

TABLES

Table 1. Average hydraulic conductivity of bentonite sand mixtures reported in Holt et al. (2019f)

Percent Bentonite	Average Hydraulic Conductivity (cm/s)
0	9.73E-04
0.35	8.20E-04
1.42	1.60E-03
5	5.70E-06
7.5	2.00E-06
10	4.90E-07
12.5	1.00E-08
15	5.40E-09
30	2.35E-09

Table 2. Average head rise in the mine footprint for the Homogeneous Scenario. Horizontal and vertical hydraulic conductivity values are equal in the upper 10 feet of the mine. The percentage of bentonite in the bentonite-sand mixture required to achieve the hydraulic conductivity is determined using Equation 2.

Percent Bentonite	Hydraulic Conductivity (cm/s)	Average Head Rise (ft)
2.50	1.00E-04	0.24
5.30	1.00E-05	0.35
6.71	3.16E-06	0.55
8.11	1.00E-06	1.20
8.81	5.62E-07	1.99
9.51	3.16E-07	3.47
10.21	1.78E-07	6.06
10.91	1.00E-07	10.57

Table 3. Average head rise in the mine footprint for the Layered Scenario. Only the vertical hydraulic conductivity in the upper 10 feet of the mine changes in this scenario. The horizontal hydraulic conductivity is the same as that in the Post-Mining Scenario of Holt et al. (2020), $1\text{E-}03$ cm/s. The percentage of bentonite in the bentonite-sand mixture required to achieve the hydraulic conductivity is determined using Equation 4 and Equation 2, assuming a 3-foot-thick bentonite-sand mixture.

Percent Bentonite	Vertical Hydraulic Conductivity (cm/s)	Average Head Rise (ft)
3.88	$1.00\text{E-}04$	0.01
6.76	$1.00\text{E-}05$	0.08
8.17	$3.16\text{E-}06$	0.55
9.57	$1.00\text{E-}06$	0.87
10.27	$5.62\text{E-}07$	1.60
10.98	$3.16\text{E-}07$	2.94
11.68	$1.78\text{E-}07$	5.21
12.38	$1.00\text{E-}07$	8.87

FIGURES

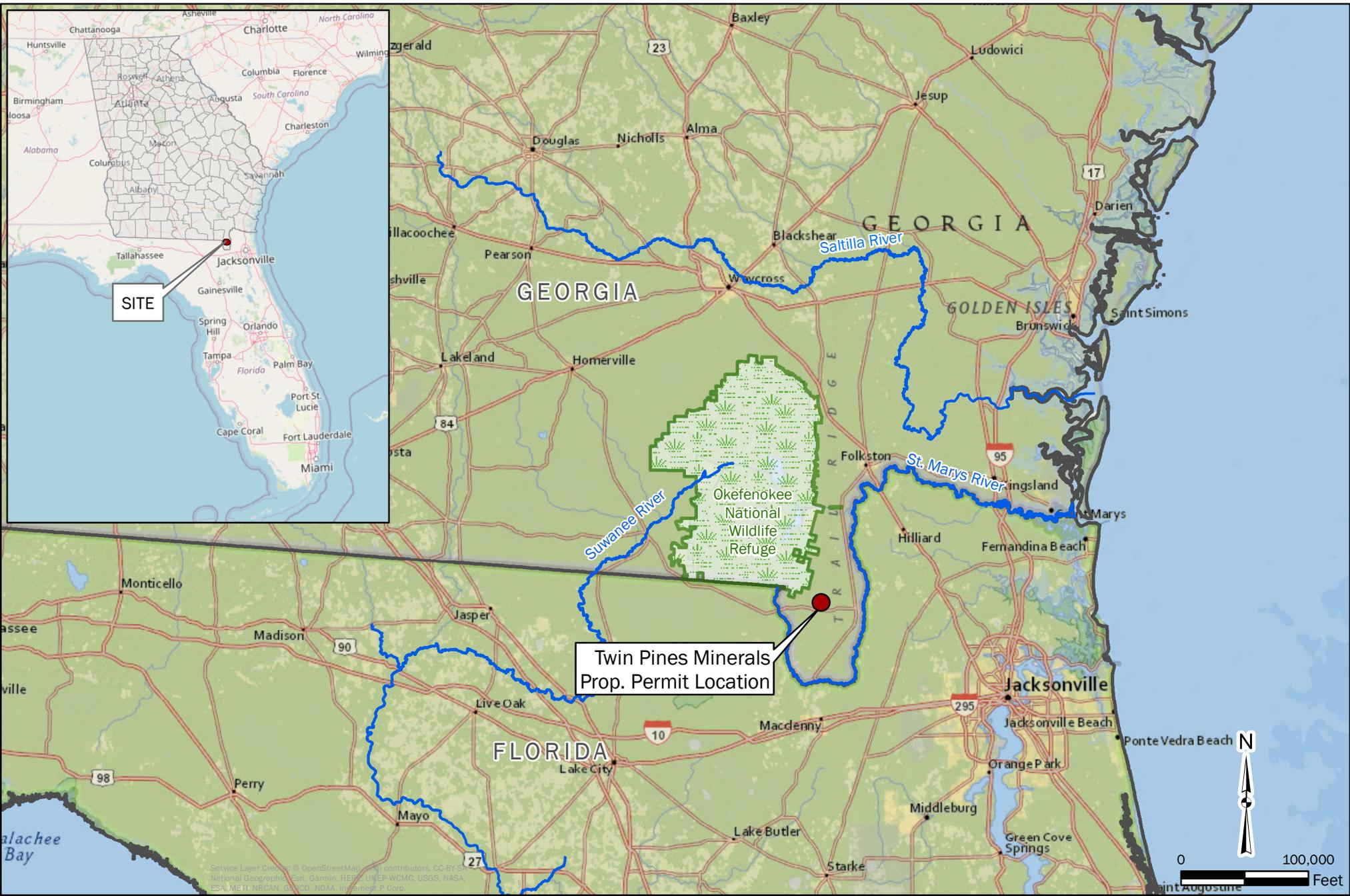


FIGURE 1: LOCATION OF THE PROPOSED SAUNDERS DEMONSTRATION MINE
TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE
ST. GEORGE, CHARLTON COUNTY, GEORGIA

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

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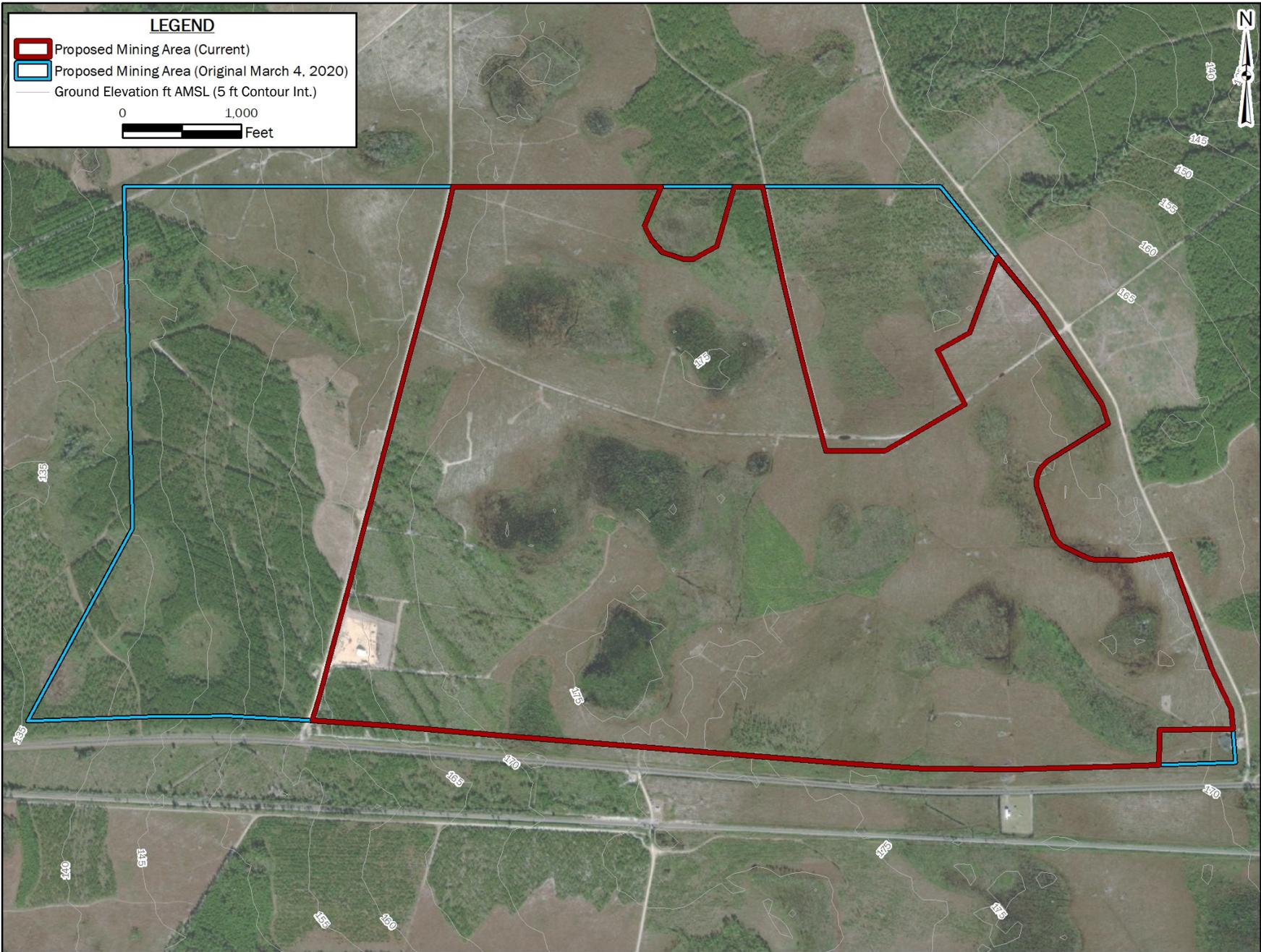


FIGURE 2: REVISED MINE FOOTPRINT
 TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE
 ST. GEORGE, CHARLTON COUNTY, GEORGIA
 BASEMAP: Maxar, Vivid Imagery, 11/20/2019 (West, 0.5 m Resolution) & 3/24/2018 (0.46 m Resolution).

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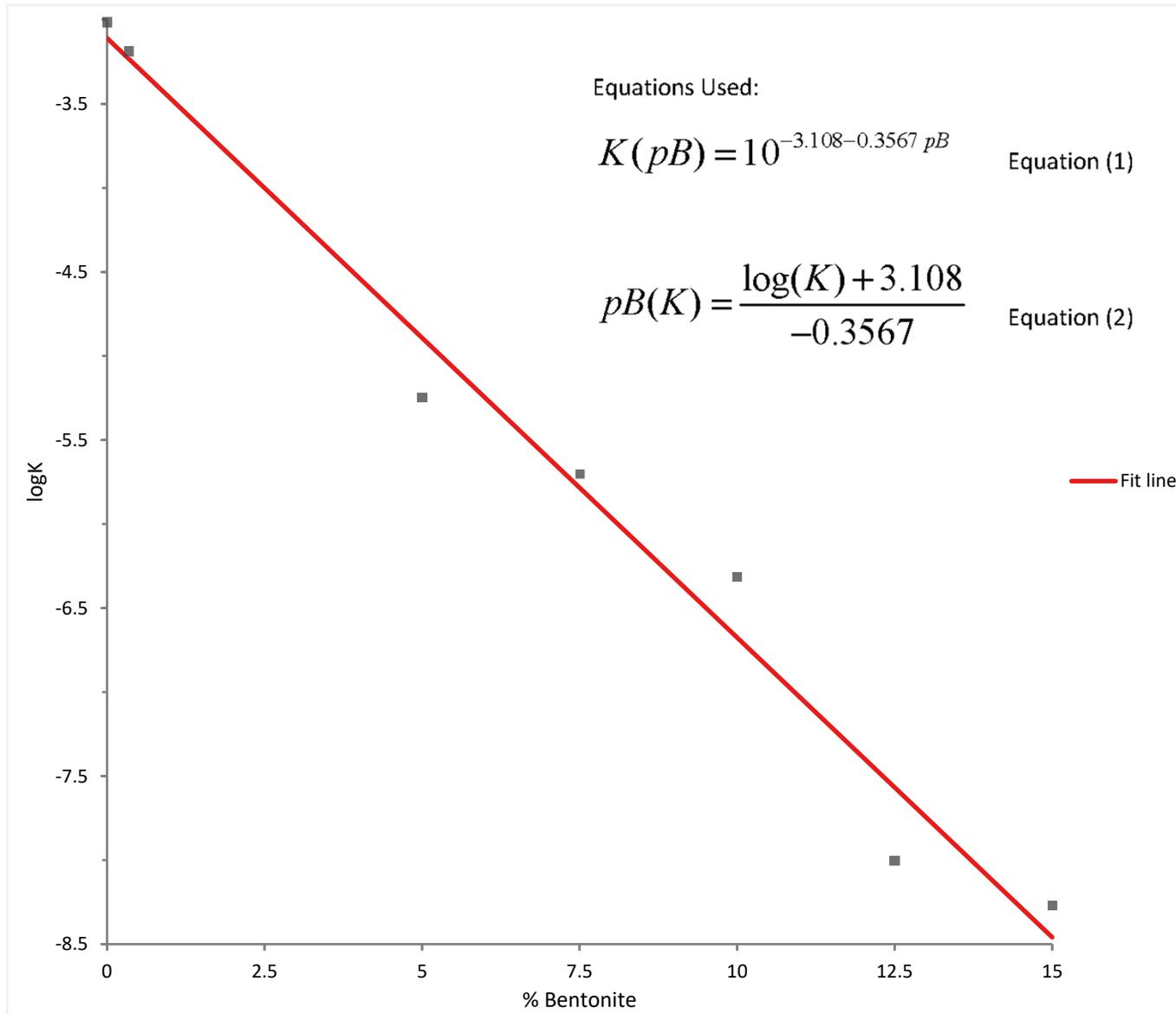
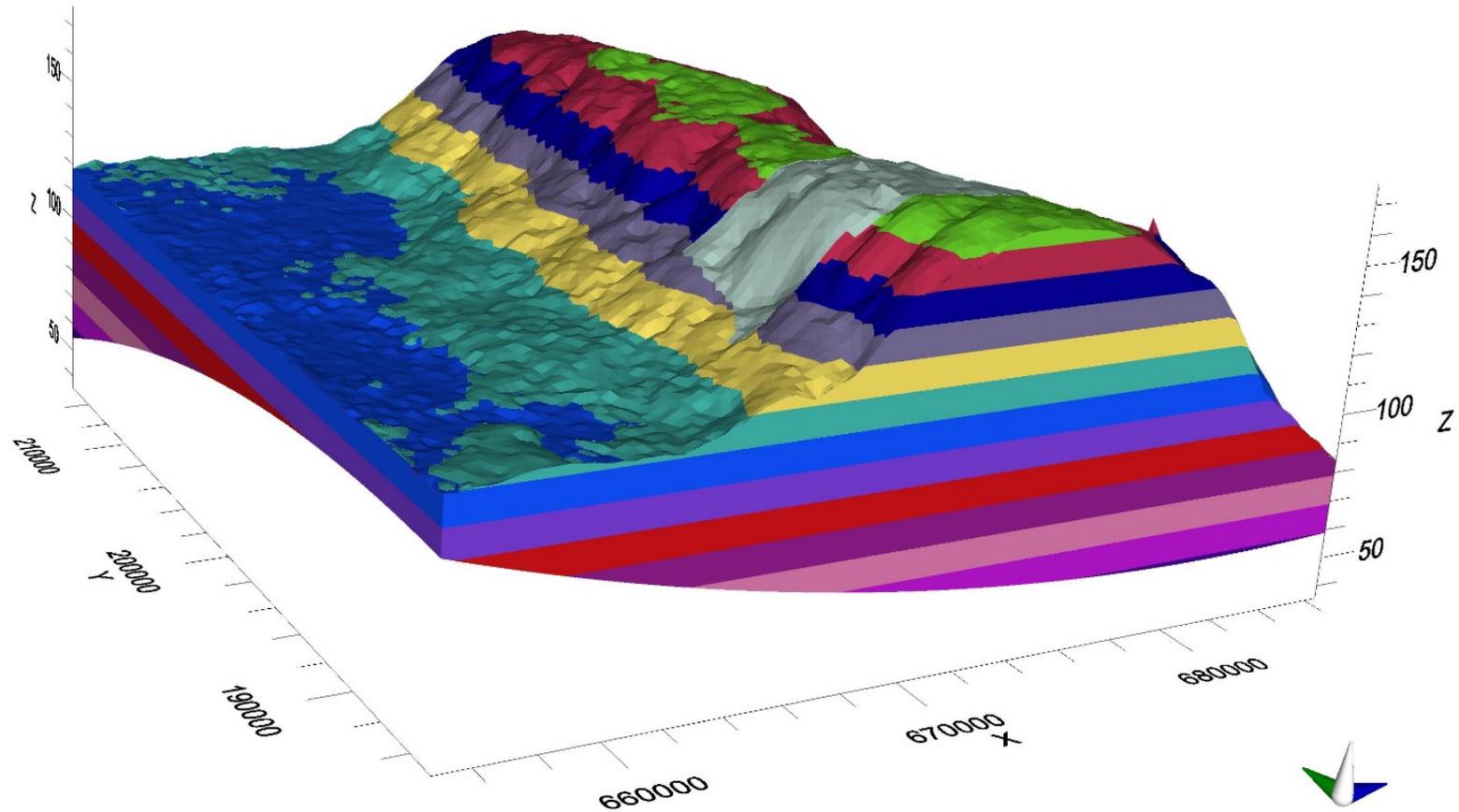


