



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

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

ST. GEORGE, CHARLTON COUNTY, GEORGIA

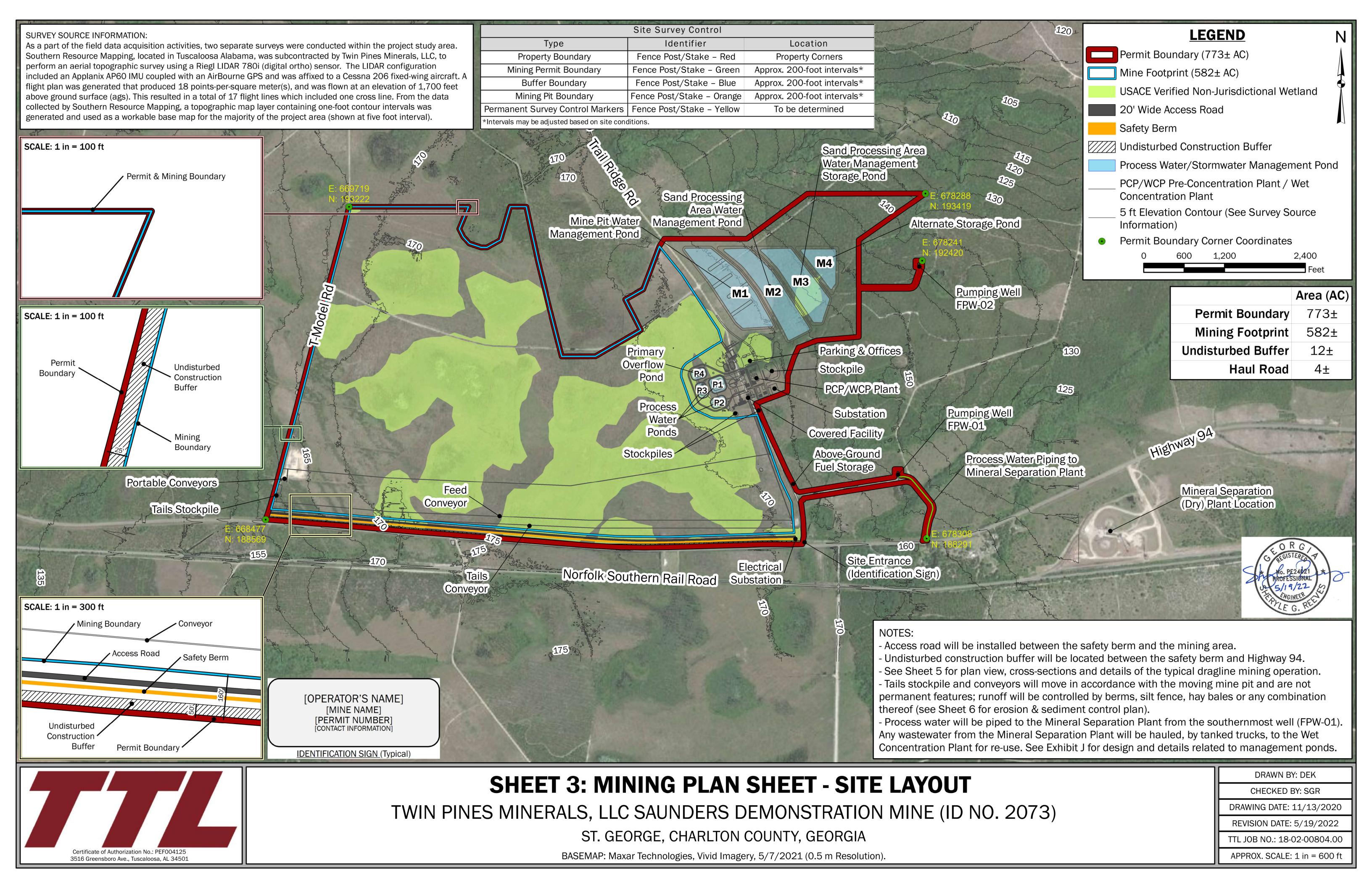
BASEMAP: Maxar Technologies, Vivid Imagery, 5/7/2021 (0.5 m Resolution).

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ı	DRAWING DATE: 11/13/2020
ı	CHECKED BY: SGR
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REVISION DATE: 5/19/2022

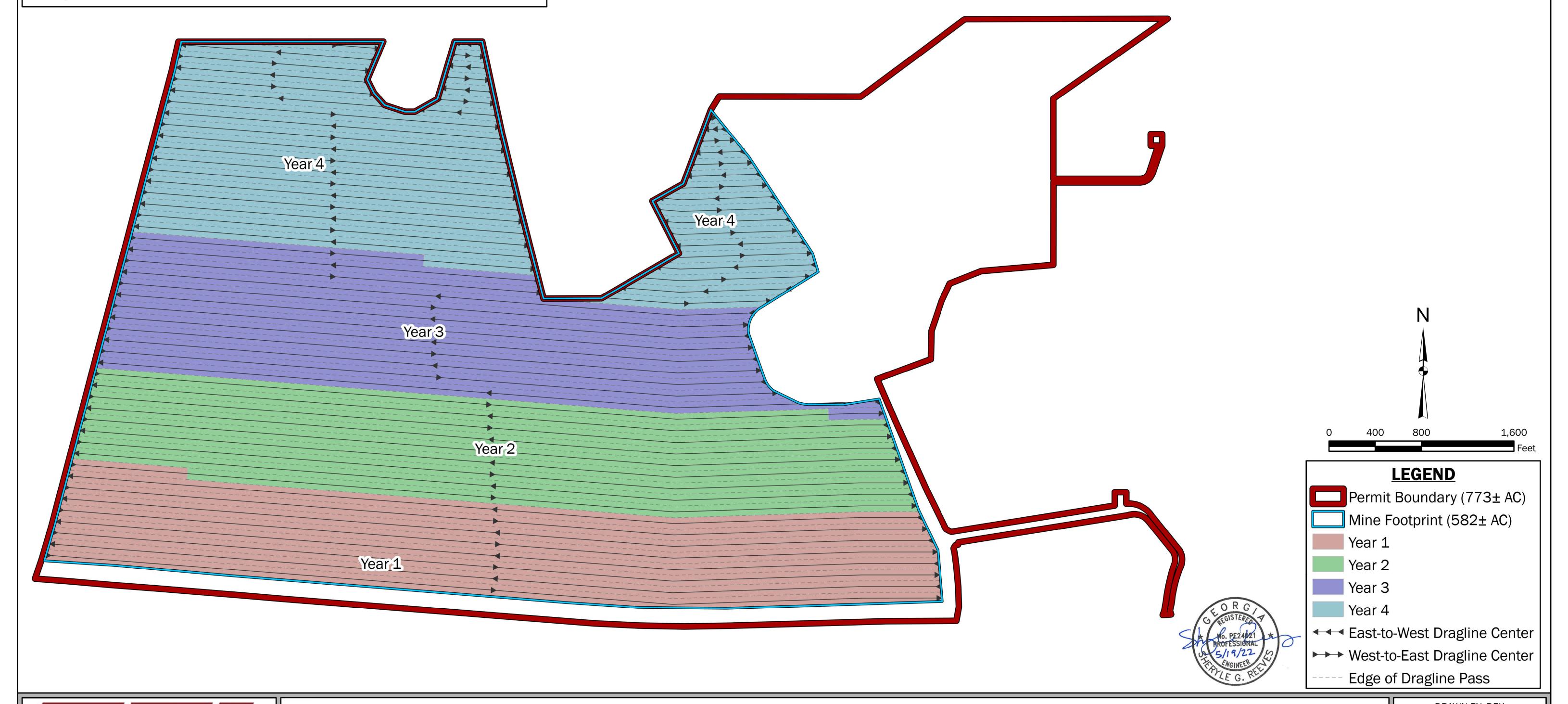
TTL JOB NO.: 18-02-00804.00

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.





SHEET 4: MINING PLAN SHEET - ESTIMATED PROGRESSION OF MINING

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

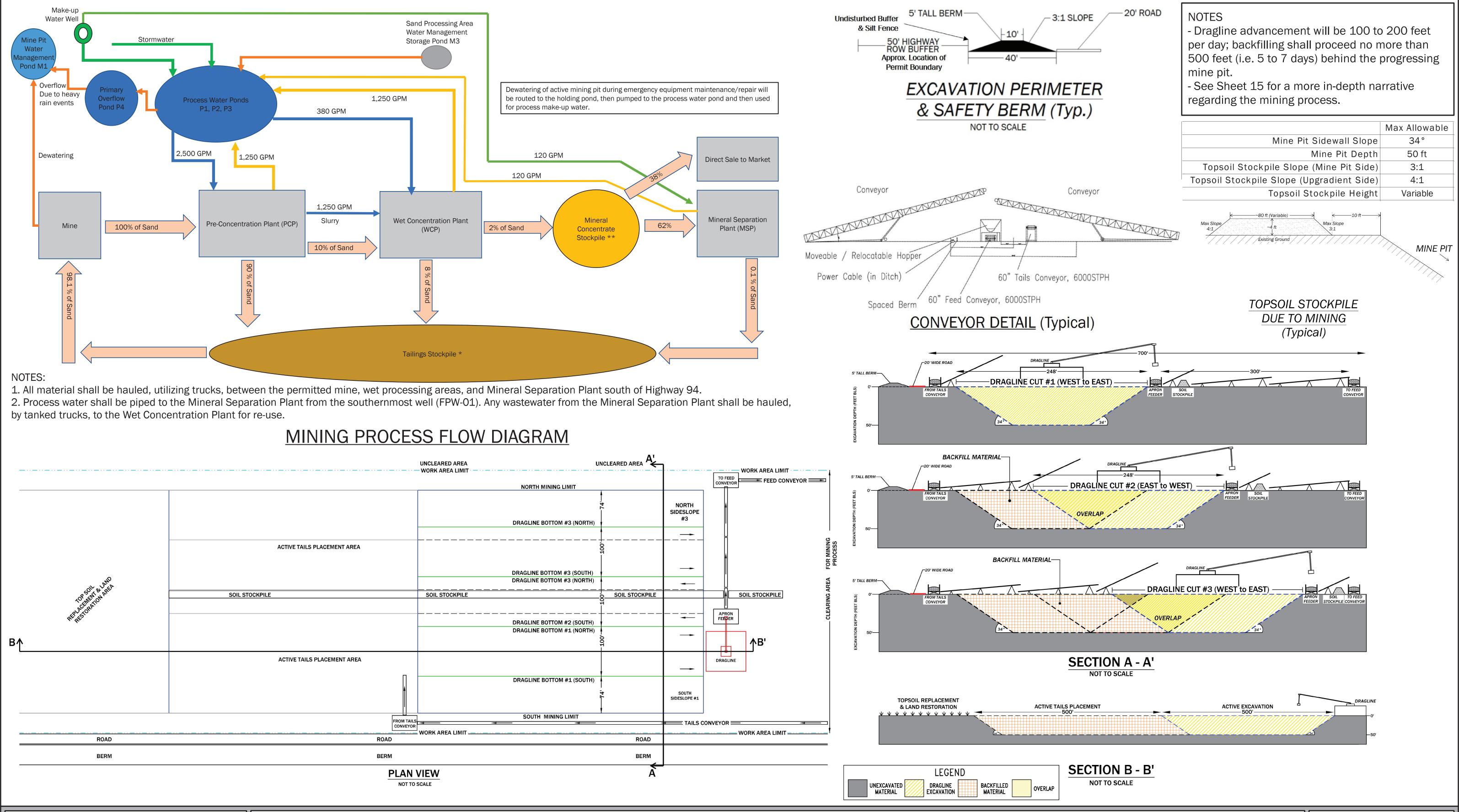
ST. GEORGE, CHARLTON COUNTY, GEORGIA

DRAWN BY: DEK
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DRAWING DATE: 11/13/2020 REVISION DATE: 5/19/2022

TTL JOB NO.: 18-02-00804.00

APPROX. SCALE: 1 in = 400 ft





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



DRAWN BY: DEK

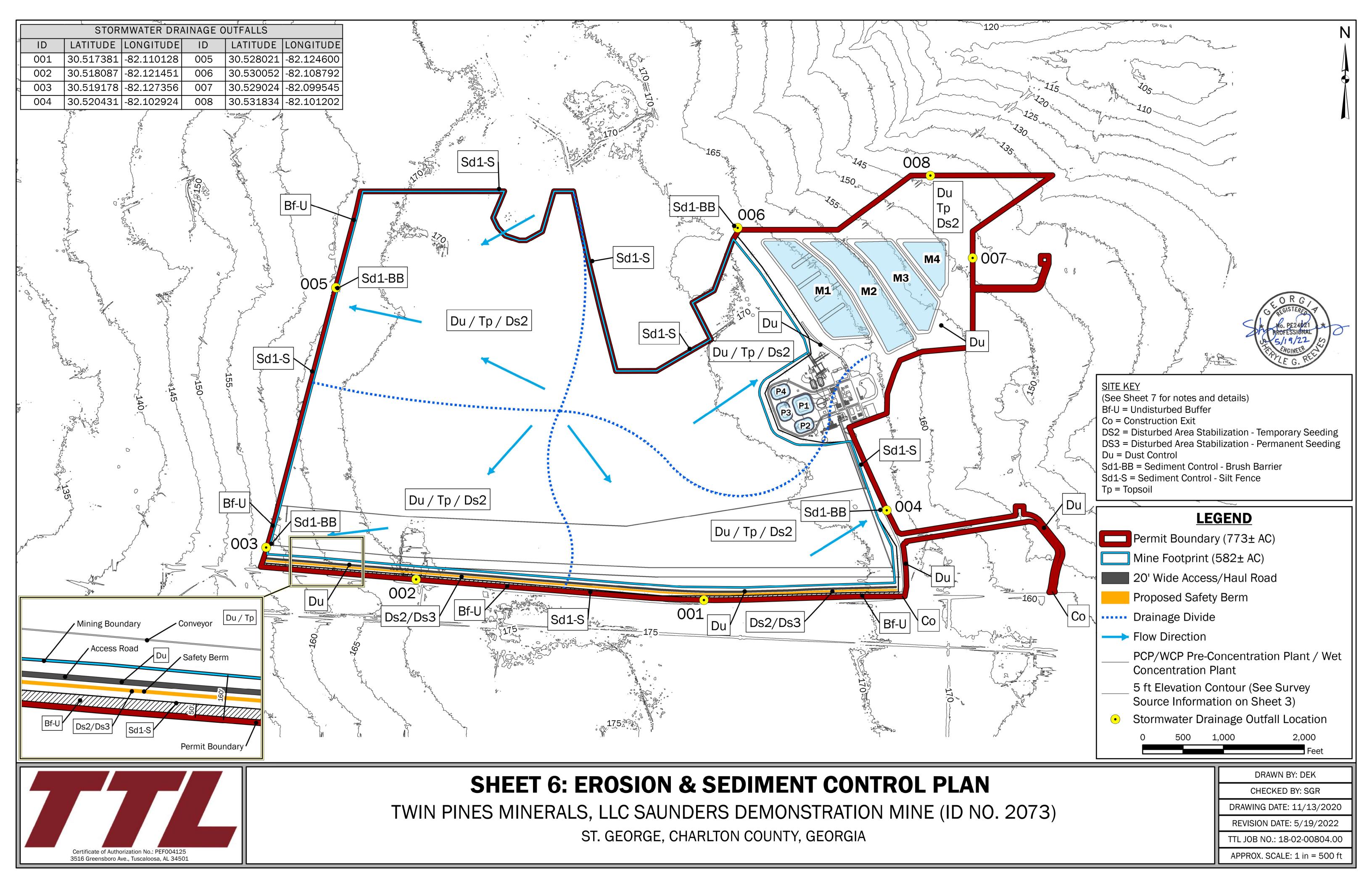
CHECKED BY: SGR

DRAWING DATE: 11/13/2020

REVISION DATE: 5/19/2022

APPROX. SCALE: N.T.S.

