Contamination Evaluation Plan
Southeast County Landfill
Lithia, Florida

Hillsborough County Public Utilities Department
Solid Waste Management Division
332 North Falkenburg Road
Tampa, Florida 33619

Hillsborough County Florida

SCS ENGINEERS

File No. 09215600.12 | May 2021

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Submitted to:

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1.0 INTRODUCTION

SCS Engineers (SCS) prepared this Contamination Evaluation Plan for the Southeast County Landfill (SCLF) on behalf of Hillsborough County (County) Public Utilities Department, Solid Waste Management Division (SWMD). The SCLF is located at 15960 County Road 672, Lithia, Florida 33547. This report is intended to fulfill the requirements of Florida Administrative Code (FAC) 62-701.500(6)(a)4 referenced in the November 20, 2020 Florida Department of Environmental Protection (FDEP) notification of Evaluation Monitoring Letter to address an apparent release of leachate detected in groundwater monitoring wells on the southeast corner of the SCLF Phase I-VI disposal area. Background information and results of groundwater monitoring and assessment are provided below. The overall site layout and groundwater monitoring wells are provided as Figure 1 of this report.

2.0 BACKGROUND

Hillsborough County originally acquired the landfill property in 1984 from Agrico Chemical Company (Agrico) through a special warranty deed. Previously, Agrico operated the property as a surficial phosphate strip mine from the 1940's through the mid 1970's as evidenced by surficial water features Mine Cut 1, Mine Cut 2, Mine Cut 3, and Mine Cut 4. Mine Cut 3 and Mine Cut 4 are located north of the landfill and are not show on Figure 1. Part of the historical mining process included deposition of a waste phosphatic clay slurry into a large settling pond area. This area would become the future site of Hillsborough County's Class I landfill, now referred to as Phase I-VI.

Phase I-VI of the SCLF was designed and permitted in the early 1980's with solid waste operations beginning in 1984 in the Phase I disposal area. Each phase was consecutively permitted and constructed by utilizing in-place, low permeability, waste phosphatic clays from the former settling pond as the bottom liner. The horizontal extents of the waste disposal area are defined by the Phase I-VI perimeter berm that is located to provide a minimum clay thickness of 4 feet within the landfill limits. This berm now encompasses the approximately 162.4 acres of disposal area. Chlorosulfonated polyethylene (CSPE), a synthetic liner material, provides lateral containment along the interior of the Phase I-VI perimeter berm. Waste has only been deposited within disposal cells that utilize the waste phosphatic clay and CSPE as a containment system (Phase I-VI) or within a Class I dual liner landfill (Sections 7, 8, and 9). Waste has not been disposed of in unlined cells at this site.

On February 25, 2016, Hillsborough County representatives collected routine groundwater monitoring samples in accordance with the SCLF solid waste operation permit. Laboratory analytical results later confirmed the presence of leachate indicator parameters in the TH-67 groundwater sample, including sodium, chloride, and ammonia. TH-67 is a groundwater monitoring well east of Phase II used for detection. The Phase II disposal area, approximately 45 feet from TH-67, had apparently experienced a previously undetected release of an unknown quantity of leachate. The detection well performed as designed and alerted the SWMD to the release.

SWMD subsequently notified FDEP via phone on April 15, 2016 and initiated an investigation into the cause. SWMD worked with FDEP and entered into a Consent Agreement (OGC. 17-0058) on July 28, 2017, which included assessment requirements and the development of corrective measures. The SWMD followed the compliance path prescribed in the Consent Agreement conducting liquid level and groundwater assessment activities for over three years.

On December 11, 2020 the Consent Agreement was closed as the compliance issue related to liquid levels within the landfill had reached resolution through additional measures and operational requirements codified in the March 13, 2020 Alternate Procedure approval. As part of the closure of the Consent Agreement, the FDEP issued an Evaluation Monitoring Program notification letter on November 20, 2020 to address remaining groundwater concerns in the area east of Phase II.

3.0 GEOLOGY AND HYDROGEOLOGY

The entire footprint of Phase I-VI overlies a former clay settling pond that was part of the historical phosphate wastewater processing. Therefore, the natural geologic and hydrogeologic characteristics have been altered at the surface. These alterations provided a good setting for siting the landfill. However, the alterations can also affect how shallow groundwater moves in the vicinity of the landfill.

3.1.1 Local and Regional Geology

The site is located within the Polk Upland subdivision of the Central Highlands. The Polk Upland is, for the most, part a flat plain with elevations ranging from 100 to 300 feet NGVD. This area is noted for showing less intense effects of limestone solution features that are generally found throughout peninsular Florida. The site is composed mostly of mined and unmined land covered with waste phosphatic clay and sand tailings disposal areas.

The near surface deposits in descending order include waste phosphatic clay and sand tailings, surficial sands, Bone Valley Formation, Hawthorn Group, and Tampa Formation. Above the Hawthorn Group are mined and unmined lands. In the previously mined areas, the native soils were removed and placed in soil piles, within retention dikes, for depositing sand tailings and constructing clay-settling areas. In the unmined areas, overlying the Bone Valley Formation, the surficial soils consist primarily of Leon, Ona, and Pomello fine Sands.

Beneath the surficial soils is the Bone Valley Formation which consists of phosphatic clays and sands and is referred to as the matrix or ore zone. In some areas adjacent to the landfill property, the matrix was mined to depths of approximately 16 to 37 feet. This area of Hillsborough County has historically been mined for phosphate, and mining operations are currently being conducted on nearby properties.

Underlying the Bone Valley Formation is the Hawthorn Group. These deposits are of marine origin and consist predominantly of light gray to dark gray, calcareous, sandy clays interbedded with lenses of dense gray and white limestone with a total thickness greater than 100 feet. Because of the thickness and low permeability of the clay beds, the Hawthorn Group and, where intact, the Bone Valley Formation serve as a confining layer for groundwater in the underlying limestone.

The Tampa Formation lies below the Hawthorn Group and consists of white and gray, sandy, fossiliferous limestone. At the site, the top of the Tampa Formation is found at a depth of approximately 140 feet. Figure 2, an excerpt from the 1983 Ardaman & Associates (Ardaman) Hydrogeological Investigation has been included as a general visual representation of local geology.

3.1.2 Local and Regional Hydrogeology

Beneath the site are three aquifer systems: the surficial aquifer, secondary artesian aquifer, and the Floridan aquifer. The surficial aquifer in unmined areas consists of the natural occurring sands above the Bone Valley Formation. In mined areas, it consists of the heterogeneous deposits of cast overburden and the sand tailings deposit. Areas used as to manage mine process water or for stormwater management, typically include water-bearing units in sand tailings separated from undisturbed surficial sands by waste clay. The thickness and continuity of the surficial aquifer is quite variable depending on the depth mined, the quantity of materials removed, and areal extent of the waste phosphatic clays.

Permeable sand and limestone zones within the Hawthorn Group make up the secondary artesian aquifer system in the region. These water-bearing zones can, in isolated cases, produce significant quantities of water, but of relatively poor quality. These water-bearing zones are typically inconsistent in depth and thickness and are often not hydraulically connected to one another. Thus, despite these water-bearing zones, the Hawthorn Group as a whole is a competent confining unit separating the surficial aquifer system from the Floridan aquifer. However, localized karst features can create a direct hydraulic connection between them.

The Floridan aquifer is found below the Hawthorn Group within the Tampa Limestone and underlying limestone formations, and is the most productive of the three aquifers. Generally, groundwater within the Floridan aquifer flows westward across the site.

Potentiometric head differences between the Floridan and the other aquifers indicate the potential for downward leakance from the overlying aquifers to the Floridan; however, the leakance values are on the order of only one inch per year for unconsolidated clay outside of the Phase I-VI perimeter berm. Leakance values vary significantly between areas with clay present and areas used for other purposes. Groundwater monitoring data does not indicate that landfill leachate is or has ever migrated through the base clay layer from the former clay settling area that acts as a clay liner for the landfill.

The site is located in the Alafia River Basin. The natural basin drainage pattern has been modified considerably by historical and ongoing phosphate mining activity throughout the area. Runoff leaves the vicinity of the site through Long Flat Creek to the west-northwest of the landfill property.

4.0 LANDFILL PERMITTING AND CONSTRUCTION

The Phase I-VI disposal area was selected and permitted to be constructed and operated in 1984 in accordance with the 1982 FDEP (formerly the Florida Department of Environmental Regulation - FDER) rules. At that time solid waste regulations, in Chapter 17-7, F.A.C., did not require Class I landfills to be constructed with a geosynthetic liner or a leachate collection and removal system (LCRS). Thus, neither a maximum leachate head nor bottom liner slope were specified in Chapter 17-7 F.A.C. The primary design requirement for the facility was that the disposal area be designed to meet water quality standards at the site boundaries.