FIGURE 3: LINEAR REGRESSION OF LOG-TRANSFORMED, AVERAGE HYDRAULIC CONDUCTIVITY VALUES FROM HOLT ET AL. (2019F)

TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE
ST. GEORGE, CHARLTON COUNTY, GEORGIA



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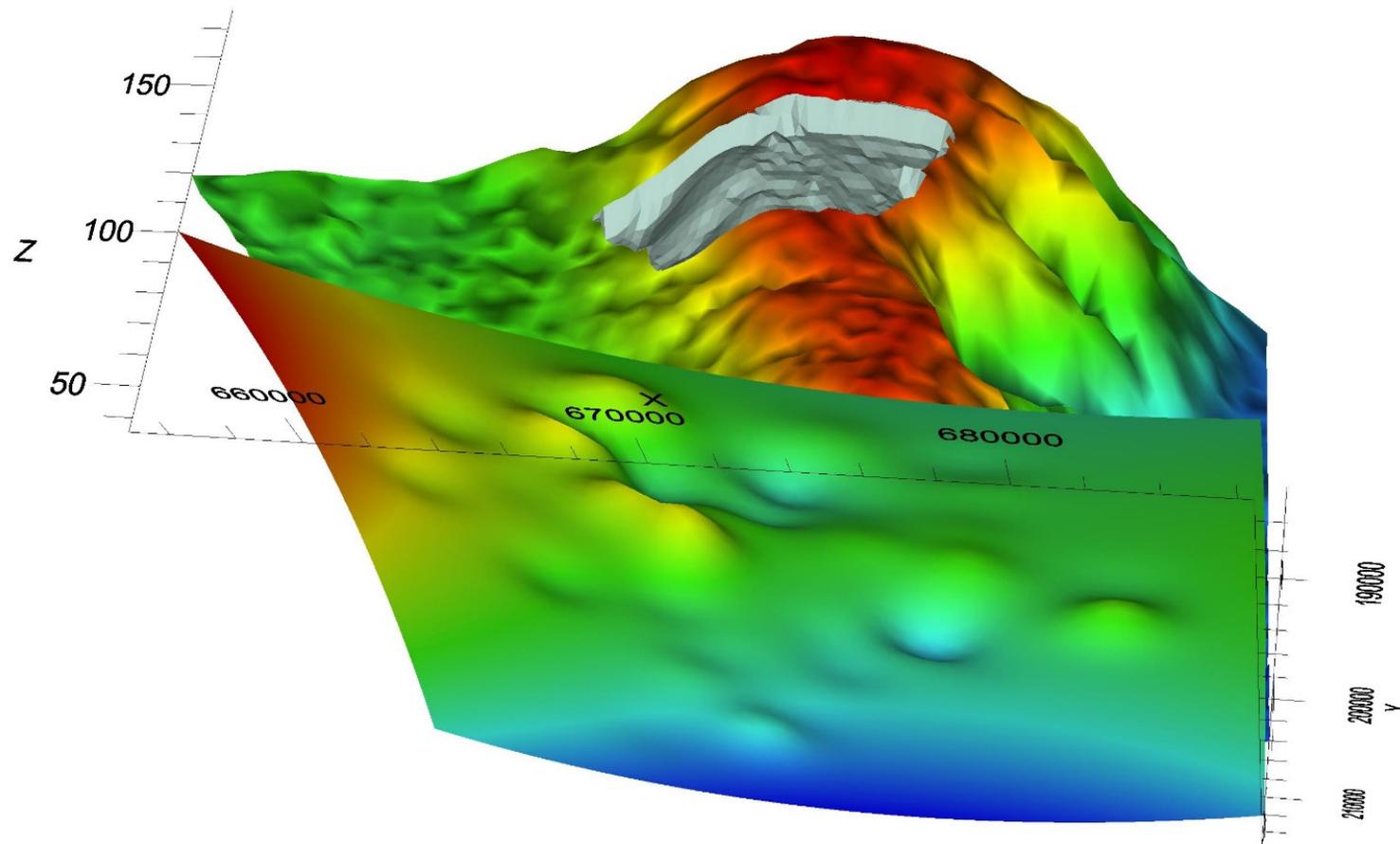


NOTE: Gray surface area represents the horizontal extent of the original mine footprint of Holt et al (2020); the current mine footprint does not extend as far west



FIGURE 4: NEW MODEL LAYER (SURFICIAL EXTENT OF THE MINING FOOTPRINT SHOWN IN GRAY) CROSS-CUTS THE UNDERLYING LAYERS OF HOLT ET AL. (2020) AND EXTENDS TO A DEPTH 10 FEET BGS
 TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE
 ST. GEORGE, CHARLTON COUNTY, GEORGIA

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NOTE: Gray area represents the mining area at the top of the Hawthorn layer elevations.
 The gray area represents the original mine footprint of Holt et al (2020); the current mine footprint does not extend as far west.



FIGURE 5: NEW MODEL LAYER (SHOWN IN GRAY) ISOLATED BETWEEN THE LAND SURFACE AND THE TOP OF THE HAWTHORN. THE NEW LAYER IS 10 FT THICK AND MIMICKS THE LAND SURFACE
 TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE
 ST. GEORGE, CHARLTON COUNTY, GEORGIA

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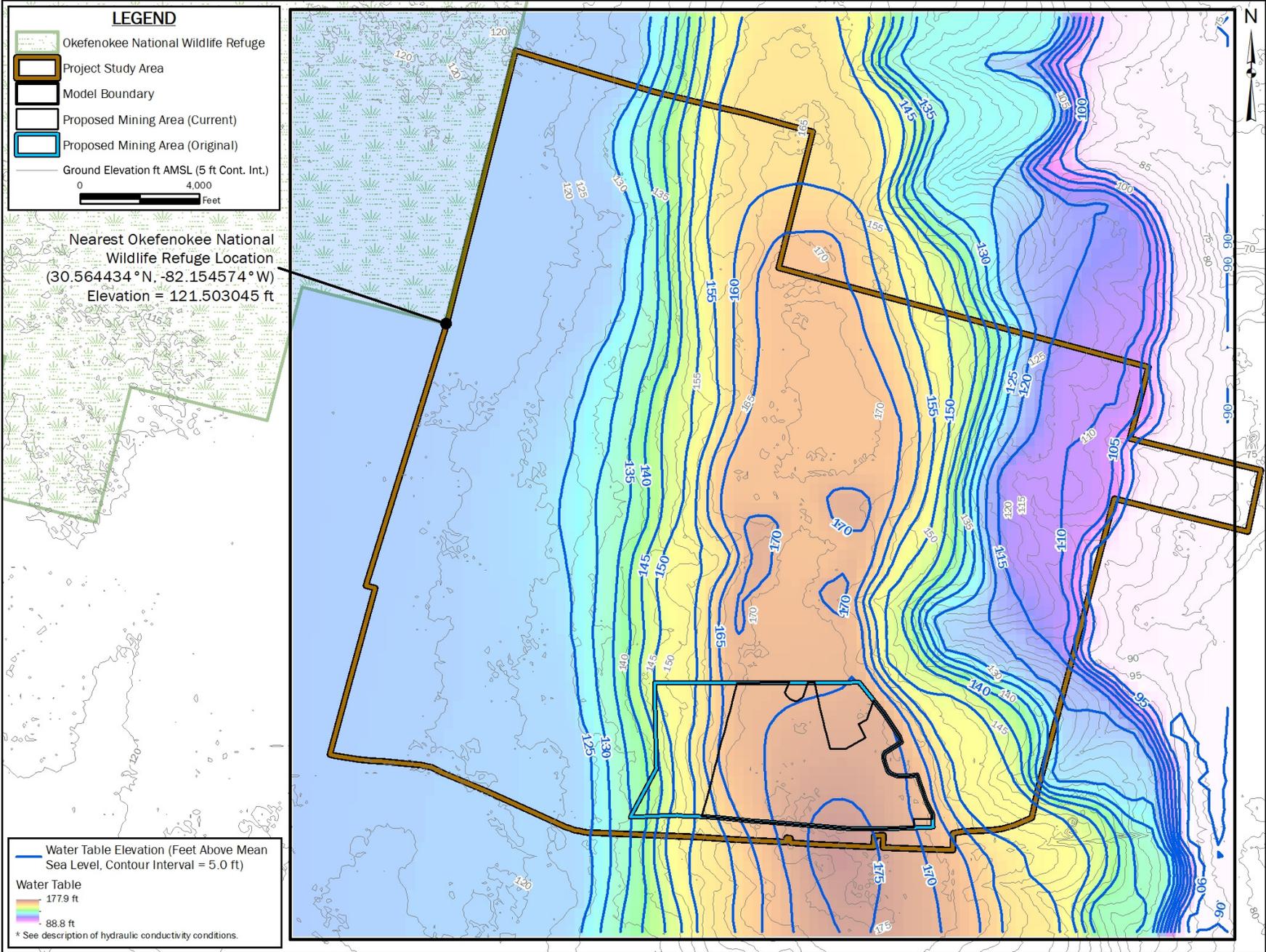


FIGURE 6: POTENTIOMETRIC SURFACE MAP OF THE HOMOGENEOUS SCENARIO MODELED HERE & POST-MINING SCENARIO OF HOLT ET AL. (2020); THE VERTICAL & HORIZONTAL K OF THE UPPER 10 FEET OF THE MINE FOOTPRINT IS 1E-04 CM/S TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE ST. GEORGE, CHARLTON COUNTY, GEORGIA

Note: K = Hydraulic Conductivity

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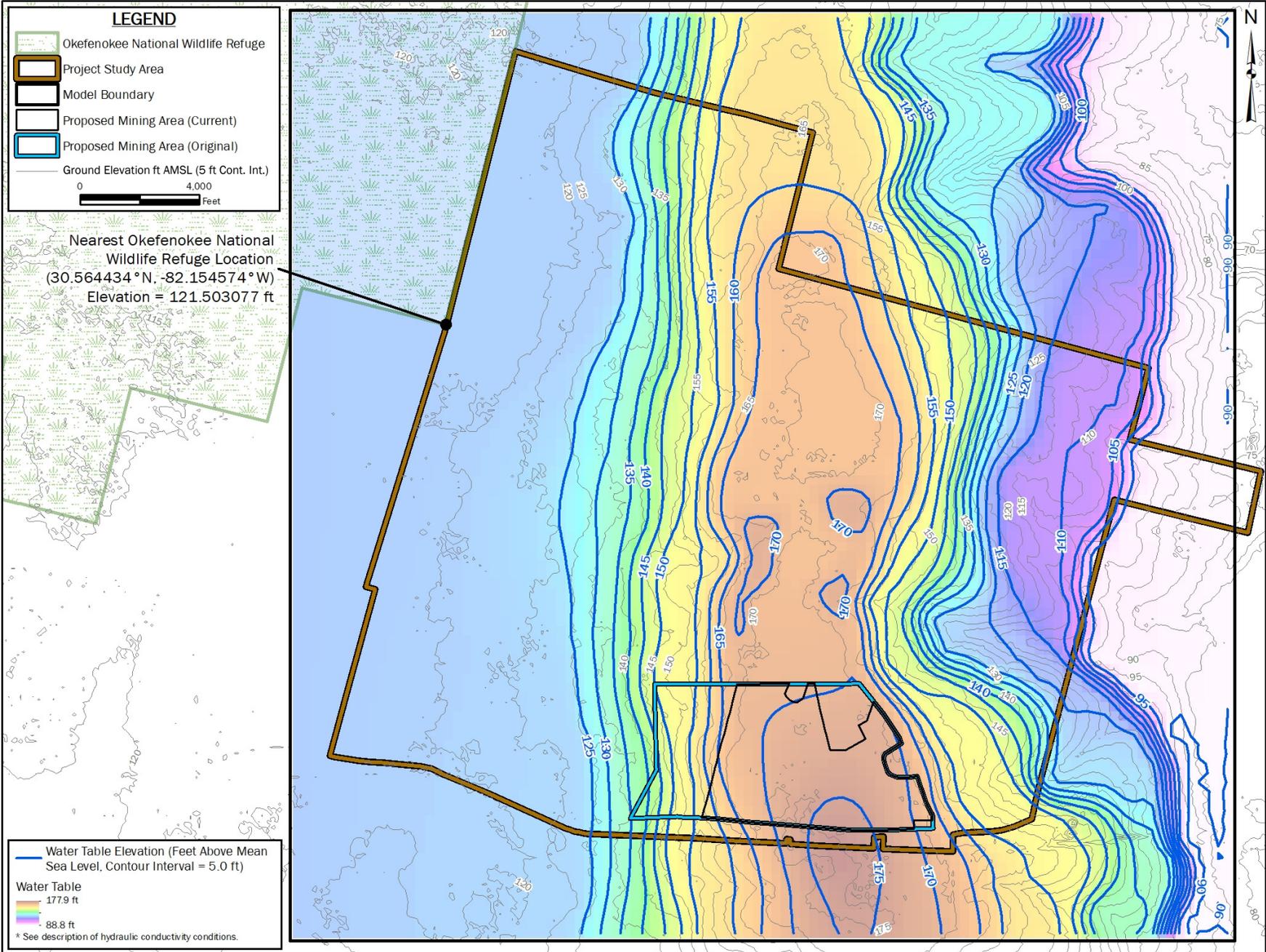


FIGURE 7: POTENTIOMETRIC SURFACE MAP OF THE HOMOGENEOUS SCENARIO MODELED HERE & POST-MINING SCENARIO OF HOLT ET AL. (2020); THE VERTICAL & HORIZONTAL K OF THE UPPER 10 FEET OF THE MINE FOOTPRINT IS 1E-05 CM/S TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE ST. GEORGE, CHARLTON COUNTY, GEORGIA