TTL JOB NO.: 18-02-00804.00



GEORGIA UNIFORM CODING SYSTEM

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

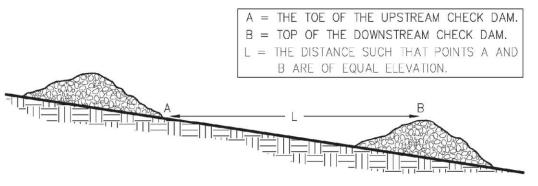
STRUCTURAL PRACTICES

CODE	PRACTICE	DETAIL	MAP SYMBOL	DESCRIPTION
Cd	CHECKDAM	THE STATE OF THE S	\$	A small temporary barrier or dam constructed across a swale, drainage ditch or area of concentrated flow.
Ch	CHANNEL STABILIZATION	90	77	Improving, constructing or stabilizing an open channel, existing stream, or ditch.
©	CONSTRUCTION EXIT		© SAMES	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		ONONCASE TOPO	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		\$500 2.480	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		(SK)~~	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		(SI)	A paved or short section of riprap channel at the outlet of a storm drain system preventing erosion from the concentrated runoff.

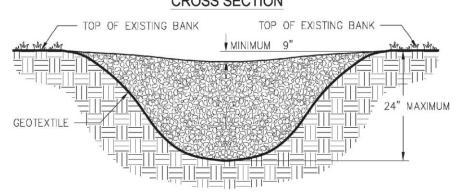
VEGETATIVE PRACTICES

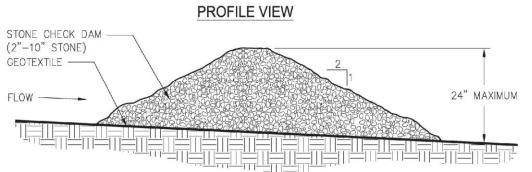
CODE	PRACTICE	DETAIL	MAP SYMBOL	DESCRIPTION			
Ds1	DISTURBED AREA STABILIZATION (WITH MULCHING ONLY)		Ds1	Establishing temporary protection for disturbed areas where seedlings may not have a suitable growing season to produce an erosion retarding cover.			
Ds2	DISTURBED AREA STABILIZATION (WITH TEMP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

STONE CHECK DAM SPACING BETWEEN CHECK DAMS



STONE CHECK DAM



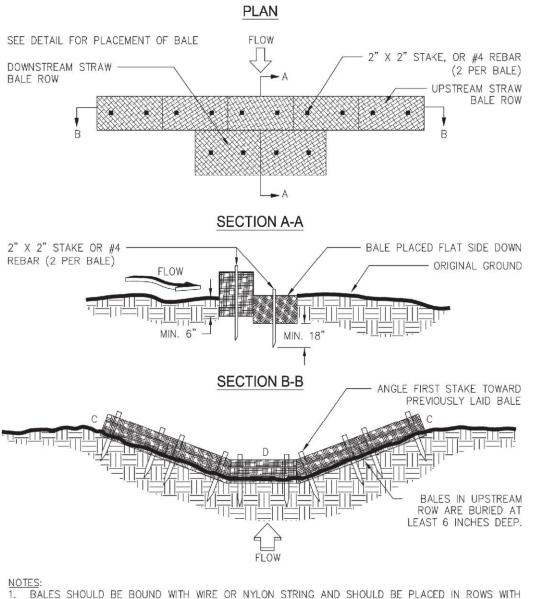


- CHECK DAMS ARE TO BE USED ONLY IN SMALL OPEN CHANNELS (THEY ARE NOT TO DRAINAGE AREA FOR STONE CHECK DAMS SHALL NOT EXCEED TWO ACRES.
- THE CENTER OF THE CHECK DAM MUST BE AT LEAST 9 INCHES LOWER THAN THE 4. THE DAM HEIGHT SHOULD BE A MAXIMUM OF 2 FEET FROM CENTER TO RIM EDGE. THE SIDE SLOPES OF THE CHECK DAM SHALL NOT EXCEED A 2:1 SLOPE.

PARTICLES INTO THE STONES (REFER TO AASHTO M288-96, SECTION 7.3, TABLE 3)

GEOTEXTILE SHALL BE USED TO PREVENT THE MITIGATION OF SUBGRADE SOIL

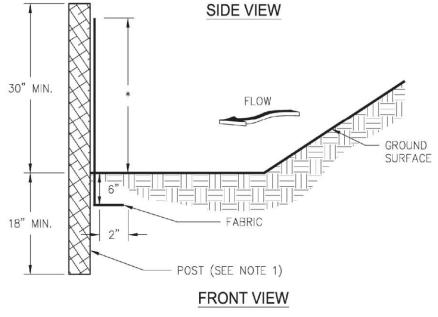
TYPICAL STRAW BALE CHECK DAM

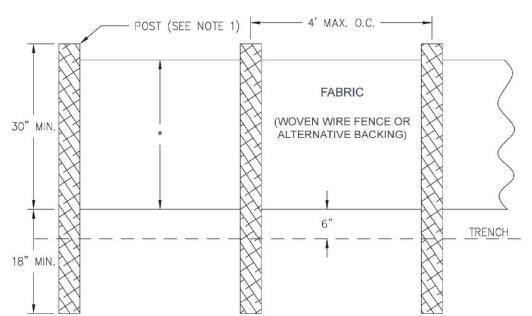


1. BALES SHOULD BE BOUND WITH WIRE OR NYLON STRING AND SHOULD BE PLACED IN ROWS WITH BALE ENDS <u>TIGHTLY</u> ABUTTING THE ADJACENT BALES.
2. <u>REMOVE</u> #4 REBAR AFTER STRAW BALES ARE NO LONGER IN PLACE.
3. POINT C OF SECTION B—B SHOULD <u>ALWAYS</u> BE HIGHER THAN POINT D.

4. STRAW-BALE CHECK DAMS SHALL NOT BE USED WHERE THE DRAINAGE AREA EXCEEDS ONE ACRE

Sd1-S SILT FENCE - TYPE C

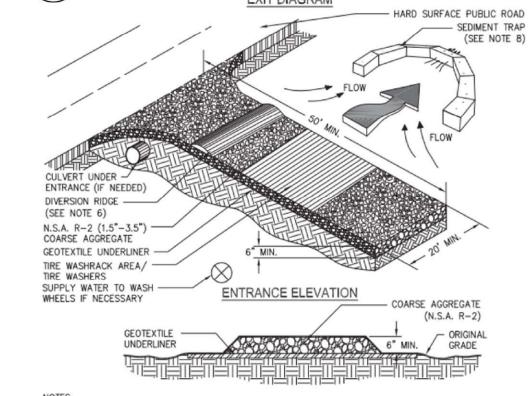




NOTES:

1. USE STEEL OR WOOD POSTS OR AS SPECIFIED BY THE EROSION, SEDIMENTATION AND POLLUTION CONTROL PLAN. 2. HEIGHT (*) IS TO BE SHOWN ON THE EROSION, SEDIMENTATION, AND POLLUTION

CRUSHED STONE CONSTRUCTION EXIT

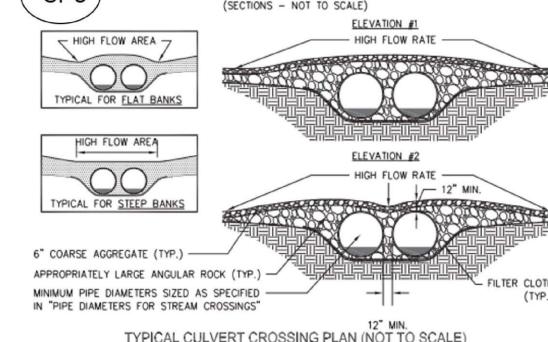


CROWN FOR POSITIVE DRAINAGE. S. AGGREGATE SIZE SHALL BE IN ACCORDANCE WITH NATIONAL STONE ASSOCIATION R-2 (1.5"-3.5" STONE . GRAVEL PAD SHALL HAVE A MINIMUM THICKNESS OF 6". 5. PAD WIDTH SHALL BE EQUAL FULL WIDTH AT ALL POINTS OF VEHICULAR EGRESS, BUT NO LESS THAN 20'. INSTALL PIPE UNDER THE ENTRANCE IF NEEDED TO MAINTAIN DRAINAGE DITCHES.
 WHEN WASHING IS REQUIRED, IT SHOULD BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT

DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN (DIVERT ALL SURFACE RUNOFF AND DRAINAGE FROM THE ENTRANCE TO A SEDIMENT CONTROL DEVICE). 9. WASHRACKS AND/OR TIRE WASHERS MAY BE REQUIRED DEPENDING ON SCALE AND CIRCUMSTANCE. IF NECESSARY, WASHRACK DESIGN MAY CONSIST OF ANY MATERIAL <u>SUITABLE</u> FOR TRUCK TRAFFIC THAT REMOVE MUD AND DIRT.

10. MAINTAIN AREA IN A WAY THAT PREVENTS TRACKING AND/OR FLOW OF MUD ONTO PUBLIC RIGHTS-OF-WAYS. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES

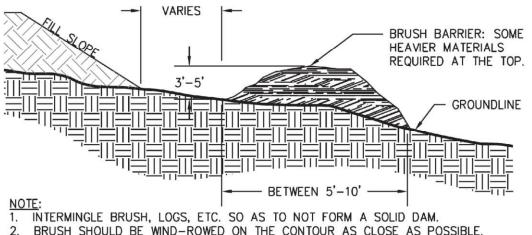
CONFIGURATION OF TEMPORARY CULVERT CROSSINGS Sr-C



TYPICAL CULVERT CROSSING PLAN (NOT TO SCALE) STREAM CROSSINGS*)

THIS TYPE OF CROSSING CAN BE INSTALLED IN BOTH A WET OR DRY WEATHER

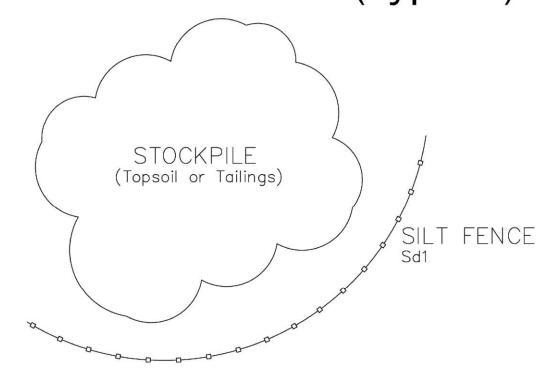
SEDIMENT BARRIERS **BRUSH BARRIER SECTION**



BRUSH SHOULD BE WIND-ROWED ON THE CONTOUR AS CLOSE AS POSSIBLE MINIMUM BASE WIDTH FOR BARRIER SHALL BE 5 FEET AND SHOULD BE NO

4. A COMMERCIALLY AVAILABLE FILTER FABRIC MAY BE PLACED ON THE SIDE OF THE BRUSH BARRIER RECEIVING SEDIMENT-LADEN RUNOFF FOR ADDED FILTER CAPACITY (LOWER EDGE MUST BE BURIED IN A 6 INCH DEEP TRENCH AND THE UPPER EDGE MUST BE FASTENED TO THE BRUSH BARRIER).

STOCKPILE BMP (Typical)



NOTE: Silt fence will be placed on the downgradient side of the stockpile located outside of the PCP/WCP area if run-off is not or can not be directed toward the mining pit.

EROSION & SEDIMENT CONTROL MEASURES

- 1. 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
- 2. EROSION CONTROL NOTES
 - a. 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.
 - APPROVED PLAN DOES NOT PROVIDE FOR EFFECTIVE EROSION CONTROL, ADDITIONAL EROSION AND
- WITH MULCH OR TEMPORARY SEEDING.
- d. ALL EROSION AND SEDIMENT CONTROL MEASURES WILL CONFORM WITH THE GUIDELINES OF THE "MANUAL FOR EROSION AND SEDIMENT CONTROL." e. 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. f. 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
- g. DUST WILL BE CONTROLLED BY APPLYING WATER TO HAUL ROADS AND OTHER HIGH-TRAFFIC AREAS. h. TPM WILL INSPECT EROSION CONTROL MEASURES AT THE END OF EACH WORKING DAY TO ENSURE

PROPER FUNCTIONING. **AUXILIARY EROSION & SEDIMENT CONTROL MEASURES**

- 1. 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.
- 2. CONTAINMENT BERMS WILL BE DESIGNED TO PROVIDE A MINIMUM OF 3 FEET OF FREEBOARD
- 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
- 4. AUXILIARY BMPS WILL BE SEEDED 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 1. DISTURBED AREAS LEFT EXPOSED FOR A PERIOD GREATER THAN 14 DAYS WILL BE STABILIZED WITH MULCH

- 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
- 3. 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.
- 4. 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,

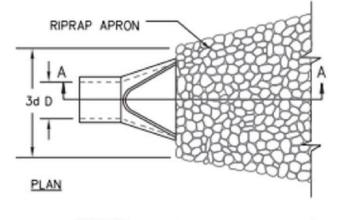
- TAILINGS STOCKPILES WILL BE DIRECTED BACK INTO THE MINING PIT AS PRACTICAL. FOR STORMWATER DISCHARGES OFF-SITE, THE FACILITY WILL OPERATE UNDER A DNR-EPD GENERAL PERMIT NO. GARO50000 STORMWATER DISCHARGES ASSOCIATED WITH INDUSTRIAL ACTIVITIES.
- 2. STORMWATER FALLING WITHIN THE PCP/WCP AREA WILL BE DIRECTED INTO THE PROCESS PONDS AND RECIRCULATED AS PROCESS WATER.
- 3. ROUTINE DEWATERING OF THE MINE PIT IS NOT ANTICIPATED. AFTER EQUIPMENT SHUTDOWNS OR HEAVY RAIN USED FOR PROCESS MAKE-UP WATER.

RIPRAP OUTLET PROTECTION



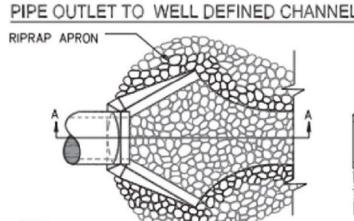
SECTION A-A

PIPE OUTLET TO FLAT AREA -- NO WELL DEFINED CHANNEL

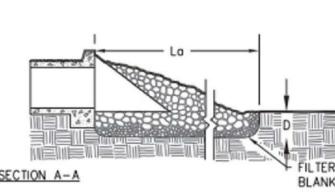


La IS THE LENGTH OF THE RIPRAP

- D = 1.5 TIMES THE MAXIMUM STONE DIAMETER BUT NOT LESSHAN 6".
- IN A WELL-DEFINED CHANNEL, EXTEND THE APRON UP THE CHANNEL BANKS TO AN ELEVATION OF 6" ABOVE THE MAXIMUM TAILWATER DEPTH OR TO THE TOP OF THE BANK (WHICHEVER IS LESS).
- A FILTER BLANKET OR FILTER FABRIC SHOULD BE INSTALLED BETWEEN THE RIPRAP AND THE SOIL FOUNDATION.







