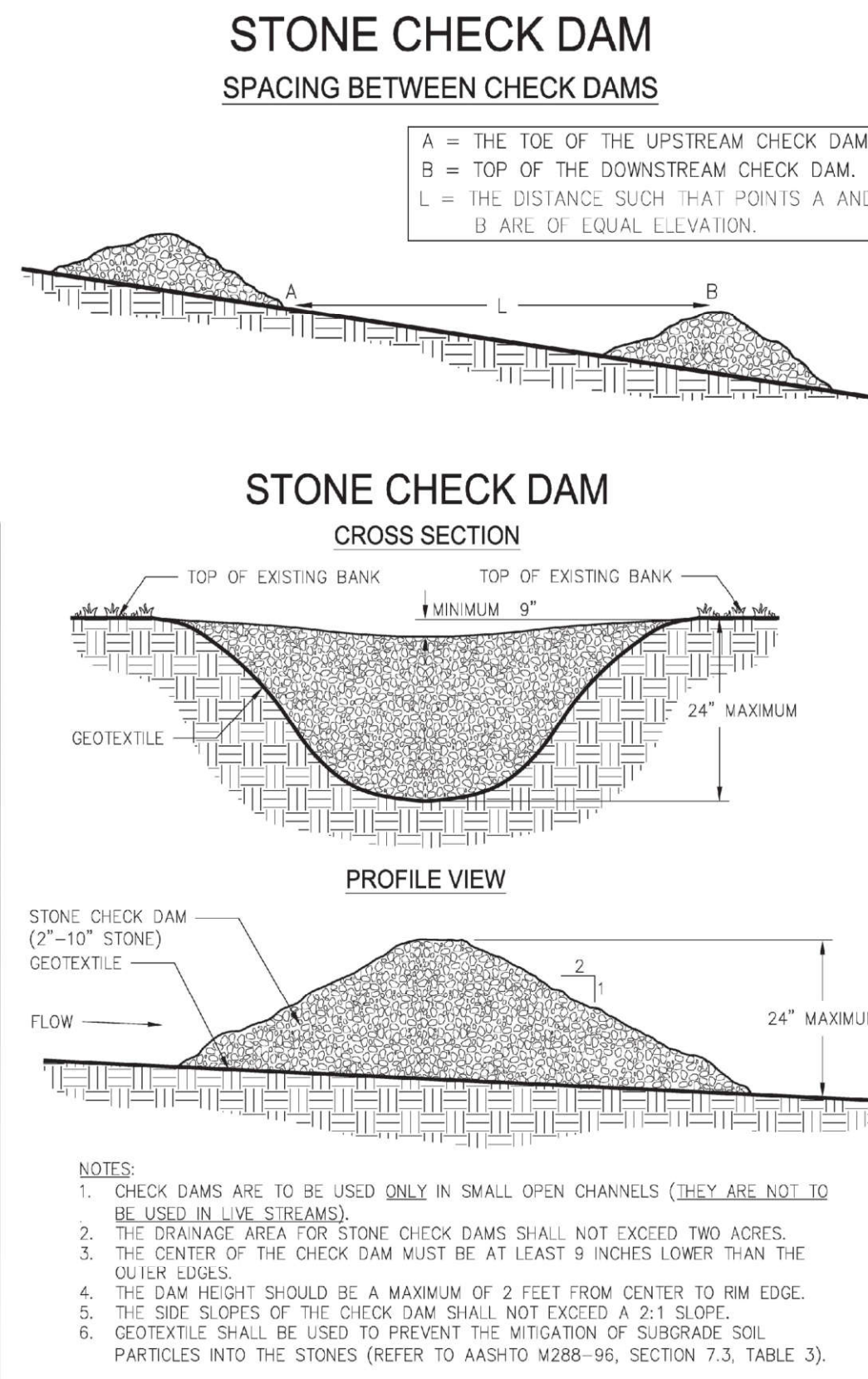
GEORGIA UNIFORM CODING SYSTEM

FOR SOIL EROSION AND SEDIMENT CONTROL PRACTICES GEORGIA SOIL AND WATER CONSERVATION COMMISSION STRUCTURAL PRACTICES

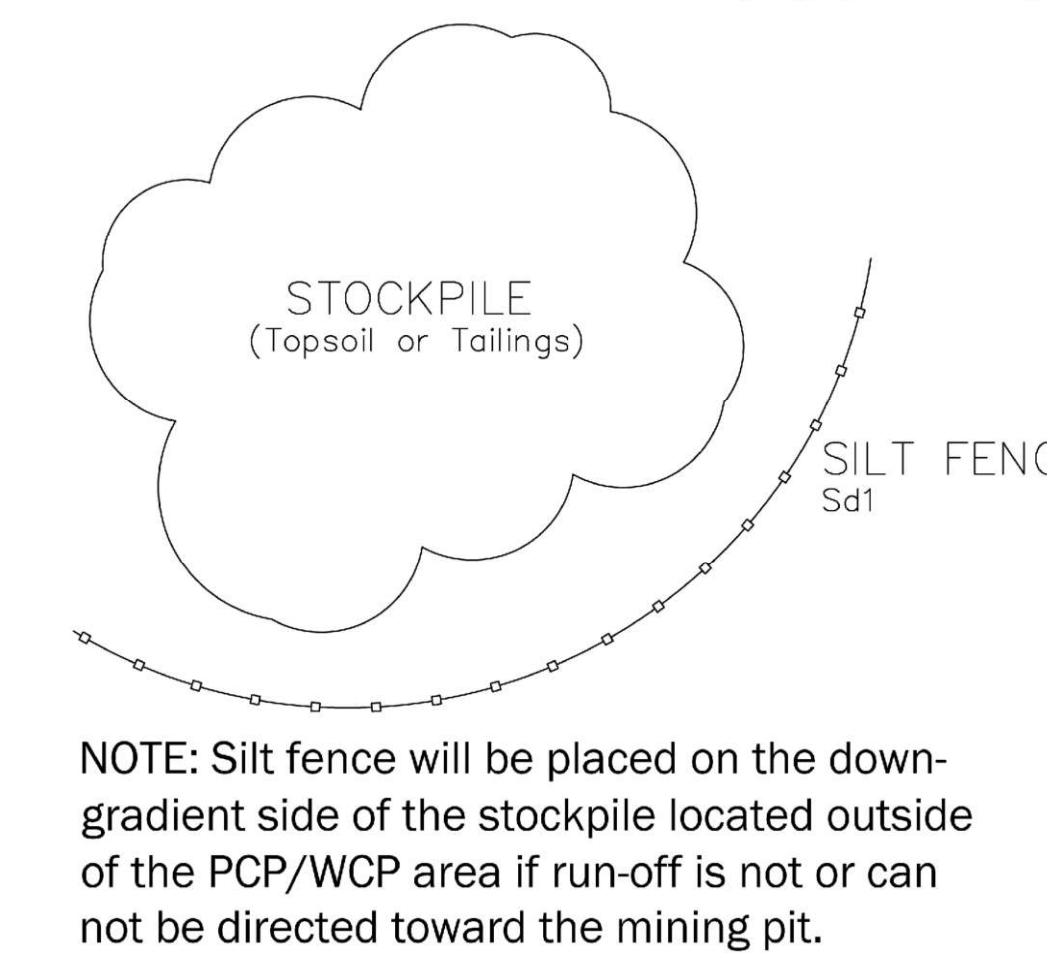
| CODE | PRACTICE | DETAIL | MAP SYMBOL | DESCRIPTION |
|------|------------------------------|--------|------------|--|
| Cd | CHECKDAM | | | A small temporary barrier or dam constructed across a swale, drainage ditch or area of concentrated flow. |
| Ch | CHANNEL STABILIZATION | | | Improving, constructing or stabilizing an open channel, existing stream, or ditch. |
| Co | CONSTRUCTION EXIT | | | A crushed stone pad located at the construction site exit to provide a place for removing mud from tires thereby protecting public streets. |
| Sd1 | SEDIMENT BARRIER | | | A barrier to prevent sediment from leaving the construction site. It may be sandbags, bales of straw or hay, brush, logs and poles, gravel, or a silt fence. |
| Sd3 | TEMPORARY SEDIMENT BASIN | | | A basin created by excavation or a dam across a waterway. The surface water runoff is temporarily stored allowing the bulk of the sediment to drop out. |
| Sk | FLOATING SURFACE SKIMMER | | | A buoyant device that releases/drains water from the surface of sediment ponds, traps, or basins at a controlled rate of flow. |
| St | STORMDRAIN OUTLET PROTECTION | | | A paved or short section of riprap channel at the outlet of a storm drain system preventing erosion from the concentrated runoff. |

VEGETATIVE PRACTICES

| CODE | PRACTICE | DETAIL | MAP SYMBOL | DESCRIPTION |
|------|---|--------|------------|---|
| Ds1 | DISTURBED AREA STABILIZATION (WITH MULCHING ONLY) | | | Establishing temporary protection for disturbed areas where seedlings may not have a suitable growing season to produce an erosion retarding cover. |
| Ds2 | DISTURBED AREA STABILIZATION (WITH TEMP SEEDING) | | | Establishing a temporary vegetative cover with fast growing seedlings on disturbed areas. |
| Ds3 | DISTURBED AREA STABILIZATION (WITH PERM SEEDING) | | | Establishing a permanent vegetative cover such as trees, shrubs, vines, grasses, or legumes on disturbed areas. |
| Ds4 | DISTURBED AREA STABILIZATION (SODDING) | | | A permanent vegetative cover using sods on highly erodible or critically eroded lands. |
| Du | DUST CONTROL ON DISTURBED AREAS | | | Controlling surface and air movement of dust on construction site, roadways and similar sites. |



STOCKPILE BMP (Typical)



EROSION CONTROL NOTES

EROSION & SEDIMENT CONTROL MEASURES

- BMPs WILL BE INSTALLED AS DEPICTED IN EROSION AND SEDIMENT CONTROL PLAN SHEET 6 PRIOR TO ANY OTHER CONSTRUCTION OR MINING ACTIVITY AND WILL BE MAINTAINED UNTIL PERMANENT GROUND COVER IS ESTABLISHED.
- EROSION CONTROL NOTES:
 - THE ESCAPE OF SEDIMENT FROM THE SITE WILL BE PREVENTED BY THE INSTALLATION OF EROSION CONTROL MEASURES AND PRACTICES PRIOR, OR CONCURRENT WITH LAND DISTURBING ACTIVITIES.
 - EROSION CONTROL MEASURES WILL BE MAINTAINED AT ALL TIMES. IF FULL IMPLEMENTATION OF THE APPROVED PLAN DOES NOT PROVIDE FOR EFFECTIVE EROSION CONTROL, ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES WILL BE IMPLEMENTED TO CONTROL OR TREAT THE SEDIMENT SOURCE.
 - ANY DISTURBED AREA LEFT EXPOSED FOR A PERIOD GREATER THAN 14 DAYS WILL BE STABILIZED WITH MULCH OR TEMPORARY SEEDING.
 - ALL EROSION AND SEDIMENT CONTROL MEASURES WILL CONFORM WITH THE GUIDELINES OF THE "MANUAL FOR EROSION AND SEDIMENT CONTROL."
 - DURING CONSTRUCTION AND MINING ACTIVITIES, TPM WILL MAINTAIN CAREFUL SCHEDULING AND PERFORMANCE TO ENSURE THAT LAND STRIPPED OF ITS NATURAL GROUND COVER IS EXPOSED ONLY IN SMALL QUANTITIES, AND PROTECTION IS ESTABLISHED.
 - SEDIMENT AND EROSION CONTROL MEASURES MUST BE CHECKED AFTER EACH RAIN EVENT. EACH DEVICE IS TO BE MAINTAINED OR REPLACED IF SEDIMENT ACCUMULATION HAS REACHED HALF THE CAPACITY OF THE DEVICE. ADDITIONAL DEVICES MUST BE INSTALLED IF NEW CHANNELS HAVE DEVELOPED.
 - DUST WILL BE CONTROLLED BY APPLYING WATER TO HAUL ROADS AND OTHER HIGH-TRAFFIC AREAS.
 - TPM WILL INSPECT EROSION CONTROL MEASURES AT THE END OF EACH WORKING DAY TO ENSURE PROPER FUNCTIONING.

AUXILIARY EROSION & SEDIMENT CONTROL MEASURES

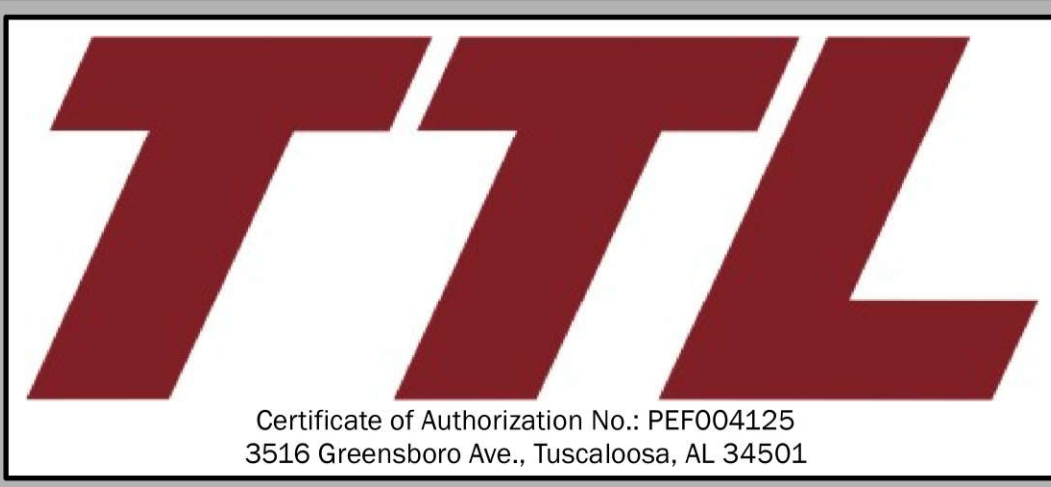
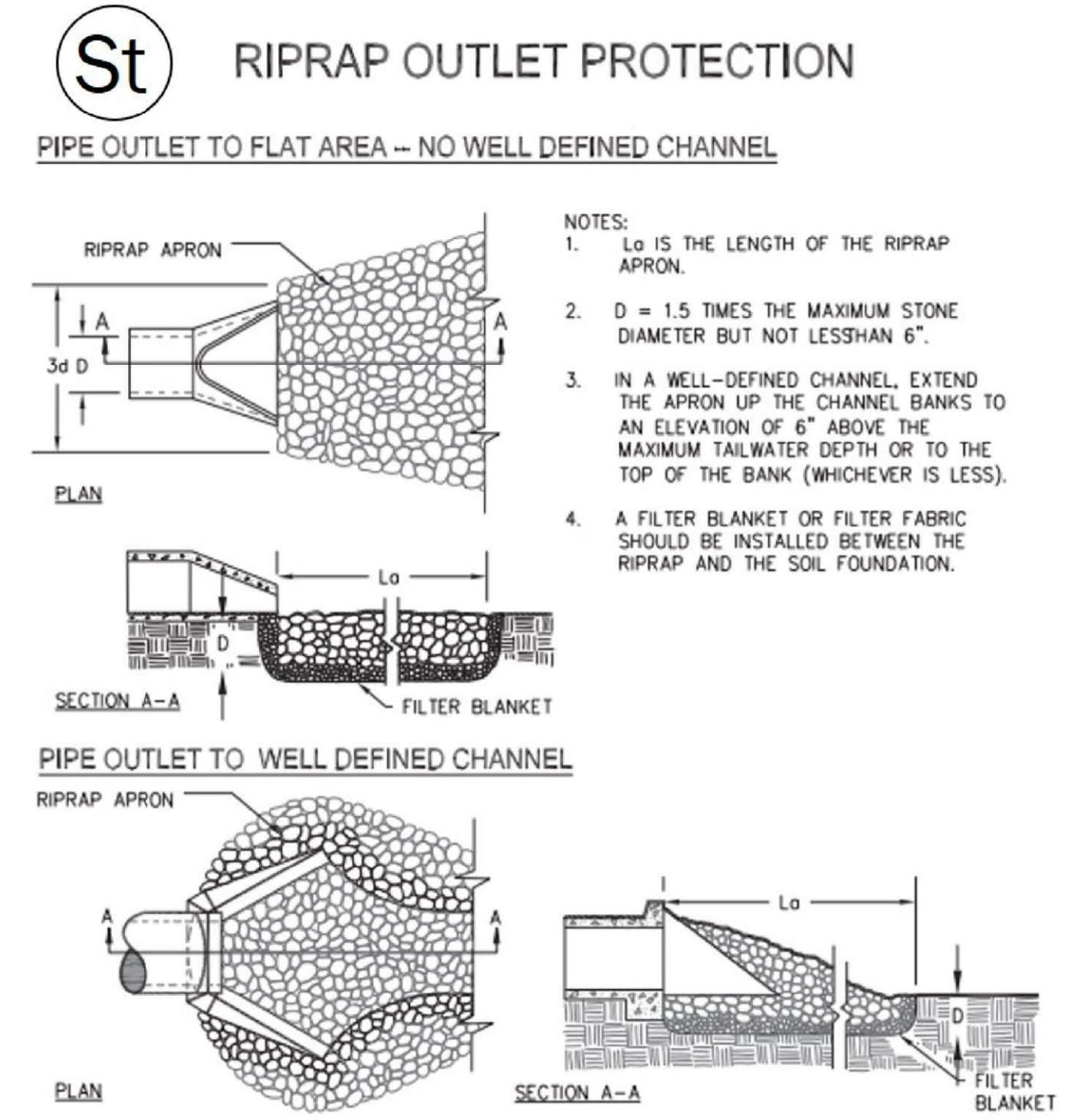
- AUXILIARY BMPs INCLUDING DIVERSIONS, DIKES, OR BERMS WILL BE CONSTRUCTED TO RETAIN, DIRECT, AND CONTROL SURFACE WATER RUNOFF FROM AFFECTED AREAS INTO DESIGNED SEDIMENT CONTROL STRUCTURES. SURFACE WATER DISCHARGE WILL BE CONTROLLED AND RELEASED IN A NON-EROSIVE VELOCITY ONTO STABILIZED AREAS OR INTO STABILIZED CHANNELS.
- CONTAINMENT BERMS WILL BE DESIGNED TO PROVIDE A MINIMUM OF 3 FEET OF FREEBOARD.
- THE BERM ALONG THE SOUTHERN SITE BOUNDARY WILL BE CONSTRUCTED AS DEPICTED IN TYPICAL CROSS-SECTIONS (SHEET 5). CRESTS WILL BE SLOPED TO DIVERT STORMWATER TOWARD THE MINE AREA. THE TOP AND EXTERIOR SLOPE AND TOE OF ALL BERMS WILL BE GRASSED WITH QUICK-GROWING/GERMINATED GRASSES. SILT FENCING WILL BE INSTALLED ALONG THE EXTERIOR TOE OF THE OUTER BERMS, AND IN ALL AREAS WHERE DEEMED NECESSARY FOR EROSION CONTROL. SILT FENCING WILL BE ARMORED WITH STACKED HAY BALES ABUTTING THE FENCE PERPENDICULAR TO THE DIRECTION OF STORMWATER FLOW WHERE NECESSARY.
- AUXILIARY BMPs WILL BE SEEDING WITH APPROPRIATE GRASSES (BASED ON PLANTING SEASON) AS SOON AS POSSIBLE. EFFORT WILL BE MADE TO UTILIZE NATURAL EXISTING VEGETATION IN THOSE AREAS WHERE BUFFERS ARE PROPOSED OR WHERE PRACTICAL.