Note: K = Hydraulic Conductivity

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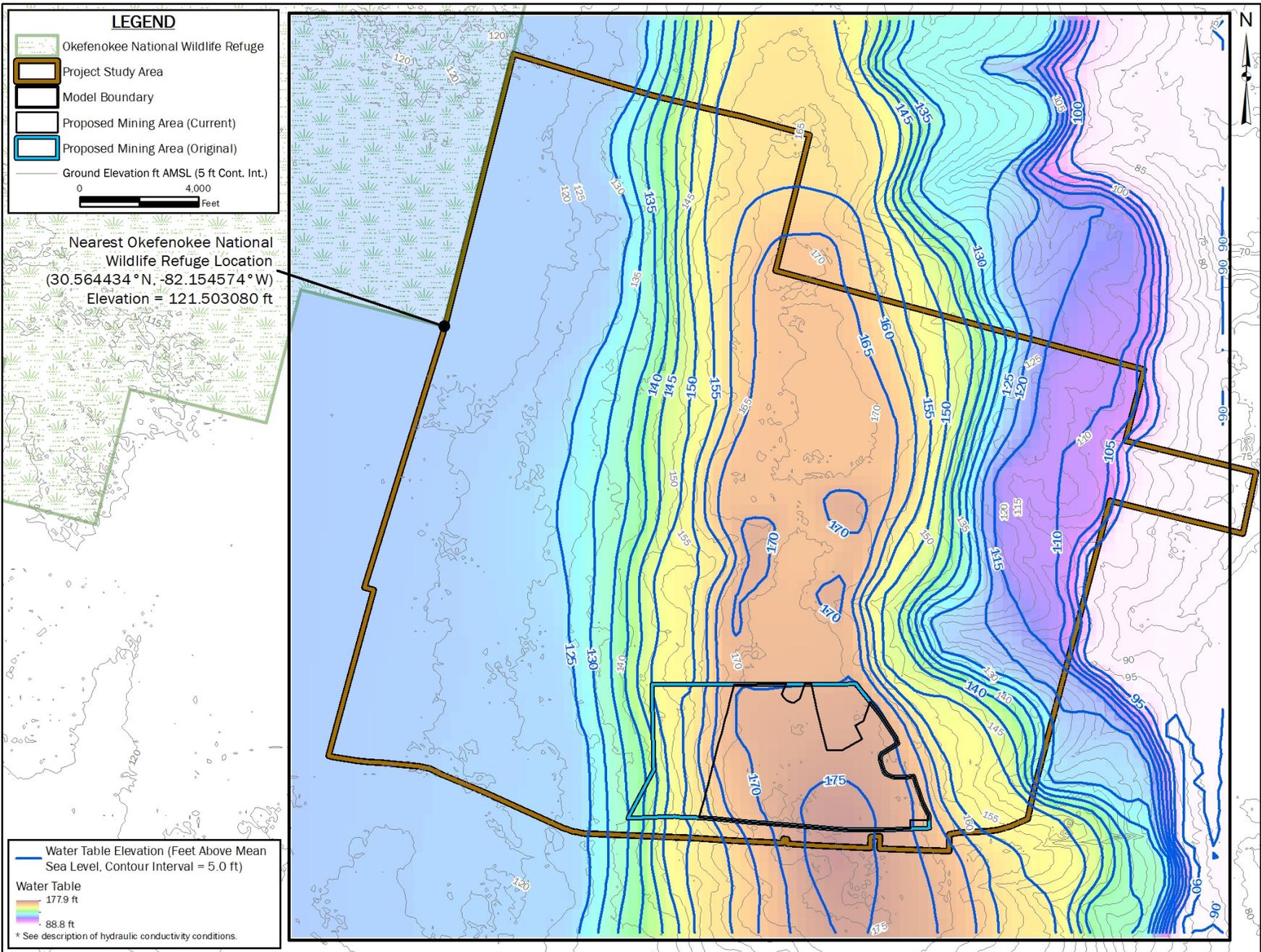


FIGURE 8: POTENTIOMETRIC SURFACE MAP OF THE HOMOGENEOUS SCENARIO MODELED HERE & POST-MINING SCENARIO OF HOLT ET AL. (2020); THE VERTICAL & HORIZONTAL K OF THE UPPER 10 FEET OF THE MINE FOOTPRINT IS 1E-06 CM/S TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE ST. GEORGE, CHARLTON COUNTY, GEORGIA

Note: K = Hydraulic Conductivity

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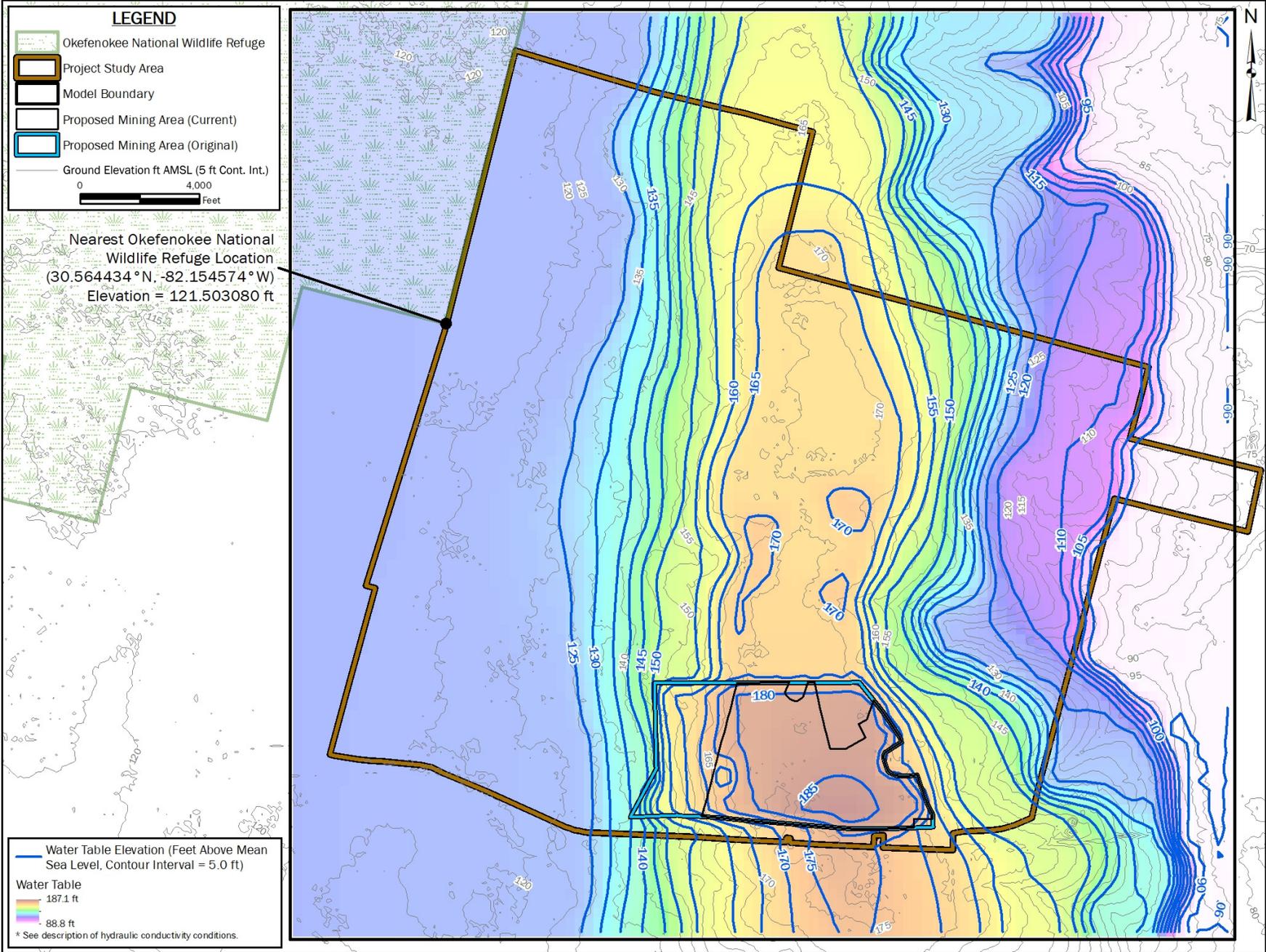


FIGURE 9: POTENTIOMETRIC SURFACE MAP OF THE HOMOGENEOUS SCENARIO MODELED HERE & POST-MINING SCENARIO OF HOLT ET AL. (2020); THE VERTICAL & HORIZONTAL K OF THE UPPER 10 FEET OF THE MINE FOOTPRINT IS 1E-07 CM/S TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE ST. GEORGE, CHARLTON COUNTY, GEORGIA



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LEGEND

- Okefenokee National Wildlife Refuge
- Project Study Area
- Model Boundary
- Proposed Mining Area (Current)
- Proposed Mining Area (Original)
- Ground Elevation ft AMSL (5 ft Cont. Int.)

0 4,000
Feet

Nearest Okefenokee National Wildlife Refuge Location
 (30.564434 °N, -82.154574 °W)
 Elevation Change = 0.000292 ft

Mean Water Table Elevation Change within Proposed Mining Area = 0.243 ft

Water Table Elevation Change (ft)
 (Minus Post-Mining Values)

- 1
- 0.1
- 0.01
- 0.001
- 0.0001
- 0.00001
- 0
- 0.00001
- 0.0001
- 0.001
- 0.01
- 0.1
- 1
- 2
- 3+

Water Table Difference

- 0.5 ft
- 0.4 ft

* See description of hydraulic conductivity conditions.

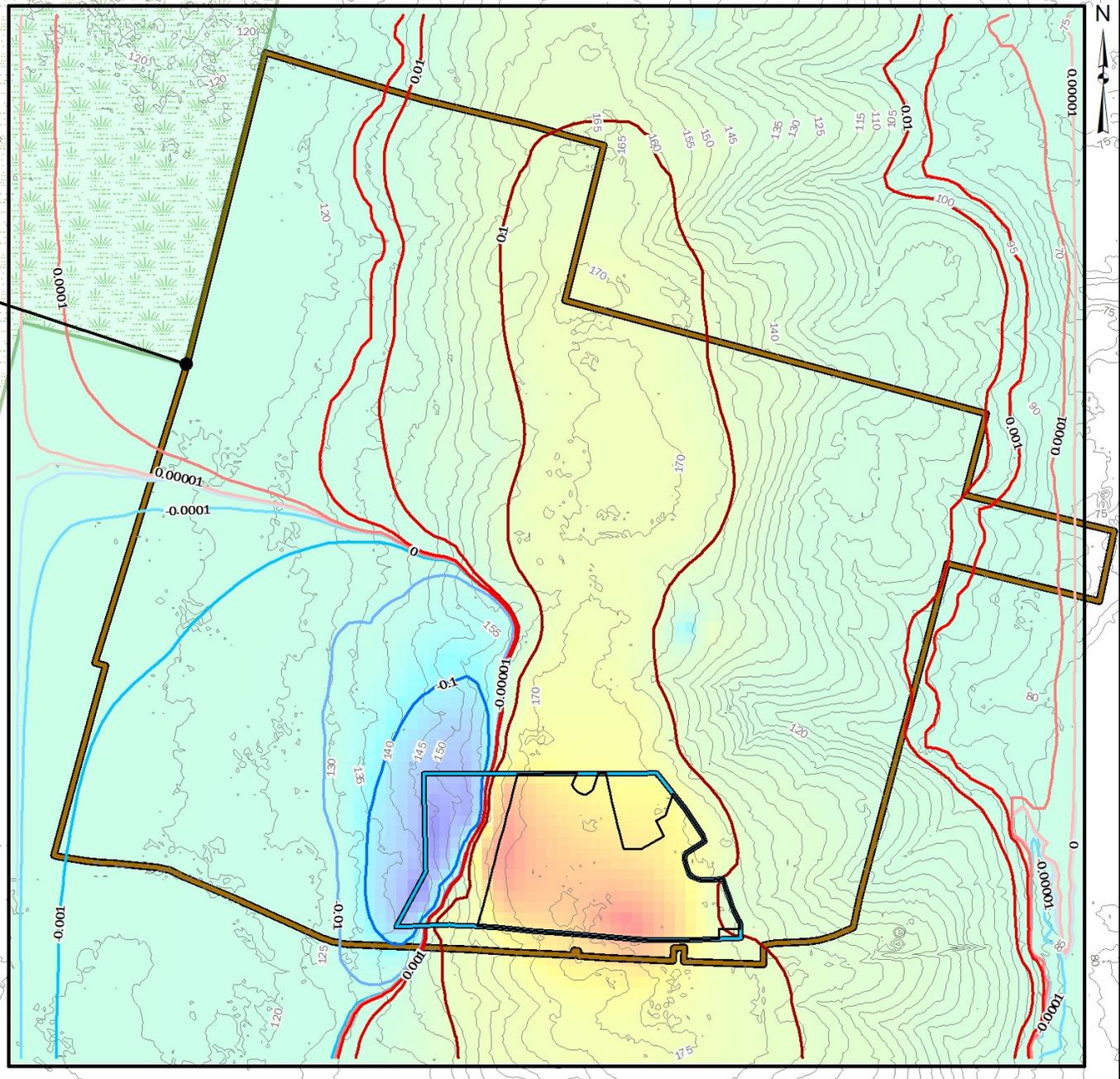


FIGURE 10: HYDRAULIC HEAD DIFFERENCE BETWEEN HOMOGENEOUS SCENARIO MODELED HERE & POST-MINING SCENARIO OF HOLT ET AL. (2020); THE VERTICAL & HORIZONTAL K OF THE UPPER 10 FEET OF THE MINE FOOTPRINT IS 1E-04 CM/S
 TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE
 ST. GEORGE, CHARLTON COUNTY, GEORGIA

Note: K = Hydraulic Conductivity

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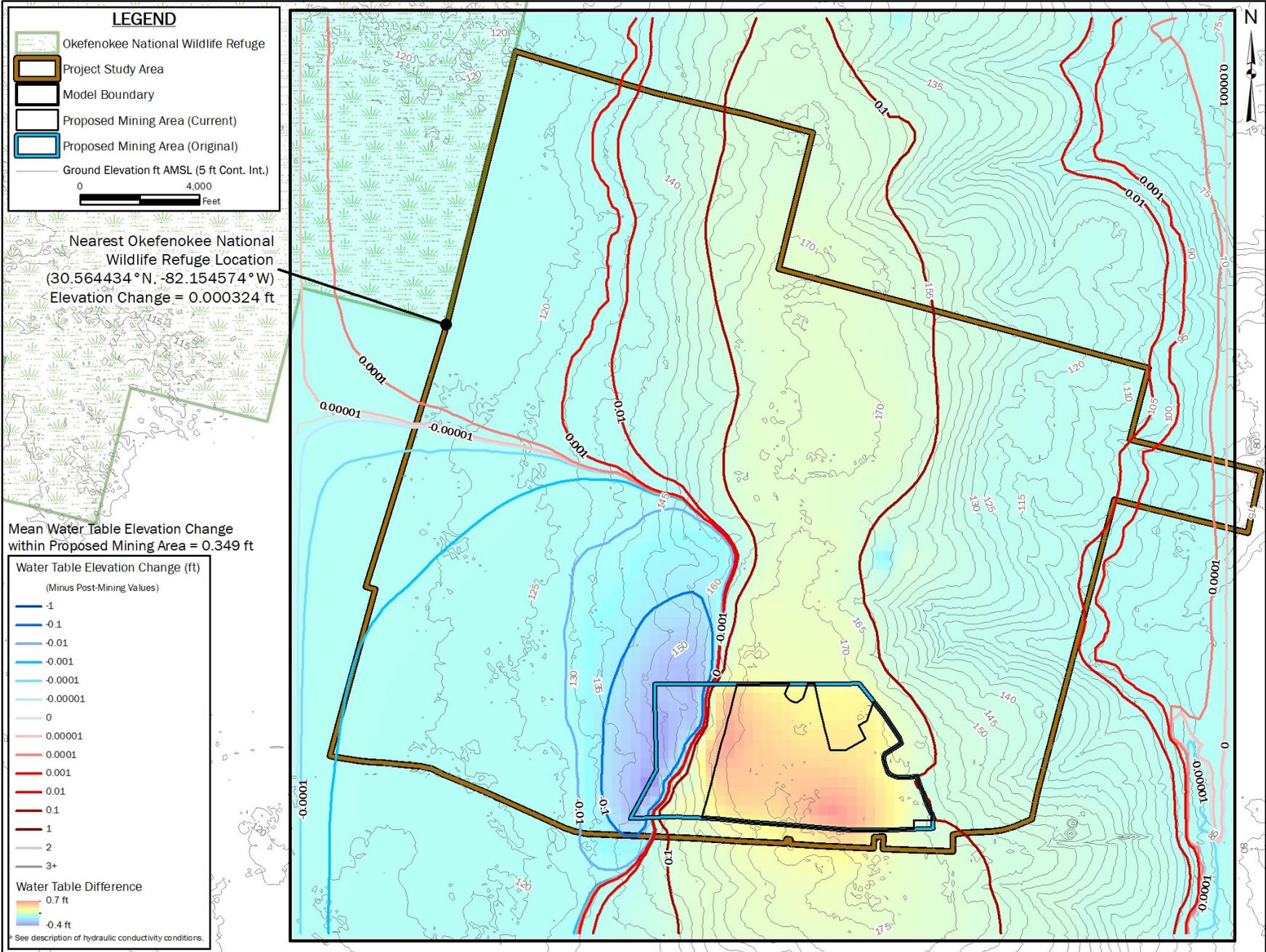


FIGURE 11: HYDRAULIC HEAD DIFFERENCE BETWEEN HOMOGENEOUS SCENARIO MODELED HERE & POST-MINING SCENARIO OF HOLT ET AL. (2020); THE VERTICAL & HORIZONTAL K OF THE UPPER 10 FEET OF THE MINE FOOTPRINT IS 1E-05 CM/S TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE ST. GEORGE, CHARLTON COUNTY, GEORGIA

Note: K = Hydraulic Conductivity

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APPROX. SCALE: 1" = 4,000 ft

LEGEND

- Okefenokee National Wildlife Refuge
- Project Study Area
- Model Boundary
- Proposed Mining Area (Current)
- Proposed Mining Area (Original)
- Ground Elevation ft AMSL (5 ft Cont. Int.)