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

ST. GEORGE, CHARLTON COUNTY, GEORGIA

SHEET 7: EROSION & SEDIMENT CONTROL NOTES & DETAILS



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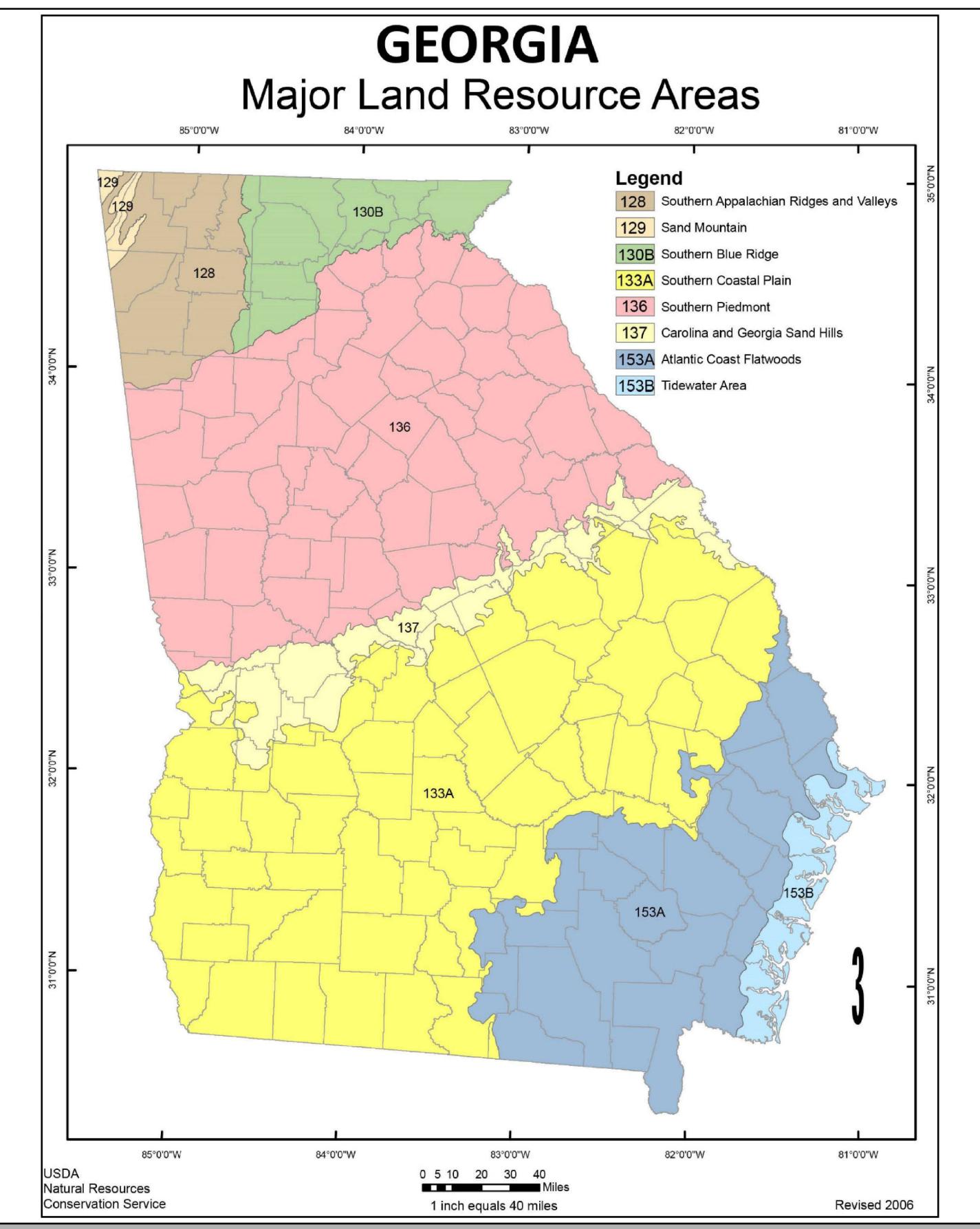
REVISION DATE: 5/19/2022

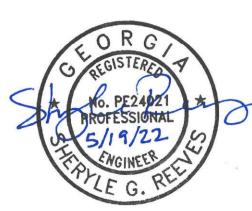
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APPROX. SCALE: N.T.S.

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 ³			Plant	tina	Date	es h	v P	eso	irce	Are	а		Remarks
opeoles	Divaduast	Nates	Alea	Soli		es in	dicat	e opt	imun	n date	es, d	otted	lines		cate	O - TATA P C - CONSTRUCTION
	•	Pure Live Seed		\vdash		r.	permi	issible	e but	març	ginal	date.	s.			1
	Rate Per Acre²	(PLS) Per 1000 sqft		J	F	М	Α	М	J	J	Α	s	0	Ν	D	
BARLEY Hordeum vulagre																
alone	3 bu. (144 lbs)	3.3 lbs	M-L	П												14,000 seed per pound. Winter hardy. Use
in mixture	1/2 bu. (24lbs)	0.6 lb	P C													on productive soils.
LESPEDEZA, ANNUAL Lespedeza striata			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,													
alone	40 lbs	0.9 lb	M-L	П												000 000
in mixture	10 lbs	0.2 lb	Р													200,000 seed per pound. May ∨olunteer for sev eral years. Use inoculant EL.
LOVEGRASS, WEEPING Eragrostis curvula			С													
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 Sericea lespedeza.
MILLET, BROWNTOP Panicum fasciculatum			<u> </u>													
alone	40 lbs	0.9 lb	M-L													137,000 seed per pound. Quick dense cover.
in mixture	10 lbs	0.2 lb	P C												l	Will provide excessive competion in mixtures if seeded at high rate.
MILLET, PEARL Pennesetum glaucum																
alone	50 lbs	1.1 lbs	M-L													88 000 cood nor nound Out-to-to-
			P C													88,000 seed per pound. Quick dense cover. Ma reach 5 feet in height. Not recommended for mixtures.
OATS Avena sativa																
alone	4 bu. (128 lbs)	2.9 lbs	M-L	П									H			
n 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 Secale cereale																
alone	3 bu. (168 lbs)	3.9 lbs	M-L	П												
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																
alone	40 lbs	0.9 lb	M-L													
			P C													227,000 seed per pound. Dense cover. Very copetitive and is <u>not</u> to be used in mixtures.
SUDANGRASS				Ш												
Sorghum sudanese	22.11															
alone	60 lbs	1.4 lbs	M-L P													EE 000 and ========= 0 = 1 = 1 = 1 = 1
TDITICAL 5			С													55,000 seed per pound. Good on droughty sites Not recommended for mixtures.
TRITICALE X-Triticosecale																
alone	3 bu. (144 lbs)	3.3 lbs	С	 												Use on lower part of Southern Coastal Plain an
n mixture	1/2 bu. (24 lbs)	0.6 lb														in Atlantic Coastal Flatwoods only.
MHEAT Triticum aestivum																
alone	3 bu. (180 lbs)	4.1 lbs	M-L										_			
n mixture	1/2 bu. (30 lbs)	0.7 lb	P C													15,000 seed per pound. Winter hardy.
	I							er cr			70			and	will	crowd out perennials if seeded too heavily
								_		-				nd R	idge	s and Valleys MLRAs
³ M-L represents the Mountain; Blue Ridge; and Ridges and Valleys MLRAs P represents the Southern Piedmont MLRA					P rep	nts ti	he Sc	outhe	rn Pi	edm	ont M	ILRA				







SHEET 8: TEMPORARY VEGETATION SCHEDULE TABLE

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

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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.

DECLAMATION DECCEDINES & 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 FLEVATIONS.
- 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 AGACIS WETS TABLE (WETS STATION: FOLKSTON 9 SW GA. YEARS: 1971-2000) FOR THE PROBABILITY OF TEMPERATURES ABOVE 28 DEGREES FARHENHEIT, 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
- ELLIOTTI).
 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
 RECLAMATION WILL BE DEEMED SUCCESSFUL WHERE TREE VEGETATION MAINTAINS A SURVIVABILITY RATE OF
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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 SAPLINGS 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 FERTILIZEDS WILL BE LITTLIZED.
- NO FERTILIZERS WILL BE UTILIZED.
 RECLAMATION WILL BE DEFMED SHOWN
- 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 (ARISTIDA SP., ANDROPOGON SP., SPOROBOLUS SP., DICHANTHELIUM SP.), SAW PALMETTO (SERENOA REPENS), GALLBERRY (ILEX GLABRA), FETTERBUSH (LYONIA LUCIDA), AND DWARF LIVE OAK (QUERCUS MINIMA).				
WET PINE FLATWOODS	SLASH PINE	BUNCHGRASSES (ARISTIDA SP., ANDROPOGON SP., CTENIUM AROMATICUM, MUHLENBERGII SP., SPOROBOLUS SP., RHYNCHOSPORA SP.), LARGE GALLBERRY (ILEX CORIACEA), FETTERBUSH, SWEETBAY, SAW PALMETTO				
DEPRESSIONAL WETLAND – DOME/DEPRESSION SWAMP	POND CYPRESS, SWAMP TUPELO	VIRGINIA CHAIN FERN (ANCHISTIA VIRGINICA), ROYAL FERN (OSMUNDA REGALIS), CINNAMON FERN (OSMUNDA CINNAMOMEA), MAIDENCANE (PANICUM HEMITOMON), REDROOT (LACHNANTHES CAROLINIANA), BEAKSEDGES (RHYNCHOSPORA SP.), AND SEDGES (CAREX SP.).				
DEPRESSIONAL WETLAND – SHRUB BOG	POND PINE, SLASH PINE	TITI (CYRILLA RACEMIFLORA,) BLACK TITI (CLIFTONIA MONOPHYLLA), SWEET PEPPERBUSH (CLETHRA ALNIFOLIA), FETTERBUSH, LARGE GALLBERRY, AND LAUREL GREENBRIER (SMILAX LAURIFOLIA).				
DEPRESSIONAL WETLAND – BAYGALL	LOBLOLLY BAY, SWAMP BAY, SWEETBAY	LOBLOLLY BAY, SWAMP BAY, SWEETBAY, FETTERBUSH, DAHOON (ILEX CASSINE), LARGE GALLBERRY, TITI, BLACK TITI, WAX MYRTLE (MYRICA CERIFERA), DOGHOBBLE (LEUCOTHOE SP.), SWEETSPIRE (ITEA VIRGINICA).				

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:

- A. 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 BURLIC BOAD.
- B. 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.
- C. 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.
- D. NO HIGHWALLS WILL REMAIN ON SITE
 - ALL AFFECTED LAND WILL BE GRADED TO MIMIC PRE-MINING TOPOGRAPHY AND BLENDED INTO THE EXISTING LANDSCAPE,
- F. 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
- G. 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.
- H. NO LAKES OR PONDS ARE PROPOSED AS PART OF THE RECLAMATION PLAN.

REQUIRED BY PERMIT DURING THE OPERATIONAL PERIOD OF THE MINE.

- I. WITHIN APPROXIMATELY 180 DAYS OF COMPLETION OF MINING ACTIVITIES, COMMENCEMENT OF DECOMMISSIONING OF THE PONDS WILL BEGIN IN THE FOLLOWING MANNER:
 - 1. PROCESS WATER WILL BE ELIMINATED FROM EACH POND BY THE FOLLOWING OR A COMBINATION OF THE FOLLOWING:
 - O PUMPING TO TANKER TRUCKS FOR TRANSPORT TO AN OFF-SITE FACILITY FOR DISPOSAL IN ACCORDANCE WITH STATE AND/OR FEDERAL REQUIREMENTS,
 - O UTILIZING AN ENGINEER DESIGNED EVAPORATION SYSTEM OR ALTERNATIVE TECHNOLOGY CAPABLE OF
 - 2. 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
 - 3. 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.
 - 4. NEXT, THE BERM WALLS WILL BE GRADED TO GENERALLY MATCH THE SURROUNDING LAND SURFACE AND THE AREAS
 - 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
- THE OPERATOR WILL PREPARE AND FILE A FINAL RECLAMATION REPORT AND REQUEST FOR RELEASE UPON COMPLETION OF RECLAMATION RESPONSIBILITIES ON AFFECTED ACREAGE.

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
- 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:

1. UNCONSOLIDATED BLACK SANDS,

- SEMI-CONSOLIDATED BLACK TO DARK BROWN SANDS, AND
- 3. 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



HOTOGRAPH 1. LOW PERMEABILITY HUMATE-CEMENTED CONSOLIDATED BLACK S





OTOGRAPH 3. UNCONSOLIDATED BLACK SAND

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

- 1. BLACK OR VERY DARK BROWN COLOR
- 2. 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).
- 3. 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:

- 1. UNIQUE BORING IDENTIFIER
- 2. DATE OF DRILLING (START/END DAT

3. SURVEYED BORING LOCATION AND ELEVATION DATA

- 4. DEPTH TO SATURATED SOILS AS MEASURED IN THE BOREHOLE OR AS IDENTIFIED IN THE CORE
- 5. LITHOLOGIC DESCRIPTIONS OF SUBSURFACE SOIL TO INCLUDE:
- SOIL TYPE (UNIFIED SOIL CLASSIFICATION SYSTEM)
 PERCENTAGE OF CLAY VERSUS SAND (VISUAL ESTIMATE)
- c. HUMATE PRESENT AND RELATIVE PERCENT (I.E. LOW, MEDIUM, HIGH; VISUAL ESTIMATE)
- d. Degree of consolidation of sands (unconsolidated, semi-consolidated, or consolidated)
- . SORTING OF SAND
- f. DESCRIPTION OF FINE, MEDIUM, COARSE GRAINS PER SANDY SOIL TYPE
- g. COLOR DESCRIPTION USING A MUNSELL OR GSA ROCK COLOR CHART
- 6. BORING TERMINATION DEPTH
- 7. 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

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.

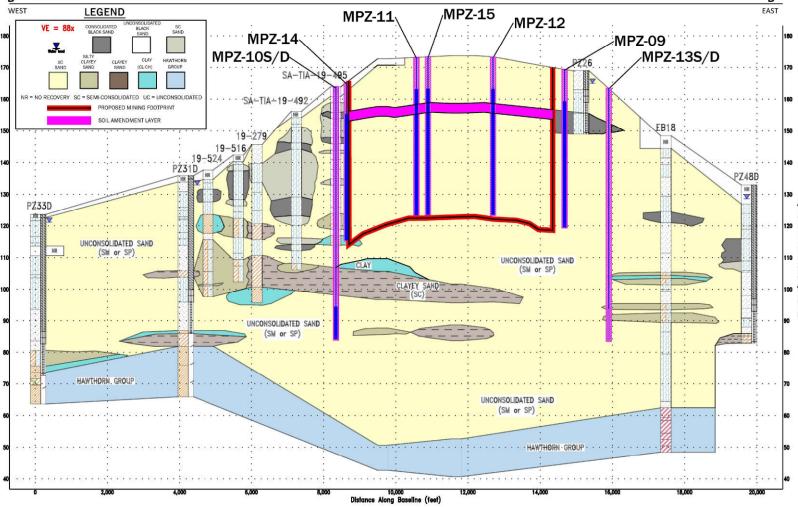
1.2.4. PROCEDURES FOR DISCONTINUING THE SOIL AMENDMENT

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.

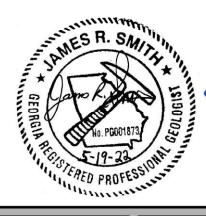
IT IS IMPORTANT TO NOTE THAT IF THE HUMATE-CEMENTED, CONSOLIDATED BLACK SANDS ARE NOT CONTINUOUS AS DEMONSTRATED BY TPM'S PRIOR INVESTIGATIONS, THE ADDITION OF A CONTINUOUS SOIL AMENDMENT LAYER MAY ADVERSELY IMPACT THE LOCAL GROUNDWATER SYSTEM. POTENTIAL IMPACTS INCLUDE:

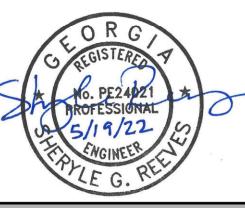
- ARTIFICIALLY RAISING THE WATER TABLE ABOVE THE LAND SURFACE LEADING TO PONDING OR INCREASED SURFACE WATER