TEMPORARY VEGETATION

- DISTURBED AREAS LEFT EXPOSED FOR A PERIOD GREATER THAN 14 DAYS WILL BE STABILIZED WITH MULCH OR TEMPORARY SEEDING.
- SEEDBED PREPARATION - WHEN A HYDRAULIC SEEDER IS USED, SEEDBED PREPARATION IS NOT REQUIRED. WHEN USING CONVENTIONAL OR HANDSEEDING, SEEDBED PREPARATION IS NOT REQUIRED IF THE SOIL MATERIAL IS LOOSE AND NOT SEALED BY RAINFALL. WHEN SOIL HAS BEEN SEALED BY RAINFALL OR CONSISTS OF SMOOTH CUT SLOPES, THE SOIL WILL BE PITTED, TRENCHED OR OTHERWISE SCARIFIED TO PROVIDE A PLACE FOR SEED TO LODGE AND GERMINATE.
- LIME AND FERTILIZER - AGRICULTURAL LIME IS REQUIRED UNLESS SOIL TESTS INDICATE OTHERWISE. APPLY AGRICULTURAL LIME AT A RATE OF ONE TON PER ACRE. FERTILIZER SHOULD BE APPLIED BEFORE LAND PREPARATION AND INCORPORATED WITH A DISK, RIPPER OR CHISEL.
- TEMPORARY VEGETATION SPECIES WILL BE PLANTED IN ACCORDANCE WITH TABLE 6-4.1 - TEMPORARY COVER OR COMPANION COVER CROPS. IN THE MANUAL FOR SEDIMENT AND EROSION CONTROL IN GEORGIA, 2016.

NPDES NOTES

- STORMWATER FALLING WITHIN THE ACTIVE MINING AREA, TO INCLUDE THE CONVEYORS AND TOPSOIL AND TAILINGS STOCKPILES WILL BE DIRECTED BACK INTO THE MINING PIT AS PRACTICAL. FOR STORMWATER DISCHARGES OFF-SITE, THE FACILITY WILL OPERATE UNDER A DNR-EPD GENERAL PERMIT NO. GAR050000 STORMWATER DISCHARGES ASSOCIATED WITH INDUSTRIAL ACTIVITIES.
- STORMWATER FALLING WITHIN THE PCP/WCP AREA WILL BE DIRECTED INTO THE PROCESS PONDS AND RECIRCULATED AS PROCESS WATER.
- ROUTINE DEWATERING OF THE MINE PIT IS NOT ANTICIPATED. AFTER EQUIPMENT SHUTDOWNS OR HEAVY RAIN EVENTS, IF DEWATERING IS NECESSARY, THIS WATER WILL BE PUMPED TO A HOLDING POND AND SUBSEQUENTLY USED FOR PROCESS MAKE-UP WATER.



SHEET 7: EROSION & SEDIMENT CONTROL NOTES & DETAILS

TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE (ID NO. 2073)

ST. GEORGE, CHARLTON COUNTY, GEORGIA

| |
|-----------------------------|
| DRAWN BY: DEK |
| CHECKED BY: SGR |
| DRAWING DATE: 11/13/2020 |
| REVISION DATE: 5/19/2022 |
| TTL JOB NO.: 18-02-00804.00 |
| APPROX. SCALE: N.T.S. |

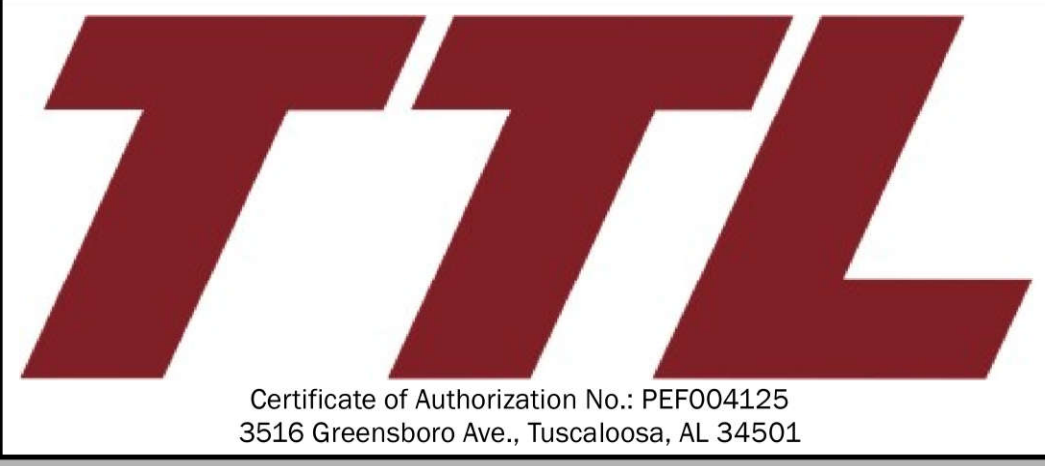
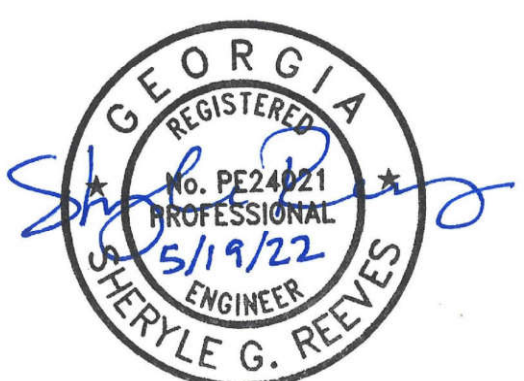
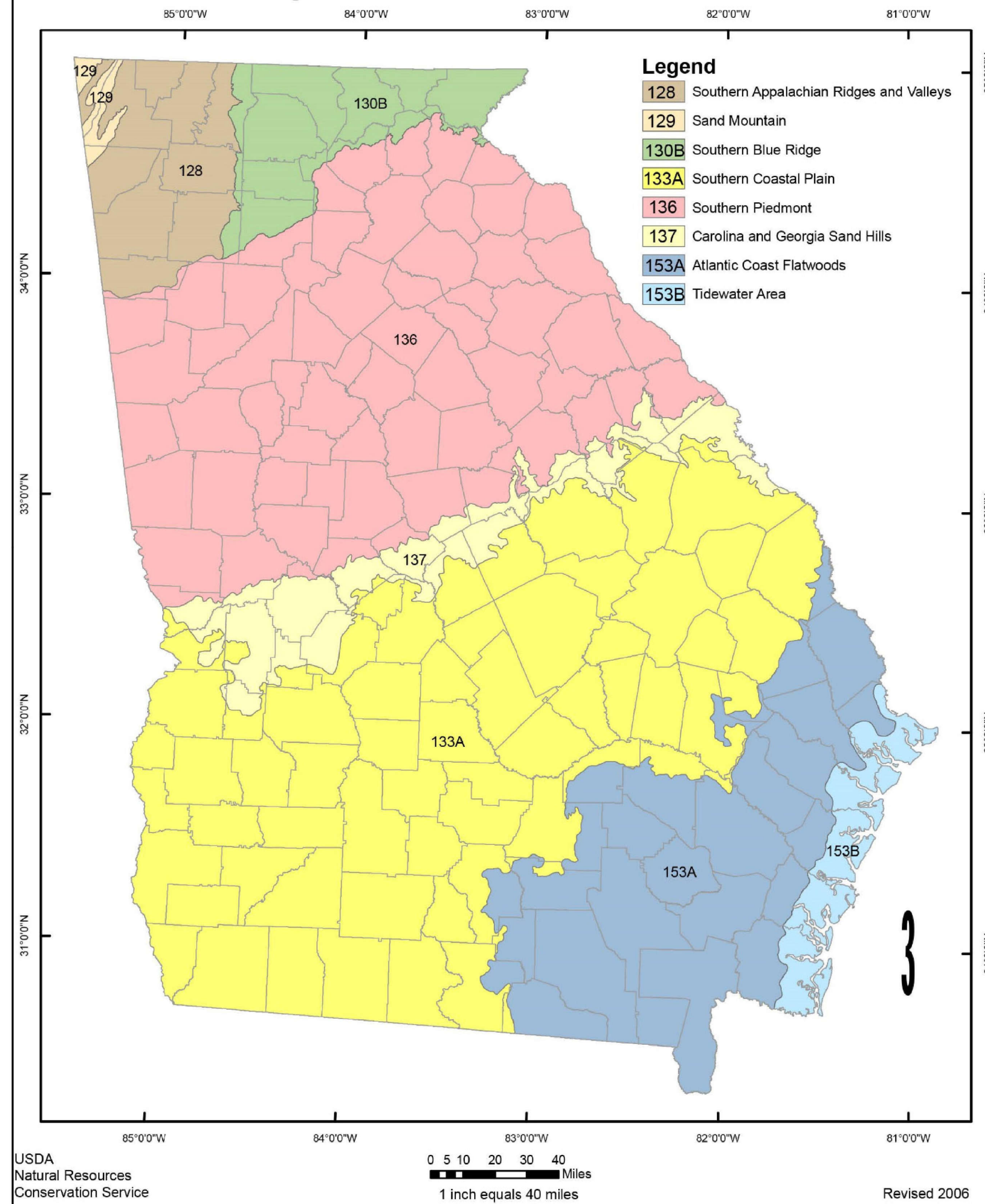
**TABLE 6-4.1: Temporary Cover or Companion Crops
Plant, Planting Rate and Planting
(Manual for Sediment and Erosion Control, Georgia 2016)**

| Species | Broadcast Rates | | Resource Area ² | Planting Dates by Resource Area | | | | | | | | | | | | Remarks |
|--|----------------------------|------------------------------------|----------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rate Per Acre ² | Pure Live Seed (PLS) Per 1000 sqft | | Solid lines indicate optimum dates, dotted lines indicate permissible but marginal dates. | | | | | | | | | | | | |
| | | | | J | F | M | A | M | J | J | A | S | O | N | D | |
| BARLEY <i>Hordeum vulgare</i> | | | | | | | | | | | | | | | | |
| alone | 3 bu. (144 lbs) | 3.3 lbs | M-L | | | | | | | | | | | | | |
| in mixture | 1/2 bu. (24 lbs) | 0.6 lb | P C | | | | | | | | | | | | | 14,000 seed per pound. Winter hardy. Use on productive soils. |
| LESPEDEZA, ANNUAL <i>Lespedeza striata</i> | | | | | | | | | | | | | | | | |
| alone | 40 lbs | 0.9 lb | M-L | | | | | | | | | | | | | |
| in mixture | 10 lbs | 0.2 lb | P C | | | | | | | | | | | | | 200,000 seed per pound. May volunteer for several years. Use inoculant EL. |
| LOVEGRASS, WEEPING <i>Eragrostis curvula</i> | | | | | | | | | | | | | | | | |
| alone | 4 lbs | 0.1 lb | M-L | | | | | | | | | | | | | |
| in mixture | 2 lbs | 0.05 lb | P C | | | | | | | | | | | | | 1,500,000 seed per pound. May last for several years. Mix with <i>Sericea lespedeza</i> . |
| MILLET, BROWNTOP <i>Panicum fasciculatum</i> | | | | | | | | | | | | | | | | |
| alone | 40 lbs | 0.9 lb | M-L | | | | | | | | | | | | | |
| in mixture | 10 lbs | 0.2 lb | P C | | | | | | | | | | | | | 137,000 seed per pound. Quick dense cover. Will provide excessive competition in mixtures if seeded at high rate. |
| MILLET, PEARL <i>Pennisetum glaucum</i> | | | | | | | | | | | | | | | | |
| alone | 50 lbs | 1.1 lbs | M-L P C | | | | | | | | | | | | | 88,000 seed per pound. Quick dense cover. May reach 5 feet in height. Not recommended for mixtures. |
| OATS <i>Avena sativa</i> | | | | | | | | | | | | | | | | |
| alone | 4 bu. (128 lbs) | 2.9 lbs | M-L | | | | | | | | | | | | | |
| in mixture | 1 bu. (32 lbs) | 0.7 lb | P C | | | | | | | | | | | | | 13,000 seed per pound. Use on productive soils. Not as a winter hardy as rye or barley. |
| RYE <i>Secale cereale</i> | | | | | | | | | | | | | | | | |
| alone | 3 bu. (168 lbs) | 3.9 lbs | M-L | | | | | | | | | | | | | |
| in mixture | 1/2 bu. (28 lbs) | 0.6 lb | P C | | | | | | | | | | | | | 18,000 seed per pound. Quick cover. Drought tolerant and winter hardy. |
| RYEGRASS, ANNUAL <i>Lolium temulentum</i> | | | | | | | | | | | | | | | | |
| alone | 40 lbs | 0.9 lb | M-L P C | | | | | | | | | | | | | 227,000 seed per pound. Dense cover. Very competitive and is <u>not</u> to be used in mixtures. |
| SUDANGRASS <i>Sorghum sudanese</i> | | | | | | | | | | | | | | | | |
| alone | 60 lbs | 1.4 lbs | M-L P C | | | | | | | | | | | | | 55,000 seed per pound. Good on droughty sites. Not recommended for mixtures. |
| TRITICALE <i>X-Triticosecale</i> | | | | | | | | | | | | | | | | |
| alone | 3 bu. (144 lbs) | 3.3 lbs | C | | | | | | | | | | | | | |
| in mixture | 1/2 bu. (24 lbs) | 0.6 lb | | | | | | | | | | | | | | Use on lower part of Southern Coastal Plain and in Atlantic Coastal Flatwoods only. |
| WHEAT <i>Triticum aestivum</i> | | | | | | | | | | | | | | | | |
| alone | 3 bu. (180 lbs) | 4.1 lbs | M-L | | | | | | | | | | | | | |
| in mixture | 1/2 bu. (30 lbs) | 0.7 lb | P C | | | | | | | | | | | | | 15,000 seed per pound. Winter hardy. |

¹Temporary cover crops are very competitive and will crowd out perennials if seeded too heavily
²Reduce seeding rates by 50% when drilled.
³M-L represents the Mountain, Blue Ridge, and Ridges and Valleys MLRAs
P represents the Southern Piedmont MLRA
C represents Southern Coastal Plain, Sand Hills, Black Lands, and Atlantic Coast Flatwoods MLRAs

GEORGIA

Major Land Resource Areas



SHEET 8: TEMPORARY VEGETATION SCHEDULE TABLE

TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE (ID NO. 2073)
ST. GEORGE, CHARLTON COUNTY, GEORGIA

| |
|-----------------------------|
| DRAWN BY: DEK |
| CHECKED BY: SGR |
| DRAWING DATE: 11/19/2021 |
| REVISION DATE: 5/19/2022 |
| TTL JOB NO.: 18-02-00804.00 |
| APPROX. SCALE: N.T.S. |

RECLAMATION OBJECTIVE

THE RECLAMATION OBJECTIVE IS TO RESTORE THE LAND SURFACE AND GROUNDWATER APPROXIMATELY TO PRE-MINING LEVELS, AND TO REVEGETATE THE SITE WITH PLANT COMMUNITIES ASSOCIATED WITH PINE FLATWOODS OR DEPRESSIONAL WETLANDS.

MINING & RECLAMATION SCHEDULE

UPON PERMIT APPROVAL, TPM ESTIMATES IT WILL TAKE 6 TO 12 MONTHS TO SET-UP FACILITIES AND PREPARE THE SITE PRIOR TO INITIATION OF MINING. MINING OF THE 582 ACRES OF THE DEMONSTRATION MINE SITE IS ANTICIPATED TO TAKE 4 TO 5 YEARS. RECLAMATION WILL BE COMPLETED WITHIN 24 MONTHS AFTER MINING IS COMPLETED. THE TOTAL LIFE OF THE MINE, FROM SET UP TO COMPLETE RECLAMATION, IS ANTICIPATED TO BE 7 TO 8 YEARS.

RECLAMATION PROCEDURES & METHODS

SURFACE TOPOGRAPHY WILL BE RESTORED BY USING POST-PROCESSED SANDS AND MINE TAILINGS (SAND AND HUMATE) TO BACK-FILL THE EXCAVATION PIT. TOP SOIL WILL BE STOCKPILED PRIOR TO MINING AND REPLACED AFTER THE EXCAVATION IS BACK-FILLED.

GROUNDWATER LEVELS ARE EXPECTED TO RETURN NATURALLY AFTER THE DRAGLINE HAS MOVED AT LEAST 1,000 FEET TO THE NORTH. TO ENSURE GROUNDWATER HYDROLOGY IS NOT AFFECTED BY THE HOMOGENIZATION OF SOILS, A LOW PERMEABILITY LAYER WILL BE PLACED FROM 7 TO 10 FEET BELOW THE LAND SURFACE. GROUNDWATER LEVELS WILL BE MONITORED, AND THE ADAPTIVE MANAGEMENT PLAN WILL BE FOLLOWED TO ADDRESS ANY UNEXPECTED OCCURRENCES.