0 4,000 Feet

Nearest Okefenokee National Wildlife Refuge Location
 (30.564434°N, -82.154574°W)
 Elevation Change = 0.000327 ft

Mean Water Table Elevation Change within Proposed Mining Area = 1.200 ft

Water Table Elevation Change (ft)
 (Minus Post-Mining Values)

- 1
- 0.1
- 0.01
- 0.001
- 0.0001
- 0.00001
- 0
- 0.00001
- 0.0001
- 0.001
- 0.01
- 0.1
- 1
- 2
- 3+

Water Table Difference

- 1.7 ft
- 0.4 ft

* See description of hydraulic conductivity conditions.

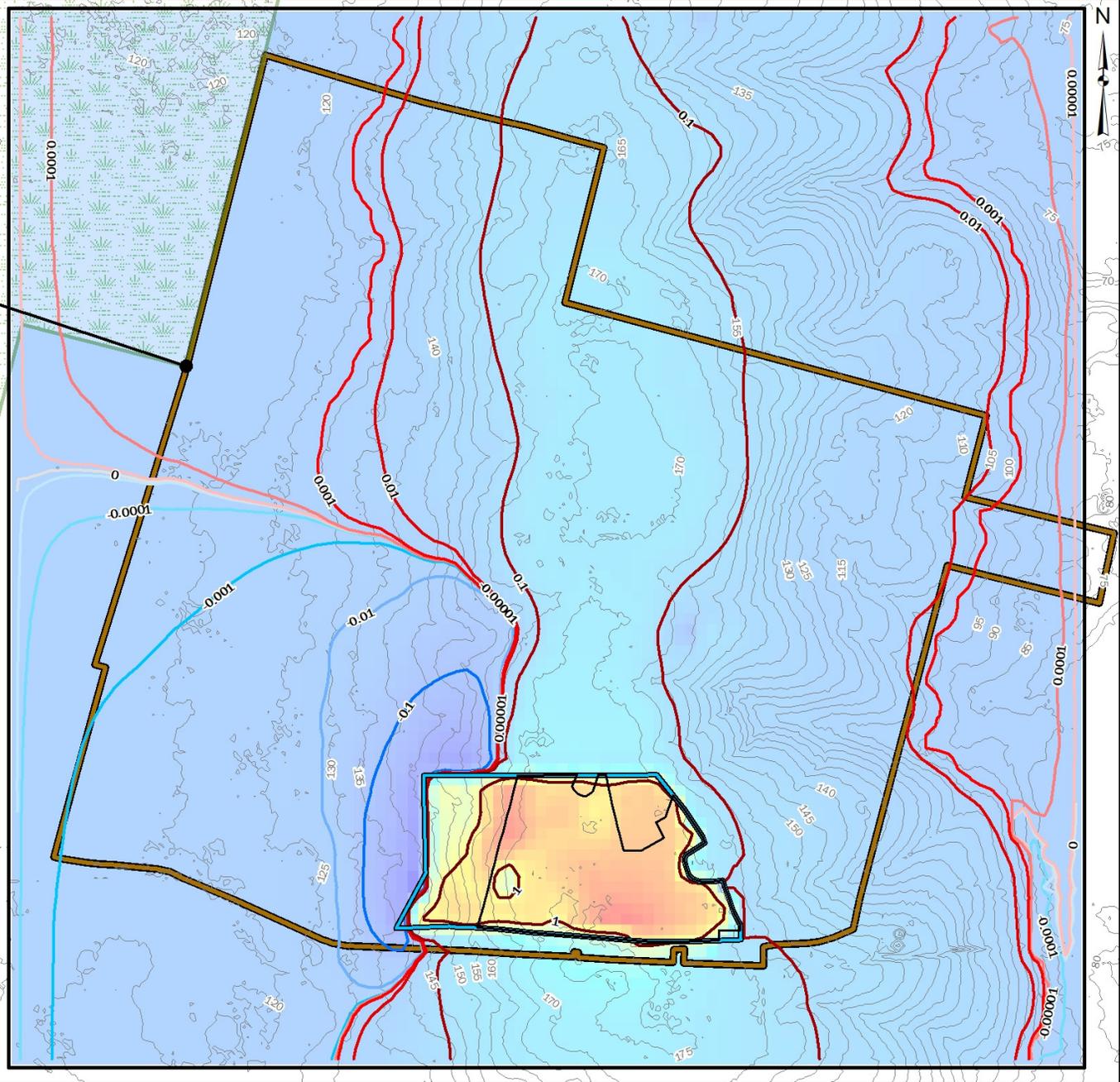


FIGURE 12: HYDRAULIC HEAD DIFFERENCE BETWEEN HOMOGENEOUS SCENARIO MODELED HERE & POST-MINING SCENARIO OF HOLT ET AL. (2020); THE VERTICAL & HORIZONTAL K OF THE UPPER 10 FEET OF THE MINE FOOTPRINT IS 1E-06 CM/S TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE ST. GEORGE, CHARLTON COUNTY, GEORGIA



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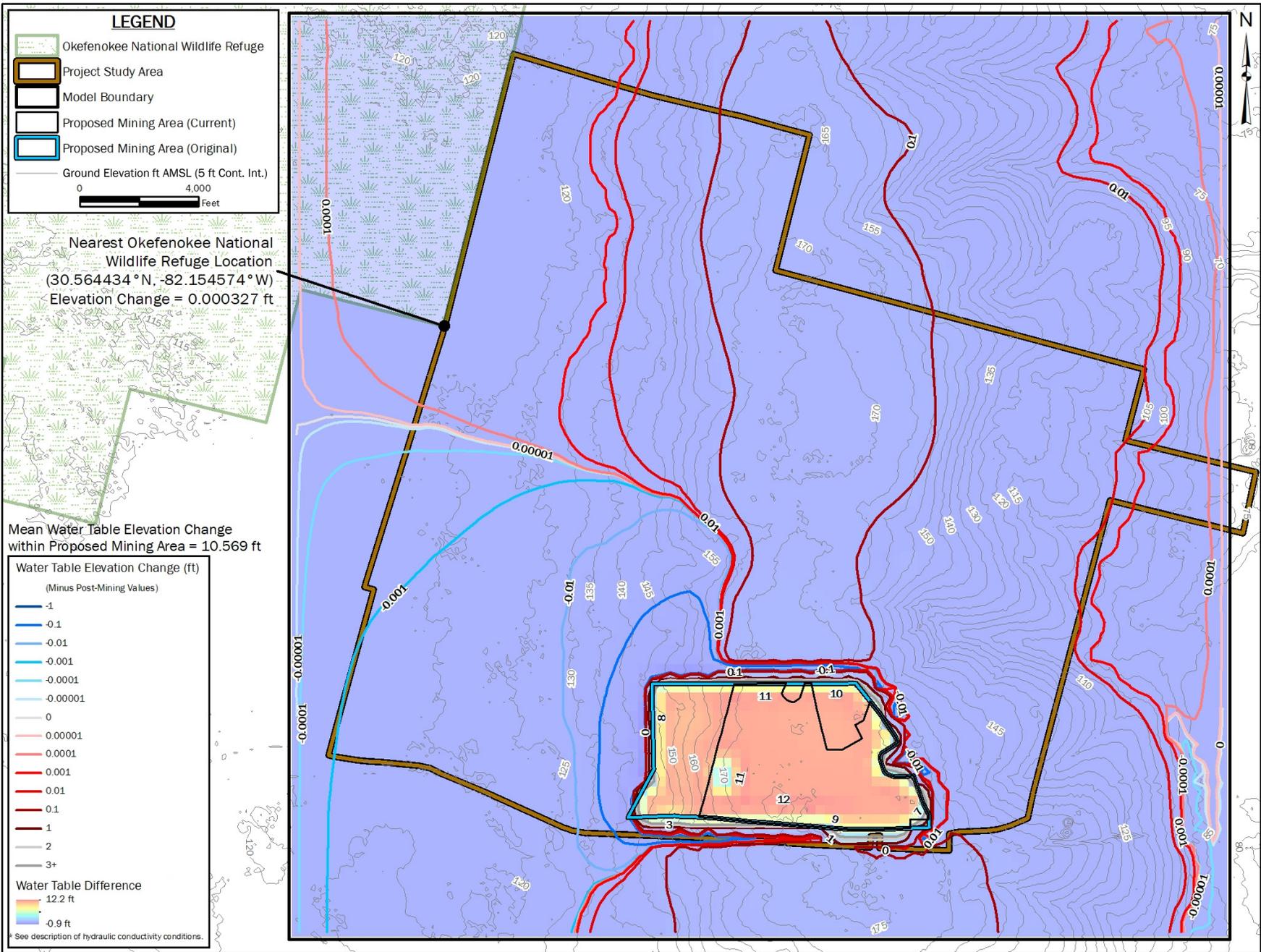


FIGURE 13: HYDRAULIC HEAD DIFFERENCE BETWEEN HOMOGENEOUS SCENARIO MODELED HERE & POST-MINING SCENARIO OF HOLT ET AL. (2020); THE VERTICAL & HORIZONTAL K OF THE UPPER 10 FEET OF THE MINE FOOTPRINT IS 1E-07 CM/S TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE ST. GEORGE, CHARLTON COUNTY, GEORGIA



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Note: K = Hydraulic Conductivity

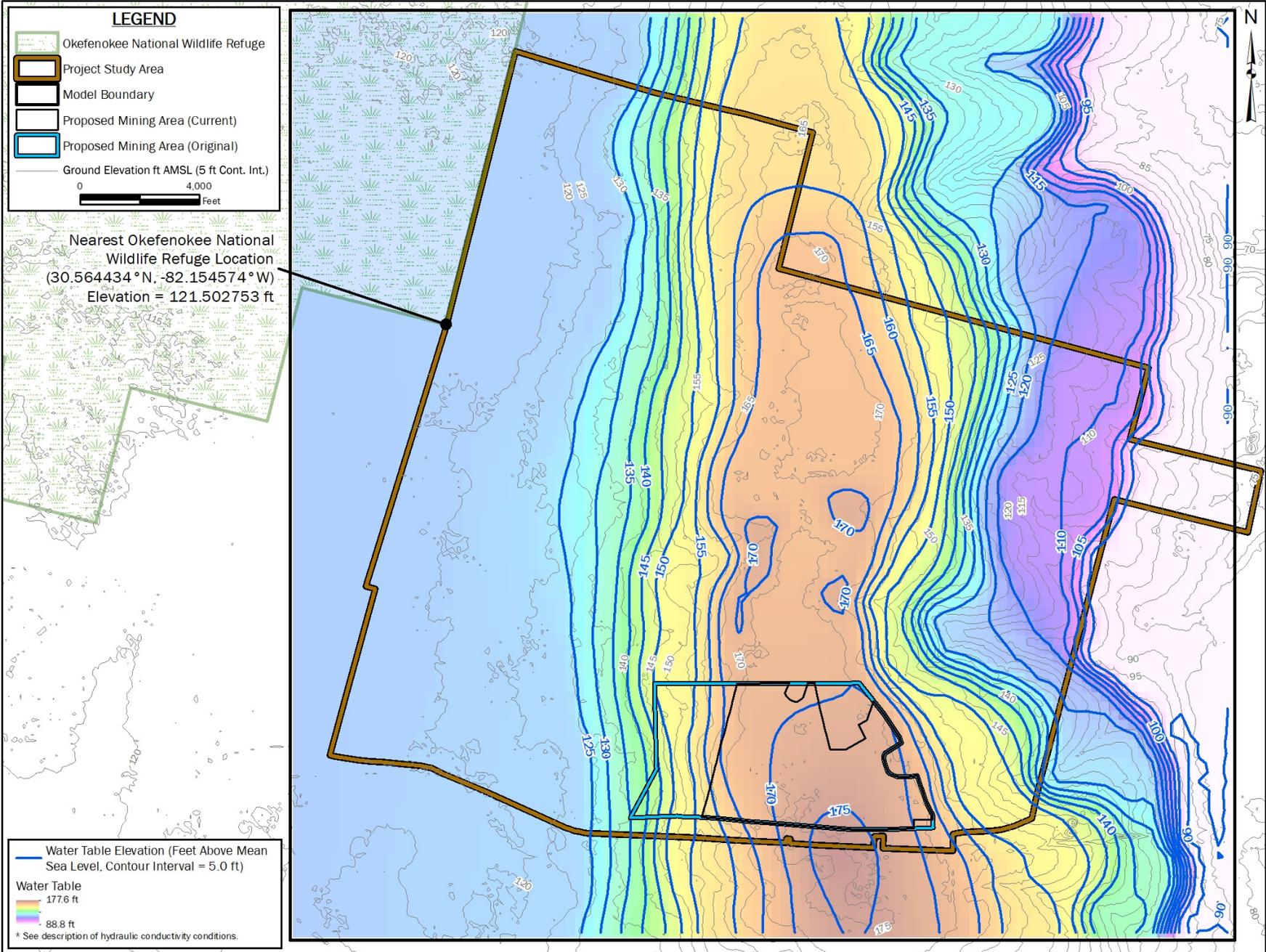


FIGURE 14: POTENTIOMETRIC SURFACE MAP OF THE LAYERED SCENARIO MODELED HERE & POST-MINING SCENARIO OF HOLT ET AL. (2020); THE VERTICAL EFFECTIVE K OF THE UPPER 10 FEET OF THE MINE FOOTPRINT IS 1E-04 CM/S & THE HORIZONTAL K IS 1E-03 CM/S TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE ST. GEORGE, CHARLTON COUNTY, GEORGIA



Note: K = Hydraulic Conductivity

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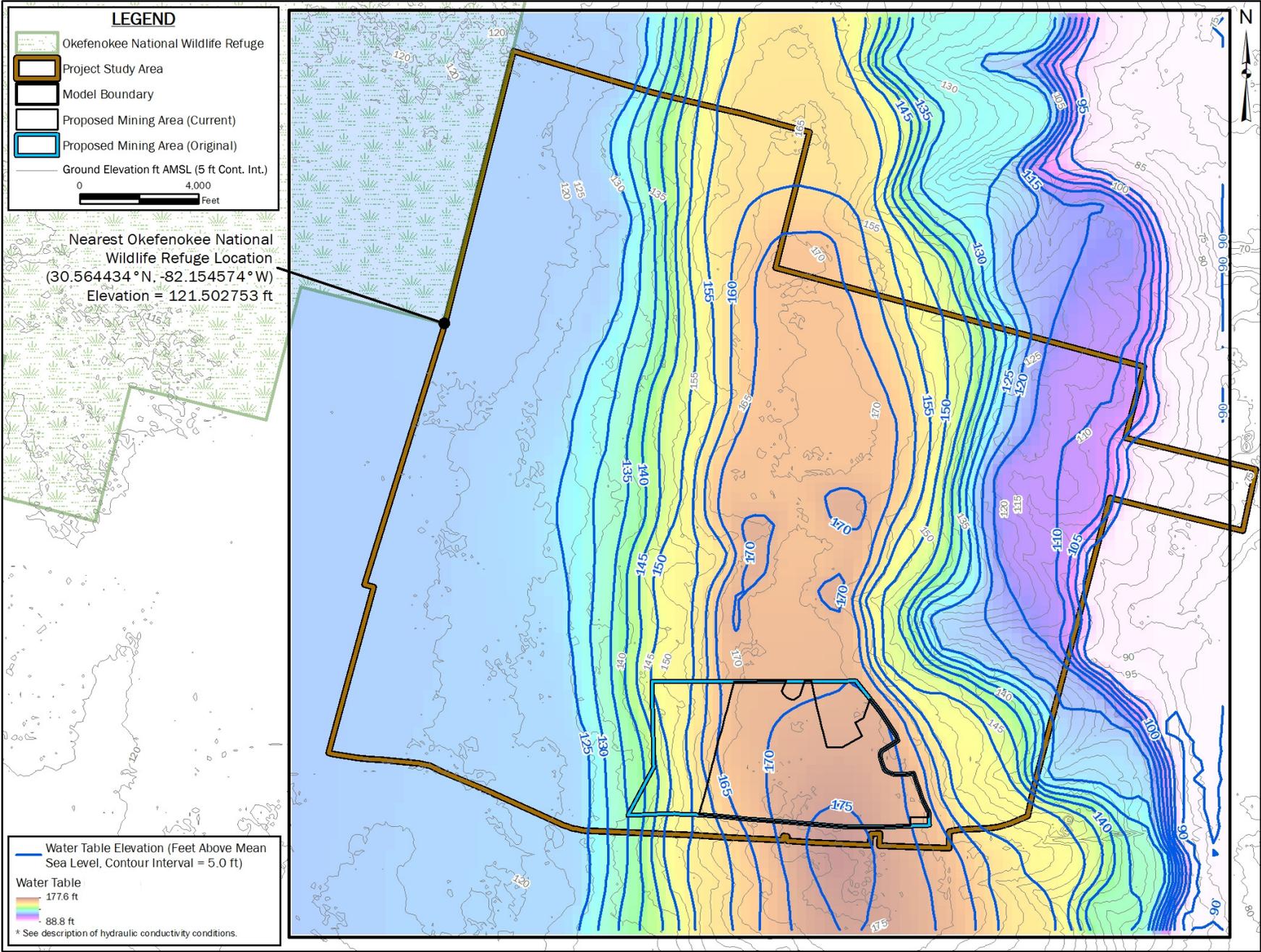