 BLINGEF
- 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

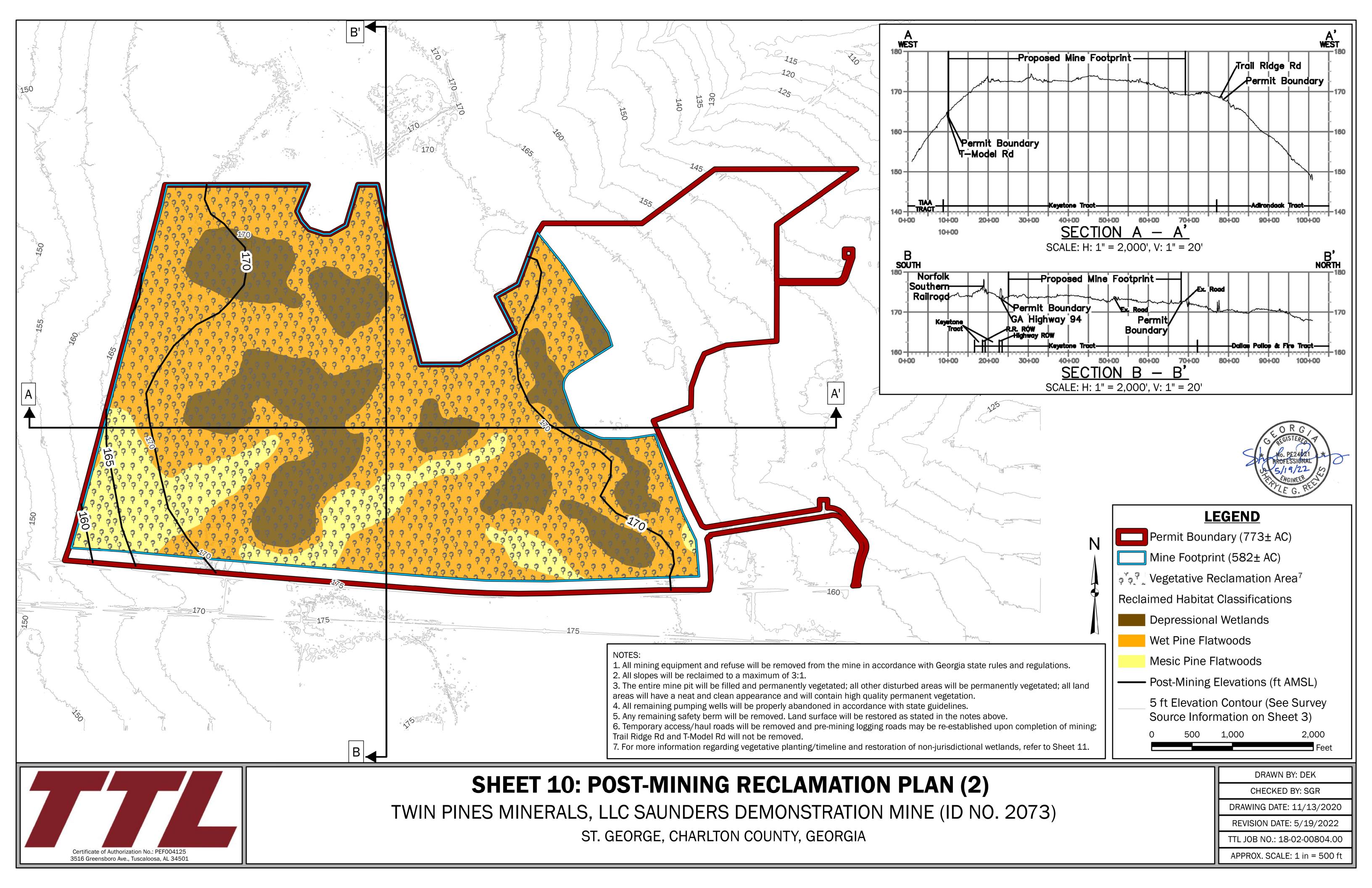
CHECKED BY: SGR

DRAWING DATE: 11/13/2020

REVISION DATE: 5/19/2022

TTL JOB NO.: 18-02-00804.00

APPROX. SCALE:



GROUNDWATER- AND SURFACE-WATER MONITORING PLAN

THIS PLAN IS DESIGNED TO MONITOR THE IMPACT OF THE MINING ACTIVITIES ON WATER LEVELS AND WATER QUALITY IN THE VICINITY OF THE MINE (DURING MINING AND POST-MINING), INCLUDING ANY POTENTIAL IMPACTS TO THE OKEFENOKEE SWAMP.

1. LOCATION OF MONITORING STATIONS 1.1 PIEZOMETERS

1.1.1 EXISTING PIEZOMETERS

SIXTY-NINE (69) PIEZOMETERS ARE CURRENTLY INSTALLED WITHIN THE MINE AND SURROUNDING TPM OWNED PROPERTIES OUTSIDE THE MINE FOOTPRINT. THE LOCATIONS ARE SHOWN ON SHEET 12. TWIN PINES MINERALS, LLC (TPM) NO LONGER HAS ACCESS TO THE TIAA-OWNED PROPERTY WEST OF THE MINE.

ALL PIEZOMETERS ARE EQUIPPED WITH IN-SITU, INC. RUGGED TROLL 200 NON-VENTED DATA LOGGER/CABLE COMBINATIONS. THESE PIEZOMETERS WERE INSTALLED BETWEEN JANUARY AND MAY 2019, AND THUS HAVE BEEN RECORDING BACKGROUND GROUNDWATER-LEVEL DATA FOR A MINIMUM OF TWO YEARS.

1.1.2 NEW PIEZOMETERS

- TWENTY-FOUR (24) ADDITIONAL PIEZOMETERS WILL BE INSTALLED PRIOR TO THE BEGINNING OF MINING. EIGHTEEN (18) PIEZOMETERS WILL BE INSTALLED TO DEPTHS OF ABOUT 50 FEET BELOW GROUND SURFACE (BGS) AND USED
- TO MONITOR WATER LEVELS AND/OR WATER QUALITY ACROSS THE MAXIMUM VERTICAL EXTENT OF THE MINE. SIX (6) ADDITIONAL PIEZOMETERS WILL BE INSTALLED TO DEPTHS OF ABOUT 80 FEET BGS IN ORDER TO MONITOR WATER LEVELS AND/OR WATER QUALITY OF THE SURFICIAL AQUIFER BELOW THE MAXIMUM MINING DEPTH.

THESE 24 SHALLOW AND DEEP PIEZOMETERS (50-FOOT AND 80-FOOT DEEP) ARE DESIGNATED AS FOLLOWS:

TABLE 1.1.2. PROPOSED NEW PIEZOMETERS							
MPZ-01S	MPZ-04	MPZ-07	MPZ-10D	MPZ-13D	MPZ-16D		
MPZ-01D	MPZ-05S	MPZ-08	MPZ-11	MPZ-14	MPZ-17S		
MPZ-02	MPZ-05D	MPZ-09	MPZ-12	MPZ-15	MPZ-17D		
MZP-03	MPZ-06	MPZ-10S	MPZ-13S	MPZ-16S	MPZ-18		

SHALLOW PIEZOMETERS MPZ-01S, MPZ-02, MPZ-03, MPZ-04, MPZ-05S, MPZ-06, MPZ-07, MPZ-08, MPZ-09, MPZ-10S, MPZ-11, MZP-12, MPZ-13S, MPZ-14, MPZ-15, MPZ-16S MPZ-17S, AND MPZ-18 WILL BE DRILLED TO DEPTHS OF ABOUT 50 FEET BGS AND CONSTRUCTED WITH 40 FEET OF 0.010-INCH SLOTTED SCREEN. THE SCREENED INTERVAL OF THESE PIEZOMETERS WILL BE FROM 10 TO 50 FEET BGS. DEEP PIEZOMETERS MPZ-01D, MPZ-05D, MPZ-10D, MPZ-13D, MPZ-16D, AND MPZ17D WILL BE DRILLED TO DEPTHS OF ABOUT 80 FEET BGS AND CONSTRUCTED WITH 10 FEET OF 0.010-INCH SLOTTED SCREEN. THE SCREENED INTERVAL OF THESE PIEZOMETERS WILL BE FROM 70 TO 80 FEET BGS.

A NEW SHALLOW PIEZOMETER WILL BE INSTALLED APPROXIMATELY EVERY 2,000 FEET IN AN EAST-WEST DIRECTION AND EVERY 1,000 FEET IN THE NORTH-SOUTH DIRECTION. THE SPACING WILL PROVIDE FOUR ROWS OF PIEZOMETERS (APPROXIMATELY 18 PIEZOMETERS), COVERING AN AREA OF ROUGHLY 582 ACRES, OR APPROXIMATELY ONE PIEZOMETER EVERY 32 ACRES. THE APPROXIMATE LOCATIONS OF THE NEW PIEZOMETERS ARE DEPICTED ON SHEET 12, WHICH WILL BE UPDATED AFTER THE NEW PIEZOMETERS ARE INSTALLED. A GENERALIZED CROSS SECTION DEPICTING THE MINING AREA, PROPOSED SHALLOW AND DEEP PIEZOMETERS, AND THE TOP OF THE HAWTHORN GROUP IS SHOWN ON SHEET 13.

ALL PIEZOMETERS WILL BE EQUIPPED WITH IN-SITU, INC. RUGGED TROLL 200 NON-VENTED DATA LOGGER/CABLE COMBINATIONS FOR WATER-LEVEL MONITORING DURING ACTIVE MINING AND THE POST-MINING PERIODS.

CONSTRUCTION DETAILS - NEW PIEZOMETERS

PIEZOMETERS MPZ-01S, MPZ-02, MPZ-03, MPZ-04, MPZ-05S, MPZ-06, MPZ-07, MPZ-08, MPZ-09, MPZ-10S, MPZ-11, MZP-12, MPZ-13S, MPZ-14, MPZ-15, MPZ-16S MPZ-17S, AND MPZ-18 WILL BE DRILLED AND CONSTRUCTED TO A DEPTH OF APPROXIMATELY 50 FEET BGS. THESE PIEZOMETERS WILL BE USED TO MONITOR WATER QUALITY ACROSS THE MAXIMUM VERTICAL EXTENT OF THE MINE. DEEP PIEZOMETERS MPZ-01D, MPZ-05D, MPZ-10D, MPZ-13D, MPZ-16D AND MPZ-17D WILL BE DRILLED AND CONSTRUCTED TO A DEPTH OF APPROXIMATELY 80 FEET BGS USING A SONIC DRILL RIG. THE DEEP PIEZOMETERS WILL BE USED TO MONITOR WATER LEVELS AND WATER QUALITY BENEATH THE MINE FOOTPRINT. DURING INSTALLATION OF THE NEW PIEZOMETERS, CONTINUOUS SOIL CORES WILL BE COLLECTED AND DESCRIBED BY AN ON-SITE GEOLOGIST. BORING AND WELL CONSTRUCTION LOGS WILL BE PREPARED FOR EACH NEWLY CONSTRUCTED PIEZOMETER.

PIEZOMETERS MPZ-01S, MPZ-02, MPZ-03, MPZ-04, MPZ-05S, MPZ-06, MPZ-07, MPZ-08, MPZ-09, MPZ-10S, MPZ-11, MZP-12, MPZ-13S, MPZ-14, MPZ-15, MPZ-16S MPZ-17S, AND MPZ-18 WILL BE CONSTRUCTED WITH 40 FEET OF 0.010-INCH SLOTTED SCREEN, 2-INCH DIAMETER, THREADED-JOINT, SCHEDULE 40 PVC WITH A SCREENED INTERVAL FROM A DEPTH OF 10 TO 50 FEET BGS. FROM THE TOP OF THE SCREEN TO APPROXIMATE LAND SURFACE WILL BE CASED WITH SOLID 2-INCH DIAMETER, SCHEDULE 40 PVC RISER. A FILTER PACK OF 20/40 GRADED FILTER SAND WILL BE PLACED AROUND AND TWO FEET ABOVE THE SCREEN TO A DEPTH OF APPROXIMATELY EIGHT FEET BGS. A TWO-FOOT-THICK BENTONITE PELLET SEAL WILL BE PLACED ABOVE THE TOP OF THE FILTER SAND. THE REMAINING ANNULAR SPACE ABOVE THE BENTONITE SEAL (ABOUT SIX FEET) WILL BE GROUTED TO LAND SURFACE USING A CEMENT/BENTONITE GROUT. A METAL, FLUSH-MOUNT, BOLT-DOWN, PROTECTIVE COVER WILL BE INSTALLED OVER THE PIEZOMETER AT LAND SURFACE TO INCLUDE A 2-FOOT X 2-FOOT X 4-INCH-THICK CONCRETE PAD. A TYPICAL SHALLOW PIEZOMETER CONSTRUCTION

DEEP PIEZOMETERS MPZ-01D, MPZ-05D, MPZ-10D, MPZ-13D, MPZ-16D AND MPZ-17D WILL BE CONSTRUCTED WITH 10 FEET OF 0.010-INCH SLOTTED SCREEN, 2-INCH DIAMETER, THREADED-JOINT, SCHEDULE 40 PVC WITH A SCREENED INTERVAL FROM A DEPTH OF 70 TO 80 FEET BGS. FROM THE TOP OF THE SCREEN TO APPROXIMATE LAND SURFACE WILL BE CASED WITH SOLID 2-INCH DIAMETER, SCHEDULE 40 PVC RISER. A FILTER PACK OF 20/40 GRADED FILTER SAND WILL BE PLACED AROUND AND TWO FEET ABOVE THE SCREEN TO A DEPTH OF APPROXIMATELY 68 FEET BGS. A TWO-FOOT-THICK BENTONITE PELLET SEAL WILL BE PLACED ABOVE THE TOP OF THE FILTER SAND. THE REMAINING ANNULAR SPACE ABOVE THE BENTONITE SEAL (ABOUT 66 FEET) WILL BE GROUTED TO LAND SURFACE USING A CEMENT/BENTONITE GROUT. A METAL, FLUSH-MOUNT, BOLT-DOWN, PROTECTIVE COVER WILL BE INSTALLED OVER THE PIEZOMETER AT LAND SURFACE TO INCLUDE A 2-FOOT X 2-FOOT X 4-INCH-THICK CONCRETE PAD. A TYPICAL DEEP PIEZOMETER CONSTRUCTION DETAIL IS SHOWN ON SHEET 13.

EACH PIEZOMETER WILL BE DEVELOPED UNTIL THE COLUMN OF WATER IN THE WELL IS RELATIVELY FREE OF VISIBLE SEDIMENT. AND THE PH, TEMPERATURE, TURBIDITY, AND SPECIFIC CONDUCTIVITY HAVE STABILIZED. EACH PIEZOMETER WILL THEN BE FITTED WITH A RUGGED TROLL 200 NON-VENTED DATA LOGGER/CABLE COMBINATION IN ORDER TO CONTINUOUSLY MONITOR GROUNDWATER

SEOUENCING OF NEW PIEZOMETER INSTALLATION RELATIVE TO PROGRESSION OF MINING

GROUNDWATER LEVEL DATA AS MINING PROGRESSES AND RECLAMATION TAKES PLACE.

ONCE INITIATED, MINING WILL ADVANCE AT AN ESTIMATED RATE OF ABOUT 100 TO 200 FEET PER DAY, AND PIEZOMETERS WITHIN THE PROCEDURES FOR THE REMOVAL AND REINSTALLATION OF PIEZOMETERS ARE DISCUSSED BELOW

- WITHIN ONE OR TWO DAYS OF THE ADVANCING MINE FACE REACHING A PIEZOMETER, THE TRANSDUCER WILL BE REMOVED, AND THE PIEZOMETER WILL SUBSEQUENTLY BE EXCAVATED BY THE ADVANCING DRAG-LINE EXCAVATOR,
- WITHIN APPROXIMATELY FIVE TO SEVEN DAYS OF MINING, THE OPEN EXCAVATION PIT WILL BE BACKFILLED WITH POST
- WITHIN APPROXIMATELY 30 DAYS OF BACKFILLING THE EXCAVATION, A REPLACEMENT PIEZOMETER WILL BE INSTALLED NEAR THE APPROXIMATE LOCATION OF THE ABOVE-REFERENCED EXCAVATED PIEZOMETER. THE REPLACEMENT PIEZOMETER SHOULD BE INSTALLED AT A LOCATION THAT WILL NOT BE RE-EXCAVATED DURING THE NEXT ADJACENT NORTHERN DRAG
- THE REPLACEMENT PIEZOMETERS WILL BE RESURVEYED AFTER INSTALLATION AND BEFORE WATER-LEVEL MEASUREMENTS

REPLACEMENT PIEZOMETERS WILL BE DEVELOPED AND FITTED WITH THE RUGGED TROLL TRANSDUCERS THAT WERE REMOVED FROM THE PREVIOUS PIEZOMETERS IN ORDER TO CONTINUE MONITORING OF GROUNDWATER LEVELS.

THESE PROCEDURES WERE DESIGNED TO ENSURE THAT A FULL COMPLEMENT OF PIEZOMETERS WILL BE MAINTAINED TO MONITOR

STAFF GAUGES

SIX (6) EXISTING STAF

GAU	GES WILL BE USED TO MONITOR SURI	FACE WATER LEVELS (SEE SHEE	T 12)
	TABLE 1.2. SURFACE WATER-LEVEL	MONITORING LOCATIONS	
	SG02	SG24	
	SG11	SG26	
	SG22	SG27	

EACH STAFF GAUGE LOCATION IS EQUIPPED WITH IN-SITU, INC. RUGGED TROLL 200 NON-VENTED DATA LOGGER/CABLE COMBINATIONS FOR RECORDING WATER ELEVATIONS.