1 - ONCE THE MINE PIT REACHES APPROXIMATELY 500 FEET IN LENGTH, TAILINGS FROM THE WET CONCENTRATION PLANT WILL BE PLACED WITHIN THE PIT. AS THE MINE PIT PROGRESSES, TAILINGS DEPOSITION (BACKFILLING) WILL OCCUR CONTINUOUSLY, CONCURRENT WITH THE RATE OF MINING.

2 - PITS WILL BE FILLED TO THE APPROXIMATE PRE-MINING TOPOGRAPHY AND GRADES - LESS THE DEPTH OF TOPSOIL. HEAVY EQUIPMENT WITH ONBOARD GPS TECHNOLOGY OR A PEDESTRIAN SURVEY CREW UTILIZING GPS TECHNOLOGY WILL VERIFY RECLAIMED ELEVATIONS.

3 - TOPSOIL WILL BE REPLACED AND FINAL GRADING WILL MIMIC THE PRE-MINING SURFACE. TOP SOIL WILL BE REPLACED AFTER THE DRAG LINE HAS PROGRESSED AT LEAST ONE TRANSECT TO THE NORTH OF THE TRANSECT BEING RESTORED. (THIS DISTANCE IS NECESSARY TO ENSURE THE TOP SOIL IS NOT REMOVED WHEN THE ADJACENT TRANSECT IS EXCAVATED.)

4 - GROUNDWATER LEVELS WILL BE RESTORED NATURALLY ONCE THE DRAGLINE HAS MOVED AT LEAST 1,000 FEET TO THE NORTH. MONITORING WELLS WILL BE CHECKED AT SUCH TIME TO ENSURE GROUNDWATER LEVELS HAVE BEEN RESTORED AND/OR TO INITIATE APPROPRIATE ADAPTIVE MANAGEMENT.

5 - REVEGETATION WILL BEGIN WITH THE REPLACEMENT OF TOP SOIL. TEMPORARY VEGETATION/SEEDING (SHEETS 6, 7 & 9) WILL BE USED AS NEEDED AND REQUIRED FOR EROSION CONTROL. EROSION CONTROL MEASURES WILL REMAIN IN PLACE UNTIL ADEQUATE VEGETATIVE COVER HAS BEEN ESTABLISHED.

6 - NATURAL PLANT COMMUNITIES ARE EXPECTED TO DEVELOP FROM THE SEEDBANK IN THE TOPSOIL, WHICH WILL BE PRESERVED AND REPLACED. THEREFORE, NO SUPPLEMENTAL PLANTING OF HERBACEOUS OR SHRUB VEGETATION IS ANTICIPATED. TREES WILL BE PLANTED 1 TO 2 YEARS AFTER THE START OF MINING IN THE APPROPRIATE SEASONS ACCORDING TO THE PRE-MINING HABITAT CLASSIFICATIONS DESCRIBED BELOW AND SHOWN ON SHEET 10. THE GROWING SEASON, AS INDICATED BY NRCS A&GIS WEETS TABLE (WEETS STATION: FOLKSTON 9 SW GA. YEARS: 1971-2000) FOR THE PROBABILITY OF TEMPERATURES ABOVE 28 DEGREES FAHRENHEIT, IS BETWEEN FEBRUARY 12 AND DECEMBER 20. STABLE GROWTH WILL BE DETERMINED WHEN PLANTED VEGETATION MAINTAINS A SURVIVABILITY RATE OF 50 PERCENT. FORESTED SYSTEMS WILL REQUIRE DECADES TO REACH MATURITY.

MESIC PINE FLATWOODS (UPLAND & NON-JURISDICTIONAL WETLAND)

- MESIC PINE FLATWOODS WILL BE PLANTED WITH LONGLEAF PINE (*Pinus palustris*) AND/OR SLASH PINE (*Pinus elliotii*).
- PLANTING WILL OCCUR IN LATE FALL/WINTER AS SITE AND WEATHER/CLIMATIC CONDITIONS ALLOW.
- NO FERTILIZERS WILL BE UTILIZED.
- RECLAMATION WILL BE DEEMED SUCCESSFUL WHERE TREE VEGETATION MAINTAINS A SURVIVABILITY RATE OF 50 PERCENT.

WET PINE FLATWOODS (NON-JURISDICTIONAL WETLAND)

- WET PINE FLATWOODS WILL BE PLANTED SLASH PINE.
- PLANTING WILL OCCUR IN LATE FALL/WINTER AS SITE AND WEATHER/CLIMATIC CONDITIONS ALLOW.
- NO FERTILIZERS WILL BE UTILIZED.
- RECLAMATION WILL BE DEEMED SUCCESSFUL WHERE TREE VEGETATION MAINTAINS A SURVIVABILITY RATE OF 50 PERCENT.

DEPRESSIONAL WETLANDS (NON-JURISDICTIONAL)

- DEPRESSIONAL WETLANDS WILL BE PLANTED WITH POND CYPRESS (*Taxodium ascendens*), SWAMP TUPELO (*Nyssa biflora*), POND PINE (*Pinus serotina*), AND/OR SLASH PINE. SUPPLEMENTAL SAPPLINGS INCLUDING LOBLOLLY BAY (*Gordonia lasianthus*), SWAMP BAY (*Persea palustris*), SWEETBAY (*Magnolia virginiana*) MAY BE ADDED TO THE PLANTING SUITE AS INDICATED BY OBSERVED HABITAT CONDITIONS.
- PLANTING WILL OCCUR IN LATE FALL/EARLY SPRING AS SITE AND WEATHER/CLIMATIC CONDITIONS ALLOW.
- NO FERTILIZERS WILL BE UTILIZED.
- RECLAMATION WILL BE DEEMED SUCCESSFUL WHERE TREE VEGETATION MAINTAINS A SURVIVABILITY RATE OF 50 PERCENT.

7 - ALTHOUGH RECLAIMED HABITATS AND THE ASSOCIATED PLANTINGS ARE ANTICIPATED TO FOLLOW THE SCHEDULE OUTLINED IN #4 AND AS SHOWN ON SHEET 10, ACTUAL TREE SPECIES TO BE PLANTED WILL DEPEND ON NATURAL HERBACEOUS/SHRUB RECRUITMENT AND DIRECT OBSERVATION OF HYDROLOGY AND TARGET SPECIES AS OUTLINED IN THE TABLE BELOW. PRIOR TO PLANTING, THE PREVIOUSLY MINED AREA WILL BE MAPPED BASED ON NATURALLY RE-ESTABLISHING PLANT COMMUNITIES. ON-SITE VEGETATION COMMUNITIES WILL BE IDENTIFIED AND MAPPED TO ROUGHLY FOLLOW THE GUIDE TO THE NATURAL COMMUNITIES OF FLORIDA (2010 EDITION).

| HABITAT SUMMARY AND PROPOSED PLANTINGS BY TARGET SPECIES OBSERVED DURING VEGETATION MAPPING | | |
|---|---|---|
| HABITAT | PLANTINGS | TARGET SPECIES OBSERVATIONS |
| MESIC PINE FLATWOODS | LONGLEAF PINE, SLASH PINE | BUNCHGRASSES (<i>Aristida sp.</i> , <i>Andropogon sp.</i> , <i>Sporobolus sp.</i> , <i>Dichanthelium sp.</i>), SAW PALMETTO (<i>Serenoa repens</i>), GALLBERRY (<i>Ilex glabra</i>), FETTERBUSH (<i>Lyonia lucida</i>), AND DWARF LIVE OAK (<i>Quercus minima</i>). |
| WET PINE FLATWOODS | SLASH PINE | BUNCHGRASSES (<i>Aristida sp.</i> , <i>Andropogon sp.</i> , <i>Ctenium aromaticum</i> , <i>Muhlenbergii sp.</i> , <i>Sporobolus sp.</i> , <i>Rhynchospora sp.</i>), LARGE GALLBERRY (<i>Ilex coriacea</i>), FETTERBUSH, SWEETBAY, SAW PALMETTO |
| DEPRESSIONAL WETLAND - DOME/DEPRESSION SWAMP | POND CYPRESS, SWAMP TUPELO | VIRGINIA CHAIN FERN (<i>Anchistia virginica</i>), ROYAL FERN (<i>Osmunda regalis</i>), CINNAMON FERN (<i>Osmunda cinnamomea</i>), MAIDENCANE (<i>Panicum hemitomon</i>), REDROOT (<i>Lachnanthes caroliniana</i>), BEAKSEDGES (<i>Rhynchospora sp.</i>), AND SEDGES (<i>Carex sp.</i>). |
| DEPRESSIONAL WETLAND - SHRUB BOG | POND PINE, SLASH PINE | TITI (<i>Cyrilla racemiflora</i>), BLACK TITI (<i>Cliftonia monophylla</i>), SWEET PEPPERBUSH (<i>Clethra alnifolia</i>), FETTERBUSH, LARGE GALLBERRY, AND LAUREL GREENBRIER (<i>Smilax laurifolia</i>). |
| DEPRESSIONAL WETLAND - BAYGALL | LOBLOLLY BAY, SWAMP BAY, SWEETBAY, FETTERBUSH | LOBLOLLY BAY, SWAMP BAY, SWEETBAY, FETTERBUSH, DAHOON (<i>Ilex cassine</i>), LARGE GALLBERRY, TITI, BLACK TITI, WAX MYRTLE (<i>Myrica cerifera</i>), DOGHOBBLE (<i>Leucothoe sp.</i>), SWEETSPIRE (<i>Itea virginica</i>). |

8 - RECLAMATION AREAS WILL BE MONITORED FOR TWO YEARS FOLLOWING PLANTING PENDING RELEASE OF THE MINE FROM THE RECLAMATION ACTIVITIES.

PERFORMANCE CRITERIA FOR RECLAMATION

SPECIFIC REQUIREMENTS THAT TPM WILL ADHERE TO FOR THIS RECLAMATION PLAN ARE:

- GRADE ALL PEAKS, RIDGES, AND VALLEYS RESULTING FROM SURFACE MINING AND BACKFILL ALL PITS AND TRENCHES RESULTING FROM SAME IN A MANNER TO MINIMIZE ANY HAZARDOUS EFFECTS OF MINING ADJACENT TO ANY STATE OR COUNTY MAINTAINED PUBLIC ROAD.
- BACKFILL ALL AFFECTED LANDS AS STATED IN THE RECLAMATION PROCEDURES OF THIS PLAN UTILIZING POST-PROCESSED SANDS, MINE TAILINGS (SAND AND HUMATE), AND/OR BORROW FROM AFFECTED (PERMITTED) LAND UNLESS APPROVAL FROM THE DIVISION IS OBTAINED TO UTILIZE OTHER MATERIALS. SOUND ENGINEERING PRINCIPLES SHALL BE APPLIED TO ENSURE THAT AFFECTED LANDS, AS RECLAIMED, MEET THE INTENDED USE.
- APPLY EROSION CONTROL MEASURES TO PROTECT THE TOPSOIL COVER UNTIL AN ADEQUATE VEGETATIVE COVER IS ESTABLISHED. EROSION CONTROL MEASURES MAY INCLUDE SCARIFYING THE LAND SURFACE PARALLEL TO CONTOURS.
- NO HIGHWALLS WILL REMAIN ON SITE.
- ALL AFFECTED LAND WILL BE GRADED TO MIMIC PRE-MINING TOPOGRAPHY AND BLENDED INTO THE EXISTING LANDSCAPE, UNLESS OTHERWISE AMENDED.
- CONSTRUCTED SLOPES WILL NOT EXCEED THREE HORIZONTALS TO ONE VERTICAL (3:1) EXCEPT WHERE MAY BE APPROVED OTHERWISE IN THIS PLAN. FILL AND CUT SLOPES SHALL BE DESIGNED AND CONSTRUCTED TO PROHIBIT SLUMPING OR SHEAR FAILURES. PRIOR TO FINAL GRADING, ALL SLOPES WILL BE BLENDED IN WITH THE ORIGINAL EXISTING TOPOGRAPHY. SLOPE GRADES SHALL BE UNIFORM. MECHANICAL OR VEGETATIVE OR BOTH STABILIZATION MEASURES SHALL BE EMPLOYED AS SOON AS PRACTICAL TO PREVENT EROSION.
- SPOIL OR REFUSE, WHEN USED AS BACKFILL MATERIAL FOR BERM OR OTHER CONSTRUCTION, WILL BE SEGREGATED AS NECESSARY, EMPLACED AND COMPACTED IN ACCORDANCE WITH SOUND ENGINEERING PRACTICES TO PROVIDE FOR THE PURPOSE INTENDED. ALL NEW LANDFORM STRUCTURES CREATED WITH THE USE OF SPOIL OR REFUSE MATERIALS SHALL BE CONSTRUCTED IN A MANNER TO PROTECT AGAINST FAILURE, SUBSIDENCE AND/OR EROSION AND WILL BE PERMANENTLY STABILIZED UPON COMPLETION OF CONSTRUCTION.
- NO LAKES OR PONDS ARE PROPOSED AS PART OF THE RECLAMATION PLAN.
- WITHIN APPROXIMATELY 180 DAYS OF COMPLETION OF MINING ACTIVITIES, COMMENCEMENT OF DECOMMISSIONING OF THE PONDS WILL BEGIN IN THE FOLLOWING MANNER:
 - PROCESS WATER WILL BE ELIMINATED FROM EACH POND BY THE FOLLOWING OR A COMBINATION OF THE FOLLOWING:
 - PUMPING TO TANKER TRUCKS FOR TRANSPORT TO AN OFF-SITE FACILITY FOR DISPOSAL IN ACCORDANCE WITH STATE AND/OR FEDERAL REQUIREMENTS.
 - UTILIZING AN ENGINEER DESIGNED EVAPORATION SYSTEM OR ALTERNATIVE TECHNOLOGY CAPABLE OF ELIMINATING LIQUIDS.
 - UNDER NO CIRCUMSTANCES WILL PROCESS WATER BE DISCHARGED AT THE FACILITY WITHOUT PRIOR AUTHORIZATION FROM THE GEORGIA EPD (I.E., A PERMIT IS OBTAINED THAT WILL ALLOW FOR THE DISCHARGE OF PROCESS WATER AT THE FACILITY).
 - AFTER THE ELIMINATION OF PROCESS WATER FROM EACH POND, SEDIMENTS THAT HAVE ACCUMULATED ON TOP OF THE LINER SYSTEM AND THE LINER WILL BE REMOVED AND TRANSPORTED TO AN OFF-SITE FACILITY FOR DISPOSAL IN ACCORDANCE WITH STATE AND/OR FEDERAL REQUIREMENTS.
 - NEXT, THE BERM WALLS WILL BE GRADED TO GENERALLY MATCH THE SURROUNDING LAND SURFACE AND THE AREAS WILL BE REVEGETATED.
 - TWIN PINES MINERALS, LLC RESERVES THE RIGHT TO REQUEST THAT THE PONDS REMAIN IN PLACE FOR POTENTIAL REUSE. DURING SUCH TIME, ALL PONDS LEFT IN PLACE WILL BE MAINTAINED IN A MANNER CONSISTENT WITH THAT REQUIRED BY PERMIT DURING THE OPERATIONAL PERIOD OF THE MINE.

- THE OPERATOR WILL PREPARE AND FILE A FINAL RECLAMATION REPORT AND REQUEST FOR RELEASE UPON COMPLETION OF RECLAMATION RESPONSIBILITIES ON AFFECTED ACREAGE.

1. SOIL AMENDMENT PLAN

A SOIL AMENDMENT LAYER OF 10.9% BENTONITE WILL BE APPLIED IN A ~3-FOOT-THICK LAYER. THE PURPOSE OF THIS LAYER IS TO ENSURE THAT THE HOMOGENIZATION OF SOILS DUE TO MINING DOES NOT AFFECT OR ALTER THE EXISTING GROUNDWATER DIVIDE.

1.1 PROCEDURES FOR APPLICATION OF THE BENTONITE LAYER

- THE FOLLOWING PROCEDURES WILL BE USED TO INSTALL THE LOW-PERMEABILITY LAYER:
 - A COVERED FACILITY WILL BE CONSTRUCTED NEAR WHERE SAND TAILINGS EXIT THE PLANT AND ARE LOADED ONTO THE TAILINGS CONVEYOR. THE BENTONITE AND SAND WILL BE LOADED INTO HOPPERS THAT WILL FEED THE CORRECT BLEND (89.1% SAND/10.9% BENTONITE) TO A MIXING BOX. ONCE BLENDED, THE AMENDED SOIL MIXTURE WILL BE LOADED ONTO THE MAIN TAILINGS CONVEYOR SYSTEM AND TRANSPORTED TO THE OPEN PIT.
 - THE MIXING PROCESS AND TRANSPORT ON THE MAIN TAILINGS CONVEYOR WILL ONLY TAKE PLACE DURING CERTAIN PERIOD(S) OF THE DAY TO ENSURE THE BENTONITE-SAND BLEND IS NOT DILUTED WITH THE SAND-ONLY TAILINGS.

- PRIOR TO PLACEMENT OF THE SOIL AMENDMENT LAYER, THE PIT WILL BE BACKFILLED TO A LEVEL APPROXIMATELY THREE FEET BELOW THE TOP OF THE HUMATE-CEMENTED CONSOLIDATED BLACK SAND AS MAPPED IN SECTION 1.2.

- ONCE THE BLENDED SAND/BENTONITE MATERIAL REACHES THE END OF THE TAILINGS CONVEYOR, IT WILL BE TRANSFERRED TO A PORTABLE CONVEYOR/STACKER THAT WILL CAST THE BLENDED MATERIAL INTO THE OPEN PIT. THE BLENDED SAND/BENTONITE MATERIAL WILL BE PLACED AT A DEPTH THAT COINCIDES, AS CLOSE AS POSSIBLE, WITH THE TOP THREE FEET OF THE MAPPED HUMATE-CEMENTED CONSOLIDATED BLACK SAND (SEE SECTION 1.2). BASED ON EXISTING DATA FROM ON-SITE BORINGS, THE DEPTHS TO THE TOP OF THE HUMATE-CEMENTED CONSOLIDATED BLACK SAND ARE VARIABLE AND ARE ANTICIPATED TO RANGE FROM 8 TO 25 FEET BGS.