The area selected for construction of the SCLF was a former Agrico Phosphate Mine. The specific area Phase I-VI is built upon had been used as a clay settling area for waste phosphatic clays from earlier mining operations. The 1983 Hydrogeological Investigation, completed by Ardaman, reported that the waste phosphatic clays in the Phase I-VI disposal area ranged in thickness from 4 to 18 feet. A figure depicting the original 1983 thickness of the waste phosphatic clays overlain by the approximate location of the Phase I-VI perimeter berm (figure originally developed pre-construction) is included as Figure 3 of this report. These high plasticity/low permeability clays would provide a bottom liner for the Phase I-VI disposal area. The waste phosphatic clays would consolidate under the load from the overlying waste and, as the clays consolidated, decrease in permeability. To finish the containment system, a CSPE (aka Hypalon) geomembrane liner was installed on the side slopes of the perimeter berm and keyed into the bottom phosphatic clays. This liner system provides an effective containment system to protect the environment and exceeded the regulations in place at the time of design and permitting of the Phase I-VI disposal area.

The bottom phosphatic clay liner was originally a relatively flat surface but was predicted by Ardaman to settle over time as the load exerted by the waste caused consolidation of the underlying clay. This consolidation of the clay would result in a denser, stronger, and lower hydraulic conductivity barrier layer. Ardaman estimated the initial permeability of the clays within the Phase I-VI disposal area ranged from 1.2 X 10^{-8} cm/sec to 1.6 X 10^{-8} cm/sec in 1983. As waste is landfilled, pressure is exerted upon the waste phosphatic clay by the overlying waste mass. This pressure consolidates the waste phosphatic clay layer, resulting in clay permeability lower than that reported by Ardaman in 1983.

Additionally, although it was not required by the FDEP at the time, an LCRS was installed over the waste phosphatic clay liner. The LCRS consisted of drainage trenches and collection pipes, and was designed to limit the leachate head over the phosphatic clay liner to depths within the 3-foot sand drainage layer.

The expected consolidation of the waste phosphatic clay was a primary consideration in the LCRS design. As the consolidating forces exerted on the clay are directly related to the depth of waste, total settlement of the clay was estimated to be greatest in the areas with thickest clay and the greatest depth of waste during the designing of the LCRS. The area of thickest clay was in the Phase VI disposal area. Through subsequent consolidation testing, Phase VI was deemed to be the area of the greatest future settlement. Thus, the PS-B sump is located within Phase VI, the central low point for Phase I-VI disposal area.

As originally designed, settlement in the clays, induced by the overlying waste mass, creates bottom slopes to convey leachate to Phase VI. Liquids above the clays are collected and conveyed through the LCRS trenches and pipes to a central collection sump located at Phase VI, which is designated as the Pump Station B (PS-B) sump. Within the PS-B sump a pressure level sensor regulates the liquid level and pump cycling to maintain a hydraulic gradient toward the PS-B sump. A daily liquid level value from the PS-B sump is recorded and submitted to FDEP in Quarterly Water Balance Reports.

By installing a geosynthetic liner and LCRS in 1984, Phase I-VI exceeded the requirements of the regulations that were in effect at the time it was originally permitted. The SWMD is not aware of any other Class I landfills in Florida that were constructed over waste phosphatic clay settling areas from earlier mining operations.

5.0 ORIGINAL RELEASE AND MITIGATION

During the February 2016 groundwater monitoring event at the SCLF, elevated readings were observed by the County for certain leachate indicator parameters at monitoring well TH-67. TH-67 is a detection well approximately 45 feet east of Phase II and monitors surficial groundwater at the SCLF. Since that time, the SWMD and SCS conducted investigations of potential causes for the elevated readings, installed additional monitoring wells, and have taken additional measures to mitigate the concern and possibility of reoccurrence.

In response to the elevated levels of indicator parameters in groundwater samples from TH-67 in February 2016, SWMD responded with the following activities:

- Initiated additional leachate removal measures, such as installation of supplemental vertical dewatering wells, pumping from LFG extraction wells, construction of a hydraulic cutoff trench, excavation of LCRS headers, construction of access cleanouts, and jet-cleaning of previously inaccessible LCRS header pipes;
- Began quarterly collection of groundwater samples from nearby monitoring wells and installed additional wells to monitor and evaluate the progress of groundwater quality restoration in the affected area;
- Installed piezometers within the Phase I-VI footprint to assess moisture distribution and migration characteristics;

- Conducted field evaluations of the piezometers and the LCRS to assess the validity of unconventional liquid assessment methods and conveyance capabilities of the LCRS; and,
- Removed an average of approximately 33,000 gallons per day of leachate, from the supplemental locations mentioned above, since August 2017.

5.1 CONSENT AGREEMENT

In July 2017, the SWMD and the FDEP entered Consent Agreement OGC No. 17–0058, regarding the liquid levels within Phase I-VI and the apparent release of leachate to groundwater. SWMD was found in violation of the Solid Waste Operations permit and Rule 62-701.500(8)(b), F.A.C., by failing to maintain the leachate collection system. FDEP asserted that this allowed an accumulation of leachate greater than one foot within the landfill and caused a discharge beyond the limits of the leachate containment system. SWMD was ordered to comply with the following corrective actions within the stated time periods as a result of their violation:

The Consent Agreement stated that within 60 days of the effective date, SWMD shall prepare and submit a Corrective Action Plan (CAP) to the FDEP. The objective of the CAP was to address the inadequacies of the leachate collection system and provide a plan for evaluating and reducing leachate levels in Phase I-VI. Although multiple drafts of a CAP were submitted to FDEP, a final version of the CAP was never formally agreed upon; however, SWMD implemented leachate and groundwater evaluation, liquids management, and reporting procedures and conducted evaluation activities based on CAP drafts provided to the FDEP until official closure of the Consent Agreement in December 2020.

During this time, the County continued to sample groundwater monitoring wells outside of Phase II on a quarterly basis, including wells that were not listed in the Solid Waste Operations Permit Water Quality Monitoring Plan. Throughout that time period, groundwater quality continued to show improvements indicating that the original release had been controlled and that groundwater was undergoing natural attenuation. In August 2019, SWMD made a request for temporary relief from the quarterly groundwater monitoring requirements in Specific Condition 10 of Consent Agreement. SWMD specifically requested the following:

- Temporarily remove the quarterly groundwater sampling requirement for groundwater monitoring wells TH-20B, TH-38B, TH-80, TH-81, and TH-82.
- Temporarily remove quarterly groundwater reporting requirements from the remaining wells, TH-66A, TH-67, TH-79, and TH-83.
  - SWMD will continue quarterly sampling of groundwater monitoring wells TH-66A, TH-67, TH-79, and TH-83.
  - SWMD will submit groundwater data in the form of ADaPT files within 60 days from completion of laboratory analysis
  - SWMD will report on quarterly groundwater sampling within the semiannual groundwater report submissions.
- Should one of the TH-66A, TH-67, TH-79, or TH-83 experience two consecutive groundwater sampling events in which any of the contaminants of concern (COCs) exceeds the primary or secondary drinking water standard maximum contaminant levels (MCLs), temporary relief from the quarterly sampling of groundwater monitoring wells TH-20B, TH-83B, TH-80, TH-81, and TH-82 will be suspended. In the event of two exceedances of the same parameter in the same well, SWMD will recommence quarterly sampling and reporting of all wells.

All conditions of OGC Case No. 17-0058 are satisfied considered based on the following regulator actions:

1) Approval of the Alternate Procedure (SWAP 19-1) on March 13, 2020
2) Issuance of Permit Modification 35435-028-SO-MM of Solid Waste Permit No. 35435-022-SO-01 on September 9, 2020
3) Issuance of the Notice of Evaluation Monitoring Letter to Hillsborough County on November 20, 2020.

FDEP officially closed Consent Agreement 17-0058 on December 11, 2020.

5.2 CORRECTIVE ACTION PLAN

As required by the Consent Agreement, a CAP was submitted to the FDEP. The CAP described actions completed, ongoing, and proposed efforts to be taken by SWMD to correct conditions that contributed to groundwater impacts in the vicinity of monitoring well TH-67. The purpose and goal of the CAP was to clarify the major activities that the SWMD was to conduct in order to reduce the depth of leachate in Phase I-VI and the quantity of leachate within the landfill. The CAP also included the proposed metrics for determining when the activities have met the stated goals, a schedule for conducting the activities, and the estimated time to complete.

The objectives of the CAP were to describe actions to be taken by the SWMD to:

1) Monitor and reduce the elevated leachate levels within head on liner to an Approved Operating Level; and,
2) Monitor groundwater quality in the area adjacent to Phase II to verify leachate mitigation efforts, delineate the area of impacted groundwater, and monitor migration of COCs over time.

An initial CAP was submitted on June 26, 2017 for FDEP review. A meeting with the FDEP was held on October 12, 2017 to discuss the CAP and SWMD submitted a revision of the initial CAP. The final CAP was never officially approved by FDEP, however SWMD continued to implement corrective measures through closure of the Consent Agreement in December 2020, as described in the following sections.