EACH STAFF GAUGE SEGMENT MEASURES APPROXIMATELY 3.3 FEET IN LENGTH AND IS MOUNTED TO EITHER A METAL POST OR A PRESSURE-TREATED WOOD POST SO THAT THE BASE OF THE GAUGE IS POSITIONED AT GROUND SURFACE. DATA LOGGERS HAVE BEEN INSTALLED AT EACH STAFF GAUGE WITH THE TRANSDUCERS TIP POSITIONED AT THE APPROXIMATE GROUND SURFACE. EACH DATA LOGGER/CABLE COMBINATION HAS BEEN RECORDING BACKGROUND SURFACE-WATER LEVEL DATA FOR A PERIOD OF BETWEEN 1 TO 2+ YEARS. THESE STAFF GAUGES WILL CONTINUE TO BE USED FOR RECORDING SURFACE WATER ELEVATIONS THROUGHOUT MINING AS WELL AS DURING THE POST MINING PERIOD.

TPM PERSONNEL INSTALLED THREE HOBO RAIN GAUGE DATA LOGGERS AT THE SITE IN NOVEMBER 2018. THE THREE RAIN GAUGE LOCATIONS (RG01, RG02, AND RG03) WERE INSTALLED IN THE NORTHERN, CENTRAL, AND SOUTHERN PORTIONS OF THE TPM OWNED PROPERTIES (SHEET 12). THE DATA LOGGERS FOR EACH RAIN GAUGE RECORD THE ACCUMULATION OF PRECIPITATION IN UNITS OF HUNDREDTHS OF AN INCH EVERY 15-MINUTES.

GROUNDWATER-LEVEL MONITORING AND ADAPTIVE MANAGEMENT PLAN

FREQUENCY OF WATER-LEVEL MONITORING

WATER-LEVEL DATA WILL BE RECORDED USING RUGGED TROLL DATA LOGGERS. DATA LOGGERS WILL BE PROGRAMMED TO RECORD DAILY WATER-LEVEL MEASUREMENTS AT EACH OF THE 69 EXISTING (PZ) AND 24 NEW (MPZ) PIEZOMETERS WITHIN THE MINE FOOTPRINT AND ADJACENT TPM-OWNED PROPERTY (SEE TABLE 2.1 AND SHEET 12).

TABLE 2.1. GI	ROUNDWATER-L	EVEL MONITO	RING LOCATION	S				
PZ01S	PZ11	PZ20S	PZ28S	PZ46	PZ56S			
PZ01D	PZ12S	PZ20D	PZ28D	PZ47	PZ56D			
PZ02	PZ12D	PZ21	PZ38	PZ48S	PZ57S			
PZ03S	PZ13	PZ22S	PZ39S	PZ48D	PZ57D			
PZ03D	PZ14	PZ22D	PZ39D	PZ49	PZ58S			
PZ04	PZ15	PZ23	PZ40	PZ50	PZ58D			
PZ05	PZ16S	PZ24	PZ41	PZ51S	OWB1BS			
PZ06	PZ16D	PZ25S	PZ42	PZ51D	OWB1S			
PZ07	PZ17S	PZ25D	PZ43	PZ52	OWB1D			
PZ08	PZ17D	PZ26	PZ44	PZ53				
PZ09	PZ18	PZ27S	PZ45S	PZ55S				
PZ10	PZ19	PZ27D	PZ45D	PZ55D				
MPZ-01S	MPZ-04	MPZ-07	MPZ-10D	MPZ-13D	MPZ-16D			
MPZ-01D	MPZ-05S	MPZ-08	MPZ-11	MPZ-14	MPZ-17S			
MPZ-02	MPZ-05D	MPZ-09	MPZ-12	MPZ-15	MPZ-17D			
MZP-03	MPZ-06	MPZ-10S	MPZ-13S	MPZ-16S	MPZ-18			

THE DAILY WATER-LEVEL MEASUREMENTS RECORDED WITH THE DATA LOGGERS WILL BE DOWNLOADED MONTHLY TO EVALUATE WATER-LEVEL DATA WITHIN AND ADJACENT TO THE MINE. THE FREQUENCY OF DATA DOWNLOADING MAY BE ADJUSTED (INCREASED OR DECREASED) AS NEEDED DURING THE LIFE OF THE MINE.

FREQUENCY OF RAIN GAUGE MONITORING

DATA FROM THE THREE ON-SITE RAIN GAUGES WILL BE MANUALLY DOWNLOADED IN THE FIELD BY TPM REPRESENTATIVES OR TPM'S

FOR THE PURPOSE OF COMPARING PRE- AND POST-MINING GROUNDWATER LEVELS. HOWEVER, SUFFICIENT TIME MUST ELAPSE AFTER THE DRAGLINE EXCAVATOR HAS PASSED TO ENSURE THE POST-MINING DATA IS NOT INFLUENCED BY THE ON-GOING MINING TO THE NORTH. TPM ESTIMATES THAT GROUNDWATER IMPACTS WILL EXTEND APPROXIMATELY 1,000 FEET FROM THE EDGE OF THE MINING PIT. THEREFORE, THE COMPARISON OF PRE- AND POST-MINING GROUNDWATER LEVELS WILL BE MADE AFTER THE DRAGLINE EXCAVATOR HAS MOVED APPROXIMATELY 1,000 FEET TO THE NORTH OF A MINED TRANSECT (SEE SHEET 12).

AFTER THE DRAGLINE EXCAVATOR HAS MOVED THE REQUIRED DISTANCE, POST-MINING GROUNDWATER-LEVEL DATA IN THE PIEZOMETERS 1,000 FEET SOUTH OF THE MOVING MINE WILL BE COMPARED TO PRE-MINING WATER-LEVEL DATA. THE POST-MINING GROUNDWATER-LEVEL DATA WILL BE USED TO CALCULATE THE DAILY GROUNDWATER DEVIATION FROM NORMAL, WHICH WILL BE ADDED TO THE HISTORICAL HYDROGRAPH DATA SHOWN ON SHEET 13. THE CRITERIA IN PART 2.4 WILL BE USED TO DETERMINE IF GROUNDWATER HAS BEEN RESTORED. OR IF ADAPTIVE MANAGEMENT IS REQUIRED.

ACTION LEVELS FOR ADAPTIVE MANAGEMENT

POST-MINING GROUNDWATER LEVELS WILL BE CONSIDERED TO APPROXIMATE PRE-MINING LEVELS AND THE GROUNDWATER TABLE WILL BE CONSIDERED TO HAVE BEEN RESTORED IF: POST-MINING GROUNDWATER-LEVELS REMAIN WITHIN THE NORMAL RANGE (2.7 FEET ABOVE OR BELOW NORMAL)

ESTABLISHED IN THE HISTORICAL HYDROGRAPH DATA SHOWN ON SHEET 13; AND/OR POST-MINING GROUNDWATER LEVELS FLUCTUATE UNIFORMLY IN THE NORTH, CENTRAL AND SOUTH SECTIONS;

SUPPORTING DOCUMENTATION DESCRIBING THE RATIONAL FOR RESTORATION OF PRE-MINING GROUNDWATER LEVELS AND THE ±2.7 FEET GROUNDWATER ELEVATION DEVIATION RANGE IS INCLUDED IN EXHIBIT D.

ADAPTIVE MANAGEMENT AND CONTINGENCY PLANNING

IF THE CONDITIONS DESCRIBED IN PART 2.4 ARE NOT ACHIEVED, TPM WILL NOTIFY THE DIRECTOR WITHIN 30 DAYS OF DETERMINING AN IMPACT CONDITION EXISTS. SUCH NOTICE WILL INCLUDE THE MONITORING DATA ALONG WITH RELEVANT INFORMATION.

NO FURTHER ACTION WILL BE REQUIRED IF THE UNEXPECTED CONDITION CAN BE ATTRIBUTED TO FACTORS UNRELATED TO THE MINING ACTIVITY. IF OTHER CAUSES FOR THE CHANGE IN WATER-LEVEL CONDITIONS CANNOT BE IDENTIFIED, HOWEVER, TPM WILL CONDUCT FURTHER INVESTIGATIONS TO DETERMINE THE SIGNIFICANCE OF THE CHANGE, POTENTIAL CAUSES, AND POTENTIAL SOLUTIONS. A CONTINGENCY PLAN TO RESTORE GROUNDWATER LEVELS TO PRE-MINING CONDITIONS WILL BE PREPARED AND SUBMITTED TO EPD FOR ITS REVIEW AND APPROVAL PRIOR TO IMPLEMENTATION

- THE CONTINGENCY PLAN WILL PROPOSE ENGINEERED SOLUTIONS POTENTIALLY INCLUDING THE FOLLOWING: 1. IF GROUNDWATER LEVELS ABOVE NORMAL ARE CAUSING GROUNDWATER TO POND ABOVE THE LAND SURFACE, AND IF THESE CONDITIONS CANNOT BE EXPLAINED BY FACTORS UNRELATED TO MINING, THE PROPOSED SOLUTION MAY BE TO PIERCE THE EXISTING BENTONITE LAYER OR OTHERWISE INCREASE ITS HYDRAULIC CONDUCTIVITY, AND/OR TO CEASE OR MODIFY THE SOIL AMENDMENT PLAN GOING FORWARD.
- 2. IF GROUNDWATER LEVELS ARE BELOW NORMAL, AND IF THE CONDITION CANNOT BE EXPLAINED BY FACTORS UNRELATED TO MINING, THE PROPOSED SOLUTION MAY BE TO INCREASE THE PERCENTAGE OF BENTONITE ADDED TO THE LOW-PERMEABILITY LAYER GOING FORWARD: AND, IF NECESSARY AND APPROPRIATE, TO INJECT ADDITIONAL BENTONITE SLURRY WITHIN A DISCRETE SUBSURFACE SOIL INTERVAL (I.E., 7 TO 10 FEET BELOW LAND SURFACE). TPM MAY ALSO PROPOSE OTHER FEASIBLE ENGINEERED SOLUTIONS.

WATER-QUALITY MONITORING AND ADAPTIVE MANAGEMENT PLAN BACKGROUND DATA

AN IMPORTANT CONSIDERATION IN THE DEVELOPMENT OF THIS MONITORING PLAN IS THAT THE MINING AND BENEFICIATION FACILITIES WILL NOT USE OR ADD CONTAMINANTS WHICH COULD THEN IMPACT THE SITE GROUNDWATER AND SURFACE WATERS FROM EITHER THE MINING OR THE BENEFICIATION PROCESSES. ALSO, THE SITE WILL NOT BE SUBJECT TO ANY OF THE TRADITIONAL/TYPICAL CONTAMINANT MONITORING PROGRAMS SUCH AS RCRA, CERCLA, ETC.

EXTENSIVE SITE CHARACTERIZATION ACTIVITIES, INCLUDING GROUNDWATER AND SURFACE WATER QUALITY MONITORING HAS BEEN PERFORMED IN MARCH 2019 AND FEBRUARY, MARCH-APRIL, MAY, JULY, AUGUST, SEPTEMBER, OCTOBER 2020, JANUARY AND APRIL 2021. THIS DATA AND FUTURE WATER QUALITY MONITORING PERFORMED PRE-MINING, DURING MINING, AND POST-MINING WILL BE USED TO ASSESS WATER QUALITY IMPACTS AS A RESULT OF MINING ACTIVITIES.

3.2 MONITORING LOCATIONS AND FREQUENCY DURING MINING GROUNDWATER MONITORING LOCATIONS

BASED ON REVIEWS OF GROUNDWATER FLOW DATA IN THE MINING AREA, THE FOLLOWING MONITORING LOCATIONS AND SAMPLING FREQUENCY WILL BE ESTABLISHED TO MONITOR GROUNDWATER QUALITY OF THE SURFICIAL AQUIFER BENEATH THE MINING AREA (SHEET 12).

TARI E 2 2.1 GR	OUNDWATER MONITORING STATION	SAMPLING FREQUENCY AND DURATION ¹				
TABLE 3.2-1 GR	OUNDWATER MONITORING STATION	DURING MINING ²	POST MINING ^{3,4}			
MPZ-01S/D MPZ-02 MPZ-03 MPZ-04 MPZ-05S/D MPZ-06	MPZ-10S/D MPZ-13S/D MPZ-14 MPZ-16S/D MPZ-17S/D MPZ-18	QUARTERLY	SEMI-ANNUAL			

- BASED ON THE RESULTS OF WATER QUALITY SAMPLING AND THE PROGRESSION OF THE MINE. THE FREQUENCY OF WATER OUALITY SAMPLING AND NUMBER OF MONITORING LOCATIONS MAY PERIODICALLY BE ADJUSTED (I.E. INCREASED OR DECREASED) DURING THE LIFE OF THE MINE (I.E. IF INCREASING CONCENTRATIONS ARE OBSERVED, SAMPLING FREQUENCY MAY BE INCREASED TO BETTER DEFINE THE TREND).
- POST-MINING MONITORING WILL BEGIN AT THE END OF ACTIVE MINING AND CONTINUE FOR A PERIOD OF APPROXIMATELY FIVE YEARS

4. EPD MAY REQUIRE AN EXTENSION OF THE MONITORING PLAN IF NECESSARY

TOTAL DISSOLVED SOLIDS (TDS)

ZINC, TOTAL AND DISSOLVED

TABLE 3.2-2. WATER QUALITY PARAMETERS AND COPCS TO BE MEASURED IN

GROUNDWATER CONSTITUENTS OF POTENTIAL CONCERN (COPC) REVIEW OF EXISTING PRE-MINING GROUNDWATER QUALITY DATA WAS USED TO DEVELOP A CONCISE LIST OF COPCS FOR THE SITE'S MONITORING PROGRAM. THE GROUNDWATER COPCS ARE LISTED IN TABLE 3.2-2 BELOW.

GROUNDWATER SAMPLES PARAMETER / COPC LABORATORY METHOD FIELD MEASURED SPECIFIC CONDUCTIVITY FIELD MEASURED WATER TEMPERATURE FIELD MEASURED OXIDATION-REDUCTION POTENTIAL (ORP FIELD MEASURED **TURBIDITY** FIELD MEASURED ARSENIC, TOTAL AND DISSOLVED EPA 200.8 LEAD, TOTAL AND DISSOLVED EPA 200.8 EPA 900.0 GROSS ALPHA RADIUM-226 + RADIUM-228 EPA 904.0 & 903.1 ALUMINUM, TOTAL AND DISSOLVE EPA 200.8 IRON. TOTAL AND DISSOLVED EPA 200.8 MANGANESE, TOTAL AND DISSOLVED EPA 200.8

SM2540C OR FIELD

MEASURED

EPA 200.8

SURFACE WATER MONITORING LOCATIONS

IN TABLE 3.2-4 BELOW.

THREE EXISTING MONITORING LOCATIONS LISTED BELOW AND SHOWN ON SHEET 12 ARE PROPOSED TO MONITOR WATER QUALITY IN SURFACE WATERS WHICH MAY RECEIVE RUNOFF FROM THE MINING AREA.