- BECAUSE THE SAND/BENTONITE MIXTURE IS VERY COHESIVE, IT CAN BE CAST INTO THE OPEN PIT WHETHER IT IS WET OR DRY, WITHOUT SEPARATING. BECAUSE BACKFILLING WILL OCCUR WITHIN 500 FEET OF THE LEADING EDGE OF THE DRAG LINE, HOWEVER, GROUNDWATER WILL NOT HAVE TIME TO COMPLETELY FILL THE PIT, AND MOST WATER WILL BE ABSORBED BY THE TAILINGS MATERIAL, WHICH WILL BE VERY DRY AND ABSORBENT. IF GROUNDWATER RISES ABOVE THE ELEVATION WHERE THE SAND/BENTONITE MIXTURE WILL BE PLACED, THE MINE PIT WILL TEMPORARILY BE DEWATERED TO ALLOW PLACEMENT OF THE BLENDED SAND/BENTONITE MATERIAL. WATER WITHDRAWN FROM THE ACTIVE MINING PIT WILL BE PUMPED TO THE MINE PIT WATER MANAGEMENT POND AND SUBSEQUENTLY REUSED BY THE FACILITY.

- THE ELEVATION OF THE TOP OF THE BLENDED MATERIAL WILL BE SURVEYED FOLLOWING EACH SOIL AMENDMENT PLACEMENT EVENT.

- SAND-ONLY TAILINGS WILL BE PLACED ABOVE THE SAND/BENTONITE MIXTURE.

- A TOPSOIL LAYER WILL THEN BE PLACED ON TOP OF THE SAND TAILINGS.

1.2 MAPPING THE HUMATE-CEMENTED CONSOLIDATED BLACK SANDS

THE SOIL AMENDMENT IS INTENDED TO MIMIC THE HYDRAULIC CONDUCTIVITY OF CONSOLIDATED BLACK SANDS THAT UNDERLAY PORTIONS OF THE SITE. TO PROVIDE INFORMATION THAT MAY BE NEEDED FOR ANY FUTURE ADAPTIVE MANAGEMENT RESPONSE, THE PRESENCE OR ABSENCE OF THIS SOIL TYPE WILL BE DOCUMENTED AS THE MINING PROGRESSES.

SOIL BORINGS WILL BE PLACED IN A 200-FOOT BY 200-FOOT GRID. ONE SAMPLE WILL BE COLLECTED FROM THE APPROXIMATE CENTER OF EACH GRID CELL BEFORE THE CELL IS EXCAVATED. THE PRESENCE OR ABSENCE OF HUMATE-CEMENTED BLACK SANDS WILL BE NOTED AND DOCUMENTED.

1.2.1. FIELD IDENTIFICATION OF BLACK SANDS

THE FOLLOWING BLACK HUMATE-STAINED SOIL LAYERS HAVE BEEN IDENTIFIED WITHIN THE MINE SITE:

- UNCONSOLIDATED BLACK SANDS,
- SEMI-CONSOLIDATED BLACK TO DARK BROWN SANDS, AND
- CONSOLIDATED BLACK SANDS

THE CONSOLIDATED BLACK SANDS ARE EASILY DISTINGUISHED FROM THE HIGHER PERMEABILITY UNCONSOLIDATED AND SEMI-CONSOLIDATED BLACK SAND LAYERS DUE TO THE FIRM OR STIFF, CEMENTED CHARACTERISTICS OF THE SAND GRAINS (SEE PHOTOGRAPH 1). RESULTS OF LABORATORY PERMEABILITY TESTING OF HUMATE-CEMENTED CONSOLIDATED BLACK SANDS COLLECTED FROM THE SITE INDICATED VERTICAL HYDRAULIC CONDUCTIVITIES RANGING FROM 10⁻⁷ TO 10⁻⁸ CENTIMETERS PER SECOND (CM/S). DIFFERENCES IN THE APPEARANCE OF THE CONSOLIDATED, SEMI-CONSOLIDATED AND UNCONSOLIDATED BLACK SANDS ARE SHOWN IN THE PHOTOGRAPHS PROVIDED BELOW:



PHOTOGRAPH 1. LOW PERMEABILITY HUMATE-CEMENTED CONSOLIDATED BLACK SAND



PHOTOGRAPH 2. SEMI-CONSOLIDATED BLACK SAND



PHOTOGRAPH 3. UNCONSOLIDATED BLACK SAND

AS SHOWN ABOVE, CONSOLIDATED SANDS ARE EASILY RECOGNIZED IN THE FIELD BASED ON THE FOLLOWING CHARACTERISTICS:

- BLACK OR VERY DARK BROWN COLOR
- FIRM OR STIFF CORE SAMPLES THAT MAINTAIN A CYLINDRICAL SHAPE WHEN RETRIEVED FROM THE BOREHOLE (SIMILAR IN APPEARANCE TO PHOTOGRAPH 1, AS COMPARED TO PHOTOGRAPHS 2 AND 3 ABOVE).
- OFTEN DISPLAY A GREASY APPEARANCE ON THE CORE SURFACE UPON REMOVAL FROM THE SAMPLER

1.2.2. DRILLING PROCEDURES

DRILLING WILL BE PERFORMED BY TPM. A SONIC, GEOPROBE, HOLLOW-STEM AUGER OR EQUIVALENT TYPE DRILL RIG WILL BE USED TO COLLECT SOIL SAMPLES CONTINUOUSLY FROM BOREHOLES IN ADVANCE OF THE MINING. THE BORINGS WILL BE DRILLED ALONG THE CENTER LINES OF THE MINING CUTS AND EXTEND TO THE MAXIMUM DEPTH OF MINING (ABOUT 50 FEET BELOW LAND SURFACE). THE FOLLOWING INFORMATION WILL BE RECORDED AT EACH BOREHOLE BY A GEOLOGIST:

- UNIQUE BORING IDENTIFIER
- DATE OF DRILLING (START/END DATE)

- SURVEYED BORING LOCATION AND ELEVATION DATA
- DEPTH TO SATURATED SOILS AS MEASURED IN THE BOREHOLE OR AS IDENTIFIED IN THE CORE
- LITHOLOGIC DESCRIPTIONS OF SUBSURFACE SOIL TO INCLUDE:
 - SOIL TYPE (UNIFIED SOIL CLASSIFICATION SYSTEM)
 - PERCENTAGE OF CLAY VERSUS SAND (VISUAL ESTIMATE)
 - HUMATE PRESENT AND RELATIVE PERCENT (I.E. LOW, MEDIUM, HIGH; VISUAL ESTIMATE)
 - DEGREE OF CONSOLIDATION OF SANDS (UNCONSOLIDATED, SEMI-CONSOLIDATED, OR CONSOLIDATED)
 - SORTING OF SAND
 - DESCRIPTION OF FINE, MEDIUM, COARSE GRAINS PER SANDY SOIL TYPE
 - COLOR DESCRIPTION USING A MUNSELL OR GSA ROCK COLOR CHART
- BORING TERMINATION DEPTH
- PHOTOGRAPHS OF EACH DRILL SAMPLE RETURN INTERVAL. PHOTOGRAPHS WILL BE REFERENCED WITH THE BORING IDENTIFIER, DATE, AND SAMPLE DEPTH INTERVAL

THE BORING DATA WILL BE COMPILED INTO A DATABASE SYSTEM AND USED TO GENERATE SUBSURFACE BORING LOGS AND CROSS SECTIONS.

1.2.3. GROUNDWATER-LEVEL MONITORING PLAN

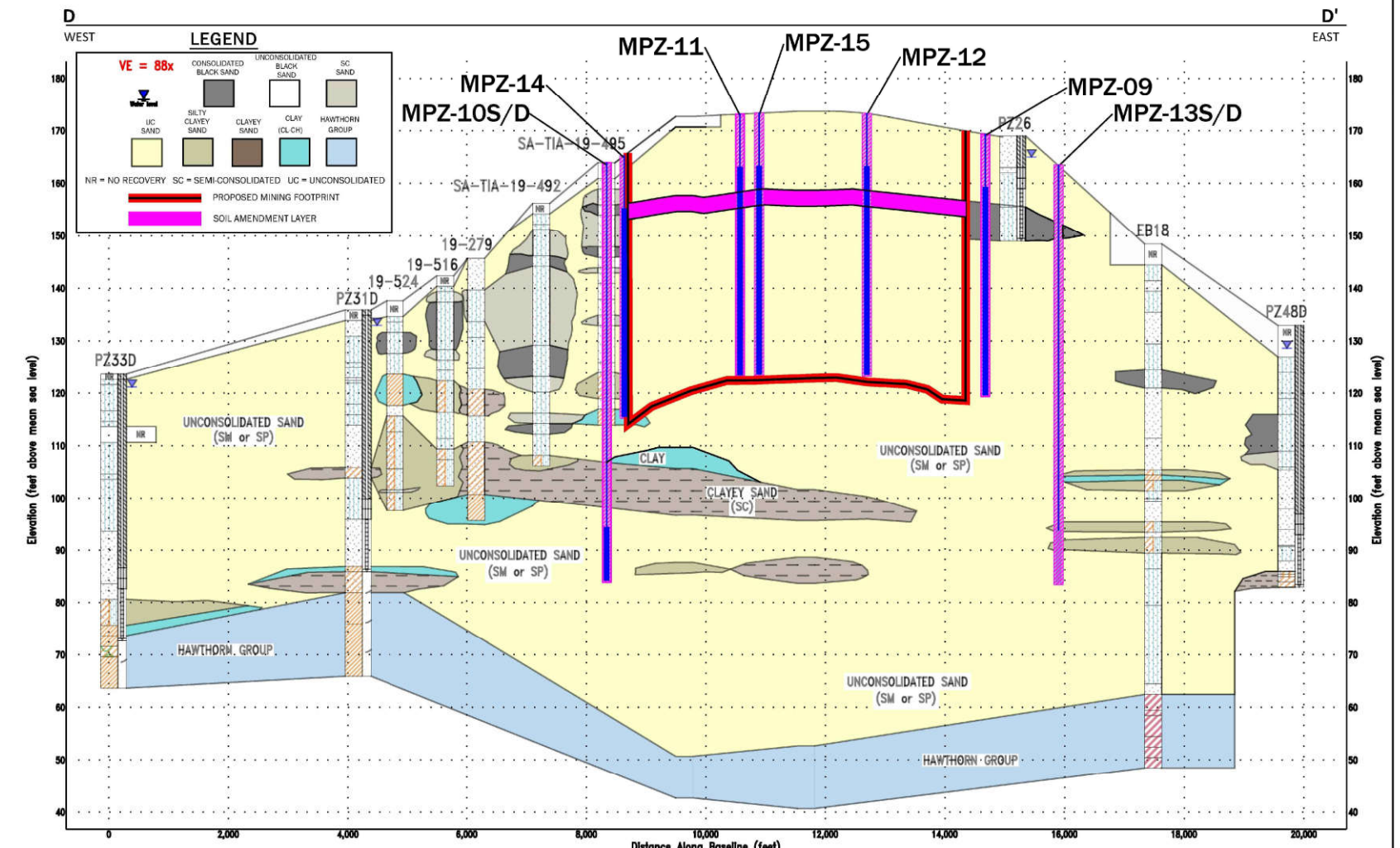
A GROUNDWATER-LEVEL MONITORING PLAN, ACTION LEVELS FOR COMPLIANCE, AND AN ADAPTIVE MANAGEMENT (OR CONTINGENCY) PLAN IF GROUNDWATER LEVELS ARE NOT RESTORED IS INCLUDED IN SECTION 2, SHEET 11 OF THE GROUNDWATER AND SURFACE WATER MONITORING PLAN OF THE SURFACE MINING LAND USE PLAN.

1.2.4. PROCEDURES FOR DISCONTINUING THE SOIL AMENDMENT

TPM WILL SUBMIT THE RESULTS (E.G., SOIL BORING LOGS, CROSS-SECTIONS, ISOPACH MAPS, ETC.) OF THE SUBSURFACE MAPPING OF THE HUMATE-CEMENTED, CONSOLIDATED BLACK SANDS TO EPD. IF THE MAPPING DEMONSTRATES THE ABSENCE OF HUMATE-CEMENTED, CONSOLIDATED BLACK SAND WITHIN AN AREA YET TO BE MINED, TPM WILL REQUEST EPD'S AUTHORITY TO PROCEED WITHOUT THE ADDITION OF THE SOIL AMENDMENT LAYER IN THOSE SPECIFIED AREAS. THE BENTONITE LAYER RECREATING THE HUMATE-CEMENTED, CONSOLIDATED BLACK SAND WILL BE CONTINUOUS UNLESS TPM RECEIVES EPD APPROVAL TO DISCONTINUE APPLICATION OF THE SOIL AMENDMENT LAYER IN THOSE SPECIFIED AREAS.

IT IS IMPORTANT TO NOTE THAT IF THE HUMATE-CEMENTED, CONSOLIDATED BLACK SANDS ARE NOT CONTINUOUS AS DEMONSTRATED BY TPM'S PRIOR INVESTIGATIONS, THE ADDITION OF A CONTINUOUS SOIL AMENDMENT LAYER MAY ADVERSELY IMPACT THE LOCAL GROUNDWATER SYSTEM. POTENTIAL IMPACTS INCLUDE:

- ARTIFICIALLY RAISING THE WATER TABLE ABOVE THE LAND SURFACE LEADING TO PONDING OR INCREASED SURFACE WATER RUNOFF,
- REDUCING DOWNWARD FLOW TO DEEPER PARTS OF THE SURFICIAL AQUIFER,
- REDUCING GROUNDWATER DISCHARGE TO THE WEST AND TO THE EAST OF TRAIL RIDGE.

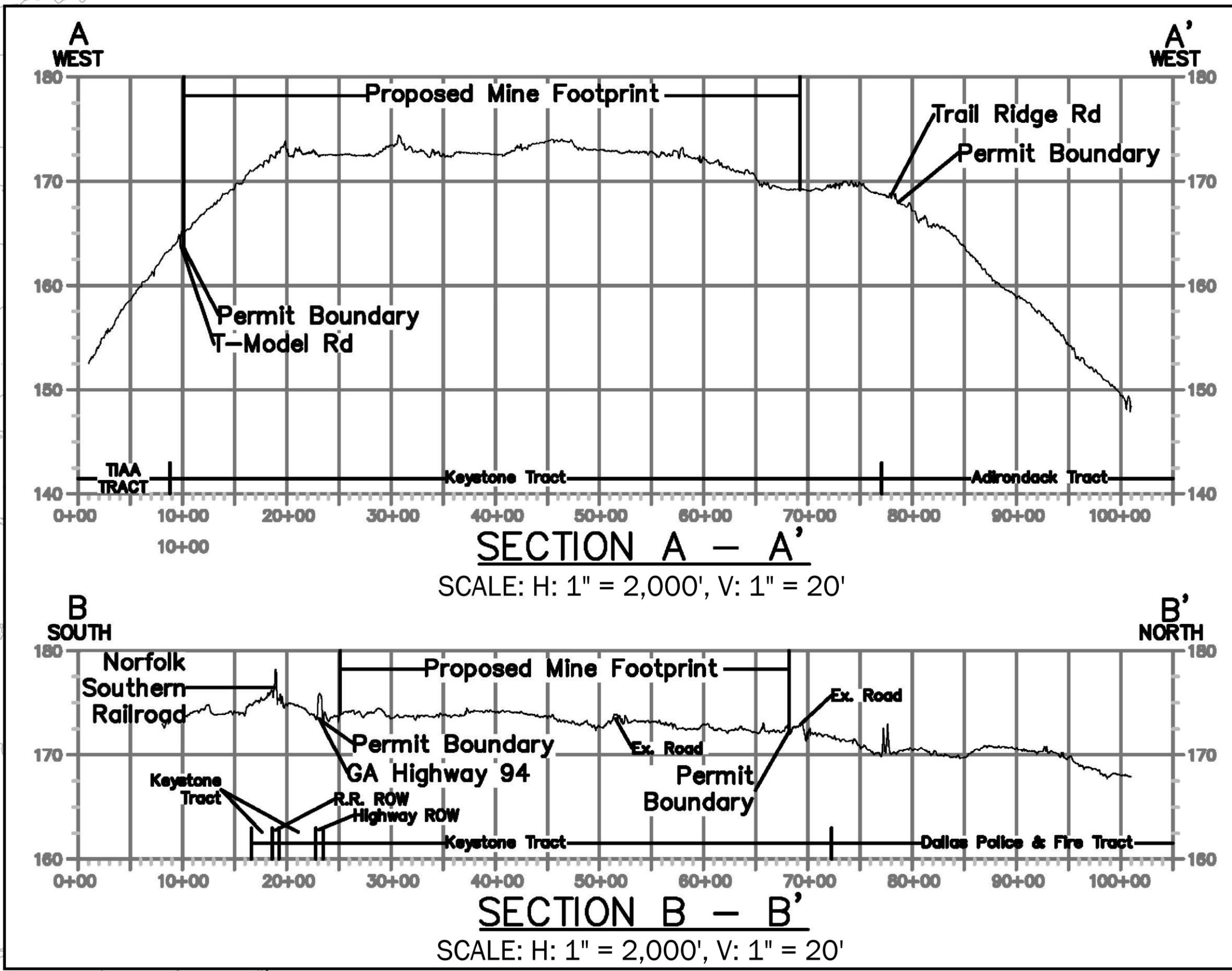
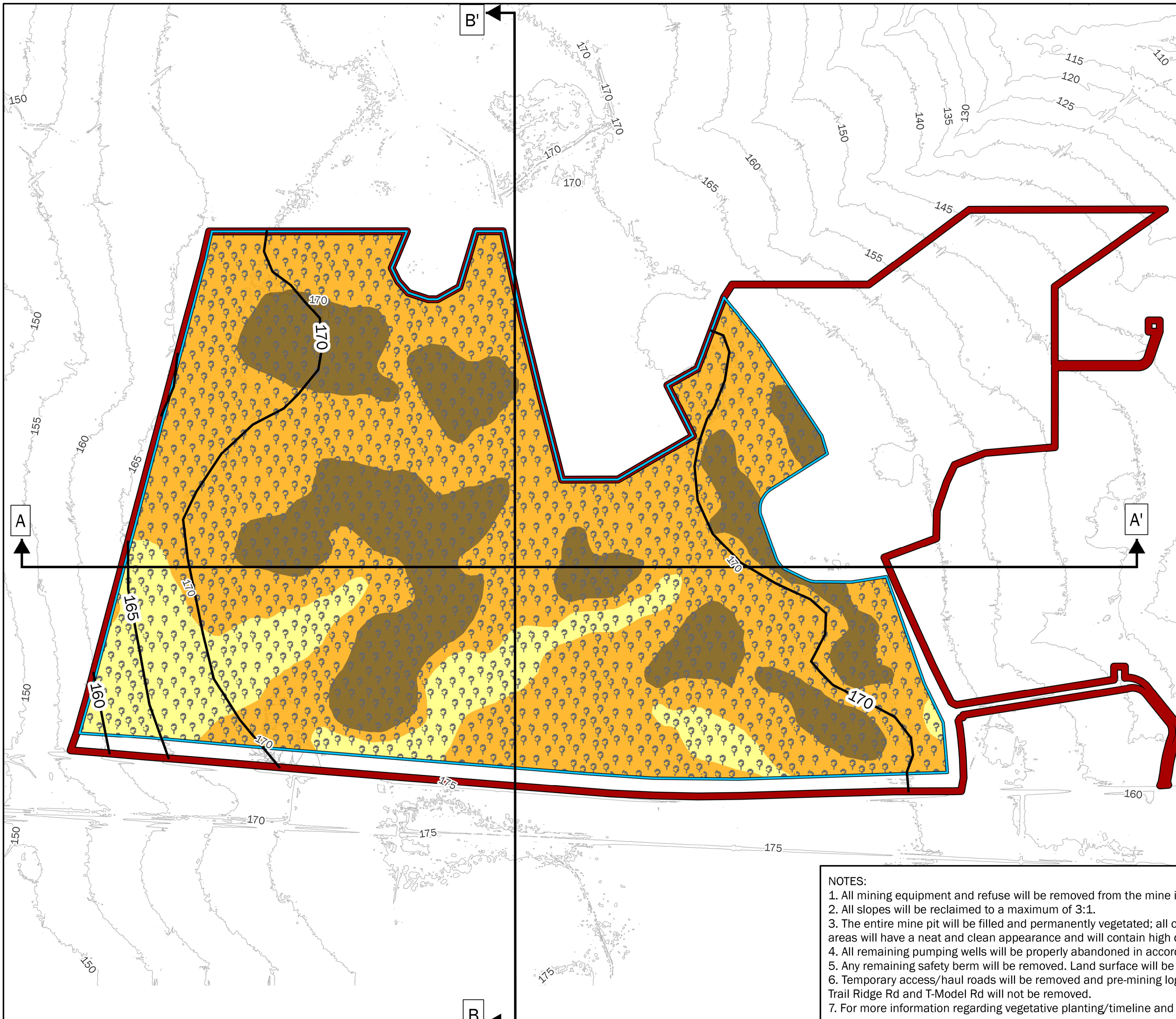