5.3 MITIGATION EFFORTS

5.3.1 Pressure Test of Effluent Irrigation Line

In order to assess potential sources of the February 2016 release, the County conducted a pressure test on approximately 1,500 feet of six-inch effluent force main from July 6 to 8, 2016. The pressure test was conducted for approximately one hour at 70 pounds per square inch of pressure. There was no observed decrease in pressure throughout the time period of the test, indicating that the integrity of pipe was not compromised. This test eliminated the hypothesis that the effluent forcemain was the source of the original detection of leachate indicator parameters within groundwater adjacent to Phase II.

5.3.2 Cutoff Trench

The initial construction of the Phase II Cutoff Trench began on June 26, 2017 and ended on July 20, 2017. Additional construction activities were conducted from November 28, 2017 through December 5, 2017. The initial 1,100-foot trench is referred to as the Phase II Cutoff Trench. This trench establishes a physical barrier between the Phase II berm and perched leachate that may be in

Phase II and provides liquid level monitoring access near the perimeter of Phase II. The trench roughly parallels the interior of the Phase II eastern perimeter berm and most of the south side of Phase II. The project consisted of the following construction sequence (in sections):

- Excavated the top of clay (approximately 15 feet deep and three feet wide)
- Transported refuse to working face for disposal
- Installed a layer of #57 stone (approximately six inches)
- Installed eight-inch perforated high density polyethylene (HDPE) pipe with geotextile sock
- Backfilled trench with sand to two feet below grade to promote vertical drainage
- Replaced intermediate cover and sodded

The Phase II Cutoff Trench was extended an additional 550 feet along the south side of Phase II, through the internal division berm beginning on May 8, 2019 and ending on May 22, 2019. The Cutoff Trench Extension project was carried out in a similar manner as the original Phase II Cutoff Trench, with the exception of the trench dimensions being 10 feet depth by four feet width as opposed to 15 feet by three feet.

The Trench Location Plan for both the Phase II Cutoff Trench and the Cutoff Trench Extension are included as Figure 4 of this report.

5.3.3 Location of Headers

One component of the landfill that was investigated following the February 2016 groundwater-monitoring event was the LCRS, specifically within Phase II of the SCLF. Inspection of the header pipes in Phase II was not practical since there were no cleanouts. The design and solid waste rules and regulations at the time Phases I, II, and III were constructed did not require the addition of header access cleanouts. The SWMD possessed multiple as-built plans of the site that showed LCRS header pipes in different locations, and it was unclear which plan was correct. On two separate occasions, Waste Management, Inc. of Florida (WMIF) excavated areas in an attempt to locate these pipes with no success. In 2017, WMI excavated the header pipes and installed cleanouts for Phase I and Phase II of the SCLF.

The Phase I header consists of an 8-inch diameter, Schedule 80, perforated polyvinyl chloride (PVC) pipe, and was located and jet cleaned in March of 2017. Cleanouts 1-1, 1-2, and 1-3 were constructed and installed to facilitate future cleaning of the Phase I header pipe.

The Phase II header pipe also consists of an 8-inch diameter, Schedule 80, perforated PVC pipe. Upon discovery, the pipe was observed to lay on top of the clay layer surrounded by an approximately two-foot thick layer of #57 stone. An eight-inch HDPE pipe was connected to the header and extended horizontally to a cross fitting at the cutoff trench. From the cross fitting, the HDPE pipe extended eastward and at an upward angle to the surface as a cleanout riser (Cleanout 2-1). This section was then covered with sand, topsoil, and sod, similar to the trench.

In 2018, WMI completed an additional Phase II and Phase III header excavation project; the goal being to unearth two LCRS headers, each on the northern sides of Phase II and Phase III. Following discovery and exposure of the header pipes in each location, header access cleanouts were extended from the original header pipes to the surface, at the edge of the landfill. The Phase III header that runs north to south, near the Phase III and the Phases IV-VI internal division berm, was extended to create Cleanout 3-1. The Phase II header that runs north to south along the western toe of the Phase II/Phase III internal division berm also had an access cleanout constructed at that time. This access cleanout is referred to as Cleanout 2-4. The construction of these header access cleanouts provides SWMD an expanded ability to maintain the LCRS.

5.3.4 2017 Revised Fill Sequence

At the time the original release was discovered, waste filling was occurring in Phase I as part of Lift 13. The following lifts, Lift 14 and Lift 15, were planned to proceed counter clockwise across Phase II and Phase III. However, the fill sequence was modified to postpone filling in Phase II and Phase III as part of an April 2017 Operations Permit Minor Modification Application submitted by SCS on behalf of the SWMD.

In order facilitate additional clay settlement at PS-B to promote LCRS conveyance, the Fill Sequence was modified starting with revised lifts numbered Lift 16A and Lift 17A. The modification called for filling the area over and around Phase VI, which improved leachate conveyance to the PS-B sump and allowed for additional time to complete CAP activities in Phase II. After the completion of Lift 13, landfilling operations were moved to Lifts 16A and 17A. Once these lifts were filled, landfilling operations returned to the approved sequence of completing Lift 14 and 15.

The following is a summary of the revised sequencing:

a) Lift 13 - No changes to landfilling operations
b) Lifts 16A and 17A - To follow Lift 13 in order to allow for filling over PS-B earlier than currently permitted to allow additional settlement to promote drainage towards PS-B.
c) Lifts 14 and 15 - To follow Lift 17A with filling to resume as outlined in the Solid Waste Operations Permit.

5.3.5 2020 Revised Fill Sequence

As a part of the March 13, 2020 approved Alternate Procedure, SWMD submitted a Solid Waste Operations Permit Modification Application to address the contents of the Alternate Procedure. The Solid Waste Operations Permit Modification Application incorporated a revised fill sequence to address two aspects of the Alternate Procedure, increasing runoff to reduce leachate generation and the accelerated final closure of Phase II and Phase III.

Upon the approval of the Solid Waste Operations Permit Modification on September 9, 2020, SWMD began preparations, moved from Lift 16A, and commenced waste filling in Lift 18A on November 1, 2020. Beginning with Lift 18A, Phase I-VI will be filled in a manner to promote runoff during interim stages and accelerate closure of Phase II and Phase III.

5.3.6 Accelerated Closure

As a part of the March 13, 2020 approved Alternate Procedure, an Accelerated Closure Plan was outlined in which the majority of Phases II and III will receive final closure cover as filling continues. The purpose of the revised fill sequence was to reduce stormwater infiltration into the landfill in an effort to subsequently reduce leachate generation, specifically in Phase II and Phase III of the SCLF. The accelerated closure areas will be divided into three closure areas:

- Closure Area 1 (southern part of Phase II) – This closure will take place approximately one-third of the way into Lift 18B, and the estimated closure area is approximately 20 acres,

- Closure Area 2 (northern part of Phase II) – This closure will take place approximately two-thirds through the filling of Lift 18B, and the estimated closure area is 17 acres.

- Closure Area 3 (northern part of Phase III) – This closure will take place upon the completion of waste filling in Lift 18B, and the estimated closure area is 18 acres.

The areas identified for accelerated final closure are identified in the currently approved Operations Plan as part of the Phase I-Vi fill sequence.

5.3.7 Alternate Procedure

In 2019, on behalf of the SWMD, SCS submitted a Request for Alternate Procedure Approval (Request) to amend the operating conditions related to leachate levels over the liner within the Phase I-VI disposal area at the SCLF. The Alternate Procedure sought was authorization to operate the Phase I-VI disposal area with a leachate depth of up to 30 inches. This operational level is comparable to the level intended in the original design as well as the original construction and operation permit application.

The basis for this exemption is founded in:

1) The unique history and design of the Phase I-VI disposal area;
2) The evolution of the regulations that have been applied to this facility and specifically the Phase I-VI disposal area;
3) The generally successful operation of the facility in providing continued protection of the environment for the past 35 years since the permitting and construction of the Phase I-VI disposal area; and
4) The supplemental operational controls already implemented and those proposed to be implemented by the SWMD to provide additional safeguards and protections to the environment.

The primary operational improvements proposed in the Request are summarized as follows:

- <u>PS-B Sump Leachate Maintenance Levels</u> - During routine operation the leachate level measured in the PS-B sump by the installed pressure sensor device will be maintained below 30 inches. Liquid levels will continue to be recorded daily and provided to the FDEP in Quarterly Water Balance Reports.

- <u>Cutoff Trench Monitoring Point Leachate Maintenance Level</u> - During routine operation the leachate level measured in the Monitoring Point 2-2 (MP 2-2) will be maintained below 30 inches as measured from a liquid level measurement device in the MP 2-2 cutoff trench monitoring point. Liquid levels will continue to be recorded daily and provided to the FDEP in Quarterly Water Balance Reports. The monitoring system consists of a solar powered cellular telemetry device that provides the data from a pressure transducer to a cloud-based console accessible by SWMD staff. This software has alarm points that alert personnel in the event of abnormal liquid levels so that the underlying issue can be resolved in a timely manner.

- <u>Phase II Cleanout 2-1 (CO 2-1) Header Pipe Leachate Maintenance Level</u> - During routine operation, after placement of initial cover, the leachate level measured within the CO 2-1 header will be maintained below 30 inches as measured from a pressure level sensor placed in the CO 2-1 header access clean out. Liquid levels will continue to be recorded daily and provided to the FDEP in Quarterly Water Balance Reports.