CE WATERS WITHOUT MAT RECEIVE RONOTT I ROW THE MINNING AREA.						
BLE 3.2-3 SURFACE WATER MONITORING	SAMPLING FREQUENCY AND DURATION ¹					
TATION	DURING MINING ²	POST MINING ^{3,4}				
SW-BG04 SW-BG05 SW-BG06	QUARTERLY	SEMI-ANNUAL				

- BASED ON THE RESULTS OF WATER QUALITY SAMPLING AND THE PROGRESSION OF THE MINE, THE FREQUENCY OF WATER QUALITY SAMPLING AND NUMBER OF MONITORING LOCATIONS MAY PERIODICALLY BE ADJUSTED (I.E. INCREASED OR DECREASED) DURING THE LIFE OF THE MINE (I.E. IF INCREASING CONCENTRATIONS ARE OBSERVED, SAMPLING FREQUENCY MAY BE INCREASED TO BETTER DEFINE THE TREND).
- POST-MINING MONITORING WILL BEGIN AT THE END OF ACTIVE MINING AND CONTINUE FOR A PERIOD OF APPROXIMATELY FIVE YEARS 4. EPD MAY REQUIRE AN EXTENSION OF THE MONITORING PLAN IF NECESSARY

REVIEW OF EXISTING PRE-MINING BACKGROUND SURFACE WATER QUALITY DATA WAS USED TO DEVELOP A CONCISE LIST OF CONSTITUENTS OF POTENTIAL CONCERN (COPCS) FOR THE SITE'S MONITORING PROGRAM. THE SURFACE WATER COPCS ARE LISTED

IN TABLE 3.2	TABLE 3.2-4. WATER QUALITY PARAMETERS AND COPCS TO BE MEASURED IN SURFACE WATER SAMPLES					
	PARAMETER	LABORATORY METHOD				
	PH		FIELD MEASURED			
	DISSOLVED	OXYGEN (DO)	FIELD MEASURED			
	SPECIFIC CO	ONDUCTIVITY	FIELD MEASURED			
	WATER TEM	PERATURE	FIELD MEASURED			
	TURBIDITY		FIELD MEASURED			
	LEAD, TOTA	L AND DISSOLVED	EPA 200.8			
	MERCURY, 1	TOTAL	EPA 1631E			
	ZINC, TOTAL	AND DISSOLVED	EPA 200.8			
	TOTAL HARD	DNESS	SM2340B			
	TOTAL ORGA	ANIC CARBON (TOC)	EPA 200.7			
TOTAL PHOSPHORUS		SPHORUS	EPA 200.7			
	TOTAL NITROGEN	NITROGEN, TOTAL KJELDAHL (TKN)	EPA 351.2			
		NITROGEN, NITRATE+NITRITE	EPA 353.2			
NOTE: TOTAL	NITROGEN =	TKN + (NITRATE+NITRITE)				

3.3 SAMPLE COLLECTION AND DATA ANALYSIS PROCEDURES GROUNDWATER-SAMPLING PROCEDURES, CHAIN OF CUSTODY, FIELD PARAMETER MEASUREMENT, AND FIELD QA/QC WILL BE PERFORMED IN ACCORDANCE WITH THE REGION 4 US ENVIRONMENTAL PROTECTION AGENCY (EPA), SCIENCE AND ECOSYSTEM SUPPORT DIVISION OPERATING PROCEDURE, GROUNDWATER SAMPLING (SESDPROC-301-R4), EFFECTIVE APRIL 26, 2017. SURFACE WATER SAMPLING PROCEDURES AND FIELD QA/QC WILL BE PERFORMED IN GENERAL ACCORDANCE WITH THE REGION 4 US ENVIRONMENTAL PROTECTION AGENCY (EPA), SCIENCE AND ECOSYSTEM SUPPORT DIVISION OPERATING PROCEDURE, SURFACE WATER SAMPLING (SESDPROC-201-R4), EFFECTIVE DECEMBER 16, 2016. LOW-LEVEL MERCURY SAMPLING WILL BE PERFORMED IN ACCORDANCE WITH EPA METHOD 1669.

ANY REUSABLE SAMPLING EQUIPMENT THAT MAY CONTACT THE INTERIOR OF THE PIEZOMETER, GROUNDWATER, OR SURFACE WATER WILL BE DECONTAMINATED IN THE FIELD IMMEDIATELY PRIOR TO USE, OR IN THE OFFICE/LAB AND PROTECTED USING PLASTIC. FOR SAMPLING EVENTS REQUIRING NON-DEDICATED SAMPLING EQUIPMENT, DECONTAMINATION PROCEDURES WILL CONSIST OF RINSING THE EOUIPMENT ONCE WITH DISTILLED OR DEIONIZED WATER. BRUSHING THE EOUIPMENT WITH A SOLUTION OF DISTILLED OR DEIONIZED WATER AND A PHOSPHATE FREE LABORATORY-QUALITY DETERGENT, AND FINALLY RINSING THE EQUIPMENT WITH DISTILLED OR DEIONIZED WATER.

WATER-LEVEL MEASUREMENTS (PIEZOMETERS ONLY)

PRIOR TO PURGING AND SAMPLING, WATER-LEVEL MEASUREMENTS WILL BE MADE AT EACH PIEZOMETER BY UTILIZING A DEDICATED OR PORTABLE WATER-LEVEL INDICATOR, TAPE, OR OTHER SUITABLE MEASURING DEVICE CAPABLE OF ACHIEVING AN ACCURACY OF 0.01 FOOT. THE DEPTH TO WATER IN EACH PIEZOMETER WILL BE MEASURED ON THE SAME DAY AND PRIOR TO PURGING. THE MEASURING DEVICE WILL BE USED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND/OR DIRECTIONS. MEASUREMENTS OF THE DEPTH TO WATER FROM THE TOP OF THE PIEZOMETER CASING (DESIGNATED MONITORING POINT) WILL BE TO THE NEAREST 0.01 FOOT, AND THE VALUE WILL BE RECORDED. TOTAL DEPTHS WILL BE MEASURED AT EACH PIEZOMETER AND

PIEZOMETER PURGING PROCEDURES

PRIOR TO THE COLLECTION OF GROUNDWATER SAMPLES, EACH PIEZOMETER WILL BE PURGED TO ENSURE THAT FRESH AQUIFER WATER IS BEING SAMPLED. PURGING OF EACH PIEZOMETER WILL BE COMPLETED USING EITHER A PERISTALTIC OR ELECTRIC SUBMERSIBLE PUMP. DUE TO THE DEPTHS OF THE PROPOSED PIEZOMETERS AND THE HIGH GROUNDWATER TABLES AT THE SITE (I.E. EXCESSIVE PURGE VOLUMES), LOW-FLOW PURGING PROCEDURES MAY BE UTILIZED. DURING LOW-FLOW PURGING, THE PUMP OR TUBING INTAKE WILL BE LOCATED WITHIN THE SCREENED INTERVAL AND AT A DEPTH THAT WILL REMAIN UNDER WATER AT ALL TIMES. DURING LOW-FLOW PURGING:

- THE PUMPING RATE WILL BE SET AT A SPEED THAT PRODUCES MINIMAL AND STABLE DRAWDOWN WITHIN THE WELL,
- THE PUMPING RATE WILL BE MEASURED USING A GRADUATED CYLINDER OR GRADUATED BUCKET AND A STOP WATCH, THE GROUNDWATER LEVEL, PUMPING RATE, AND FIELD PARAMETERS (PH, WATER TEMPERATURE, SPECIFIC CONDUCTIVITY, DISSOLVED OXYGEN, OXIDATION-REDUCTION POTENTIAL, AND TURBIDITY) WILL BE MONITORED AND RECORDED EVERY 5 TO 10 MINUTES (OR AS APPROPRIATE),
- THE FIELD PARAMETERS WILL BE MEASURED USING A CALIBRATED MULTI-PARAMETER INSTRUMENT AND FLOW-THROUGH
- PURGING WILL BE CONSIDERED COMPLETE AND SAMPLING WILL BEGIN WHEN THE FIELD MEASURED PARAMETERS HAV STABILIZED. STABILIZATION IS CONSIDERED COMPLETE WHEN THREE CONSECUTIVE READINGS ARE WITHIN THE FOLLOWING

PARAMETER	MAXIMUM VARIATION
TURBIDITY	10% FOR VALUES GREATER THAN 10 NTU
DISSOLVED OXYGEN	0.2 MG/L OR 10% SATURATION,
OXIDATION-REDUCTION POTENTIAL	20 MILLIVOLTS,
SPECIFIC CONDUCTANCE	5%,
PH	0.1 STANDARD UNIT

GROUNDWATER SAMPLING IS THE PROCESS OF OBTAINING, CONTAINERIZING, PRESERVING, AND SHIPMENT OF A GROUNDWATER SAMPLE AFTER THE PURGING PROCESS IS COMPLETE. APPROPRIATE DEVICES TO BE USED TO COLLECT GROUNDWATER SAMPLES FROM PIEZOMETERS INCLUDE: PERISTALTIC OR ELECTRIC SUBMERSIBLE PUMPS. ALTERNATIVE SAMPLING DEVICES/METHODS MAY BE UTILIZED IF THE ALTERNATIVE DEVICE/METHOD IS APPROVED FOR USE IN EPA FIELD SAMPLING GUIDANCE LITERATURE.

DURING SAMPLE COLLECTION, EACH PIEZOMETER WILL BE SAMPLED WITH EQUIPMENT AND METHODOLOGIES THAT MINIMIZE THI POTENTIAL FOR ALTERATION OR CONTAMINATION OF THE SAMPLE AND THAT ARE CAPABLE OF OBTAINING A SAMPLE REPRESENTATIVE OF THE FORMATION GROUNDWATER. CARE WILL BE TAKEN TO AVOID PLACING CLEAN SAMPLING EQUIPMENT ON THE GROUND OR ON ANY CONTAMINATED SURFACE. ADDITIONALLY, PERSONNEL WHO CONTACT SAMPLING EQUIPMENT THAT MAY CONTACT THE INTERIOR OF THE MONITORING WELL OR THE GROUNDWATER WILL WEAR NEW POWDERLESS LATEX OR NITRILE GLOVES. GLOVES WILL BE CHANGED BETWEEN SAMPLE LOCATIONS TO AVOID CROSS-CONTAMINATION.

FIELD PERSONNEL RESPONSIBLE FOR SAMPLE COLLECTION WILL RECORD, AT A MINIMUM, THE FOLLOWING:

- DATE, TIME AND TECHNICIAN'S NAME
- PIEZOMETER NUMBER AND WELL DEPTH WELL CASING MATERIAL AND INSIDE DIAMETER
- STATIC WATER LEVEL PRIOR TO PURGING SAMPLING EQUIPMENT USED
- VOLUME OF WATER PURGED PRIOR TO SAMPLING
- SAMPLE CONTAINER NUMBERS, TYPES, SIZES, AND PRESERVATIVES • PH, SPECIFIC CONDUCTANCE, DISSOLVED OXYGEN, OXIDATION-REDUCTION POTENTIAL, TURBIDITY, AND TEMPERATURE OF
- COMMENTS ABOUT SAMPLE COLOR, ODOR, AND UNUSUAL CHARACTERISTICS
- COMMENTS ABOUT WEATHER CONDITIONS
- COMMENTS ABOUT ACCESSIBILITY AND CONDITION OF PIEZOMETER GROUNDWATER COLLECTED FROM EACH PIEZOMETER WILL BE SLOWLY DISCHARGED INTO LABORATORY PROVIDED SAMPLE CONTAINERS OF THE APPROPRIATE SIZE AND TYPE, AND WITH THE PRESERVATIVES, IF ANY, APPROPRIATE FOR THE ANALYTICAL TESTS REQUIRED. THE SAMPLE CONTAINER WILL BE LABELED WITH THE FOLLOWING INFORMATION
- SITE NAME SAMPLE ID
- COLLECTED DATE AND TIME
- PROJECT REFERENCE NUMBER

- ANALYSIS REQUIRED
- PRESERVATIVE, IF ANY THE LABORATORY WILL SPECIFY THE PRESERVATION METHODS BASED ON KNOWLEDGE OF METHODS AND PROCEDURES APPROVED

SAMPLE COLLECTION AND PRESERVATION - SURFACE WATER

SURFACE WATER SAMPLES WILL BE COLLECTED DIRECTLY INTO THE LABORATORY PROVIDED CONTAINER FROM THE SURFACE WATER BODY OR BY DECANTING THE WATER SAMPLE FROM A COLLECTION DEVICE SUCH AS AN UNPRESERVED LABORATORY PROVIDED PLASTIC CONTAINER. THE FIELD SAMPLER WILL FACE UPSTREAM IF THERE IS A CURRENT AND COLLECT THE SAMPLE WITHOUT DISTURBING THE BOTTOM SEDIMENT. ALTERNATIVE SAMPLING DEVICES/METHODS MAY BE UTILIZED IF THE ALTERNATIVE DEVICE/METHOD IS APPROVED FOR USE IN EPA FIELD SAMPLING GUIDANCE LITERATURE. WATER QUALITY SAMPLES COLLECTED FOR LOW-LEVEL MERCURY ANALYSIS (EPA METHOD 1631E) WILL BE COLLECTED IN GENERAL ACCORDANCE WITH EPA METHOD 1669.

EACH SURFACE WATER SAMPLE WILL BE COLLECTED WITH EQUIPMENT AND METHODOLOGIES THAT MINIMIZE THE POTENTIAL FOR ALTERATION OR CONTAMINATION OF THE SAMPLE. CARE WILL BE TAKEN TO AVOID PLACING CLEAN SAMPLING EQUIPMENT ON THE GROUND OR ON ANY CONTAMINATED SURFACE. ADDITIONALLY, PERSONNEL WHO CONTACT SAMPLING EQUIPMENT WILL WEAR NEW POWDERLESS LATEX OR NITRILE GLOVES. GLOVES WILL BE CHANGED BETWEEN SAMPLE LOCATIONS TO AVOID CROSS-

FIELD PERSONNEL RESPONSIBLE FOR SAMPLE COLLECTION WILL RECORD, AT A MINIMUM, THE FOLLOWING:

- DATE, TIME AND TECHNICIAN'S NAME SAMPLE LOCATION IDENTIFIER
- SAMPLING EQUIPMENT USED
- SAMPLE CONTAINER NUMBERS, TYPES, SIZES, AND PRESERVATIVES
- PH, SPECIFIC CONDUCTANCE, DISSOLVED OXYGEN, OXIDATION-REDUCTION POTENTIAL, AND TEMPERATURE OF WATER
- COMMENTS ABOUT SAMPLE COLOR, ODOR, AND UNUSUAL CHARACTERISTICS COMMENTS ABOUT WEATHER CONDITIONS
- COMMENTS ABOUT ACCESSIBILITY AND CONDITION OF THE SAMPLE LOCATIONS
- SURFACE WATER SAMPLES WILL BE COLLECTED INTO LABORATORY PROVIDED SAMPLE CONTAINERS OF THE APPROPRIATE SIZE AND TYPE, AND WITH THE PRESERVATIVES APPROPRIATE FOR THE ANALYTICAL TESTS REQUIRED. THE SAMPLE CONTAINER WILL BE
- LABELED WITH THE FOLLOWING INFORMATION:

ANALYSIS REQUIRED

- SAMPLE ID
- PROJECT REFERENCE NUMBER COLLECTED DATE AND TIME
- SAMPLER'S NAME
- PRESERVATIVE, IF ANY THE LABORATORY WILL SPECIFY THE PRESERVATION METHODS BASED ON KNOWLEDGE OF METHODS AND PROCEDURES APPROVED BY THE GEORGIA EPD OR EPA.

UPON COMPLETION OF SAMPLE COLLECTION AT EACH PIEZOMETER AND/OR SURFACE WATER MONITORING POINT, EACH LABORATORY PROVIDED CONTAINER WILL BE PROPERLY SEALED, LABELED AND PLACED ON ICE IN A COOLER FOR PRESERVATION AND TRANSPORT TO A GEORGIA EPD APPROVED LABORATORY FOR ANALYSIS. CHAIN OF CUSTODY FORMS WILL BE COMPLETED IN THE FIELD AT THE TIME OF SAMPLING OF EACH SAMPLE LOCATION. SAMPLES WILL BE TRANSPORTED TO THE LABORATORY VIA COURIER OR SHIPPED VIA OVERNIGHT DELIVERY USING FEDEX OR UPS DELIVERY.

WATER QUALITY SAMPLES WILL BE ANALYZED FOR THE CONSTITUENTS SPECIFIED IN TABLES 3.2-2 AND 3.2-4. THE ANALYZICAL LIST MAY BE REVISED DURING THE LIFE OF THE MINE. LABORATORY ANALYSIS WILL BE CONDUCTED ACCORDING TO SUFFICIENTLY SENSITIVE TEST PROCEDURES (I.E., METHODS) APPROVED UNDER 40 CFR 136.

QUALITY ASSURANCE AND QUALITY CONTROL

A QUALITY-ASSURANCE AND QUALITY-CONTROL PROGRAM (QA/QC) WILL BE PART OF THE SAMPLING PROTOCOL AND A REQUIREMENT OF THE LABORATORY CHOSEN TO PROVIDE ANALYTICAL SERVICES. AT A MINIMUM, FIELD QA/QC PER SAMPLING EVENT WILL REQUIRE THE COLLECTION OF AN EQUIPMENT-RINSE BLANK IF EQUIPMENT IS FIELD CLEANED AND RE-USED ON-SITE. ADDITIONAL QA/QC SAMPLING SUCH AS FIELD OR TRIP BLANKS MAY ALSO ANALYZED AS DEEMED NECESSARY.