POST-MINING GENERALIZED GEOLOGIC CROSS-SECTION OF THE MINE FOOTPRINT



SHEET 9: POST-MINING RECLAMATION PLAN (1)
 TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE (ID NO. 2073)
 ST. GEORGE, CHARLTON COUNTY, GEORGIA

| |
|-----------------------------|
| DRAWN BY: DEK |
| CHECKED BY: SGR |
| DRAWING DATE: 11/13/2020 |
| REVISION DATE: 5/19/2022 |
| TTL JOB NO.: 18-02-00804.00 |
| APPROX. SCALE: N/A |



LEGEND

- Permit Boundary (773± AC)
- Mine Footprint (582± AC)
- Vegetative Reclamation Area⁷

Reclaimed Habitat Classifications

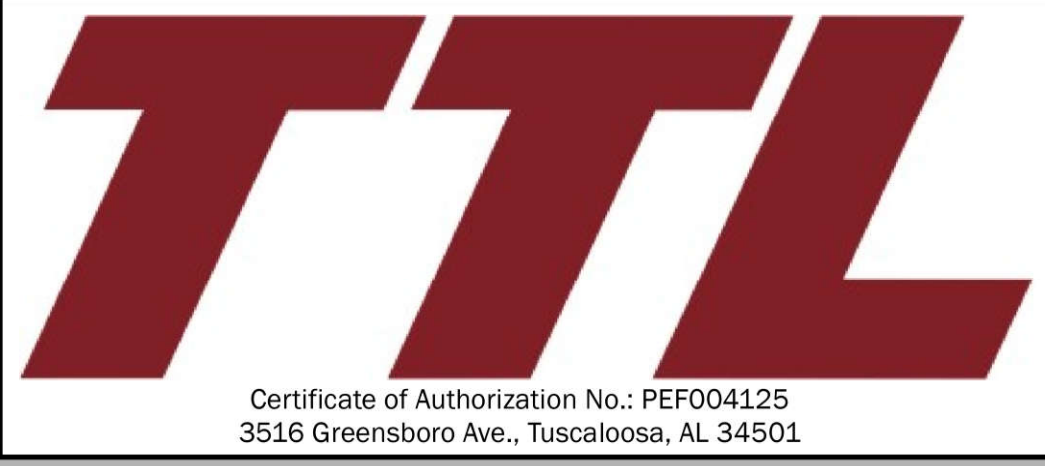
- Depressional Wetlands
- Wet Pine Flatwoods
- Mesic Pine Flatwoods

- Post-Mining Elevations (ft AMSL)
- 5 ft Elevation Contour (See Survey Source Information on Sheet 3)

0 500 1,000 2,000
 Feet

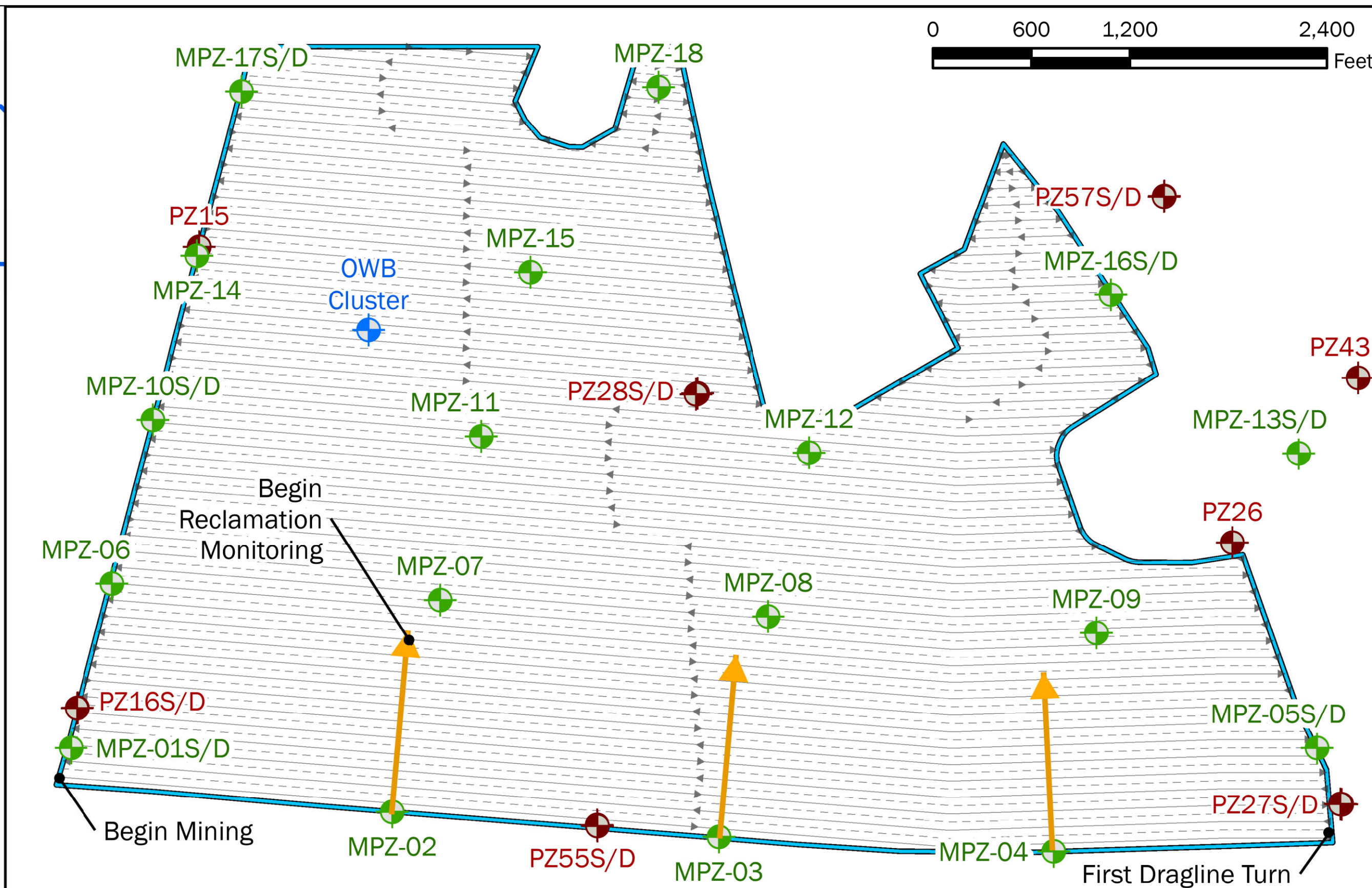
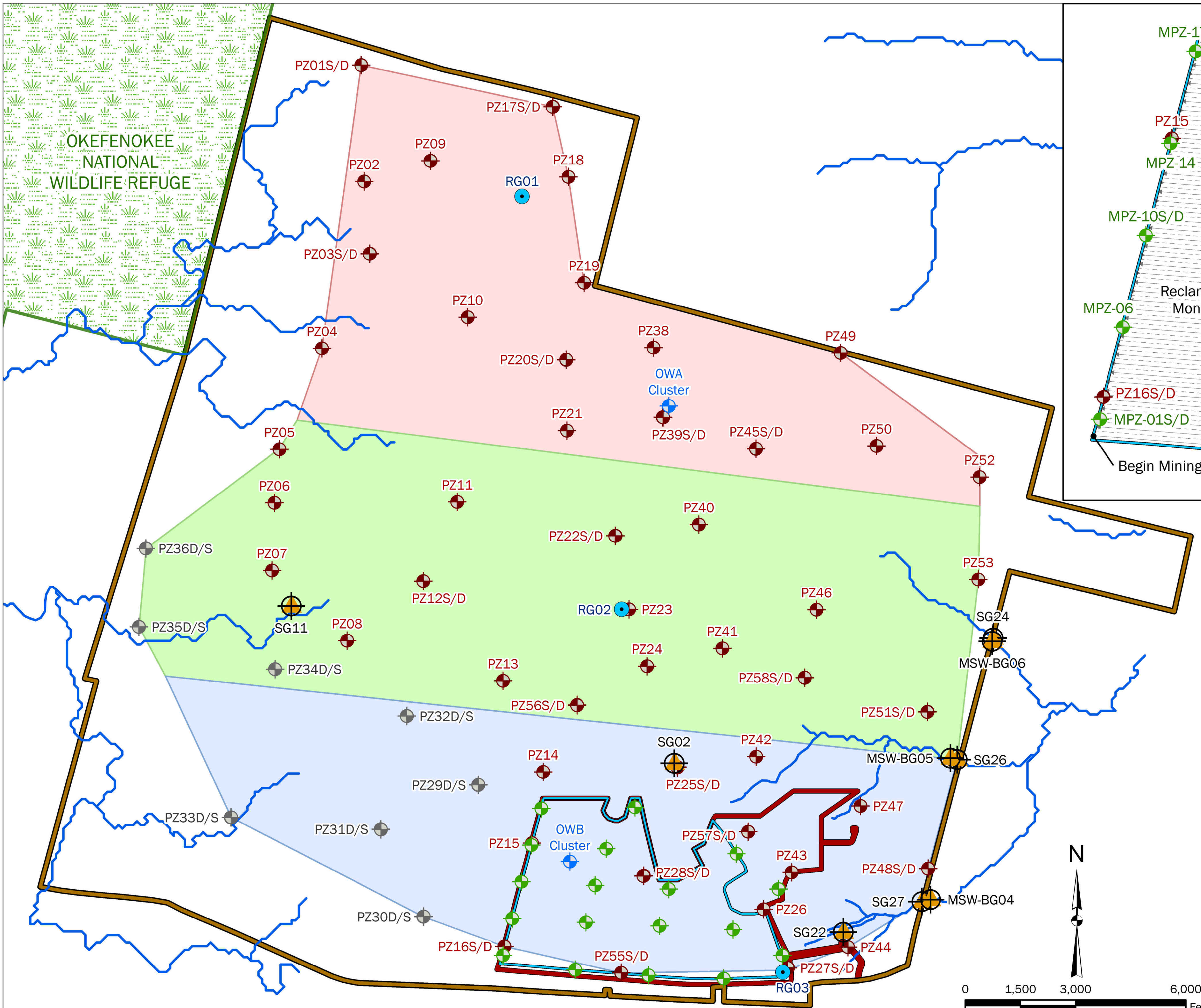
NOTES:

1. All mining equipment and refuse will be removed from the mine in accordance with Georgia state rules and regulations.
2. All slopes will be reclaimed to a maximum of 3:1.
3. The entire mine pit will be filled and permanently vegetated; all other disturbed areas will be permanently vegetated; all land areas will have a neat and clean appearance and will contain high quality permanent vegetation.
4. All remaining pumping wells will be properly abandoned in accordance with state guidelines.
5. Any remaining safety berm will be removed. Land surface will be restored as stated in the notes above.
6. Temporary access/haul roads will be removed and pre-mining logging roads may be re-established upon completion of mining; Trail Ridge Rd and T-Model Rd will not be removed.
7. For more information regarding vegetative planting/timeline and restoration of non-jurisdictional wetlands, refer to Sheet 11.



SHEET 10: POST-MINING RECLAMATION PLAN (2)
 TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE (ID NO. 2073)
 ST. GEORGE, CHARLTON COUNTY, GEORGIA

| |
|------------------------------|
| DRAWN BY: DEK |
| CHECKED BY: SGR |
| DRAWING DATE: 11/13/2020 |
| REVISION DATE: 5/19/2022 |
| TTL JOB NO.: 18-02-00804.00 |
| APPROX. SCALE: 1 in = 500 ft |



NOTE: Estimated average daily progress of the dragline is 170 feet per day based on the estimated mining timeline shown on Sheet 4. See Sheet 11 for a more complete description of the proposed dragline mining process.

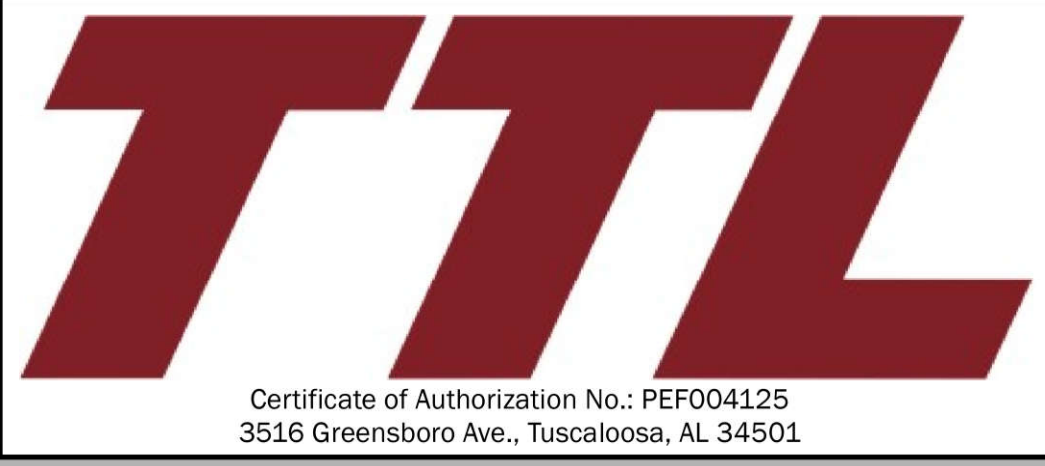
NOTE: Access to the TIAA property is restricted. Piezometers were abandoned in October 2020.

LEGEND

| | |
|-------------------------------------|------------------------------------|
| Okefenokee National Wildlife Refuge | Weather Station |
| Project Study Area | Proposed Piezometer* |
| Permit Boundary (773± AC) | Existing Piezometer* |
| Mine Footprint (582± AC) | Abandoned Piezometer |
| North Analysis Section | Existing Observation Well Cluster* |
| Central Analysis Section | Surface Water Monitor* |
| South Analysis Section | |
| Drain Boundaries | |
| East-to-West Dragline Center | |
| West-to-East Dragline Center | |
| Edge of Dragline Pass | |
| 1,000+ ft from Piezometer** | |

* See Sheet 13 for a complete list of locations that will be used for groundwater and surface water elevation and quality monitoring.