FIGURE 15: POTENTIOMETRIC SURFACE MAP OF THE LAYERED SCENARIO MODELED HERE & POST-MINING SCENARIO OF HOLT ET AL. (2020); THE VERTICAL EFFECTIVE K OF THE UPPER 10 FEET OF THE MINE FOOTPRINT IS 1E-05 CM/S & THE HORIZONTAL K IS 1E-03 CM/S TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE ST. GEORGE, CHARLTON COUNTY, GEORGIA



Note: K = Hydraulic Conductivity

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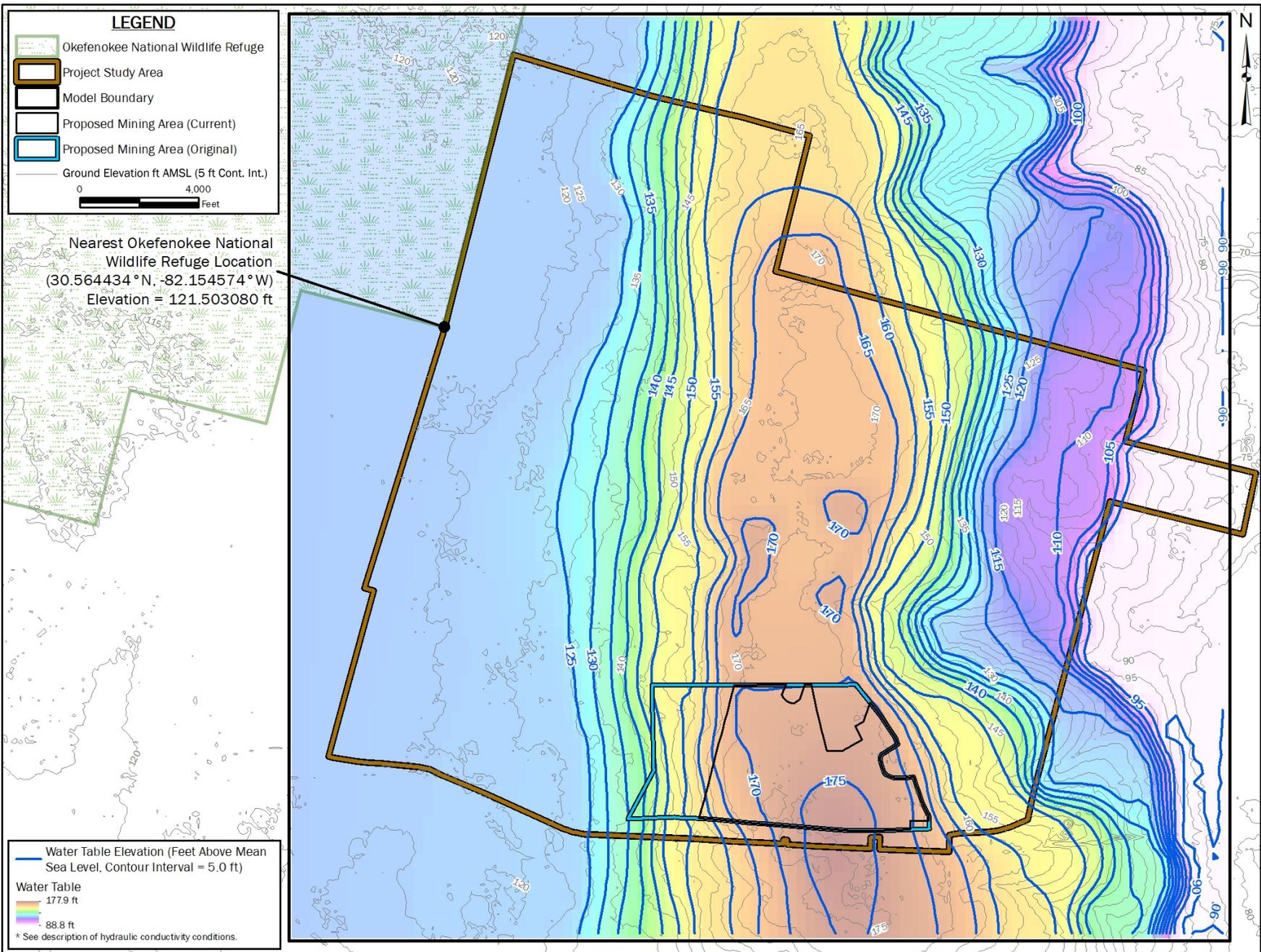


FIGURE 16: POTENTIOMETRIC SURFACE MAP OF THE LAYERED SCENARIO MODELED HERE & POST-MINING SCENARIO OF HOLT ET AL. (2020); THE VERTICAL EFFECTIVE K OF THE UPPER 10 FEET OF THE MINE FOOTPRINT IS 1E-06 CM/S & THE HORIZONTAL K IS 1E-03 CM/S TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE ST. GEORGE, CHARLTON COUNTY, GEORGIA



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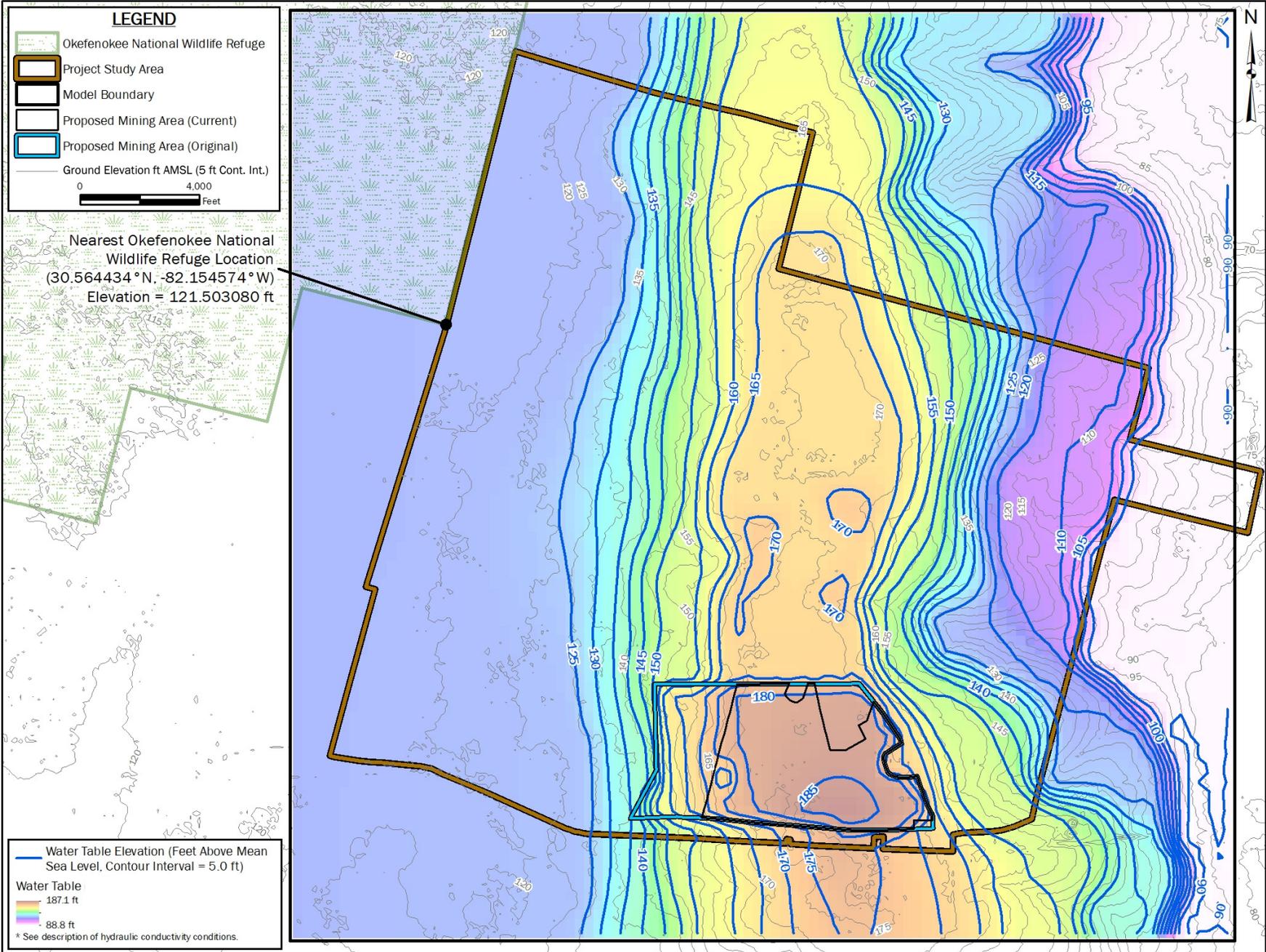


FIGURE 17: POTENTIOMETRIC SURFACE MAP OF THE LAYERED SCENARIO MODELED HERE & POST-MINING SCENARIO OF HOLT ET AL. (2020); THE VERTICAL EFFECTIVE K OF THE UPPER 10 FEET OF THE MINE FOOTPRINT IS 1E-07 CM/S & THE HORIZONTAL K IS 1E-03 CM/S
TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE
ST. GEORGE, CHARLTON COUNTY, GEORGIA



Note: K = Hydraulic Conductivity

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LEGEND

- Okefenokee National Wildlife Refuge
- Project Study Area
- Model Boundary
- Proposed Mining Area (Current)
- Proposed Mining Area (Original)
- Ground Elevation ft AMSL (5 ft Cont. Int.)

0 4,000
Feet

Nearest Okefenokee National Wildlife Refuge Location
 (30.564434 °N, -82.154574 °W)
 Elevation Change = 0.000000 ft

Mean Water Table Elevation Change within Proposed Mining Area = 0.008 ft

Water Table Elevation Change (ft)
 (Minus Post-Mining Values)

- 1
- 0.1
- 0.01
- 0.001
- 0.0001
- 0.00001
- 0
- 0.00001
- 0.0001
- 0.001
- 0.01
- 0.1
- 1
- 2
- 3+

Water Table Difference

- 0.01 ft
- 0.00 ft

* See description of hydraulic conductivity conditions.

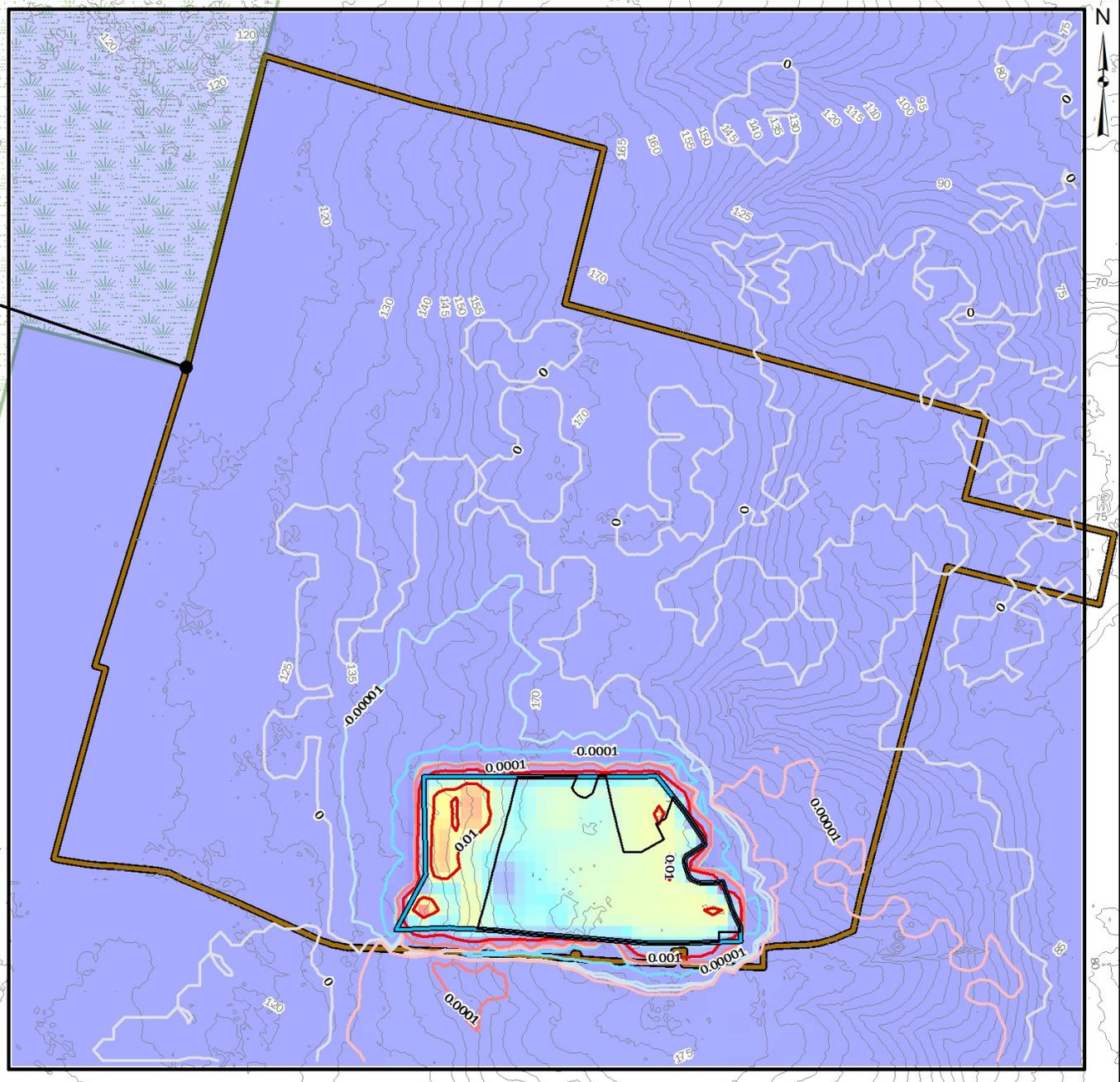


FIGURE 18: HYDRAULIC HEAD DIFFERENCE BETWEEN LAYERED SCENARIO HERE MODELED HERE & POST-MINING SCENARIO OF HOLT ET AL. (2020); THE VERTICAL EFFECTIVE K OF THE UPPER 10 FEET OF THE MINE FOOTPRINT IS 1E-04 CM/S & THE HORIZONTAL K IS 1E-03 CM/S TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE ST. GEORGE, CHARLTON COUNTY, GEORGIA