THE LABORATORY QA/QC PROGRAM WILL BE A WRITTEN PROGRAM AND WILL DESCRIBE THE ACCURACY AND COMPLETENESS OF THE LABORATORY DATA; THE DOCUMENTATION OF PROCEDURES FOR CALIBRATION AND MAINTENANCE OF LABORATORY EQUIPMENT, FOR ANALYSIS OF SAMPLES, FOR COMPUTING AND VALIDATING TEST DATA, AND FOR CHAIN-OF-CUSTODY CONTROL; AND THE CONTROL AND SECURITY OF ALL DOCUMENTATION. LABORATORY QA/QC STANDARDS WILL BE INITIATED WITH THE RECEIPT OF SAMPLES AND WILL BE MAINTAINED THROUGHOUT THE RECORD-KEEPING PERIOD.

THE CHAIN-OF-CUSTODY PROGRAM WILL ALLOW TRACING THE POSSESSION AND HANDLING OF INDIVIDUAL SAMPLES FROM THE TIME OF FIELD COLLECTION THROUGH THE COMPLETION OF LABORATORY ANALYSIS.

RESULTS OF THE FIELD MEASUREMENTS AND ANALYTICAL DATA WILL BE TABULATED FOR EACH MONITORING EVENT. THE DATA WILL

CONSTANT (NO DISCERNABLE CHANGE), OR INCREASING. WATER CHEMISTRY DATA WILL BE REGULARLY COMPARED TO BACKGROUND CONCENTRATION AND APPLICABLE REGULATORY STANDARDS. IN ADDITION, A STATISTICAL SUMMARY OF WATER QUALITY DATA COLLECTED AT EACH SAMPLING LOCATION WILL BE

BE ANALYZED FOR TRENDS AND COMPARED TO APPLICABLE GROUNDWATER PROTECTION AND IN-STREAM WATER QUALITY

STANDARDS. THE PURPOSE OF THE TREND ANALYSIS WILL BE TO EVALUATE IF CONCENTRATIONS ARE DECLINING, REMAINING

PREPARED AND SELECTED DATA WILL BE PRESENTED GRAPHICALLY TO ILLUSTRATE TRENDS OR SEASONAL CHANGES IN WATER

BACKGROUND CONCENTRATIONS AND APPLICABLE REGULATORY STANDARDS. IN ADDITION, A STATISTICAL SUMMARY OF WATER

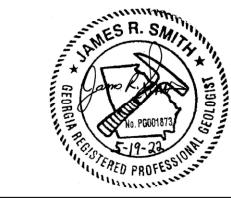
QUALITY DATA COLLECTED AT EACH SAMPLING LOCATION WILL BE PREPARED AND SELECTED DATA WILL BE PRESENTED GRAPHICALLY

QUALITY. A SUMMARY WATER QUALITY REPORT WILL BE SUBMITTED TO GEORGIA EPD ON A QUARTERLY BASIS DURING THE FIRST YEAR, WATER QUALITY REPORTS WILL INCLUDE GROUNDWATER CONTOUR MAPS, RESULTS OF WATER QUALITY ANALYSIS FOR THE PERIOD OF MONITORING, AND TREND GRAPHS OF CONCENTRATIONS. WATER CHEMISTRY DATA WILL BE EVALUATED AND COMPARED TO

TO ILLUSTRATE TRENDS OR SEASONAL CHANGES IN WATER QUALITY.

3.3.3 DATA REVIEW & ADAPTIVE MANAGEMENT WATER CHEMISTRY DATA WILL BE EVALUATED AND COMPARED TO BACKGROUND CONCENTRATIONS AND APPLICABLE REGULATORY STANDARDS. THE DATA WILL ALSO BE EVALUATED FOR TRENDS THAT COULD INDICATE CHANGES IN WATER OUALITY. IF CHANGES IN WATER QUALITY ARE OBSERVED THAT CAN BE DIRECTLY ATTRIBUTED TO THE MINING ACTIVITY. TPM WILL NOTIFY THE DIRECTOR WITHIN 30 DAYS. SUCH NOTICE WILL INCLUDE THE MONITORING DATA ALONG WITH ANY OTHER RELEVANT INFORMATION.

NO FURTHER ACTION WILL BE REQUIRED IF THE REPORTED CHANGES IN WATER QUALITY CAN BE ATTRIBUTED TO FACTORS UNRELATED TO THE MINING ACTIVITY. IF OTHER CAUSES FOR THE CHANGE IN WATER QUALITY CONDITIONS CANNOT BE IDENTIFIED, TPM SHALL CONDUCT FURTHER INVESTIGATIONS TO DETERMINE THE SIGNIFICANCE AND CAUSATION OF SUCH CHANGES





SHEET 11: GROUNDWATER & SURFACE WATER MONITORING PLAN (1)

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

ST. GEORGE, CHARLTON COUNTY, GEORGIA

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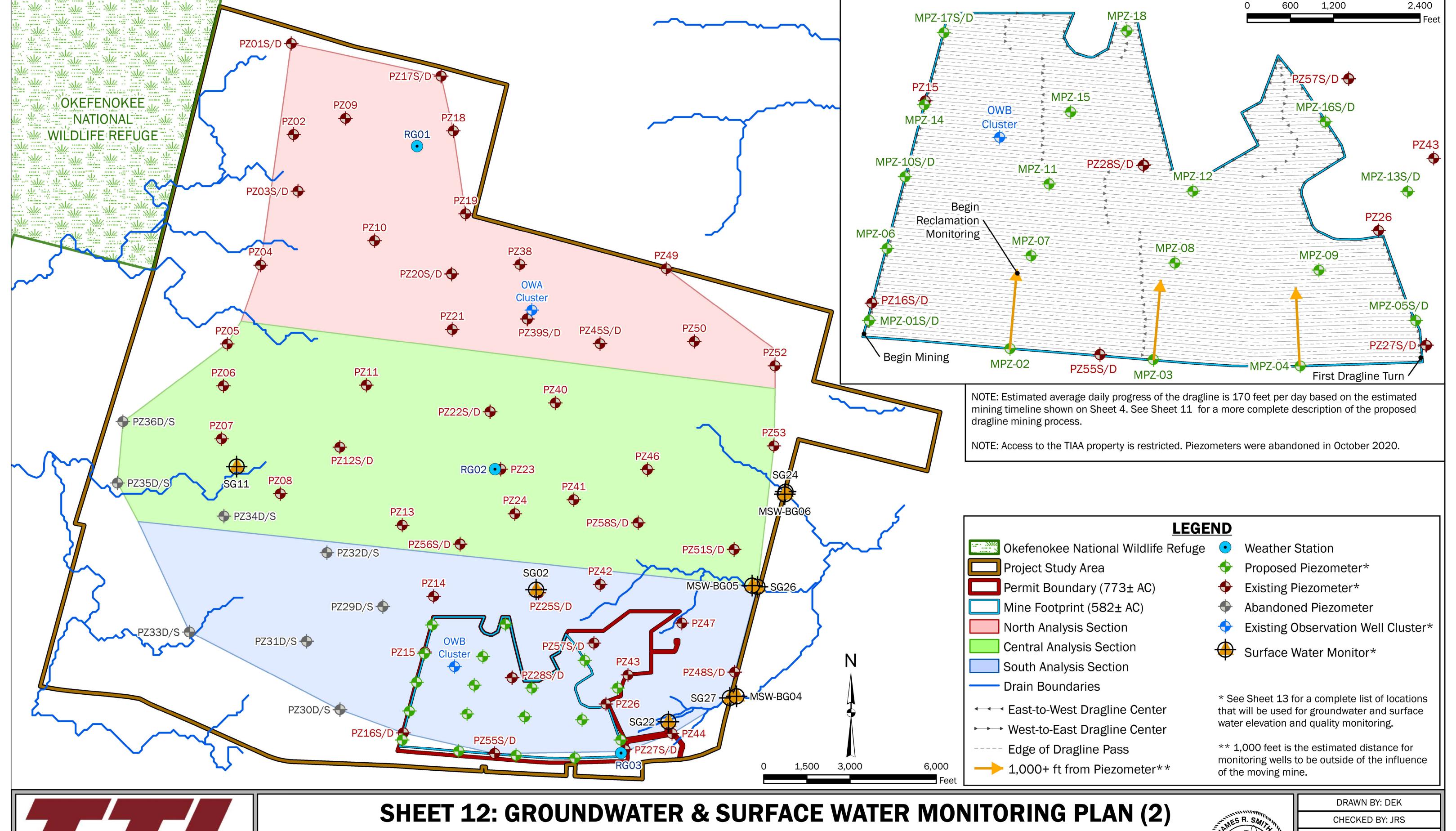
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DRAWING DATE: 11/13/2020

REVISION DATE: 5/19/2022

TTL JOB NO.: 18-02-00804.00

APPROX. SCALE:





Certificate of Authorization No.: PEF004125

3516 Greensboro Ave., Tuscaloosa, AL 34501

TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE (ID NO. 2073)
St. George, Charlton County, Georgia



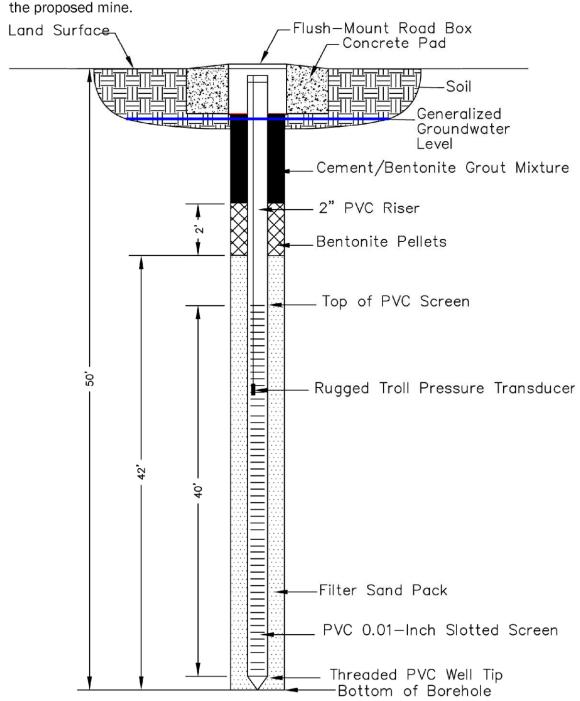
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	CHECKED BY: JRS
I	DRAWING DATE: 11/13/2020
	REVISION DATE: 5/19/2022
I	TTL JOB NO.: 18-02-00804.00

APPROX. SCALE: 1 in = 1,500 ft

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

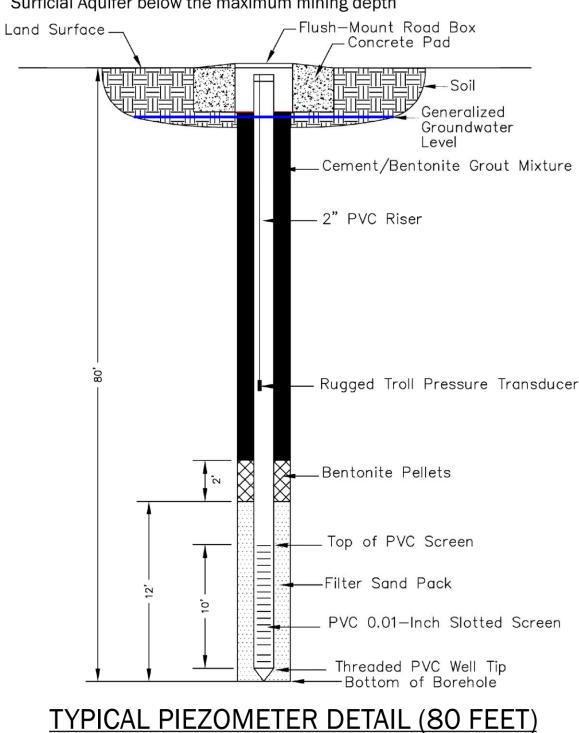
SURFACE WATER MONITORING TABLE				
ID	ELEVATION	QUALITY		
SG02	X			
SG11	X			
SG22	X			
SG24	X			
SG26	X			
SG27	X			
MSW-BG04		Х		
MSW-BG05		Х		
MSW-BG06		Х		

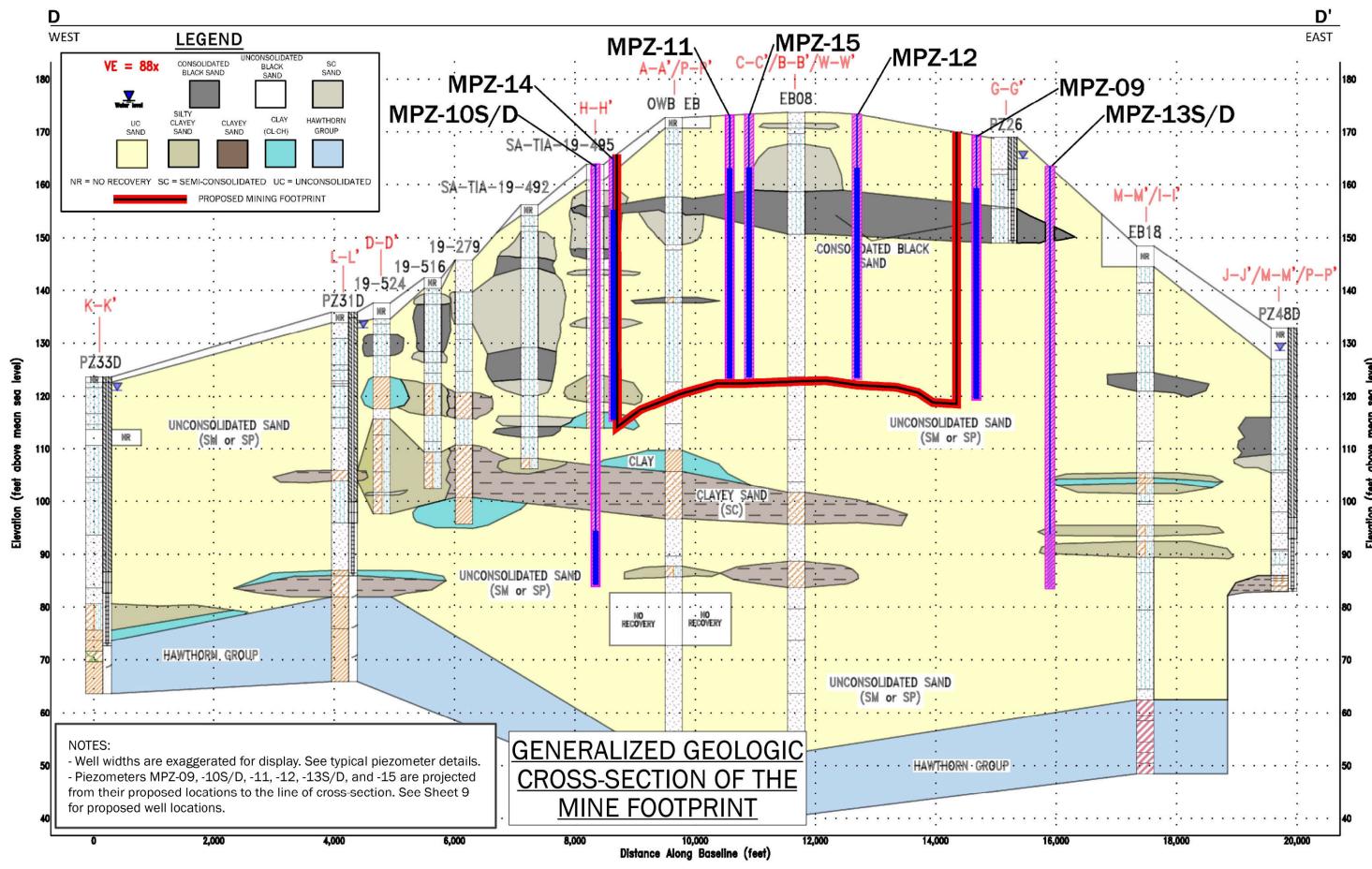
Note: Eighteen piezometers (MPZ-01S, MPZ-02, MPZ-03, MPZ-04, MPZ-05S, MPZ-06, MPZ-07, MPZ-08, MPZ-09, MPZ-10S, MPZ-11, MZP-12, MPZ-13S, MPZ-14, MPZ-15, MPZ-16S MPZ-17S, and MPZ-18) will be installed to depths of about 50 feet below ground surface and used to monitor water quality across the maximum vertical extent of the proposed mine.