- <u>Additional Leachate Monitoring Locations</u> - The SWMD will install necessary telemetry systems and measurement devices required to control additional pumping and to collect daily liquid level data for compliance monitoring.

- <u>Revised Fill Sequence Plan</u> - See Section 2.6.4 2020 Revised Fill Sequence.

- <u>Accelerated Closure of Phases II and III</u> - The SWMD will conduct closure of Phases II and III areas that have reached design elevations to mitigate storm water infiltration. See Section 2.6.5 Accelerated Closure.

- Abandon Existing Piezometers - To reduce stormwater infiltration into the landfill, the SWMD abandoned piezometers installed through the Phase I-VI waste mass by grouting the casing of each piezometer and removing the PVC stickup. The abandonment eliminated unnecessary conduits from the landfill surface directly to the top of the waste phosphatic clay liner, reducing leachate generation and leachate head on the liner.

6.0 GROUNDWATER ASSESSMENT ACTIVITIES

As discussed above, elevated leachate indicator parameters were detected in samples from TH-67 during routine monitoring. Subsequent monitoring confirmed the results and indicated that COCs were migrating down-gradient in groundwater from TH-67 southward. No leachate release was specifically identified and actions taken to mitigate potential releases were undertaken, as described in detail above.

To help understand the potential extent of elevated COCs in groundwater, constituent trend analysis and geophysical investigations were conducted. These activities are described below.

6.1 CONSTITUENT TREND ANALYSES

6.1.1 Mann-Kendall Methodology

A Mann-Kendall Trend Analysis Test (M-K Test) was used to analyze data that has been collected over time for either increasing or decreasing trends. The M-K Test is insensitive to gross outliers, does not make assumptions regarding data distributions, and accommodates trace values or non-detects.

Sufficiency was defined as a parameter analyzed for a well in at least four monitoring events between August 2012 and August 2020, and of which at least 50 percent of the data consisted of detected concentrations (i.e., a proportion of the non-detect results 50 percent or lower). These data restrictions were imposed because of the limitations of the M-K Test, which lacks statistical power at low sample sizes and is unable to appropriately handle high-censored data sets (those with high proportions of non-detect results).

For each monitoring well data set, a false positive rate of 0.05 was applied (i.e., 95 percent confidence). This means that in order for the M-K Test to identify a statistically significant trend, there must have be a false positive trend identification probability of less than a five percent.

The M-K Test was conducted with the GSI Mann-Kendall Toolkit, programmed in the Microsoft Excel spreadsheet format, and included as Appendix A of this report.

6.1.2 Results of Mann-Kendall Trend Analysis Test

The M-K Test was applied to the groundwater monitoring data collected at the SCLF from August 2012 through August 2020 to provide a more defined statistical view of the flow of the contaminant plume in the southeast corner of the landfill. The following monitoring wells were included in the M-K Test: TH-20B, TH-80, TH-81, TH-82, TH-83, TH-66A, TH-67, and TH-79. The M-K Test was used to evaluate groundwater conductivity, total dissolved solids, chloride, ammonia, and sodium.

Monitoring Well TH-67

Elevated readings were first observed at TH-67 during the February 2016 water quality monitoring sampling event. At TH-67, the parameters evaluated by the M-K Test identified elevated parameter values at and after the time of the first observed event in 2016. There was one statistically significant trend in parameter concentration over time. This was a decrease in conductivity since 2012. Additionally, there was probable decreases in the parameters of total dissolved solids and sodium over this time period as well. These trends are displayed in Appendix A.

Down-Gradient Monitoring Wells

Groundwater monitoring wells TH-81 and TH-83 are located down gradient from TH-67. Following the initial observation of elevated concentrations of leachate indicator parameters within the groundwater samples collected from TH-67 in 2016, similar indicator parameters were observed in increasing concentration in the groundwater samples collected from TH-81 and TH-83. These elevated concentrations as well as the trends are presented below and in Appendix A.

For TH-81, there were four significant trends in parameter concentrations over time. These were decreases in conductivity, chloride, ammonia and sodium. For MW TH-83, there were four significant trends in parameter concentrations over time. These were increases in conductivity, total dissolved solids, ammonia, and sodium.

Elevated readings in TH-67 in 2016 and TH-81 in 2018, followed by statistically significant decreases displays that the contaminant plume was migrating down-gradient from TH-67. This was further supported by the statistically significant rise in parameter concentrations at TH-83; which is down gradient from both TH-67 and TH-81.

Up-Gradient Monitoring Wells

Groundwater monitoring wells TH-82, TH-80, TH-79, and TH-66A lie up gradient from TH-67. The trends presented below are presented in Appendix A of this report.

Groundwater monitoring well TH-82 is the closest up-gradient well from TH-67 and did not have any statistically significant trend indicating an increase in the parameter concentration. Conductivity, chloride, ammonia, and sodium were all considered to be stable concentrations over time.

Monitoring wells TH-80 and TH-79 are up-gradient of monitoring well TH-82, and there were four and five statistically significant trends in parameter concentrations over time, respectfully. The statistically significant trends for TH-80 were decreases in all parameters except ammonia, which the M-K Test determined was stable. For TH-79, the statistical trends were decreases for all parameters tested.

Monitoring well TH-66A lies furthest up-gradient of the wells included in the M-K Test. There were four statistically significant trends in parameters concentrations over time. The parameters of conductivity, chloride, and sodium exhibited decreases, and ammonia displayed an increase. This increase in ammonia can be attributed to ammonia naturally present in groundwater as a result of the degradation of naturally occurring organic matter. It does not appear that the ammonia concentrations observed in TH-66A were related to the original leachate release in 2016. Groundwater analytical data predating the 2016 leachate release supports this assertion. Also, ammonia is not a reliable indicator of nitrogen-based contamination origin or migration, for the following reasons:

- Ammonia is naturally generated under anaerobic conditions from organic matter and is bioavailable for uptake by plants.
- Under certain anaerobic conditions, ammonia can be broken down by anaerobic bacteria, producing nitrogen gas.
- In the presence of oxygen, ammonia is rapidly converted to nitrite and then to nitrate by two species of aerobic bacteria.

- If groundwater again becomes anaerobic, the reverse reactions can occur, producing ammonia from nitrate and nitrite.

The statistically significant trends of leachate indicator parameters decreasing at up-gradient monitoring wells demonstrates that the plume has been moving down-gradient from TH-67 and is following groundwater flow in the area that is driven largely by the phosphatic clay layer that extends beyond the edge of the landfill.

Monitoring Well TH-20B

Monitoring well TH-20B is located in the southeast corner of the SCLF, south and to the west of TH-83. For the M-K Test, TH-20B served as a background well. Parameter concentrations for this monitoring well were collected from 2016 through 2019, and there were no statistically significant trends in any of the parameters tested. This confirms that the contaminant plume has not migrated beyond TH-83, either to the south or to the west. These trends are presented in Appendix A of this report.

6.1.3 Summary of Findings

The results of the M-K Tests illustrate how the contaminant plume, first detected at TH-67 in 2016, consistently migrated southward over the past four years. This can be seen in the elevated readings at TH-81 in 2018, followed by a statistically significant decrease in four of the parameters tested. This migration is also revealed in the current elevated readings in the parameters in TH-83, down-gradient from both TH-67 and TH-82.

Further, a lack of statistically significant increasing trends in wells up-gradient from TH-67 work to display that the contaminant plume is moving southward along the top of waste phosphatic clay adjacent to Phase II.

The constituent trends shown in the M-K analysis are supported visually in the groundwater COC concentration maps included in Appendix B of this report. The constituents analyzed for the concentration maps were chlorides, conductivity, and sodium from 2016-2020 in the same wells used in the M-K analysis. A tables summarizing the M-K Test results is provided below, in Table 1.

Table 1. Summary of M-K Test Results

Monitoring Location	Conductivity	Total Dissolved Solids	Chloride	Ammonia	Sodium
TH-20B	Stable	No Trend	Stable	No Trend	Stable
TH-66A	Decreasing	No Trend	Decreasing	Increasing	Decreasing
TH-67	Decreasing	Prob. Decreasing	No Trend	No Trend	Prob. Decreasing
TH-79	Decreasing	Decreasing	Decreasing	Decreasing	Decreasing
TH-80	Decreasing	Decreasing	Decreasing	Stable	Decreasing
TH-81	Decreasing	Prob. Decreasing	Decreasing	Decreasing	Decreasing
TH-82	Stable	No Trend	Stable	Stable	Stable
TH-83	Increasing	Increasing	Prob. Increasing	Increasing	Increasing

6.2 GEOPHYSICAL INVESTIGATION

At the request of SWMD, Geoview, Inc. (Geoview) conducted a geophysical investigation at the SCLF in November 2016. The horizontal geophysical investigation was performed between the southeastern corner of the landfill and the perimeter road as specified by SCS personnel and focused on the area surrounding TH-67. The purpose of the investigation was to help identify the source and extent of elevated groundwater specific conductance and constituents of concern related to the original leachate release. Conductivity measurements were collected by Geoview using a Geonics EM-31-MK2 ground conductivity meter in vertical dipole orientation at one-foot intervals along transects spaced approximately 15 feet apart, parallel to the SCLF landfill limits.