Note: K = Hydraulic Conductivity

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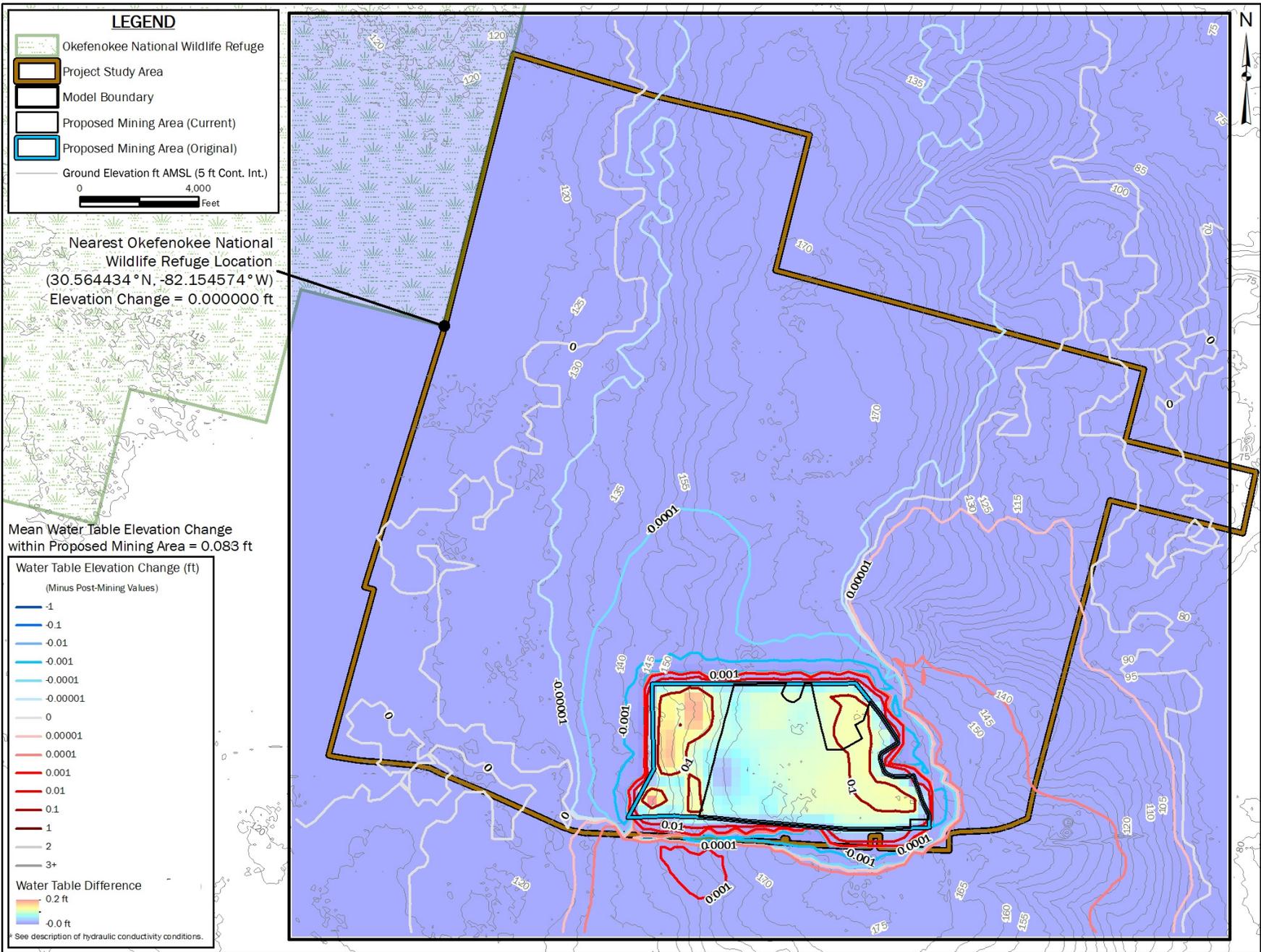


FIGURE 19: HYDRAULIC HEAD DIFFERENCE BETWEEN LAYERED SCENARIO HERE MODELED HERE & POST-MINING SCENARIO OF HOLT ET AL. (2020); THE VERTICAL EFFECTIVE K OF THE UPPER 10 FEET OF THE MINE FOOTPRINT IS 1E-05 CM/S & THE HORIZONTAL K IS 1E-03 CM/S
 TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE
 ST. GEORGE, CHARLTON COUNTY, GEORGIA



Note: K = Hydraulic Conductivity

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APPROX. SCALE: 1" = 4,000 ft

LEGEND

- Okefenokee National Wildlife Refuge
- Project Study Area
- Model Boundary
- Proposed Mining Area (Current)
- Proposed Mining Area (Original)
- Ground Elevation ft AMSL (5 ft Cont. Int.)

0 4,000
Feet

Nearest Okefenokee National Wildlife Refuge Location
 (30.564434 °N, -82.154574 °W)
 Elevation Change = -0.000008 ft

Mean Water Table Elevation Change within Proposed Mining Area = 0.873 ft

Water Table Elevation Change (ft)
 (Minus Post-Mining Values)

- 1
- 0.1
- 0.01
- 0.001
- 0.0001
- 0.00001
- 0
- 0.00001
- 0.0001
- 0.001
- 0.01
- 0.1
- 1
- 2
- 3+

Water Table Difference

- 1.7 ft
- 0.1 ft

* See description of hydraulic conductivity conditions.

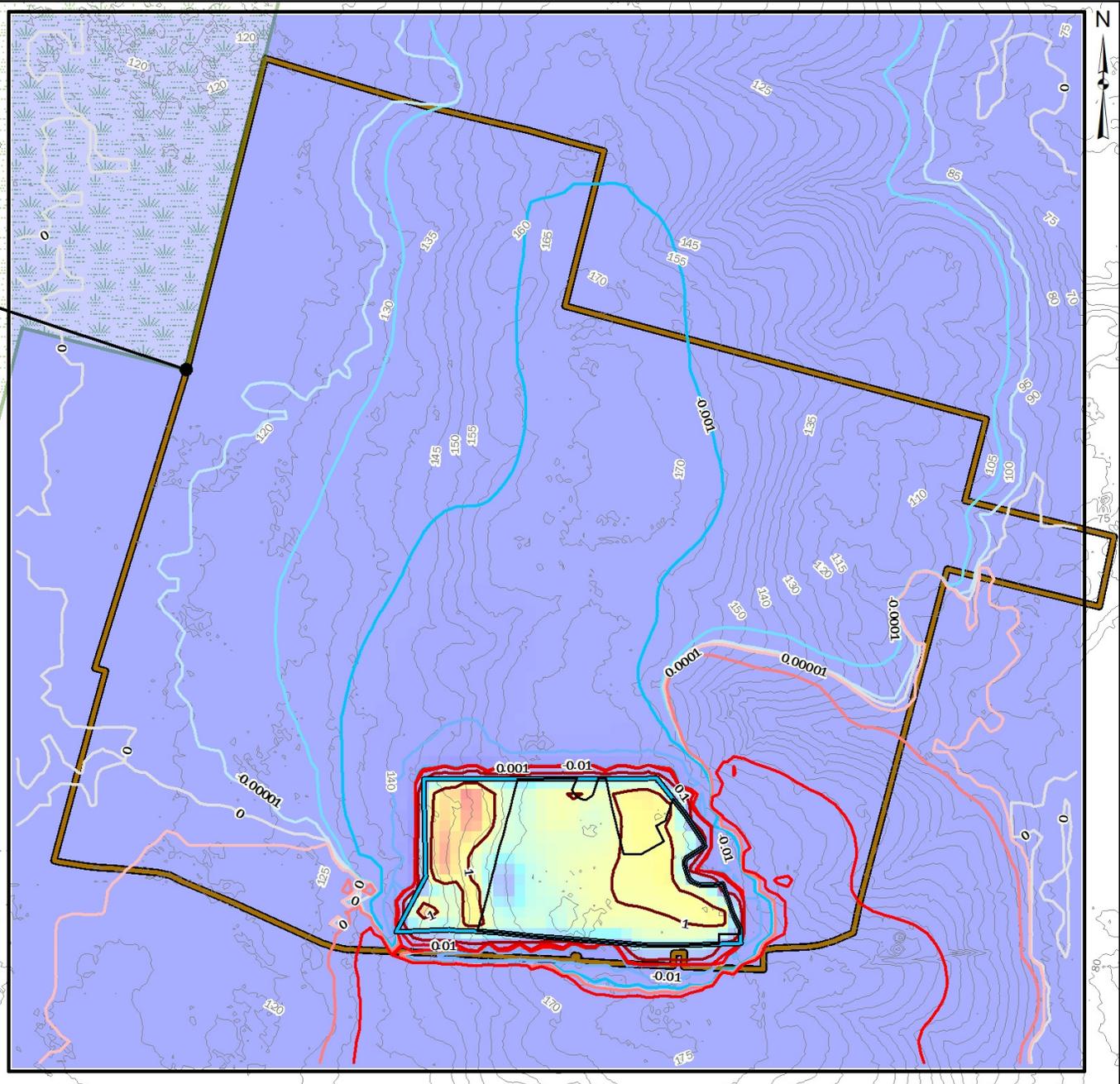


FIGURE 20: HYDRAULIC HEAD DIFFERENCE BETWEEN LAYERED SCENARIO HERE MODELED HERE & POST-MINING SCENARIO OF HOLT ET AL. (2020); THE VERTICAL EFFECTIVE K OF THE UPPER 10 FEET OF THE MINE FOOTPRINT IS 1E-06 CM/S & THE HORIZONTAL K IS 1E-03 CM/S
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 ST. GEORGE, CHARLTON COUNTY, GEORGIA



Note: K = Hydraulic Conductivity

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APPROX. SCALE: 1" = 4,000 ft

LEGEND

- Okefenokee National Wildlife Refuge
- Project Study Area
- Model Boundary
- Proposed Mining Area (Current)
- Proposed Mining Area (Original)
- Ground Elevation ft AMSL (5 ft Cont. Int.)

0 4,000
Feet

Nearest Okefenokee National Wildlife Refuge Location
 (30.564434 °N, -82.154574 °W)
 Elevation Change = -0.000085 ft



Mean Water Table Elevation Change within Proposed Mining Area = 8.870 ft

Water Table Elevation Change (ft)
 (Minus Post-Mining Values)

- 1
- 0.1
- 0.01
- 0.001
- 0.0001
- 0.00001
- 0
- 0.00001
- 0.0001
- 0.001
- 0.01
- 0.1
- 1
- 2
- 3+

Water Table Difference
 13.4 ft
 -0.7 ft

* See description of hydraulic conductivity conditions.

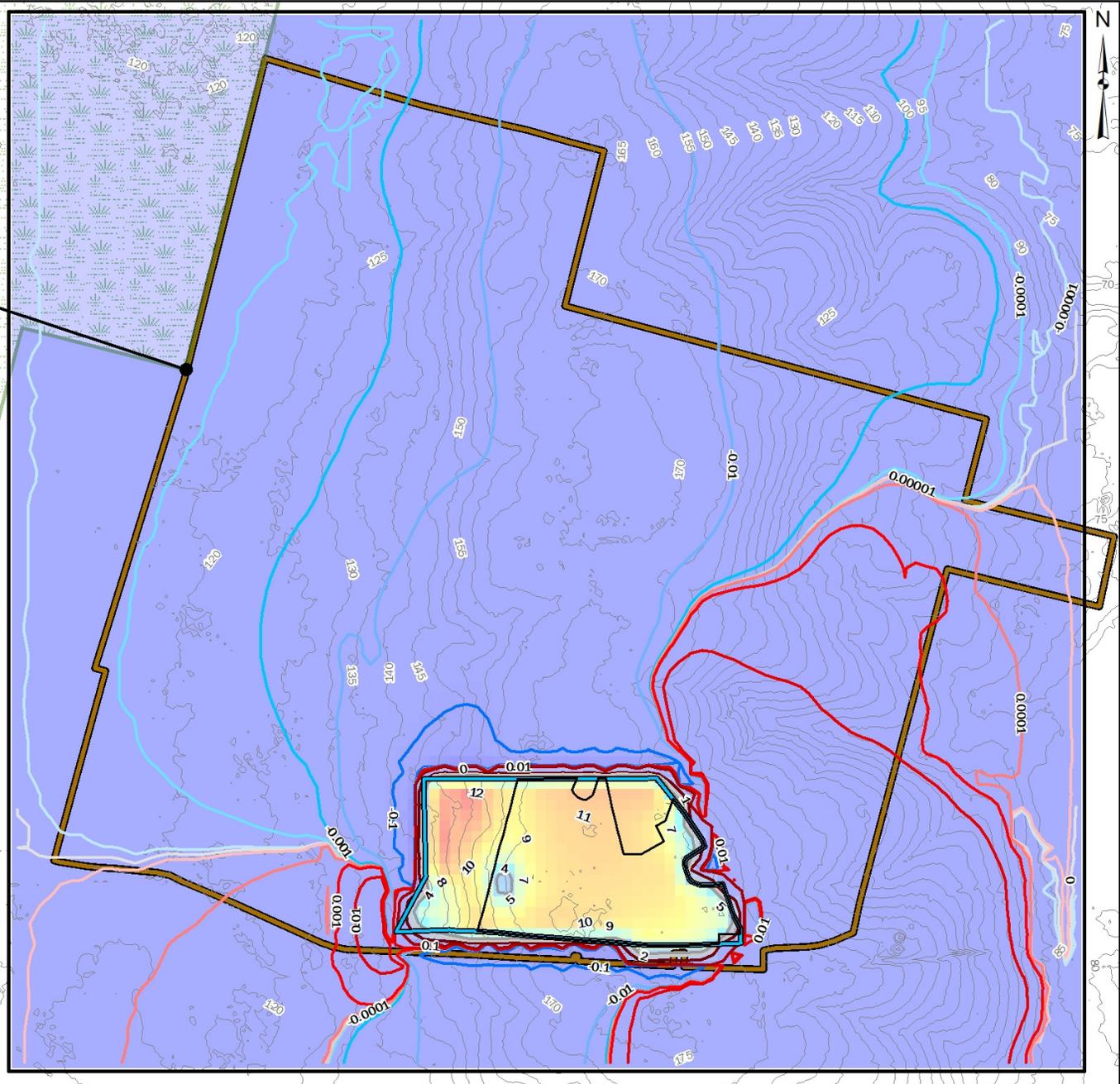


FIGURE 21: HYDRAULIC HEAD DIFFERENCE BETWEEN LAYERED SCENARIO HERE MODELED HERE & POST-MINING SCENARIO OF HOLT ET AL. (2020); THE VERTICAL EFFECTIVE K OF THE UPPER 10 FEET OF THE MINE FOOTPRINT IS 1E-07 CM/S & THE HORIZONTAL K IS 1E-03 CM/S TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE ST. GEORGE, CHARLTON COUNTY, GEORGIA



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Note: K = Hydraulic Conductivity