** 1,000 feet is the estimated distance for monitoring wells to be outside of the influence of the moving mine.



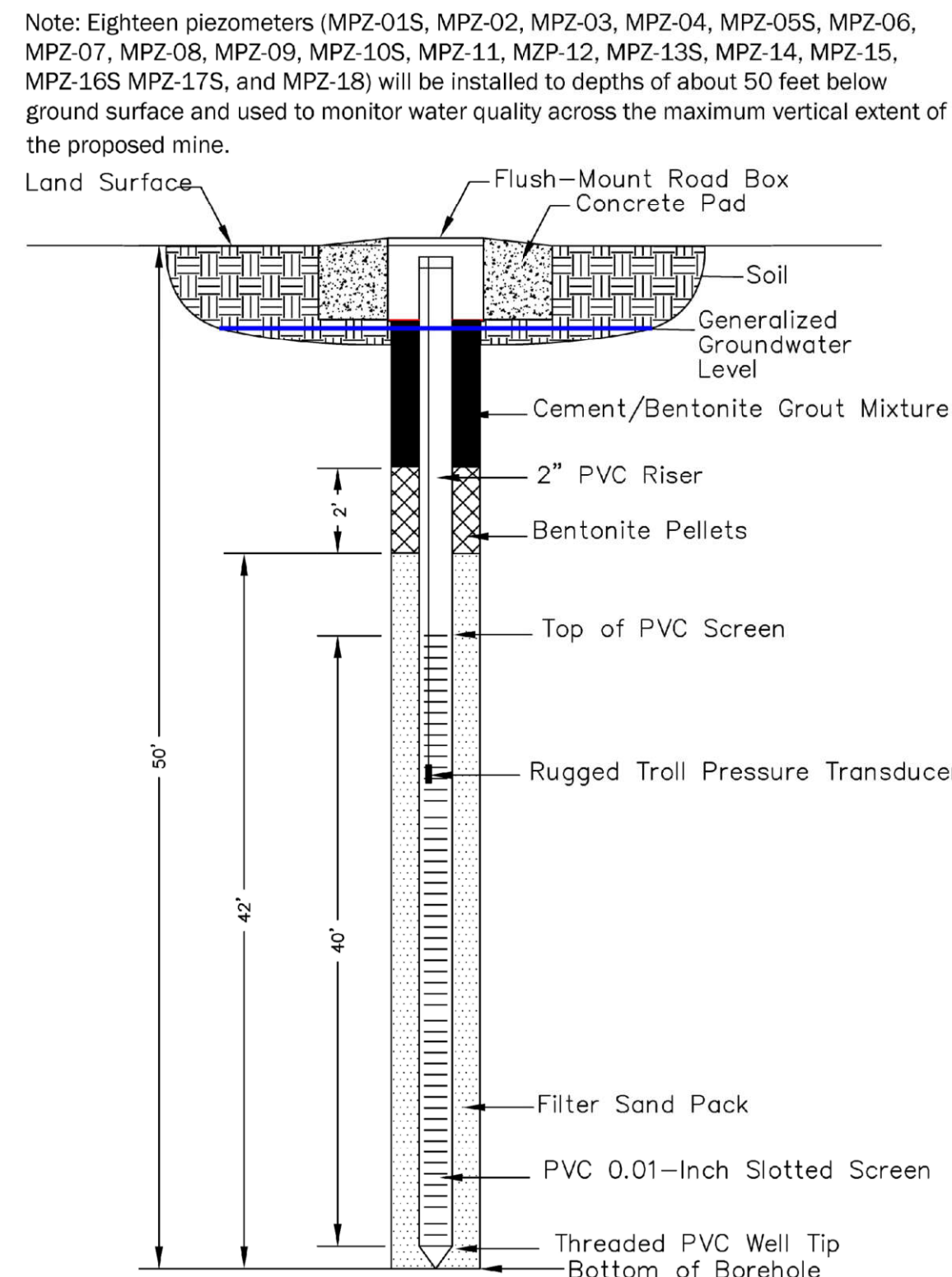
SHEET 12: GROUNDWATER & SURFACE WATER MONITORING PLAN (2)
 TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE (ID NO. 2073)
 ST. GEORGE, CHARLTON COUNTY, GEORGIA



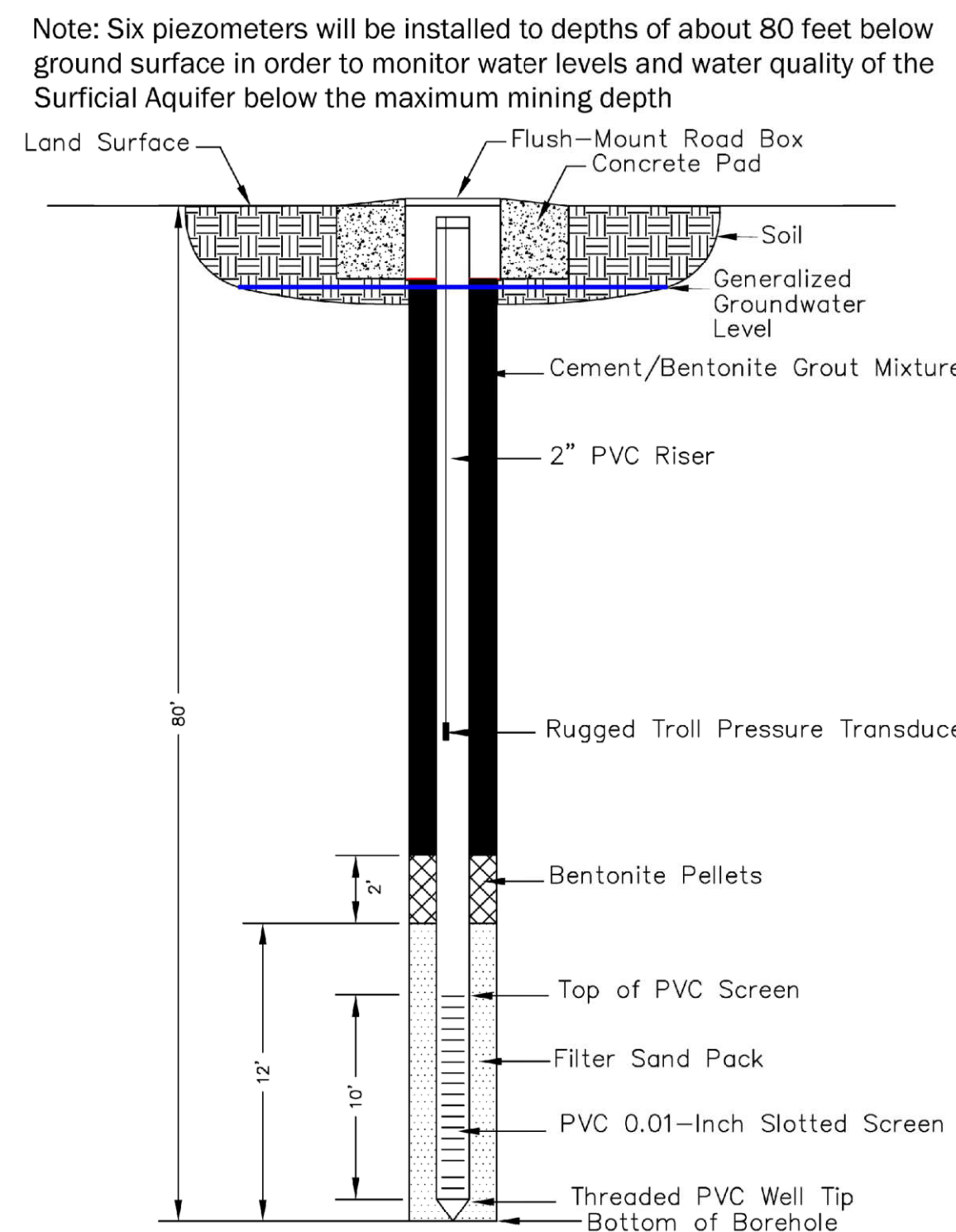
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| CHECKED BY: JRS |
| DRAWING DATE: 11/13/2020 |
| REVISION DATE: 5/19/2022 |
| TTL JOB NO.: 18-02-00804.00 |
| APPROX. SCALE: 1 in = 1,500 ft |

| GROUNDWATER MONITORING TABLE | | | | | |
|------------------------------|-----------|---------|---------|-----------|---------|
| ID | ELEVATION | QUALITY | ID | ELEVATION | QUALITY |
| PZ01S | X | | PZ48D | X | |
| PZ01D | X | | PZ49 | X | |
| PZ02 | X | | PZ50 | X | |
| PZ03S | X | | PZ51S | X | |
| PZ03D | X | | PZ51D | X | |
| PZ04 | X | | PZ52 | X | |
| PZ05 | X | | PZ53 | X | |
| PZ06 | X | | PZ55S | X | |
| PZ07 | X | | PZ55D | X | |
| PZ08 | X | | PZ56S | X | |
| PZ09 | X | | PZ56D | X | |
| PZ10 | X | | PZ57S | X | |
| PZ11 | X | | PZ57D | X | |
| PZ12S | X | | PZ58S | X | |
| PZ12D | X | | PZ58D | X | |
| PZ13 | X | | OWB1BS | X | |
| PZ14 | X | | OWB1S | X | |
| PZ15 | X | | OWB1D | X | |
| PZ16S | X | | MPZ-01S | X | X |
| PZ16D | X | | MPZ-01D | X | X |
| PZ17S | X | | MPZ-02 | X | X |
| PZ17D | X | | MPZ-03 | X | X |
| PZ18 | X | | MPZ-04 | X | X |
| PZ19 | X | | MPZ-05S | X | X |
| PZ20S | X | | MPZ-05D | X | X |
| PZ20D | X | | MPZ-06 | X | X |
| PZ21 | X | | MPZ-07 | X | X |
| PZ22S | X | | MPZ-08 | X | X |
| PZ22D | X | | MPZ-09 | X | X |
| PZ23 | X | | MPZ-10S | X | X |
| PZ24 | X | | MPZ-10D | X | X |
| PZ25S | X | | MPZ-11 | X | X |
| PZ25D | X | | MPZ-12 | X | X |
| PZ26 | X | | MPZ-13S | X | X |
| PZ27S | X | | MPZ-13D | X | X |
| PZ27D | X | | MPZ-14 | X | X |
| PZ28S | X | | MPZ-15 | X | X |
| PZ28D | X | | MPZ-16S | X | X |
| PZ38 | X | | MPZ-16D | X | X |
| PZ39S | X | | MPZ-17S | X | X |
| PZ39D | X | | MPZ-17D | X | X |
| PZ40 | X | | MPZ-18 | X | X |
| PZ41 | X | | PZ45D | X | |
| PZ42 | X | | PZ46 | X | |
| PZ43 | X | | PZ47 | X | |
| PZ44 | X | | PZ48S | X | |
| PZ45S | X | | | | |

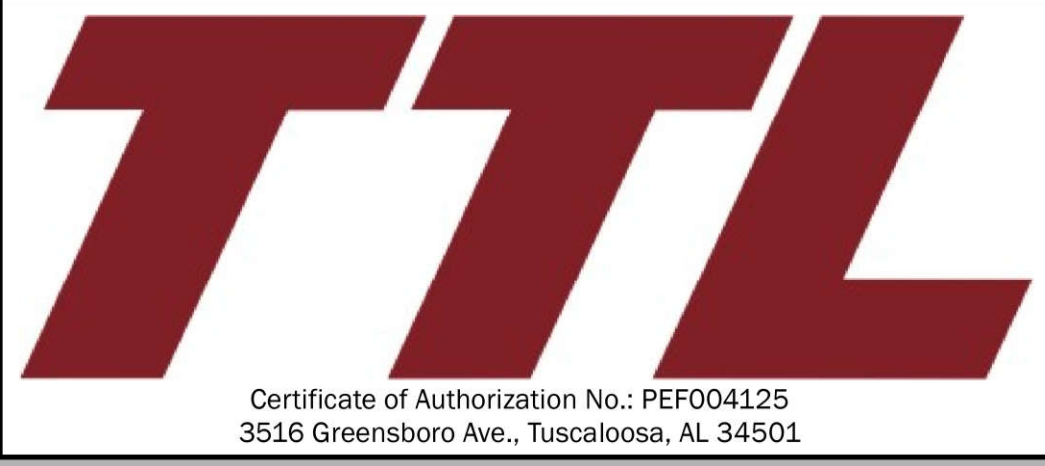
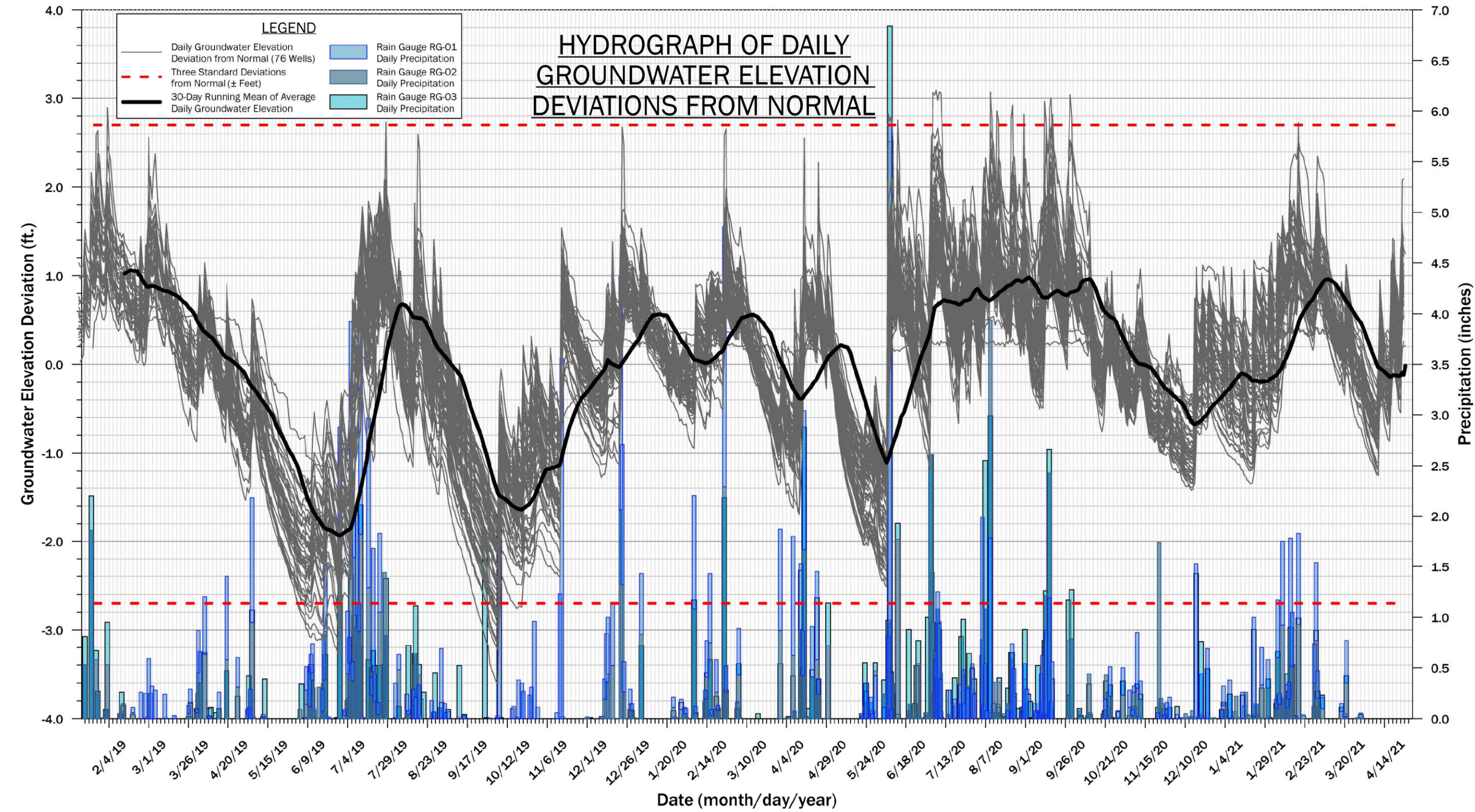
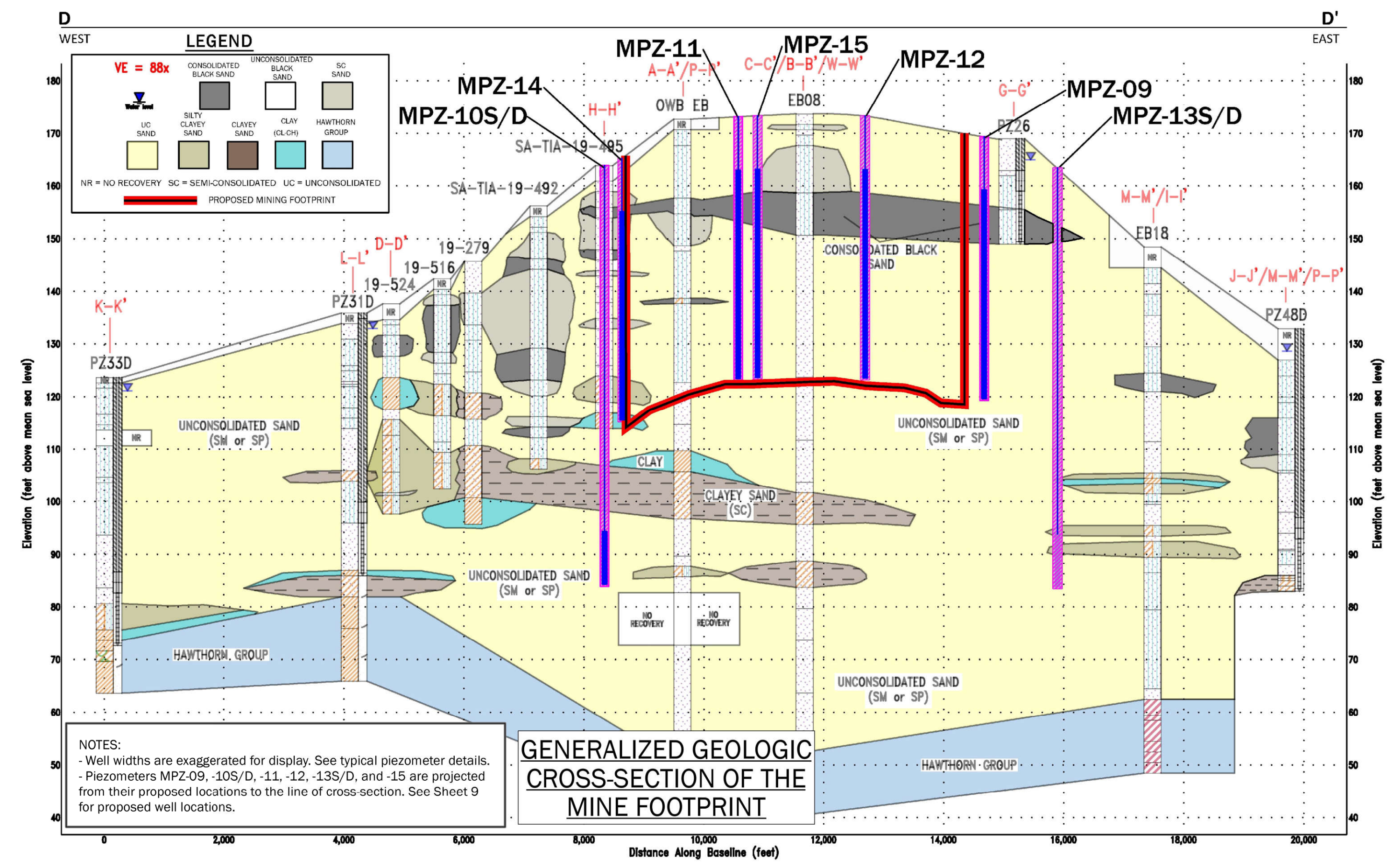
| SURFACE WATER MONITORING TABLE | | |
|--------------------------------|-----------|---------|
| ID | ELEVATION | QUALITY |
| SG02 | X | |
| SG11 | X | |
| SG22 | X | |
| SG24 | X | |
| SG26 | X | |
| SG27 | X | |
| MSW-BG04 | | X |
| MSW-BG05 | | X |
| MSW-BG06 | | X |