The report, by Geoview, presented the bulk conductivity readings near the edge of Phase II perimeter berm to a depth of approximately 16 feet below ground surface (fbgs). An area of elevated soil conductivity was mapped. Further investigation was required to monitor the relative conductivity of the soil near the SCLF and to horizontally delineate areas of high conductivity.

Geoview completed additional geophysical surveys in November 2017 and November 2018. The equipment and area of focus were the same as what was used in 2016. The 2017 and 2018 Geoview reports showed similar conductivity ranges as the 2016 report. Additional subsurface geophysical surveys were conducted in May 2019, October 2019, December 2019, and July 2020 to observe and monitor changes in subsurface bulk conductivity over time and seasonal variability. The 2016-2020 geophysical subsurface conductivity figures are included as Appendix C of this report.

In the 2016, 2017, and 2018 Geoview reports, the area that shows an elevated conductivity response was identified near the toe of the containment berm in the southeast corner of Phase II. SCS compared the results of the three surveys and noted a discernable decrease in the bulk subsurface conductivity within the area of elevated conductivity response.

From 2016 to 2018, conductivity values between TH-67 and TH-83 decreased approximately 60 milli-seimens/meter (mS/m). Additionally, the subsurface conductivity of the area immediately south of TH-79 decreased approximately 40 mS/m. Conversely, conductivity values near the perimeter road changed little (less than 10 mS/m) from 2016 to 2018, which indicates that subsurface conductivity changes are limited to the area between the toe of the Phase II containment berm and the perimeter road.

The Geoview reports state that changes in local conductivity measurements can be caused by metallic interference (metal monitoring well housing and pumps), changes in geologic conditions, or changes in groundwater chemistry. For the purposes of the reports, Geoview assumed that changes in conductivity were a result of changes in conductance of shallow groundwater. Metallic interference of subsurface conductivity was limited to areas immediately adjacent metal monitoring well housings and protective bollards.

By evaluating the results of the 2016 through 2020 Geoview reports, SCS concluded that the corrective actions implemented by SWMD isolated and abated the source of groundwater impacts, and that overall groundwater quality adjacent to Phase II exhibited continuous improvement over that period. Groundwater monitoring results from the same period confirmed this conclusion. The corrective actions conducted by SWMD appear to have been effective in reducing groundwater parameter exceedances observed during the quarterly monitoring events.

6.2.1 Tierra Geotechnical Soil Resistance

In order to verify that subsurface geologic conditions with high resistivity were not misinterpreted as a COC plume, SCS subcontracted Tierra, Inc. (Tierra) to advance multiple soil borings between the southeast edge of Phase II and the perimeter road at SCLF. Various geotechnical laboratory tests were conducted on the samples collected from the soil borings, including soil resistivity utilizing The Florida Department of Transportation Sampling and Testing Method 5-551. The laboratory test results provided by Tierra were converted from ohm-cm to mS/m to represent the conductivity of the soil sample. The converted data and the field boring logs were then compared to the bulk subsurface conductivity obtained from the analysis performed by Geoview and historical data for waste phosphatic clay collected in a 1982 study by Ardaman and Associates, Inc. in order to assess the horizontal and vertical extents of the phosphatic clay.

The laboratory results of the sand soil samples show a low conductivity reading from a depth of 2-4 feet, as well as 6-8 feet, while the waste phosphatic clay exhibits a higher conductivity due to the high water retention capabilities of the soil. The results of the average conductivity analysis for waste phosphatic clay from the 1982 Ardaman study generally coincide with the values from the Geoview survey, as well as the Tierra laboratory results. Furthermore, the pre-construction contour map of the thickness of waste phosphatic clay produced by Ardaman in a 1981-1983 study shows that the area outside Phase II of the SCLF contained waste phosphatic clay, but that the limits did not extend throughout the property. The Ardaman clay contour thickness map is included in Figure 3. Considering this historical data, it is likely that the limit of elevated conductivity outside of Phase II is largely a reflection of the horizontal extent of waste phosphatic clay.

This differentiation between elevated conductivity due to the presence of ionic compounds associated with leachate in the groundwater versus the presence of waste phosphatic clay is important. Elevated conductivity from the clay effectively represents background conductivity detected during geophysical surveys. SCS has considered this when comparing results of the geophysical surveys. Changes in bulk subsurface conductivity represent movement and attenuation of ionic compounds in groundwater. Thus, both geophysical and groundwater quality data suggest that the limits of impacted groundwater are notably less than what was thought after review of the first geophysical survey.

Furthermore, the presence of the waste phosphatic clay adjacent to Phase II creates a vertical hydraulic barrier in the immediate vicinity of the original release that abruptly ends laterally. The physical properties and location of the waste phosphatic clay in this area affects groundwater flow direction immediately adjacent to the landfill. This is consistent with water-level elevation data indicating a southerly flow of groundwater adjacent to the landfill. It also explains the COC trends in samples from TH-67 and subsequent similar trends in samples from wells down-gradient of TH-67.

6.3 NEW ZONE OF DISCHARGE WELL TH-84

At the request of the SWMD, SCS conducted a limited field investigation to better understand groundwater quality and flow direction near monitoring well TH-83 at the SCLF. The field investigation data facilitated identification of an appropriate location for an additional compliance well located at the Zone of Discharge (ZOD). The new ZOD well (TH-84) was later installed in coordination with input from the FDEP. The following is a description of the field effort and summary of initial findings.

6.3.1 TH-84 Location Site Assessment

SCS representatives were on site September 23, 2020 to observe soil boring activities, install temporary groundwater sampling points, collect measurements of field parameters, and record preliminary groundwater elevation measurements. SCS subcontracted Action Environmental (Action) to advance four soil borings using hand augers and direct push technology (DPT). The borings were completed to a depth of 15 feet below land surface. Soil samples were collected to record lithology.

At the completion of the soil borings, temporary sampling points were installed and constructed of 1-inch-diameter PVC pipe. A 10-foot section of 0.010-inch horizontal slotted PVC screen was attached to 5-foot section of solid PVC pipe to above ground surface. Following installation of temporary sampling points, Peavey & Associates was subcontracted to survey the horizontal and vertical locations of the DPT borings.

Depth to groundwater was measured prior to purging the temporary sampling points. Based on the collected elevation data, SCS was unable to determine a reliable groundwater flow direction. This was likely due to inconsistencies in the data resulting from the short stabilization time between installation and removal of the temporary sampling points. Approximate flow directions are shown in the semiannual groundwater monitoring reports contour maps, included as Appendix D of this report.

Following installation and development of temporary wells, groundwater samples were collected and analyzed for selected field and laboratory parameters. Field measurements of pH, specific conductance, temperature, dissolved oxygen, and turbidity were collected during purging of the temporary sampling points. Specific conductance is a good indicator of groundwater quality with respect to the COCs. The preliminary field screening values of the temporary wells indicated that it was unlikely that the COCs were unlikely to be in exceedance of primary or secondary MCLs at the edge of the ZOD. Later, preliminary sampling results from TH-84 confirmed that groundwater quality had not been impacted at ZOD. A memorandum documenting field activities, results, and recommendations was provided to FDEP on November 4, 2020.

Results of laboratory analysis indicated that the groundwater sample from GW SB-1 had higher concentrations of the analyzed parameters compared to the other samples. However, the laboratory results suggested that concentrations of COCs were below regulatory limits at the ZOD. After sampling was completed, the PVC pipes were removed, and the boreholes were backfilled with hydrated bentonite slurry.

SCS recommended the installation of a ZOD compliance well (TH-84) on the south-southeast side of the landfill perimeter road, between GW SB-1 and GW SB-2. FDEP agreed that the proposed location of the ZOD compliance well appeared to be appropriate in a November 17, 2020 email. The ZOD compliance well was installed within 100 feet of the landfill with as much clearance from the landfill perimeter road as possible in order to mitigate traffic safety concerns and to decrease the possibility of inadvertent damage to the well.

6.3.2 Installation of TH-84

SCS subcontracted with Ambient Technologies (ATI) to install the required ZOD compliance well at SCLF on November 25, 2020. The new well, designated TH-84, was installed approximately 99 feet from the edge of the Phase II disposal unit, at the edge of the zone of discharge. TH-84 will act as the required compliance well associated with detection well TH-83. Therefore, TH-84 was screened from elevation 116.6 to elevation 126.6 feet (NGVD 1929), which intersects historically observed local groundwater elevations. Following installation, ATI developed the well and SCS collected preliminary field parameter readings.