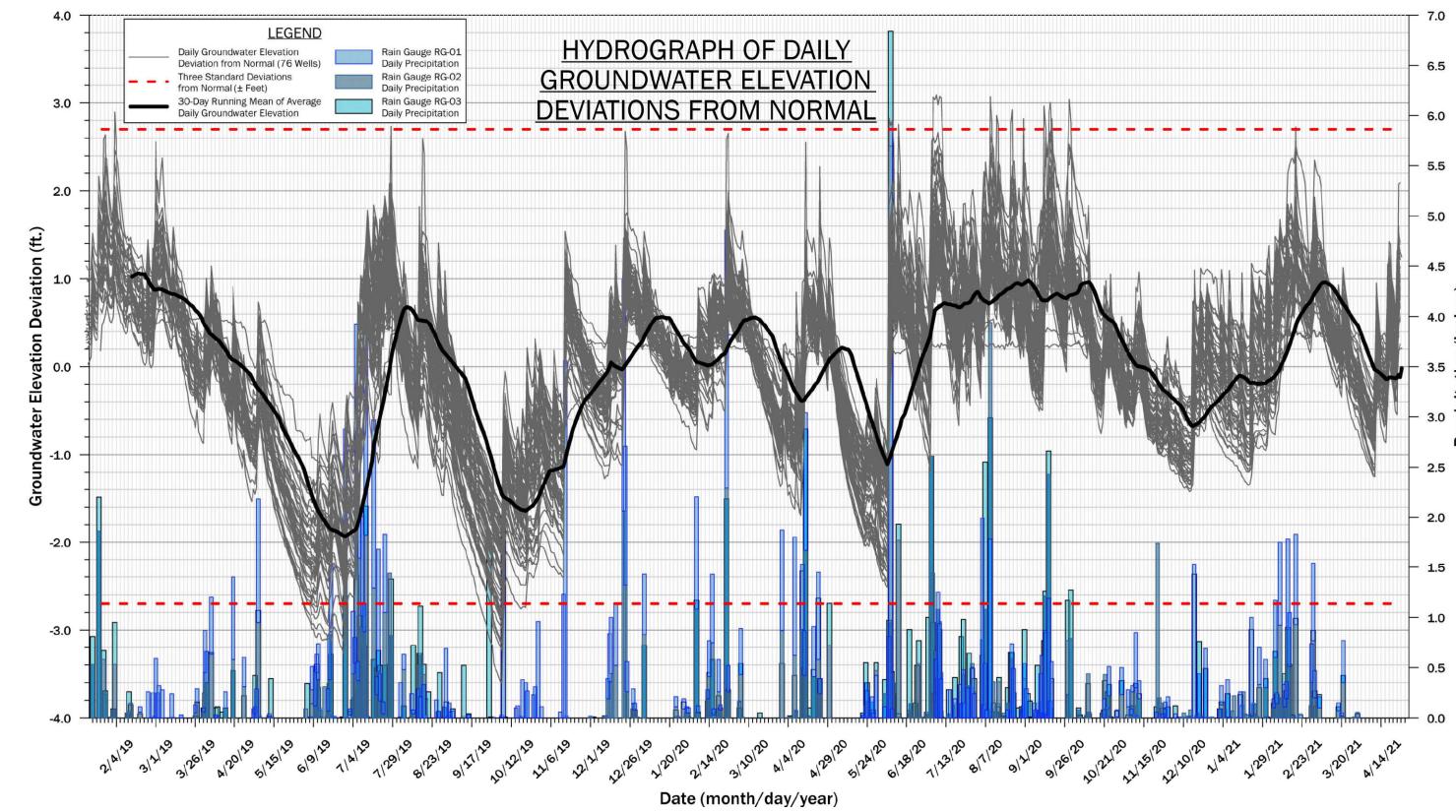


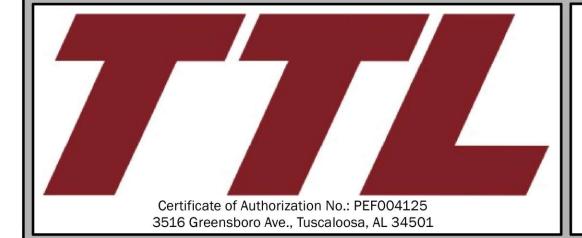
TYPICAL PIEZOMETER DETAIL (50 FEET)

Note: Six piezometers will be installed to depths of about 80 feet below ground surface in order to monitor water levels and water quality of the Surficial Aquifer below the maximum mining depth





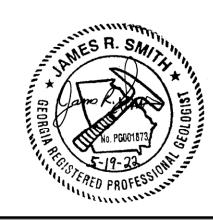




SHEET 13: GROUNDWATER & SURFACE WATER MONITORING PLAN (3)

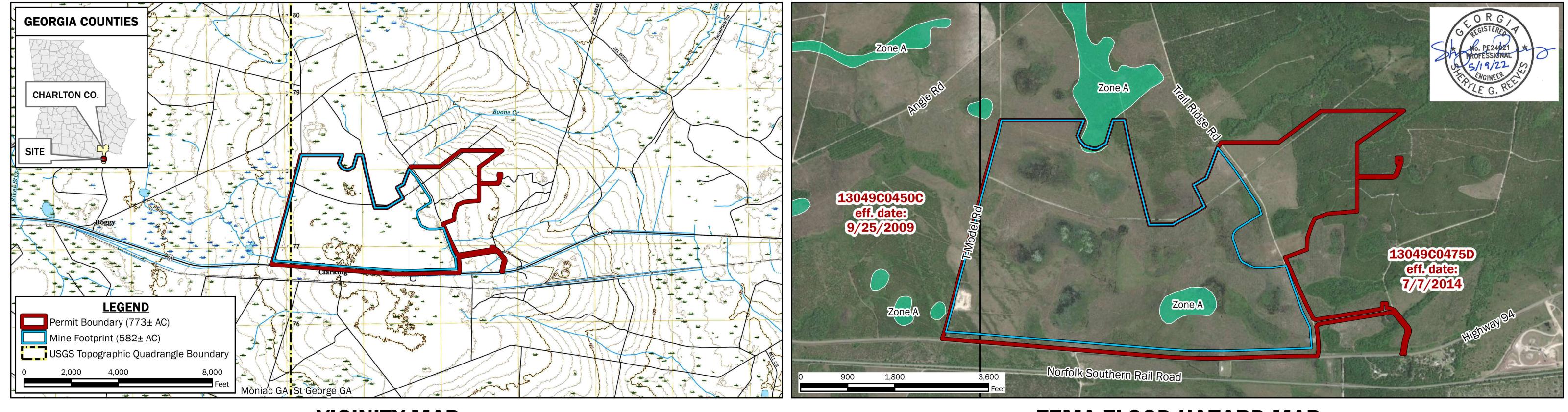
TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE (ID NO. 2073)

ST. GEORGE, CHARLTON COUNTY, GEORGIA



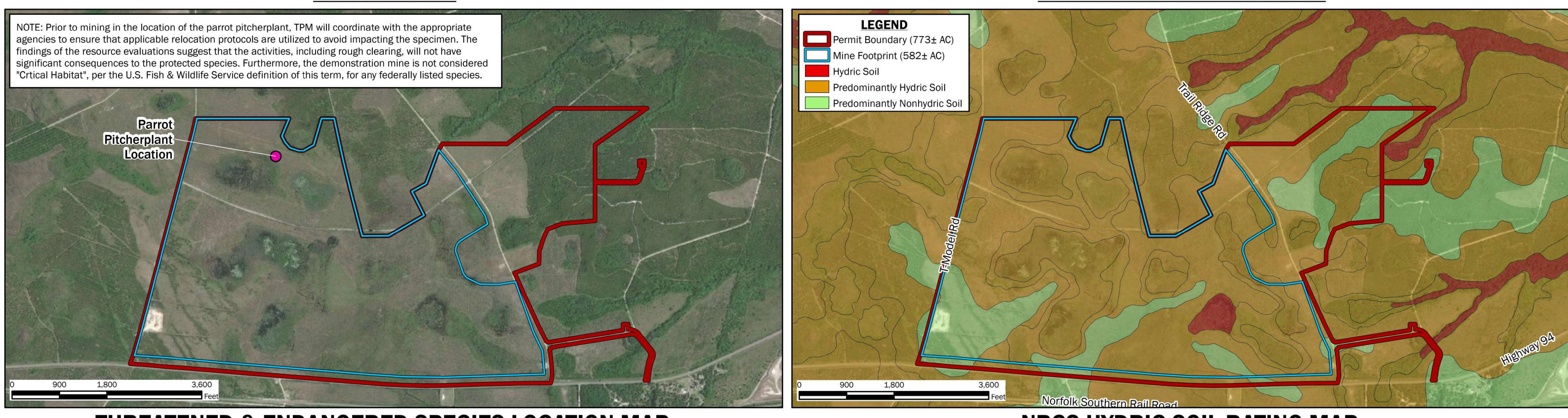
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DRAWING DATE: 11/13/2020
REVISION DATE: 5/19/2022
TTL JOB NO.: 18-02-00804.00

APPROX. SCALE: N.T.S.





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).

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: See Panels

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

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Surface Mining Land Use Plan - Supplemental Narrative Twin Pines Minerals, LLC Saunders Demonstration Mine

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 (ZrSiO₂). 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 premining 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.

Surface Mining Land Use Plan - Supplemental Narrative

Twin Pines Minerals, LLC Saunders Demonstration Mine

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

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

Surface Mining Land Use Plan - Supplemental Narrative Twin Pines Minerals, LLC Saunders Demonstration Mine

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

8.1 Consistency with land use in the area

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

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

8.2 Wetlands and Streams

the mining operation.

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.

Surface Mining Land Use Plan - Supplemental Narrative

Twin Pines Minerals, LLC Saunders Demonstration Mine

Introduction

The Twin Pines Minerals, LLC (TPM) Saunders Demonstration Mine site is located near St. George, Charlton County, Georgia. The Heavy Mineral Sands (HMS) deposits including zircon, titanium minerals (ilmenite, leucoxene, rutile), and staurolite occupy a portion of a relict beach ridge along Trail Ridge in Charlton County. The location and adjacent property owners are shown on the Mining Land Use Plan (MLUP) Sheets 1 and 2, respectively. The mine will extract these HMS reserves in a safe, cost effective, and environmentally sound manner for transport from the site by truck and rail to national and international customers.

The purpose of this demonstration mining project is to develop a high-quality HMS reserve to produce HMS concentrate products including titanium mineral concentrates and zircon concentrates to meet global demands in a safe, cost effective, and environmentally sound manner. This project is also to demonstrate that HMS mining can be accomplished in an environmentally sensitive area with negligible impact to the site and surrounding

The TPM mining plan and associated groundwater and surface water monitoring plan will be used to confirm the ability of HMS mining to be conducted within close proximity to sensitive environmental resources. The strategic significance of HMS is notable as this project will serve to decrease the United States dependence on foreign imports of critical minerals and the potential threats related to disruptions to those supply chains. As the economically viable locations for mining HMS within the United States are becoming scarce, it is vital that new mines be developed in such a manner as to minimize environmental impacts. TPM has completed extensive geologic and hydrogeologic evaluations of the Saunders Tract which culminated with the production of a groundwater hydrology model demonstrating that mining can be safely conducted within the demonstration mine area with negligible impact to the site, the surrounding area, and the Okefenokee Swamp. Small scale projects, such as this one, that can demonstrate sound environmental practices for extracting heavy mineral resources in environmentally sensitive locations, represent good stewardship of the environment.

2. Operator and General Information

2.1 Description of Twin Pines Minerals, LLC The Saunders Demonstration Mine is owned and operated by Twin Pines Minerals, LLC. The underlying real

estate is owned by Trail Ridge Land, LLC, a wholly owned subsidiary of Twin Pine Minerals, LLC.

TPM is a privately held mining company established to develop, construct and operate mines throughout the United States and to sell output to consumers throughout the world through long-term forward purchase contracts. The management team has over 180 years of combined mining and geological experience.

Mine Information

3.1 Affected acreage

As shown on Sheet 2- Boundary Sheet, the mining area consists of one mining block (Saunders Tract) bounded by Georgia Highway 94 to the south, Trail Ridge Road to the east, T-Model Road to the west, and surveyed boundaries on the north. As shown on the Site Layout (Sheet 3 - Mining Plan Sheet), the 773-acre permit area includes the mine area (approximately 582 acres), a Pre-Concentration Plant (PCP), a Wet Concentration Plant (WCP), and a material transport road.

The approximate center of the site is located near latitude 30.524023°N and longitude --82.113326°W. According to the USGS Topographic Map, the surface elevation at the mine excavation area ranges from approximately 155 to 175 feet above mean sea level (amsl). Currently a burnt-over pine plantation, the mine site has been used for industrial silviculture for at least the last 50 years.

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5. Description of Mining Methods

TPM has developed a heavy mineral sand mining technique using a dragline excavator, conveyor system for materials transport, and land-based processing plants. This mining technique is different from conventional "wet mining", which utilizes a dredge and floating concentration plant to mine and process heavy mineral-bearing ands. In general, a dragline is a more efficient method for moving bulk material where long mining cuts and pits can be utilized. Employing elongated cuts allows for simultaneous mining the mineral sands and tailings placement to occur in the same pit. This process will allow backfilling and rough grading to occur as close to +/-500 feet behind the dragline dig face.

The dragline method involves a large crane-like earthmoving machine equipped with a bucket to scoop material. The 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. Appropriate sediment-control measures will be utilized to ensure that sediment-laden waters do not leave the mine property and affect local waterways.

A conveyor system is utilized to transport mined material to the PCP and WCP. Trucks will be used to transport the HMS concentrate from the WCP to the off-site Mineral Separation Plant (MSP). The locations of the mineral processing plants are depicted on Sheet 3 – Mining Plan Sheet The mineral processing plants are situated so that mineral processing activities are located close to the mining areas, which decreases material transport distances and energy demands. Process water ponds (P1 through P4) will be constructed adjacent to the processing plant creating an efficient method for process water reuse and recirculation. Sheet 5 – Mining Plan Sheet depicts a process flow diagram for the mining operation.

Mining will commence after the topsoil has been removed from the initial dragline mining cut. The topsoil will be stockpiled near the excavation, generally beneath or alongside the conveyor lines. Mine tailing stockpiles will not be mixed with topsoil stockpiles. The dragline will then excavate and temporarily stockpile the mined material. The material will then be transferred onto the conveyor system for transport to the processing plant. After processing, the tailings will be temporarily stockpiled adjacent to the processing plant. The tailings will then be transported back to the open mining cut via a tailings conveyor system. The back-filled area will then be recontoured, covered with topsoil and revegetated to comply with reclamation standards. The operation is a continuous process and while the dragline is operating, backfilling of the cut is occurring simultaneously.

5.1.1 Site Preparation

Prior to initiating mining activities, the project area will be delineated by survey markers, boundary markers, and flagging in the field to indicate the locations of permanent infrastructure and mining boundaries. A pre-mining survey using LiDAR will be used to create a topographic surface that will serve as a guide for design elevations for all post-mining reclamation. Merchantable timber will be harvested prior to the beginning of mining activities. Timber will be harvested on average 4 to 6 months prior to the initiation of mining in that area. Timber that is not merchantable and timber scraps will be removed by TPM and all areas within the limits of clearing and mining will be root raked, windrowed, and burned in compliance with Georgia Forestry Commission and/or county permits.

The first areas to be cleared will be for the processing facilities, initial mining area, and feed and tailings conveyors. Once the areas have been cleared, the permanent facilities and infrastructure will be constructed/installed along with the berms, stormwater controls, and other best management practices for

The permanent facilities will consist of an interior road system, PCP/WCP processing facility, and off-site MSP, described further in the next section. Process water ponds (P1 through P4) will be constructed adjacent to the

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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 makeup 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 ${\sf FWP-01}$ 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-

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

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.

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.

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Other Permits

• 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
- Amendments to Plan The Operator will submit any future proposed changes in this proposed plan to the
- 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

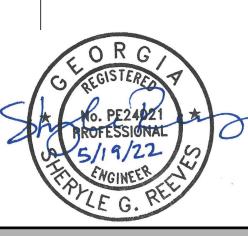
Exhibit I - Modeling the Groundwater Flow System at the Proposed Twin Pines Mine on Trail Ridge; Revised September 14, 2021

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

DRAWN BY: DEK

CHECKED BY: SGR

DRAWING DATE: 11/13/2020

TTL JOB NO.: 18-02-00804.00

APPROX. SCALE:

REVISION DATE: 5/19/2022