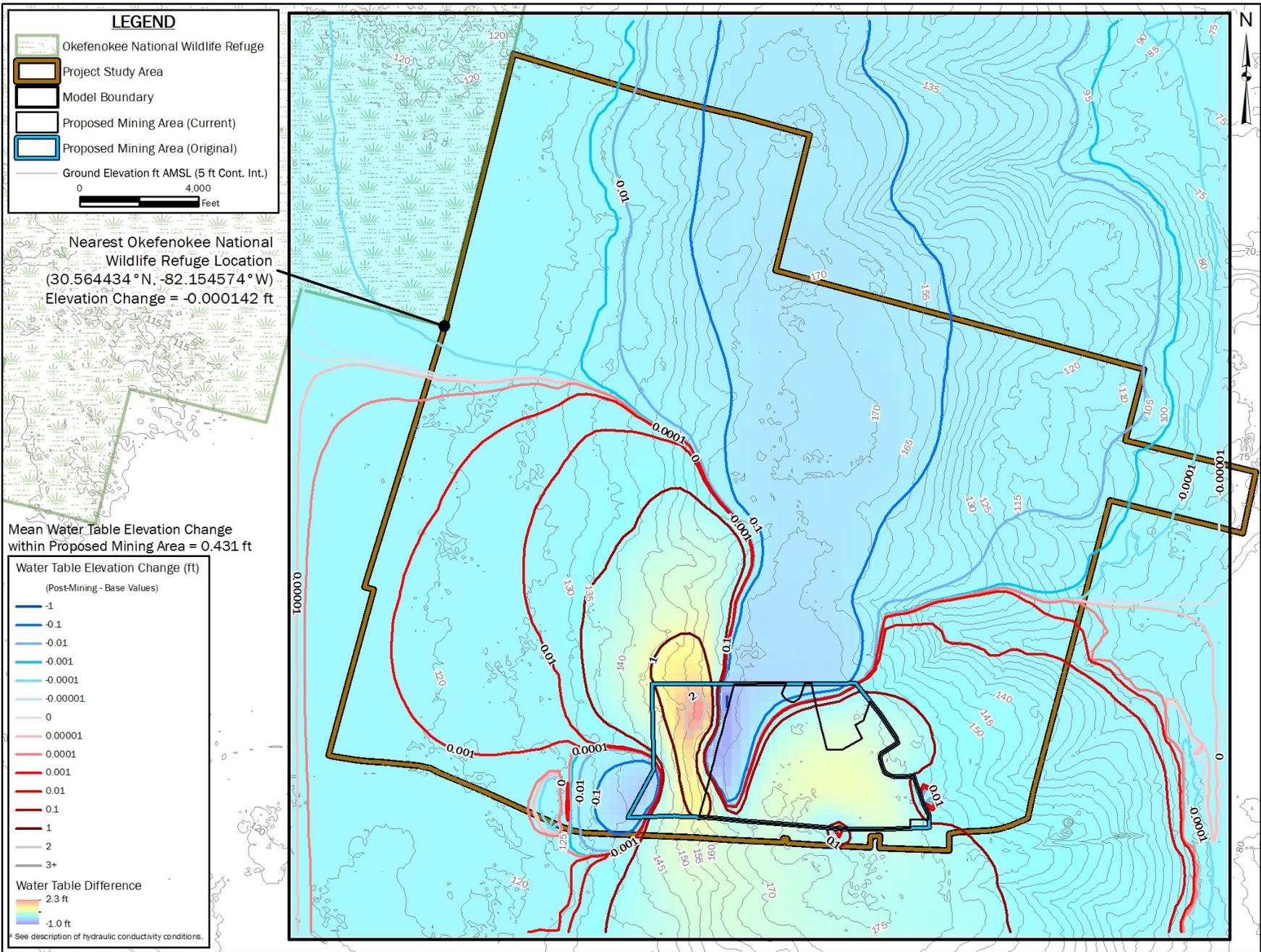


FIGURE 22: HYDRAULIC HEAD DIFFERENCE BETWEEN HOMOGENEOUS SCENARIO MODELED HERE & PRE-MINING SCENARIO OF HOLT ET AL. (2020); THE VERTICAL & HORIZONTAL K OF THE UPPER 10 FEET OF THE MINE FOOTPRINT IS 1E-04 CM/S TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE ST. GEORGE, CHARLTON COUNTY, GEORGIA



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Note: K = Hydraulic Conductivity

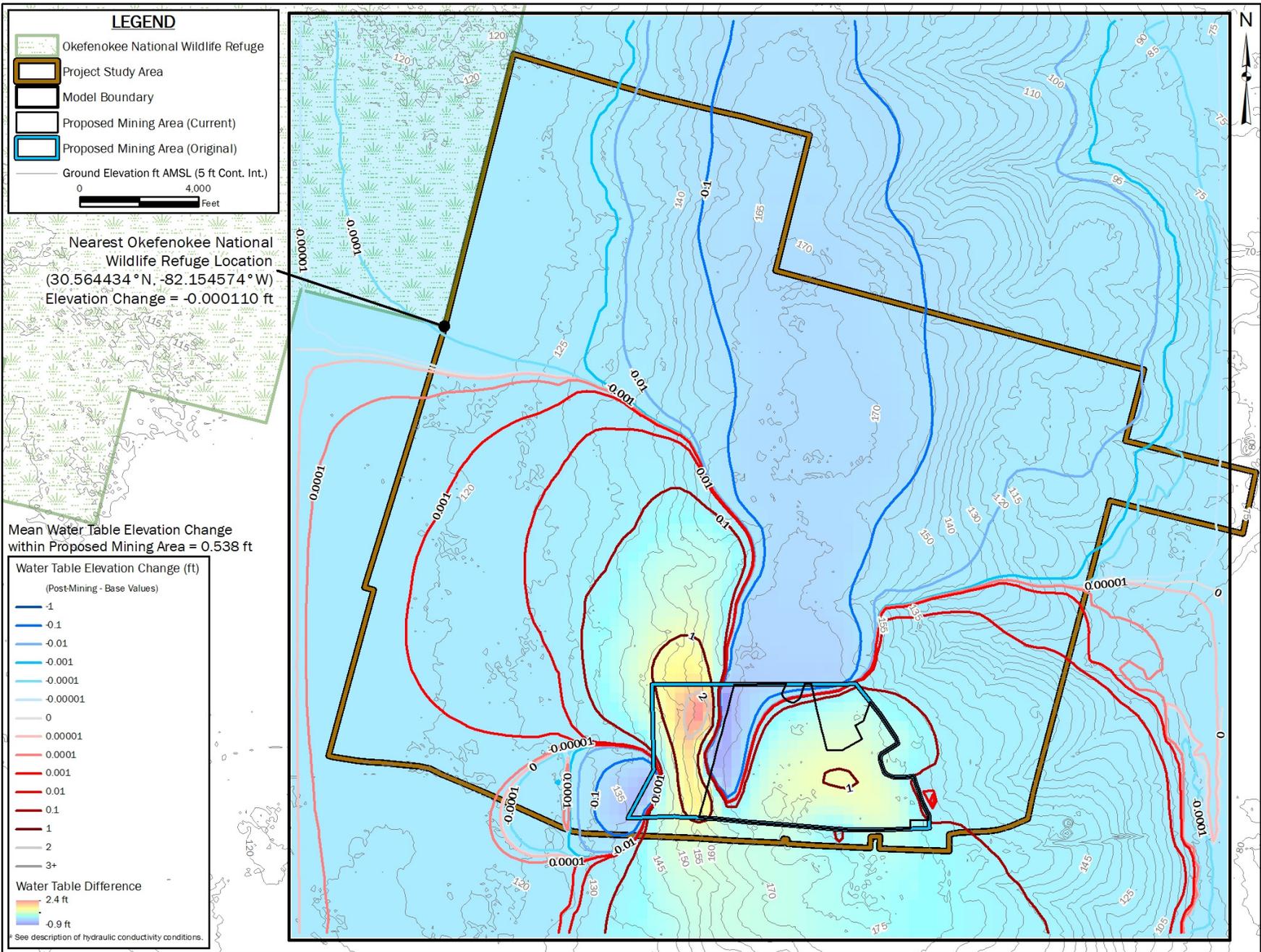


FIGURE 23: HYDRAULIC HEAD DIFFERENCE BETWEEN HOMOGENEOUS SCENARIO MODELED HERE & PRE-MINING SCENARIO OF HOLT ET AL. (2020); THE VERTICAL & HORIZONTAL K OF THE UPPER 10 FEET OF THE MINE FOOTPRINT IS 1E-05 CM/S TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE ST. GEORGE, CHARLTON COUNTY, GEORGIA



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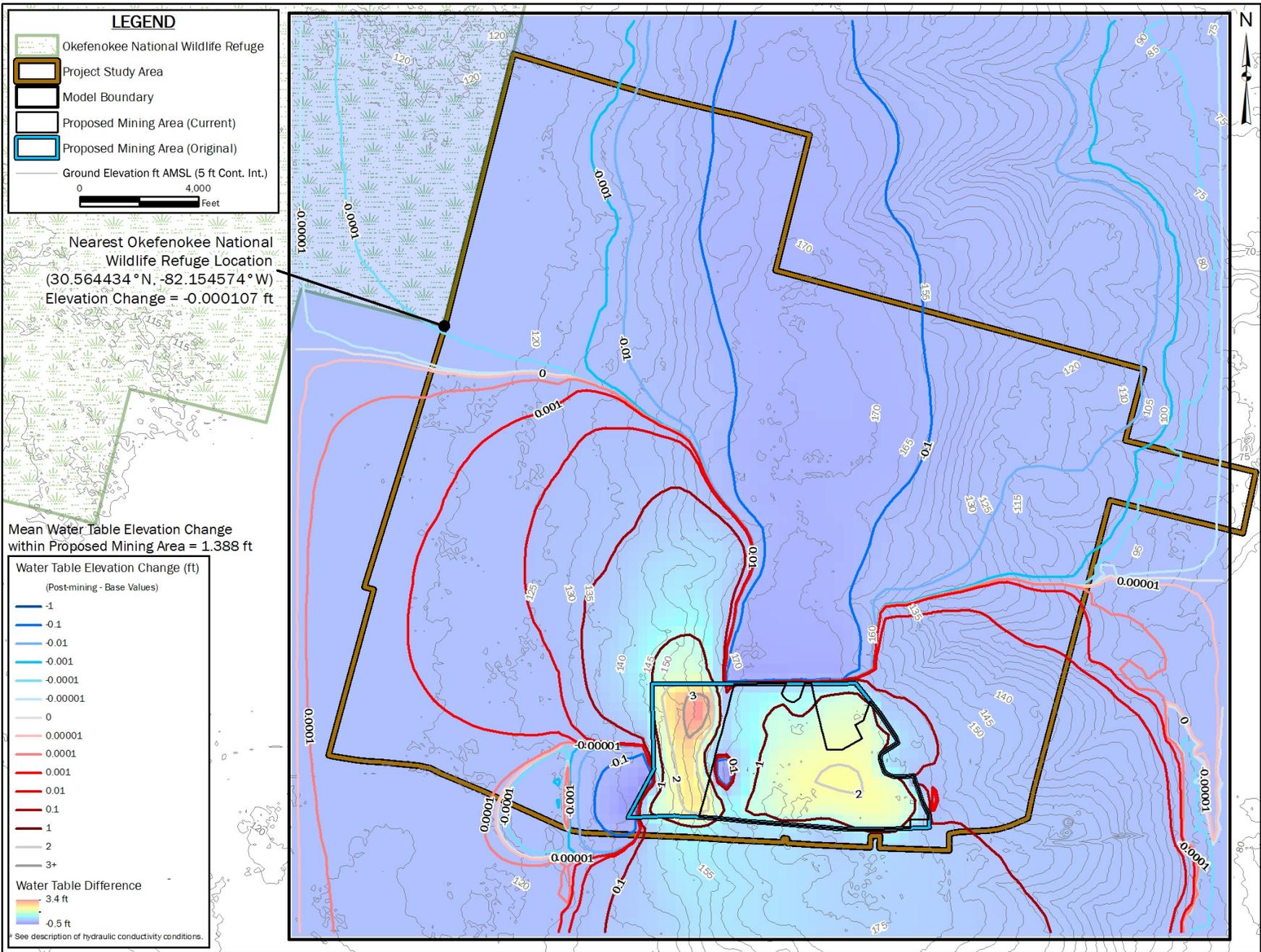


FIGURE 24: HYDRAULIC HEAD DIFFERENCE BETWEEN HOMOGENEOUS SCENARIO MODELED HERE & PRE-MINING SCENARIO OF HOLT ET AL. (2020); THE VERTICAL & HORIZONTAL K OF THE UPPER 10 FEET OF THE MINE FOOTPRINT IS 1E-06 CM/S TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE ST. GEORGE, CHARLTON COUNTY, GEORGIA



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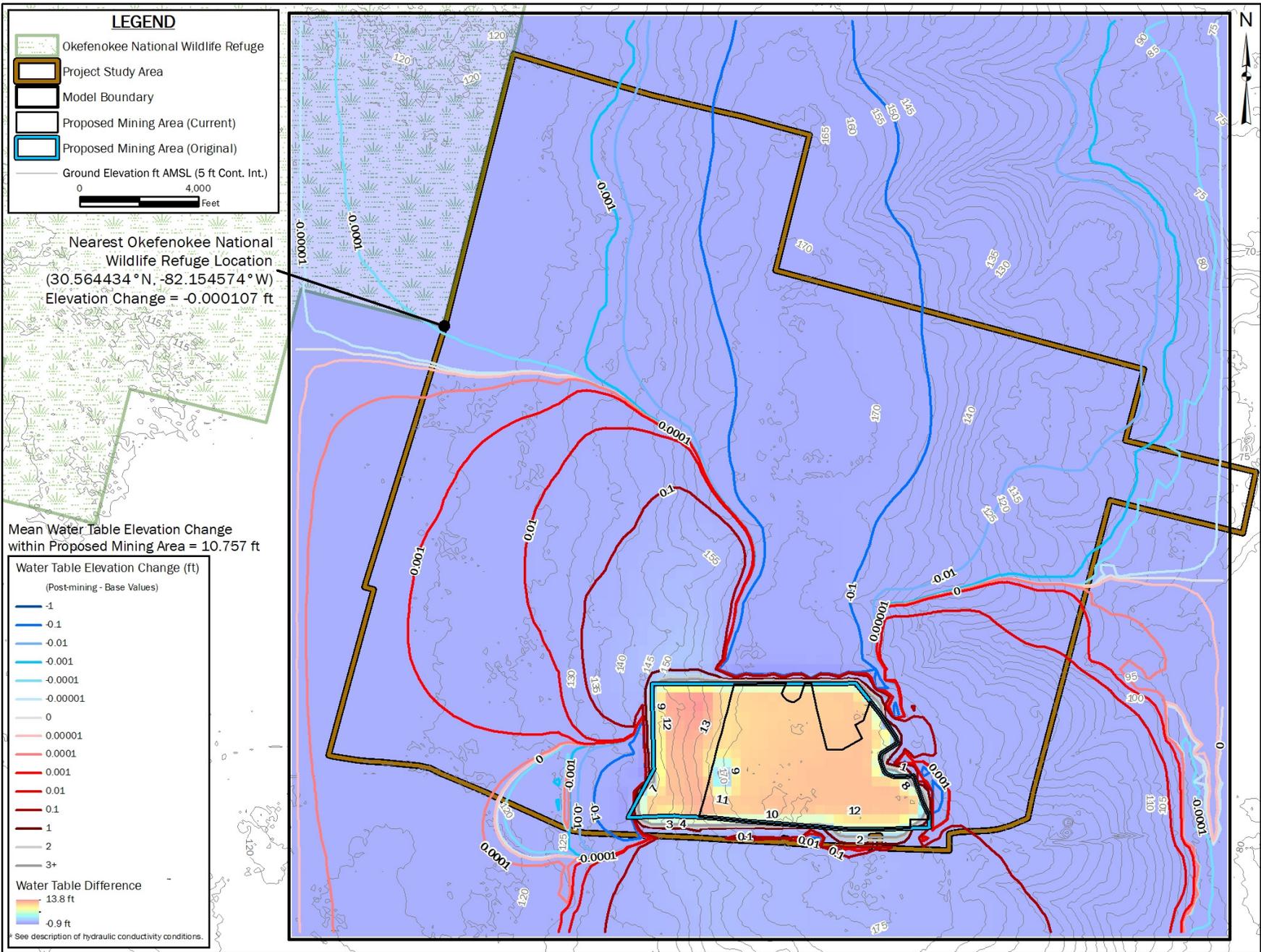


FIGURE 25: HYDRAULIC HEAD DIFFERENCE BETWEEN HOMOGENEOUS SCENARIO MODELED HERE & PRE-MINING SCENARIO OF HOLT ET AL. (2020); THE VERTICAL & HORIZONTAL K OF THE UPPER 10 FEET OF THE MINE FOOTPRINT IS 1E-07 CM/S TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE ST. GEORGE, CHARLTON COUNTY, GEORGIA