On January 8, 2021, Hillsborough County representatives conducted the initial groundwater-monitoring event for the ZOD well TH-84. Additionally, samples were also collected from background well TH-22A and detection well TH-83. Complete results were recently submitted to the FDEP in the Evaluation Monitoring Preliminary Sample Results report prepared by SCS. Concentrations of COCs related to the leachate release were below MCLs in all three wells, with results from TH-22A and TH-83 being consistent with recent historical data. Concentrations of COCs in the sample from TH-84 were two orders of magnitude below the MCLs and an order of magnitude below concentrations in the sample from TH-83. Data trends will be monitored after future monitoring events are completed, but the data does not indicate that COCs have impacted groundwater at the edge of the ZOD.

7.0 CONCLUSIONS

Based on actions taken to mitigate the risk of future leachate releases and results of groundwater monitoring and assessment, SCS concludes the following:

1) Landfill operational improvements have significantly reduced the risk of future leachate releases.
2) No breach of the landfill liner system has been identified and it appears that the release was a one-time event.
3) COCs originally detected at elevated concentrations in samples from TH-67, have migrated southward along the edge of the landfill, exhibiting a similar pattern in each successive downgradient well. Concentrations rise over time to a peak and then gradually lower as the plume migrates and attenuates. We believe that COC concentrations are close to a peak in TH-83 and that the trend will decrease going forward. The maximum COC concentrations have continued to decrease as groundwater has naturally attenuated as it has migrated from TH-67 to TH-83.
4) Groundwater in the area between TH-67 and TH-83 appears to move southward, parallel to the landfill liner, on top of residual waste phosphatic clay that extends beyond the margins of the landfill. The clay is evident in geophysical surveys of the area and serves prevent downward migration of COCs.
5) Based on monitoring results from TH-81 and TH-82, as compared with those from TH-67 and TH-83, the direction of groundwater flow is predominantly southward, with very little eastward migration.
6) COC concentrations at the newly-installed ZOD well (TH-84) are well below Primary and Secondary MCLs.
7) The COC concentration trends suggest that groundwater COCs have continued to attenuate since the original event. If COCs in groundwater eventually reach the edge of the ZOD, concentrations will likely be below Primary and Secondary MCLs and water quality standards will not be violated at the edge of the ZOD.

8.0 RECOMMENDATIONS

SCS recommends the implementation of monitored natural attenuation for a period of 18 months. SWMD will continue collection of groundwater samples from TH-22A, TH-83, and TH-84 on a quarterly basis in conjunction with the semiannual groundwater sampling and reporting required as part of the Solid Waste Permit No. 35435-022-SO-01 Water Quality Monitoring Plan. The proposed schedule will allow for collection of additional groundwater data from TH-83 and TH-84 while accounting for season groundwater variations. Similar to groundwater reporting conducted under Consent Agreement 17-0058 since 2019, quarterly groundwater sampling results will be submitted in ADaPT form following receipt of laboratory analysis and quarterly Evaluation Monitoring Program reporting will be incorporated into Semiannual Water Quality Monitoring Reporting conducted as part of the Solid Waste Permit Water Quality Monitoring Plan.

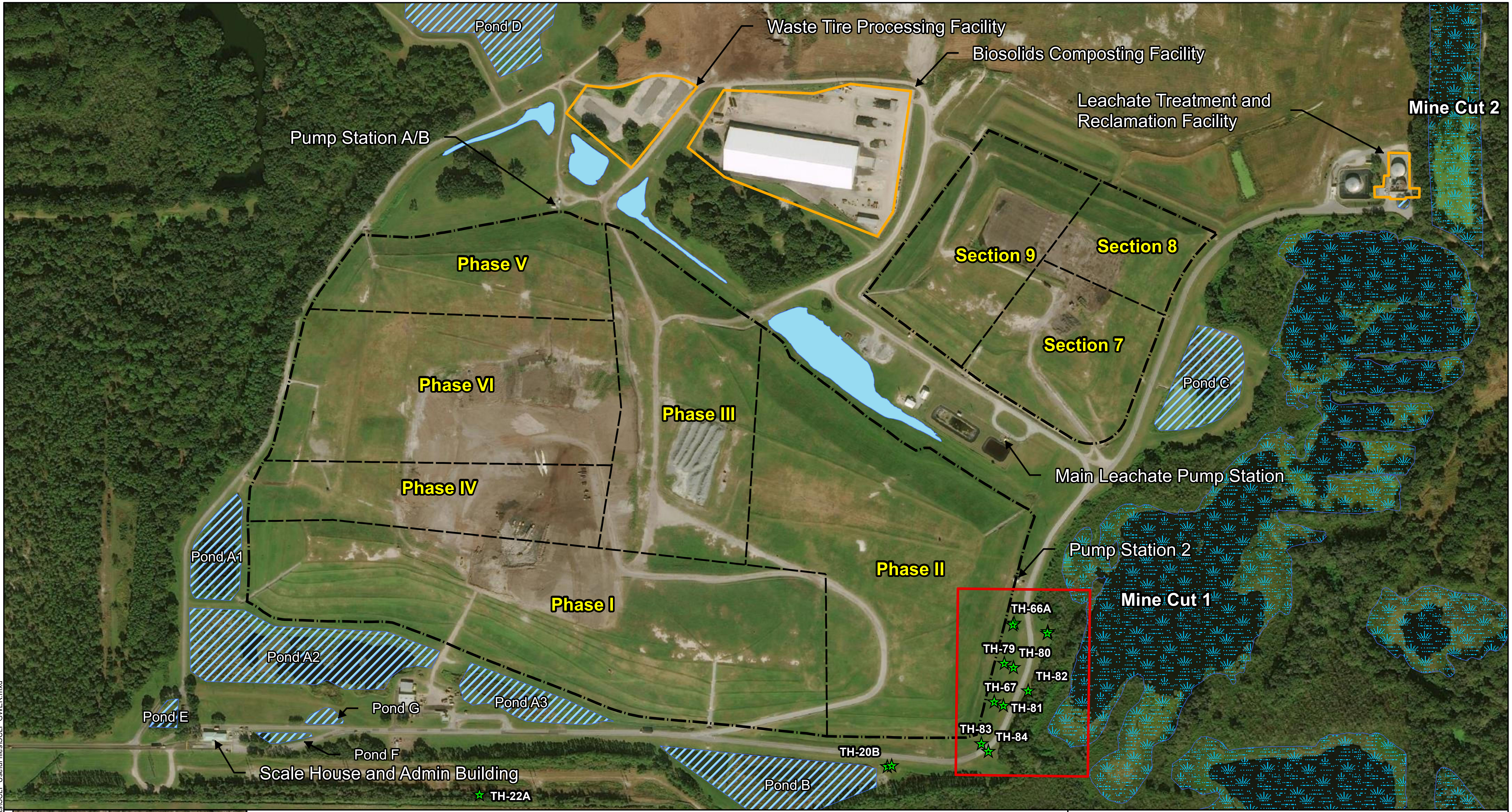
SWMD will conduct regular sampling, confirmation sampling, and reporting in accordance with FAC 62-701.510(6)(a). If laboratory analytical generated as part of quarterly sampling events indicates that water quality standards or criteria are likely to be violated outside the zone of discharge, SWMD will, within 90 days, submit a Prevention Measures Plan to the Department.

Following conclusion of the 18 month monitoring period recommended as part of this Contamination Evaluation Plan, SWMD will develop a Contamination Evaluation Report in accordance with Condition 5 of the November 20, 2020 FDEP letter to SWMD indicating initiation of evaluation monitoring. The Contamination Evaluation Report will be submitted to FDEP within 90 days of receipt of the laboratory analytical report for the final sampling event to be included in the report.

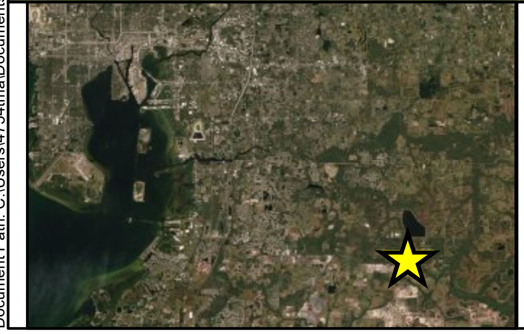
FIGURES

Figure 1

Overall Site
Map



Document Path: C:\Users\4754tma\Documents\SCLF Useful files\SCLF GWER.mxd



Legend

- Groundwater Monitoring Well
- Area of Interest
- Landfill Liner Limit
- Phase/Section Boundary
- Site Features
- Detention Pond
- Existing Waterbody
- Sedimentation Pond