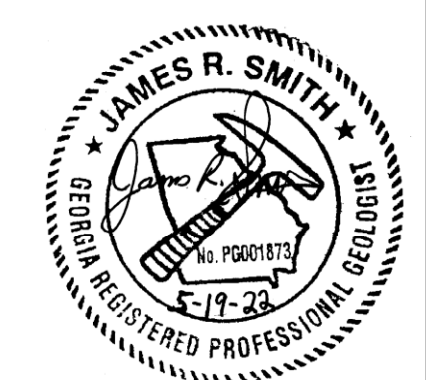
TYPICAL PIEZOMETER DETAIL (50 FEET)



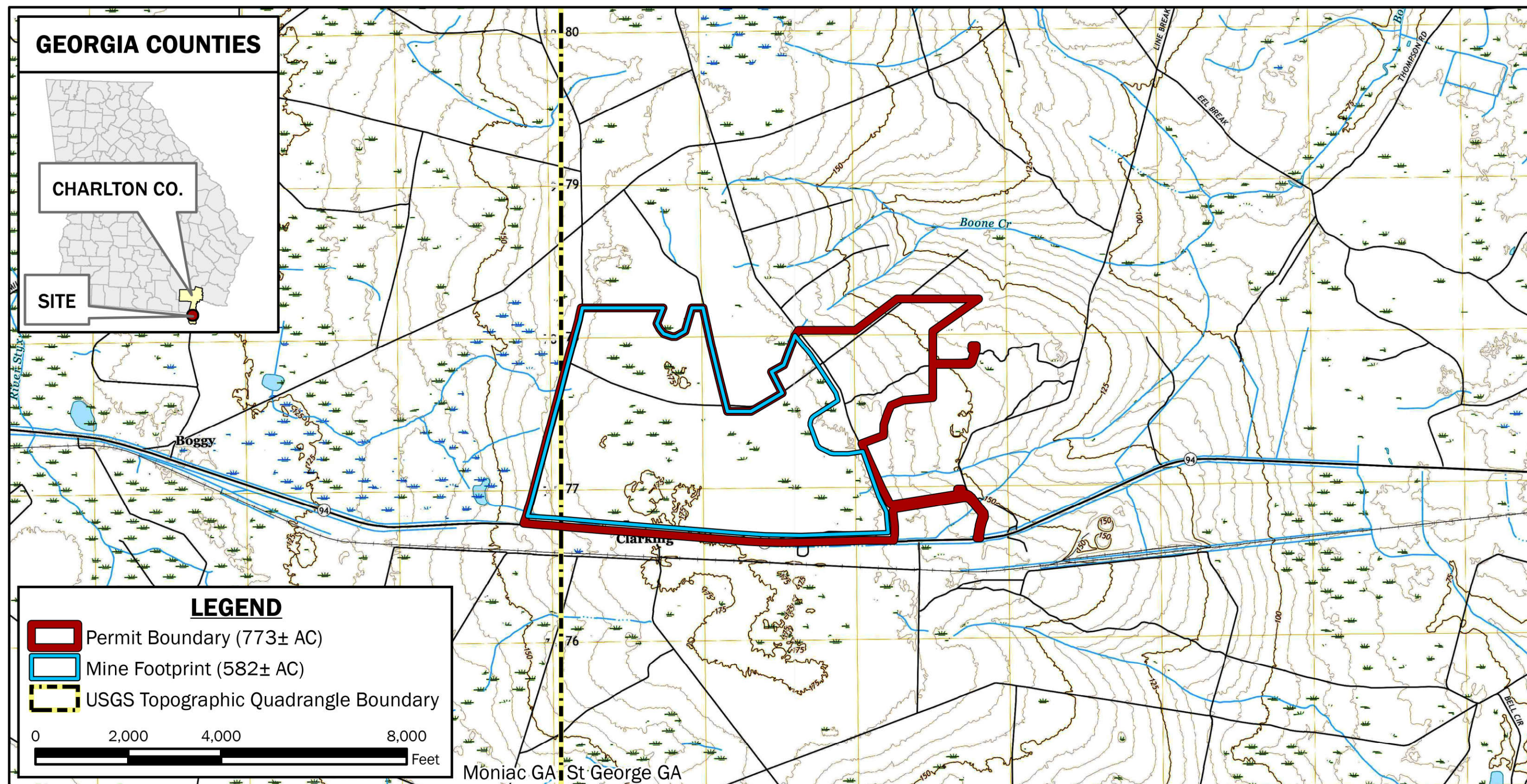
TYPICAL PIEZOMETER DETAIL (80 FEET)



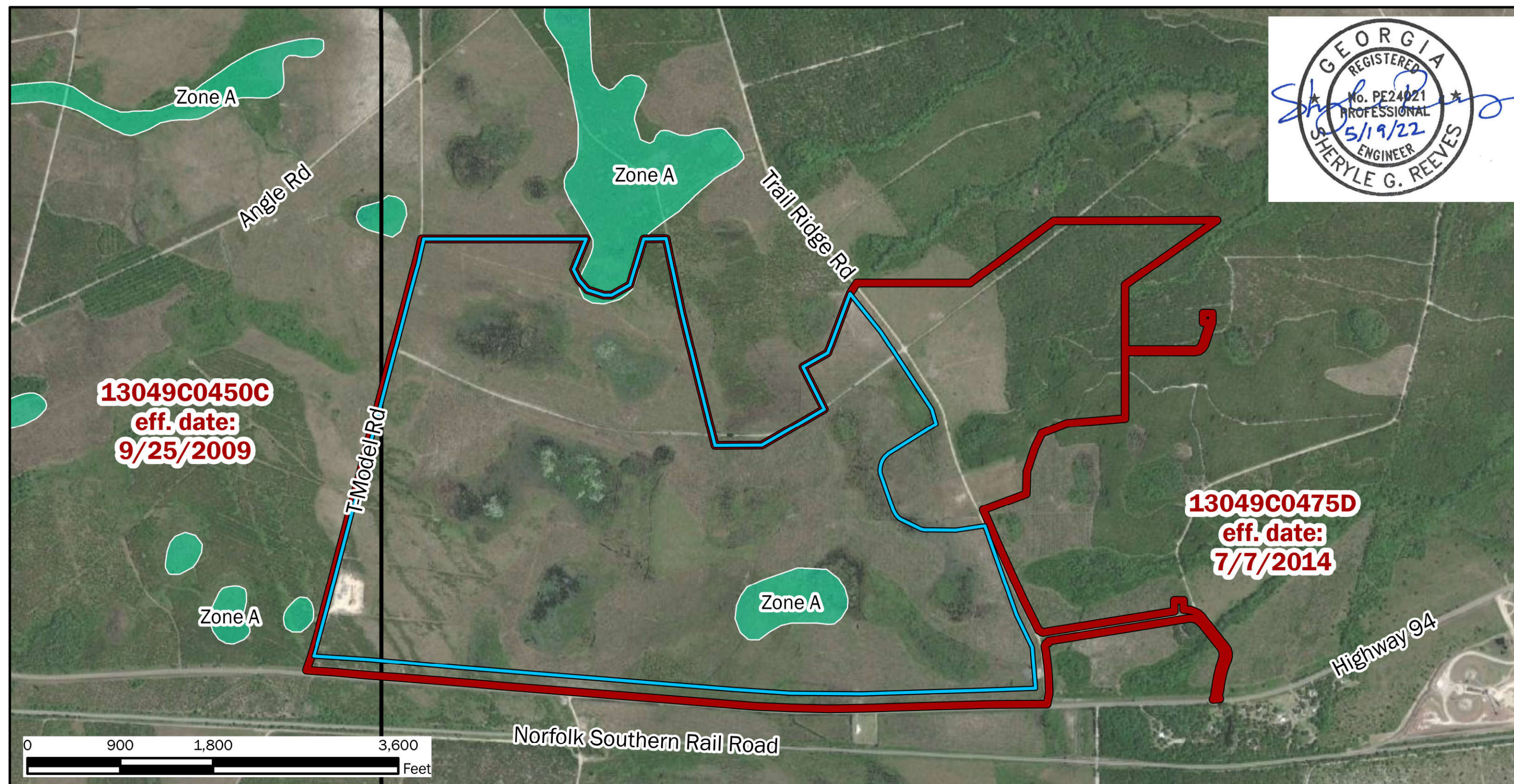
SHEET 13: GROUNDWATER & SURFACE WATER MONITORING PLAN (3)
 TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE (ID NO. 2073)
 ST. GEORGE, CHARLTON COUNTY, GEORGIA



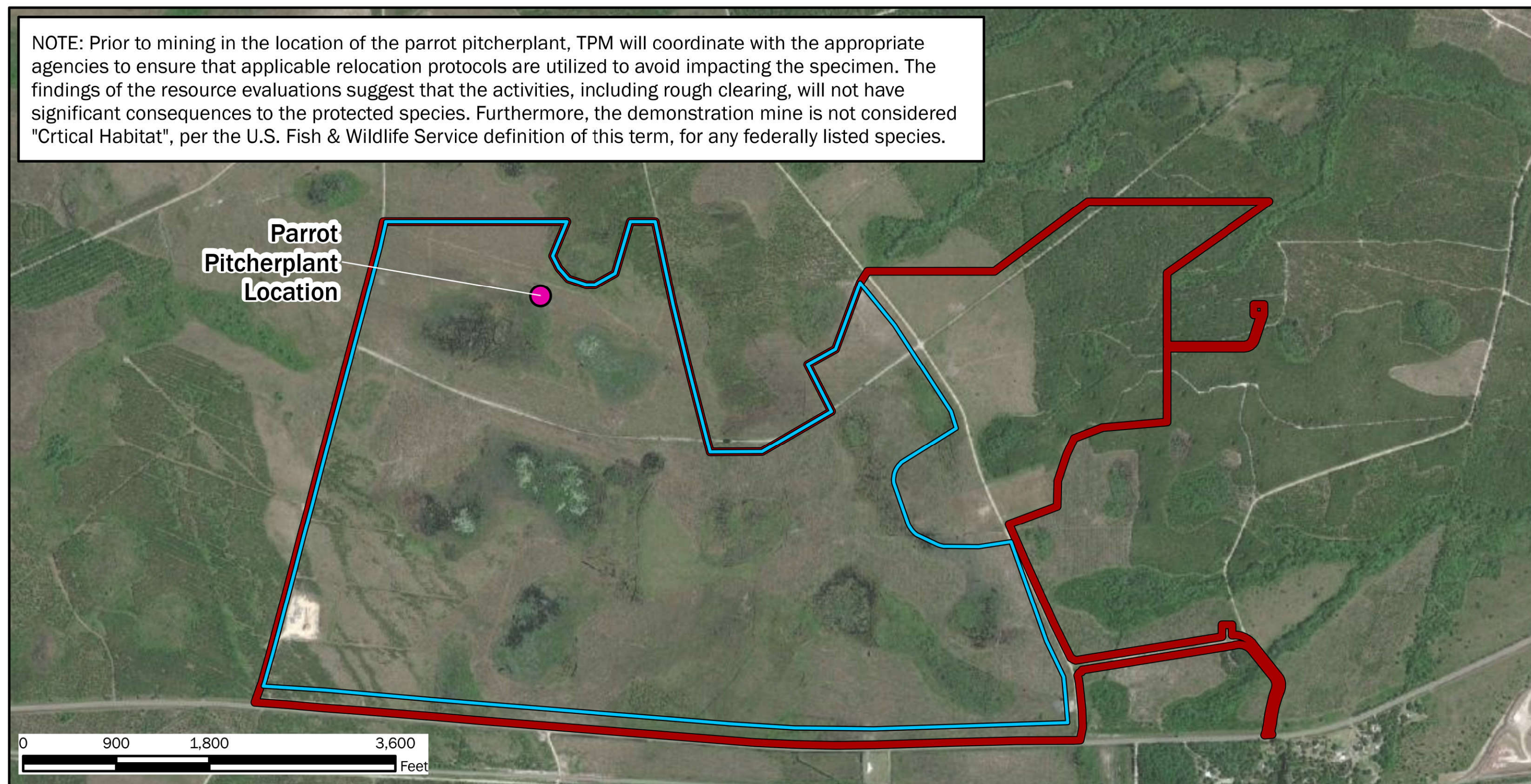
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| CHECKED BY: JRS |
| DRAWING DATE: 11/13/2020 |
| REVISION DATE: 5/19/2022 |
| TTL JOB NO.: 18-02-00804.00 |
| APPROX. SCALE: N.T.S. |



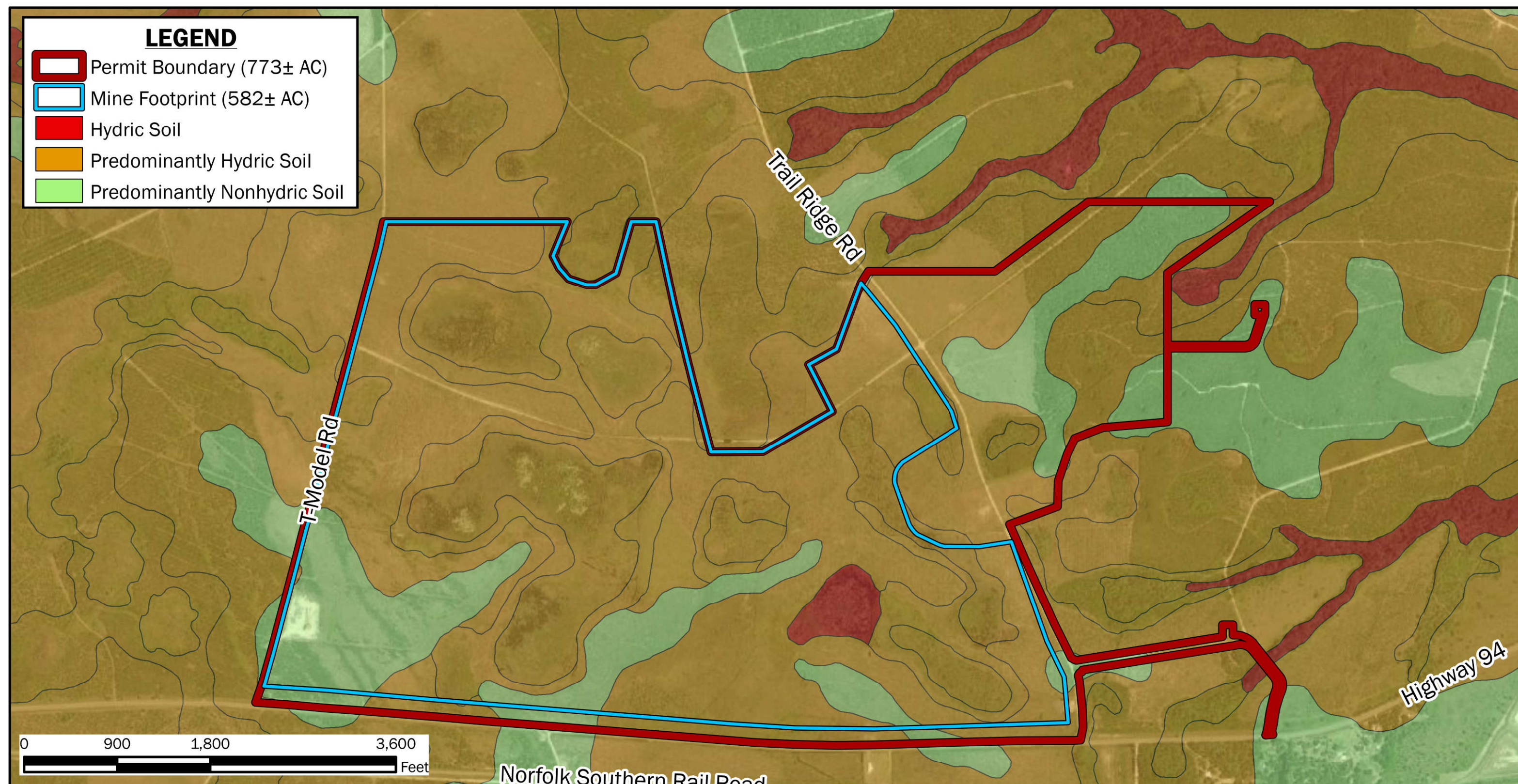
VICINITY MAP



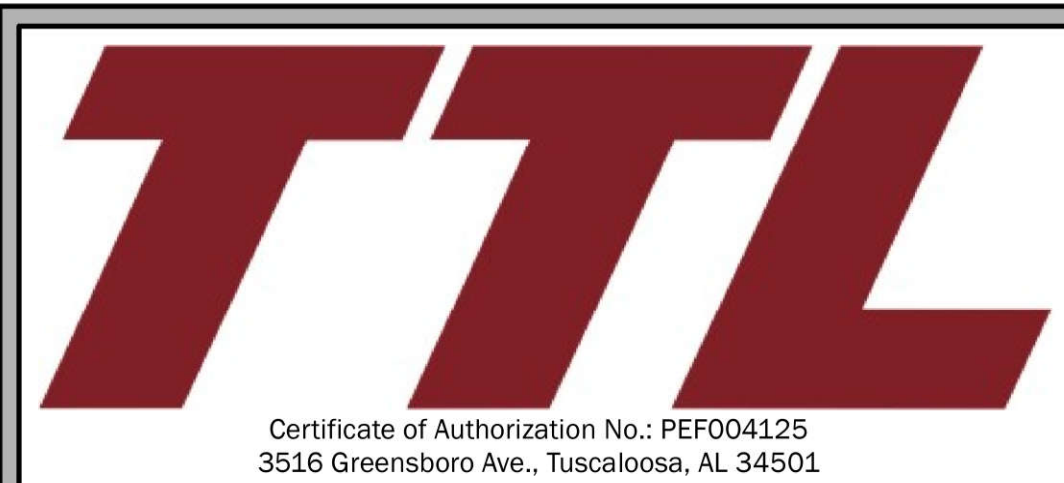
FEMA FLOOD HAZARD MAP



THREATENED & ENDANGERED SPECIES LOCATION MAP



NRCS HYDRIC SOIL RATING MAP



SHEET 14: SUPPLEMENTAL INFORMATION - VICINITY MAP, FEMA FLOOD HAZARD MAP, THREATENED & ENDANGERED SPECIES MAP, NRCS SOILS MAP

TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE (ID NO. 2073)
ST. GEORGE, CHARLTON COUNTY, GEORGIA

TOPOGRAPHIC BASEMAP: Moniac (W) & Saint George (E), Georgia, USGS 7.5 Minute Quadrangle Map, 2020 (5-ft Contour Interval). AERIAL BASEMAP: Maxar Technologies, Vivid Imagery, 5/7/2021 (0.5 m Resolution).