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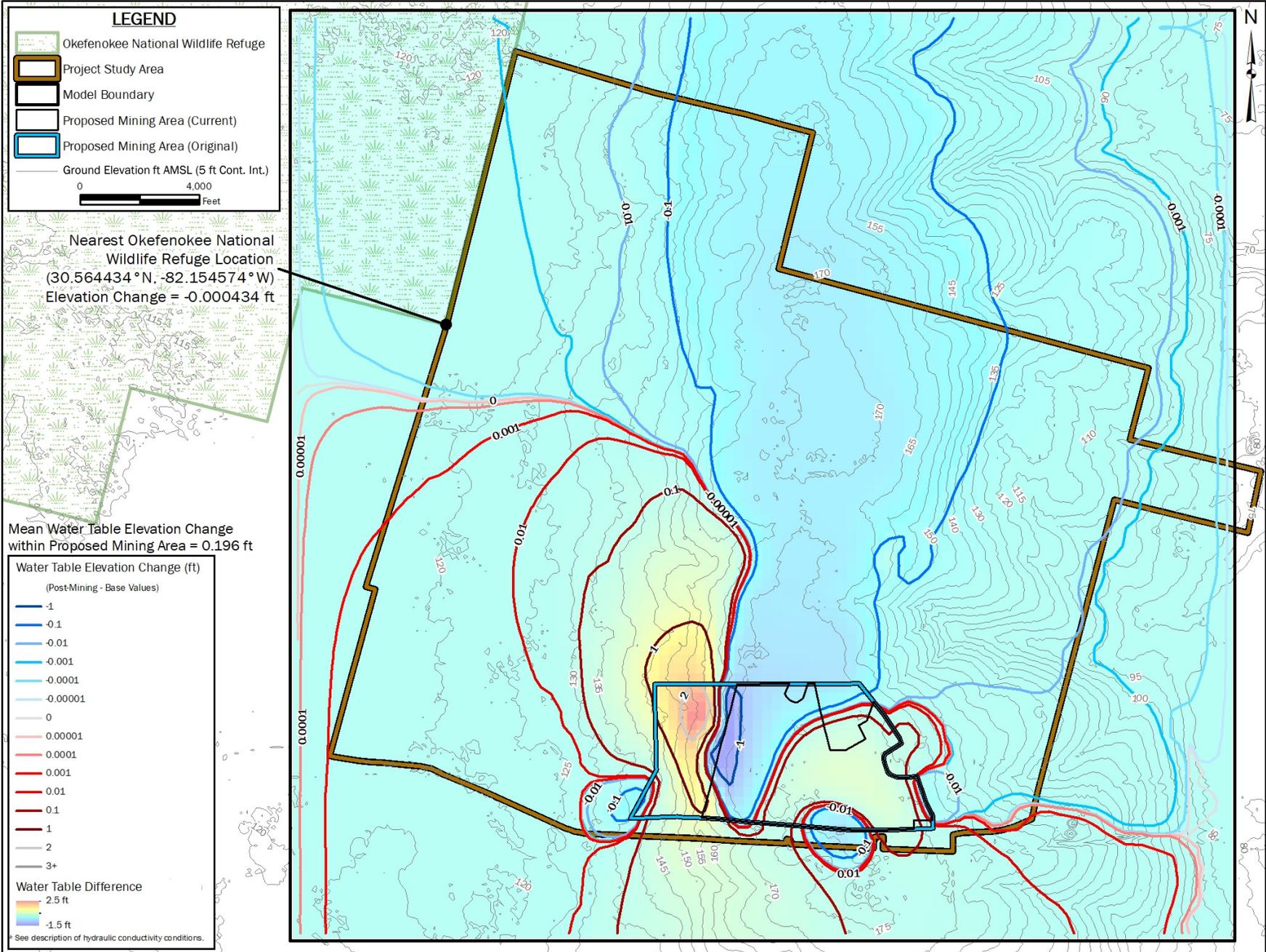


FIGURE 26: HYDRAULIC HEAD DIFFERENCE BETWEEN LAYERED SCENARIO HERE MODELED HERE & PRE-MINING SCENARIO OF HOLT ET AL (2020); THE VERTICAL EFFECTIVE K OF THE UPPER 10 FEET OF THE MINE FOOTPRINT IS 1E-04 CM/S & THE HORIZONTAL K IS 1E-03 CM/S TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE ST. GEORGE, CHARLTON COUNTY, GEORGIA

Note: K = Hydraulic Conductivity

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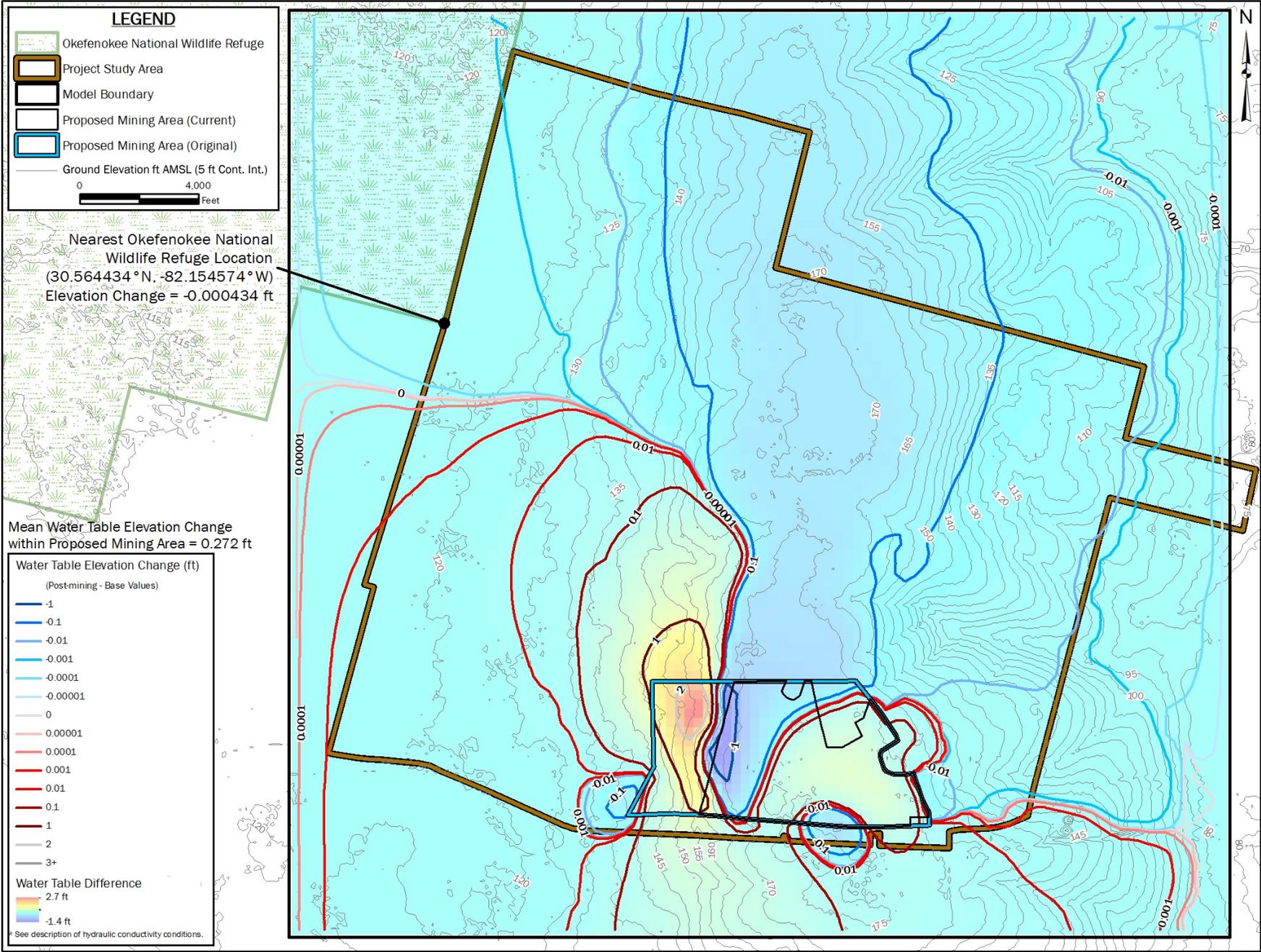


FIGURE 27: HYDRAULIC HEAD DIFFERENCE BETWEEN LAYERED SCENARIO HERE MODELED HERE & PRE-MINING SCENARIO OF HOLT ET AL (2020); THE VERTICAL EFFECTIVE K OF THE UPPER 10 FEET OF THE MINE FOOTPRINT IS 1E-05 CM/S & THE HORIZONTAL K IS 1E-03 CM/S
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Note: K = Hydraulic Conductivity

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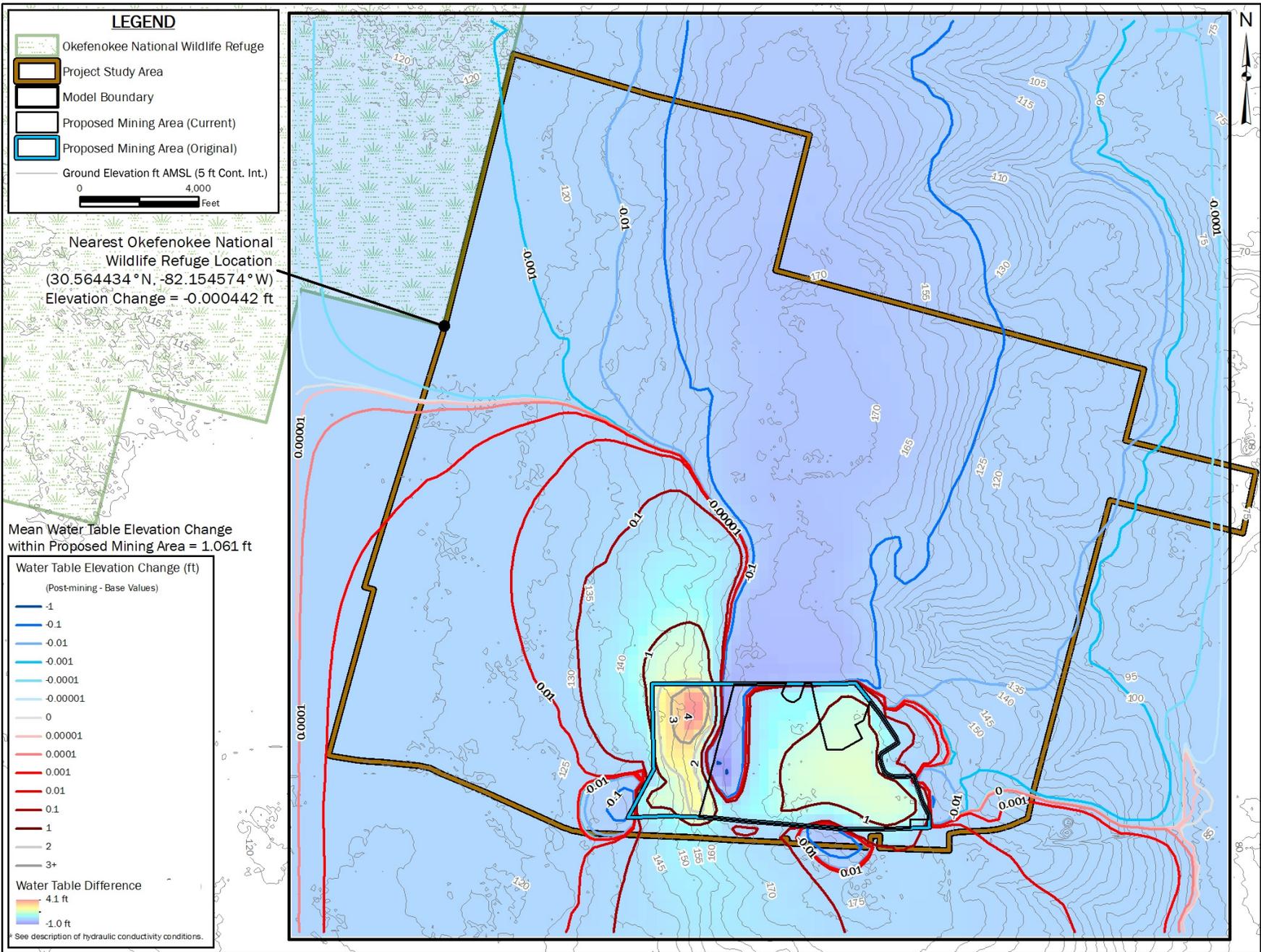


FIGURE 28: HYDRAULIC HEAD DIFFERENCE BETWEEN LAYERED SCENARIO HERE MODELED HERE & PRE-MINING SCENARIO OF HOLT ET AL (2020); THE VERTICAL EFFECTIVE K OF THE UPPER 10 FEET OF THE MINE FOOTPRINT IS 1E-06 CM/S & THE HORIZONTAL K IS 1E-03 CM/S TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE ST. GEORGE, CHARLTON COUNTY, GEORGIA

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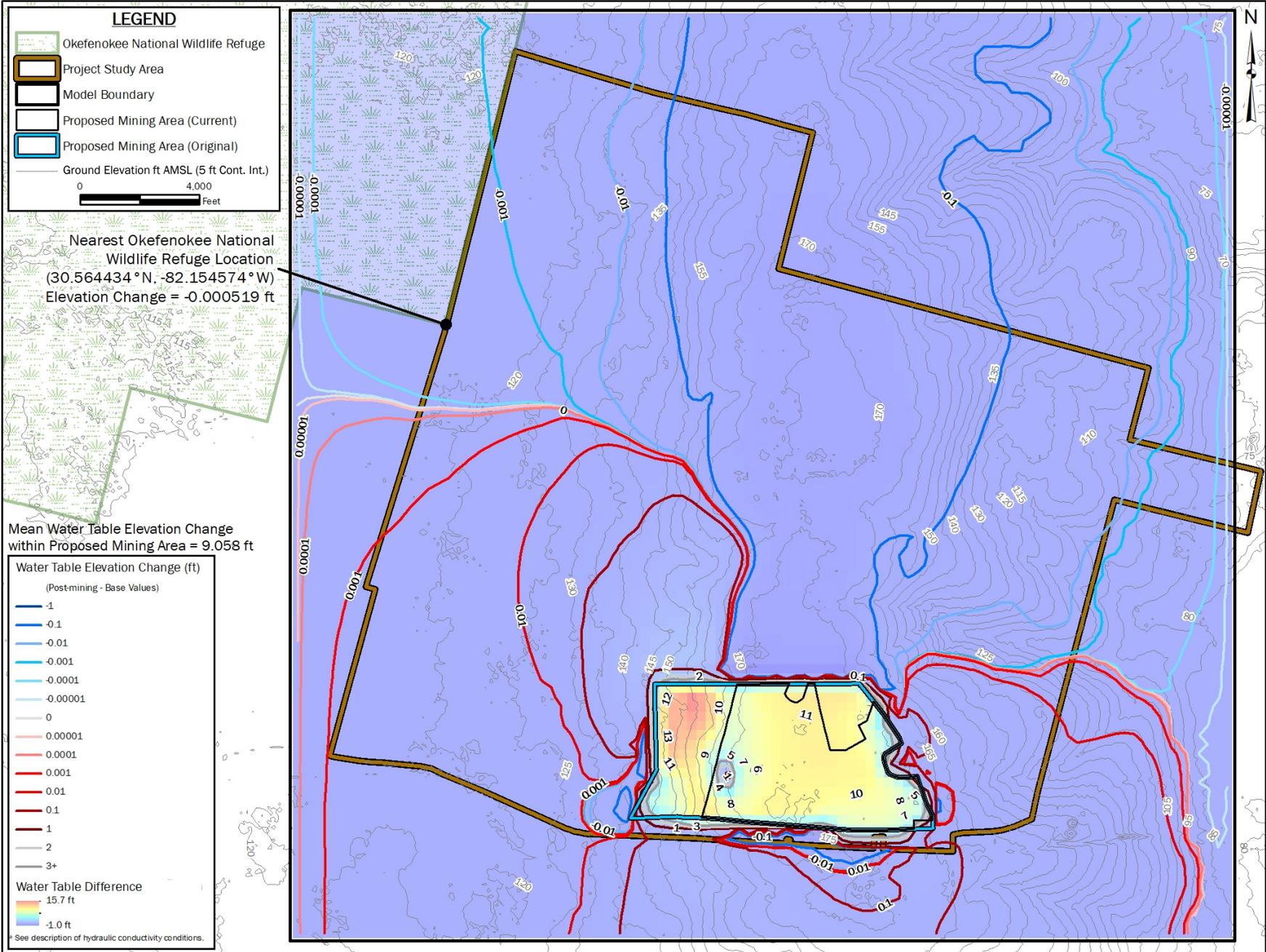


FIGURE 29: HYDRAULIC HEAD DIFFERENCE BETWEEN LAYERED SCENARIO HERE MODELED HERE & PRE-MINING SCENARIO OF HOLT ET AL (2020); THE VERTICAL EFFECTIVE K OF THE UPPER 10 FEET OF THE MINE FOOTPRINT IS 1E-07 CM/S & THE HORIZONTAL K IS 1E-03 CM/S TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE ST. GEORGE, CHARLTON COUNTY, GEORGIA

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