Hillsborough County Florida

EST. 1834

FIGURE 1 SITE OVERVIEW
HILLSBOROUGH COUNTY FLORIDA
SOUTHEAST COUNTY LANDFILL
SITE MAP

SCS ENGINEERS

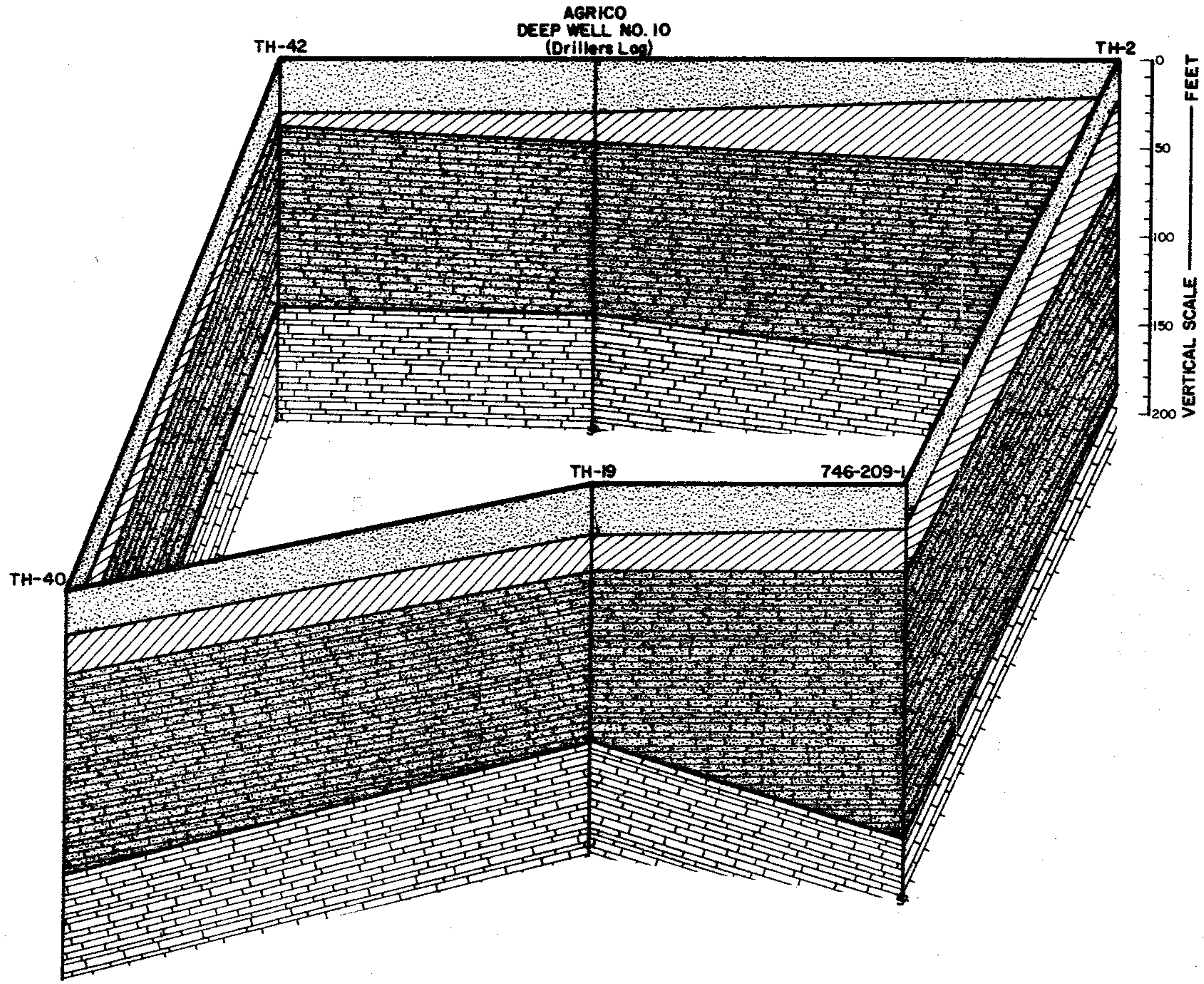
Tampa, FL | May 2021

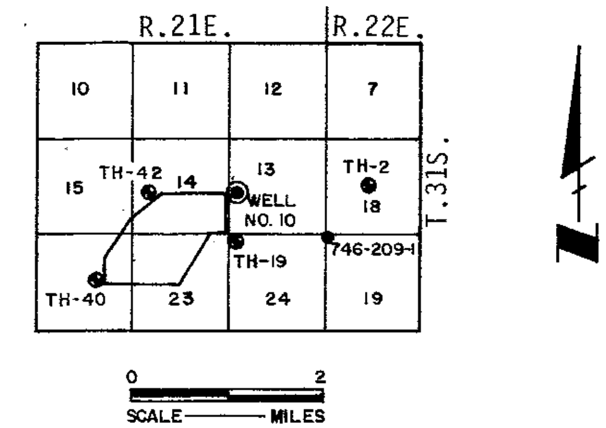
0 250 500 Feet

N

Figure 2
General Local Geology Figure from 1983 Hydrogeologic Investigation

FENCE DIAGRAM OF THE GENERAL GEOLOGY





LEGEND

- UNDIFFERENTIATED SANDS AND CLAYS
- BONE VALLEY FORMATION
- HAWTHORN FORMATION
- TAMPA LIMESTONE
- 746-209-1 U.S. GEOLOGICAL SURVEY WELL LOG
- AGRICO DEEP WELL NO. 10
- TEST HOLE LOCATION

NOTE: TH-2 WAS DRILLED AS PART OF ARDAMAN REPORT DATED DECEMBER 28, 1981.

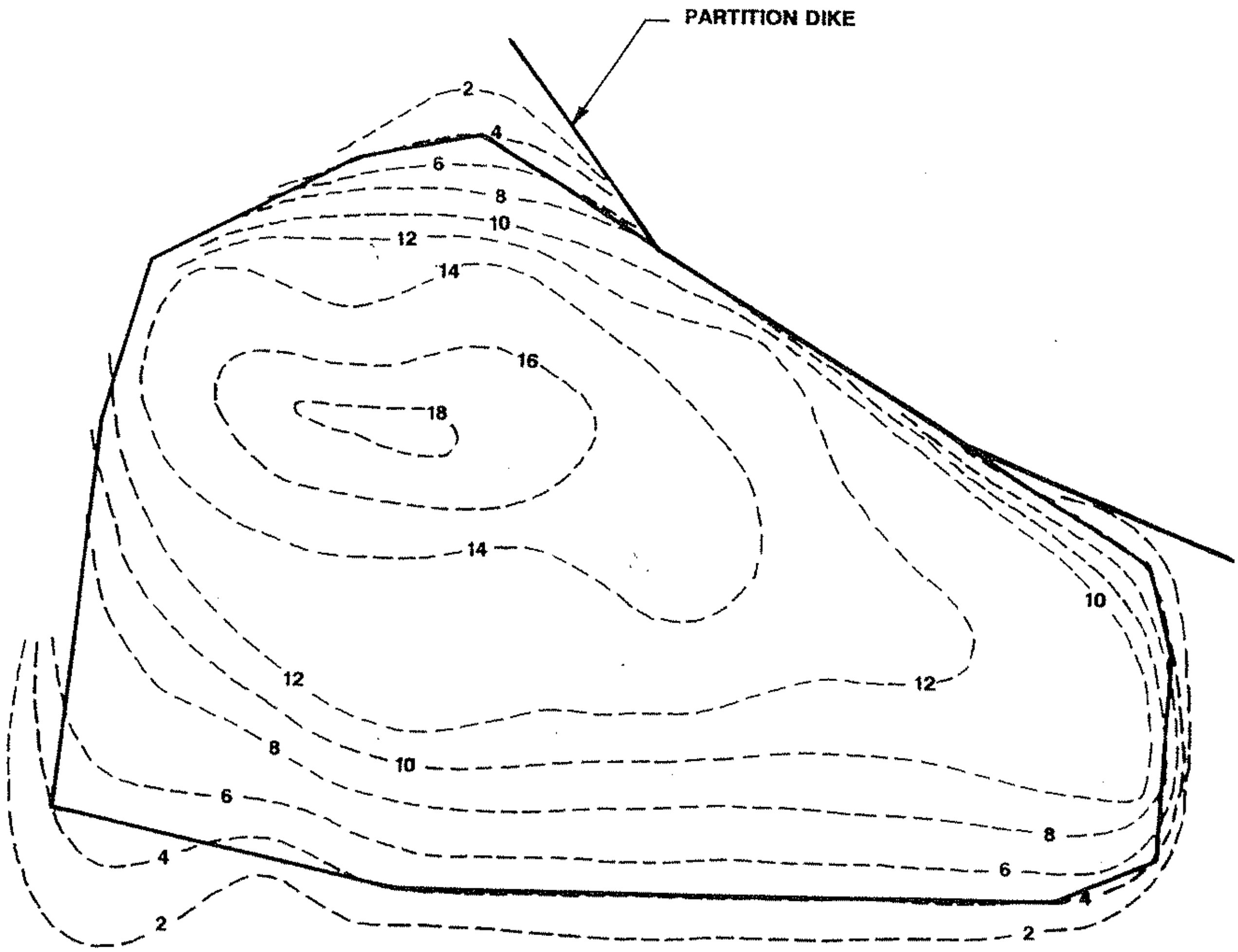
Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics, Foundations, and Material Testing