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| CHECKED BY: SGR |
| DRAWING DATE: 11/13/2020 |
| REVISION DATE: 5/19/2022 |
| TTL JOB NO.: 18-02-00804.00 |
| APPROX. SCALE: See Panels |

SURFACE MINING LAND USE PLAN
SAUNDERS DEMONSTRATION MINE (MINE ID NO. 2073)
SUPPLEMENTAL NARRATIVE

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3.2 Description of The Minerals to Be Mined

Mineral sands, titanium minerals (ilmenite, leucoxene and rutile), zircon, and staurolite occur in the upper 50 feet of sand in the Trail Ridge physiographic landform, which is an ancient beach ridge in Charlton County. These minerals will be extracted, separate, and concentrated on site. After the HMS products have been separated, the final products will be containerized, bulk shipped or loaded onto trucks or rail dependent upon customer requirements.

These deposits include the primary ores of titanium dioxide (TiO₂) and zircon (ZrSiO₄). TiO₂ is primarily obtained from mining and processing the minerals ilmenite, rutile, and leucoxene. Leucoxene, not technically a mineral, is a higher quality derivative of ilmenite resulting from the preferential weathering and leaching of iron, which increases the TiO₂ percentage to greater than 70 percent. Zircon is recovered as a co-product from the processing of HMS deposits.

3.3 Description of Lands and Community to Be Affected

The mine site is located within a rural area that has historically been and is currently used for silviculture; specifically slash pine plantation in various stages of production. Off-site impacts due to dust and noise are not anticipated. Dust will be managed by applying water to haul roads and other high traffic areas. An electrically powered dragline will be utilized to minimize noise disturbance. The following land use types were identified within the mining area during pre-mining field evaluations:

- Southeastern North American Temperate Forest Plantation
- Recently Logged-Herb and Grass Cover
- Southern Coastal Plain Nonriverine Cypress Dome
- Developed-Roads
- Southeastern Ruderal Grassland
- Southern Coastal Plain Seepage Swamp and Baygall Woodland
- Atlantic Coastal Plain Upland Longleaf Pine Woodland
- Southern Coastal Plain Nonriverine Basin Swamp
- Southeastern Ruderal Shrubland
- Southeastern Native Ruderal Flooded & Swamp Forest

Land use types are classified in accordance with land use cover descriptions by Natureserve: *The Descriptions of Ecological Systems for Modeling of LANDFIRE Biophysical Settings, Ecological Systems (2020)*. The dominant land use was managed pine silviculture (Southeastern North American Temperate Forest Plantation, Recently Logged-Herb and Grass Cover), which comprises greater than 88% of the existing land use.

4. Timeframe

After permit issuance, initial prep and facility setup is expected to take six months to one year to complete. Next, excavation of the mine pit will commence. The moving mine pit will progress at a rate of approximately 10 to 15 acres per month once all infrastructure is in place. The extraction of heavy mineral sand is anticipated to take 4 to 5 years. The start of reclamation monitoring will begin after the dragline has moved approximately 1,000 feet north from each completed excavation transect line. Final site reclamation will be completed within 24 months following the completion of mining. Total expected mine life from permit issuance to final reclamation is 7 to 8 years.

processing plant. TPM will also install two deep water wells (FWP-01 and FWP-02) screened in the Upper Floridan Aquifer to provide make-up water during times of need (locations shown on Sheet 3 – Mining Plan Sheet).

The feed and tailings conveyors will be constructed for the entire east-west length of the mining corridor from near T-Model Road to near Trail Ridge Road, where they will turn to the north towards the concentration plants, located near the northeastern portion of the mining area. A berm will be constructed along Georgia State Highway 94 to mitigate erosion and contain stormwater. Berms or other facilities may be constructed along T-Model and Trail Ridge Roads as necessary to control stormwater. Topsoil within each mining cell will be removed by heavy equipment and transported to the topsoil storage piles adjacent to the mine pit. Additionally, silt fencing, brush barriers, and hay bales will also be utilized for erosion and sediment control (see Sheets 6 and 7 – Erosion and Sediment Control Plan Sheets).

The topsoil storage piles/mining perimeter berms will serve to prevent stormwater runoff and sediment-laden waters within the active cut from leaving the site as well as preserve “seed banks” for native vegetation and a planting medium for later reclamation. Topsoil removal will be conducted two weeks in advance of mining activities. The topsoil storage piles will be stabilized with three horizontal to one vertical (3H:1V) internal slope and four horizontal to one vertical (4H:1V) external slope. As noted previously, silt fences and hay bales will be utilized along the outside of the topsoil storage piles to control post construction erosion.

The first step in the mining process will be rough clearing of the mining corridor ahead of the dragline. The initial mining corridor will be approximately 700 feet north to south which will allow for mining of three pit widths before relocating the feed/tailings conveyors. This clearing will extend +/-500 feet ahead of the mining and progress as the dragline advances. The clearing of this 700-foot north to south corridor is required to facilitate the advancement of the apron feeder and mobile conveyors as mining progresses to the east in the initial pit.

5.1.2 Excavation, Processing, and Backfilling

Excavation of the mining cuts will commence after the topsoil is removed. The mining process proceeds as follows: The dragline moves through the mining area excavating approximately 100-foot wide by 50-foot-deep cuts, in an east to west or west to east direction as shown on Sheet 4 – Mining Plan Sheet. A mining cut profile/cross-section is included as Sheet 5 – Mining Plan Sheet. Mining rates are anticipated to vary from approximately 100-200 feet of pit length excavation per day. The excavated material will be stockpiled nearby before being transferred to an apron feeder which feeds to a screen. The screen removes roots and other large objects. The material will then be transferred to a pit/feed conveyor system. The oversized organic material will be placed near the screen area for future deposit into the mining pit 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 (screen). The under-sized material from the trommel will be fed to the PCP as a slurry.

In the PCP, spirals will be used to separate the heavy mineral sands from the lighter clays and quartz sand. The heavy mineral sands will be fed to the WCP. The WCP further separates the lighter minerals from the heavy mineral sands creating the heavy mineral sands concentrate that will be trucked to the off-site MSP for final mineral separation. Process water will be recovered from the tailings and heavy minerals sands via a series of dewatering screens and hydrocyclones throughout the process. Humates and clays will also be separated from the process water as slimes within the PCP. The slimes will be separated from the process water in a thickener. The underflow from the thickener will be dewatered and temporarily stored before being transported back to and placed in the mined pit area for reclamation. The facility will operate with zero discharge of wastewater. Process water for the mineral separations will be withdrawn from the process water ponds (Sheet 3 – Mining Plan Sheet – Site Layout) TPM will utilize three lined process water ponds (P1 through P3) and one lined primary process water overflow pond to maintain the adequate volume needed to operate the PCP/WCP. Overflow from the process water primary overflow pond (P4) may occur due to heavy rain events. Such overflows will be routed to the mine pit water management pond (M1). Water in the water management ponds (M1, M2 and M3) will be

stored until it can be routed back to the process water pond (P3) and used for process make-up water. Alternate storage pond M4 will only be used for water storage if ponds M1, M2 and M3 are filled to their maximum capacity. Two water wells installed in the Upper Floridan Aquifer will be used to supply make-up water as needed to maintain adequate process water reserves.

The HMS concentrate material from the WCP will be transported to the off-site MSP, via truck. Water needed for processing at the MSP will also be provided by the make-up water wells. Water will be piped from well FWP-01 to the MSP plant. Once water has been used in the mineral processing it may be recycled for re-use at the MSP or transported to the WCP to be used in the processing of sands.

The MSP further separates the valuable and non-valuable mineral products such as zircon, titanium minerals (ilmenite, leucoxene, rutile), and staurolite 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. Tailings and slimes will then be loaded onto the mainline tails conveyor system. The mainline tails conveyor system will convey material onto a reclamation conveyor. The reclamation conveyor will deposit the tailings back into the mined pit area for reclamation. The mainline tailings conveyor will also be used to transport the blended bentonite/sand mixture to the pit.

Water within the active mining pit is anticipated to be withdrawn only during upset conditions (i.e., equipment maintenance/failure), installation of the soil amendment layer, or due to a heavy rain event. This water will be pumped from the mine pit to the mine pit water management pond (M1) and subsequently routed to the sand processing area water management ponds (M2 and M3). Water stored in the sand processing area water management storage area pond (M3) will be pumped to the process water pond (P3) and used for process make-up water.

5.1.3 Mining Progression and Schedule of Advancement

Mining will initiate in the southwest corner of the mine footprint and will proceed in a west to east transect until the dragline excavator reaches the eastern mining boundary. Heavy mineral sands will be excavated from a moving mine pit that has a length of approximately 500 feet and a width of approximately 100 feet. Within one to two weeks of the commencement of mining, sand tailings will be returned to the pit as mining continues to advance. Once the dragline reaches either the east or west limit of mining, the dragline will reverse its course and mine the next adjacent transect in the opposite direction (Sheet 4 – Mining Plan Sheet). Additionally, a portion of the filled pit will be re-excavated by the next, adjacent dragline pass. This east-west alternating mining will continue throughout the entire course of mining until termination along the northern boundary of the mine footprint.

Mining will commence upon authorization and is expected to be conducted over a four-year period. The moving mine pit will progress at a rate of approximately 10 to 15 acres per month once all infrastructure is in place.

6. Erosion and Sediment Control

The Erosion and Sediment Control Plan is provided on Sheets 6 and 7, which provide for BMPs employed to control sedimentation, protect adjacent watersheds, and prevent erosion on the periphery of the property.

7. Reclamation

The Reclamation Plan is provided on Sheets 9 and 10. The reclamation objective is to restore the land surface and groundwater elevations approximately to pre-mining levels. The mine pit will be back-filled with processed tailings; all structures and materials associated with the mine will be removed; and the site will be revegetated with plant communities appropriate to pine flatwoods. Although some wetlands may be restored and/or created, no lakes will be developed.

7.1 Topsoil Use; Overburden (Spoil) or Refuse Disposal Placement or Use; Backfilling

Topsoil will be stockpiled and returned to the mined area upon reclamation. Spoil will be used to backfill the excavation. No other refuse will be generated.

7.2 Highwall Reduction, Grading and Sloping

The site will be graded and sloped to mimic pre-mining contours. No highwalls will remain.

8. Other Provisions for the Protection of the Environment and Resources of the State

8.1 Consistency with Land Use in the Area

The mine will maintain consistency with land use within the area. As noted in correspondence from the Charlton County Board of Commissioners, dated November 12, 2020, Charlton County confirmed the mining operation is consistent with the land use in the area. Currently, Charlton County has no zoning regulations that would prohibit the mining operation.

8.2 Wetlands and Streams

The proposed mining operation will not impact jurisdictional wetlands or streams. Copies of the U.S. Army Corps of Engineers Approved Jurisdictional Determination documents are provided as Exhibit A.

8.3 Protection of Properties on the National Register of Historic Places

No properties on the National Register will be affected by the mine. A copy of the Cultural Resources assessment is included as Exhibit B.

8.4 Protection of Contiguous Natural and Other Resources

The mine will operate pursuant to the various permits issued by Georgia EPD, which are designed to ensure protection of the environment. Contiguous natural and other resources will not be disturbed or significantly affected by the mining project.

8.5 Threatened and Endangered Species

The Saunders Demonstration Mine site was evaluated for the presence of protected species and/or their associated critical habitat(s) during 2018 - 2020. Referenced species surveys and habitat assessment reports are provided in Exhibit C. With the exception of the (Threatened) Wood Stork (*Mycteria americana*), which may forage on-site, but are not known to nest on-site, no Federal protected species are known to occur on the project site. Gopher tortoise burrows are located adjacent to the Saunders Demonstration Mine site, only some of which were occupied by resident tortoises at the time of the surveys. The site and mine layout have been designed to specifically avoid areas of gopher tortoise burrows. No additional federally listed plant or animal species are known to occur on the demonstration project mine site (reference Exhibit C). One State protected species, the (Threatened) parrot pitcherplant (*Sarracenia psittacena*), was identified within the limits of the proposed year 4 mining progression area. Prior to mining in this location, TPM will coordinate with appropriate agencies to ensure that applicable relocation protocols are utilized to avoid impacting the parrot pitcherplant specimen. The findings of the resource evaluations suggest that the mining activities, including the rough clearing, will not have significant consequences to protected species. Furthermore, the demonstration mine site is not considered “Critical Habitat”, per the U.S. Fish and Wildlife Service definition of this term, for any federally listed species.

9. Other Permits

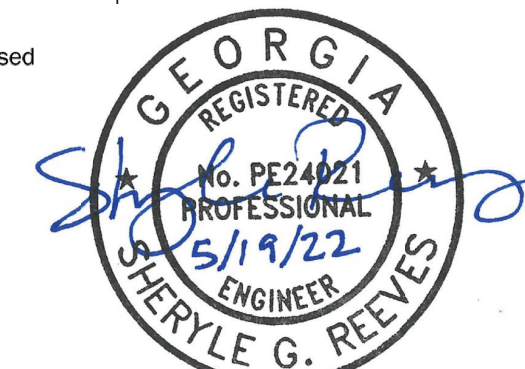
- Other required permits include:
- Coverage under the General Stormwater Permit for Stormwater Discharges Associated with Industrial Activity, Permit No. GAR05000 (Issuance Date June 1, 2017);
 - A Groundwater Withdrawal Permit issued pursuant to O.C.G.A. § 12-5-90.
 - An Air Quality Permit issued pursuant to the Georgia Air Quality Protection Act, O.C.G.A. 12-9-1.
 - (Potentially) A Radioactive Materials License for the handling of naturally-occurring radioactive materials (NORM), if required pursuant to O.C.G.A. § 31-13-12.

10. Additional Operator Submissions

- Bonding – Bonding will be completed upon approval of this application for surface mining.
- Annual Permit Status Report – An annual status report will be prepared by the Operator and submitted to the Division as required.
- Amendments to Plan – The Operator will submit any future proposed changes in this proposed plan to the Division for approval.
- Change of Ownership of Mining Operation – Should a change in Operator ownership of this mining operation occur, the new owner(s) will submit a new application and a new bond within 60 days from the date of consummation of the ownership change.
- TPM acknowledges that additional mining operations not included in this demonstration mine will require a new set of permits and a full permitting process.

11. Attachments

- Exhibit A – USACE Jurisdictional Determination
- Exhibit B – Cultural Resources Surveys
- Exhibit C – Species Surveys and Habitat Assessments
- Exhibit D – Groundwater-Level Monitoring Plan
- Exhibit E – Impact of the Proposed Twin Pines Mine on the Trail Ridge Hydrologic System; January 14, 2020
- Exhibit F – Subsurface Lithology of the Surficial Aquifer at Twin Pines Mine; December 11, 2019
- Exhibit G – Assessing the Impact of Soil Amendments During the Reclamation of the Proposed Twin Pines Minerals, LLC Saunders Demonstration Mine Using Groundwater Models; November 13, 2020
- Exhibit H – Subsurface Continuity of Humate-Bearing Sands in the Surficial Aquifer, Trail Ridge, Georgia; January 25, 2021
- Exhibit I – Modeling the Groundwater Flow System at the Proposed Twin Pines Mine on Trail Ridge; Revised September 14, 2021
- Exhibit J – Saunders Demonstration Mine Water Management Ponds (Engineered Drawings); May 18, 2022
- Exhibit K – Water Management Ponds Hydrology & Hydraulic Analysis; May 18, 2022
- Exhibit L – Water Use Management Plan; May 18, 2022
- Exhibit M – Technical Specifications; May 18, 2022



SHEET 15: SUPPLEMENTAL NARRATIVE

TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE (ID NO. 2073)

ST. GEORGE, CHARLTON COUNTY, GEORGIA

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|-----------------------------|
| DRAWN BY: DEK |
| CHECKED BY: SGR |
| DRAWING DATE: 11/13/2020 |
| REVISION DATE: 5/19/2022 |
| TTL JOB NO.: 18-02-00804.00 |
| APPROX. SCALE: N/A |