HYDROGEOLOGICAL INVESTIGATION
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH COUNTY, FLORIDA

DRAWN BY: R.J.F.	CHECKED BY:	DATE: 1/10/83
FILE NO. 81-159	APPROVED BY: H.G. Stangland	

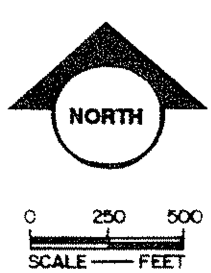
FIGURE 4.2

Figure 3
1983 Clay Contour
Map



THICKNESS OF PHOSPHATIC CLAY BEFORE LANDFILL CONSTRUCTION

(REPRODUCED FROM ARDAMAN & ASSOCIATES' 1981-1983 STUDY)



LEGEND

10 CONTOUR OF CLAY THICKNESS IN FEET

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

GEOTECHNICAL INVESTIGATION
SOUTHEAST LANDFILL
HILLSBOROUGH COUNTY, FLORIDA

DRAWN BY: TS	CHECKED BY: SKB	DATE: 03/02/94
FILE NO. 93-029	APPROVED BY:	FIGURE 2

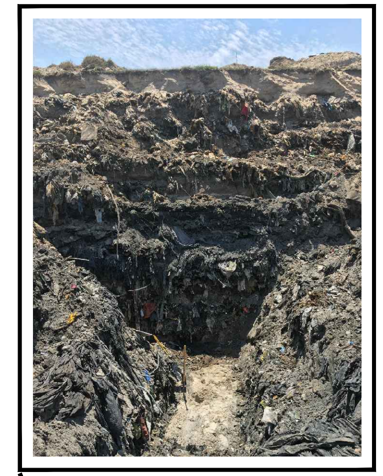
N03676

Figure 4

Trench Location

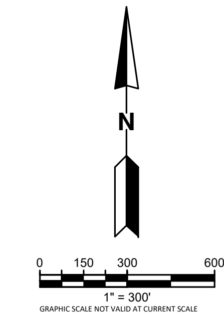
Plan

APRIL-MAY 2018: TRENCHING TO TOP OF CLAY FOR THE 3-1 HEADER - APPROXIMATELY 50 FEET (HORIZONTALLY) FROM THE TOP OF THE CONTAINMENT BERM

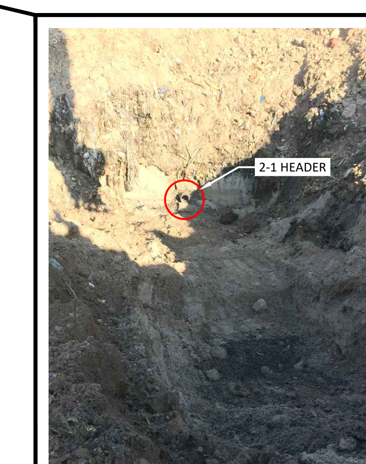


APRIL-MAY 2018: TRENCHING TO TOP OF CLAY FOR THE 2-4 HEADER - APPROXIMATELY 50 FEET (HORIZONTALLY) FROM THE TOP OF THE CONTAINMENT BERM

APRIL-MAY 2018: TRENCHING TO TOP OF CLAY FOR THE 2-4 HEADER - APPROXIMATELY 50 FEET (HORIZONTALLY) FROM THE TOP OF THE CONTAINMENT BERM

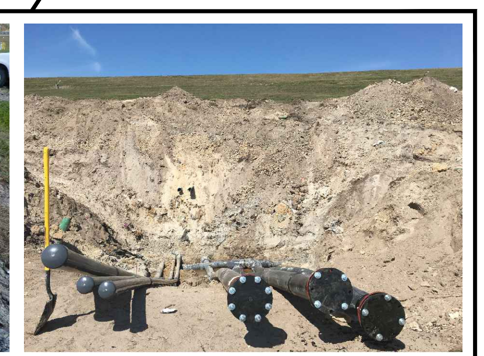


JUNE-JULY 2017: TRENCHING TO TOP OF CLAY - PHASE II CUTOFF TRENCH - APPROXIMATELY 35 FEET (HORIZONTALLY) FROM THE TOP OF THE CONTAINMENT BERM



JUNE-JULY 2017: EXCAVATION TO TOP CLAY FOR THE 2-1 HEADER - APPROXIMATELY 50 FEET (HORIZONTALLY) FROM THE TOP OF THE CONTAINMENT BERM

MARCH 2017: TRENCHING TO TOP OF CLAY FOR PHASE I HEADER - APPROXIMATELY 35 FEET (HORIZONTALLY) FROM THE TOP OF THE CONTAINMENT BERM



MARCH 2017: CONNECTION TO THE PHASE I HEADER AND LATERAL PIPES AT THE TOP OF CLAY - APPROXIMATELY 50 FEET (HORIZONTALLY) FROM THE TOP OF THE CONTAINMENT BERM

MAY 2019: TRENCHING TO TOP OF CLAY FOR THE PHASE II CUTOFF TRENCH EXTENSION- APPROXIMATELY 35 FEET (HORIZONTALLY) FROM THE TOP OF THE CONTAINMENT BERM

JUNE-JULY 2017: TRENCHING TO TOP OF CLAY FOR THE PHASE II CUTOFF TRENCH - APPROXIMATELY 35 FEET (HORIZONTALLY) FROM THE TOP OF THE CONTAINMENT BERM

LEGEND:

SB-# ○	REMOVED PIEZOMETER LOCATION
MP-# ●	MONITORING POINT
TH-# (MW)	MONITORING WELL
PS-# □	PUMP STATION
#-# ●	CLEANOUTS
— — —	PHASE LIMIT
———	PERFORATED HEADER PIPE
· · · · ·	LEACHATE COLLECTION TRENCH (CHIPPED TIRES)
- - - - -	LEACHATE COLLECTION TRENCH (GRAVEL)
- · - · -	CUTOFF TRENCH

SCS ENGINEERS

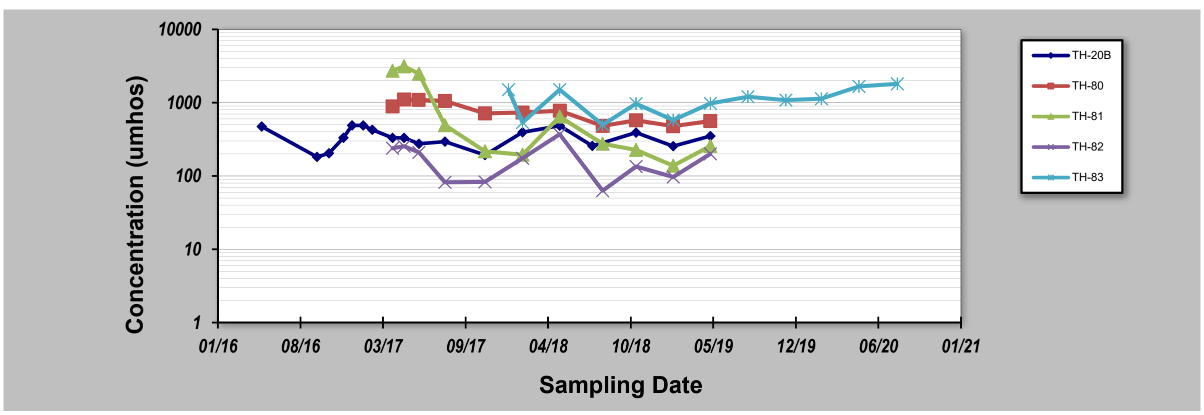
SOUTHEAST COUNTY LANDFILL TRENCH LOCATION PLAN
HILLSBOROUGH COUNTY
MAY 2021

Appendix A
Mann-Kendell
Analysis Results

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 11-Feb-21
Facility Name: SCLF
Conducted By: FCH
Job ID: 09215600.11
Constituent: Conductivity
Concentration Units: umhos

Sampling Event	Sampling Date	TH-20B	TH-80	TH-81	TH-82	TH-83		
		CONDUCTIVITY CONCENTRATION (umhos)						
1	May-16	473						
2	Sep-16	182						
3	Oct-16	204						
4	Nov-16	332						
5	Dec-16	490						
6	Jan-17	489						
7	Feb-17	427						
8	Mar-17	331	889	2723	239			
9	Apr-17	331	1104	3128	254			
10	May-17		1090					
11	Jun-17	275		2476	210			
12	Aug-17	294	1055	493	82			
13	Nov-17	192.9	714	216.8	83			
14	Jan-18					1504		
15	Feb-18	394.8	733	194.9	174.3	537		
16	May-18	484.6	777	644	370.9	1505		
17	Jul-18	257						
18	Aug-18		482	275	63	498		
19	Nov-18	390.5	575	226.6	134.6	968		
20	Feb-19	255.1	477.6	137.8	96.9	580		
21	May-19	350.5	562	256.6	200.4	976		
22	Aug-19					1204		
23	Nov-19					1084		
24	Feb-20					1131		
25	May-20					1666		
26	Aug-20					1808		
27								
28								
29								
30								
Coefficient of Variation:		0.30	0.31	1.20	0.54	0.39		
Mann-Kendall Statistic (S):		-16	-37	-31	-11	28		
Confidence Factor:		71.3%	99.8%	99.2%	77.7%	96.9%		
Concentration Trend:		Stable	Decreasing	Decreasing	Stable	Increasing		



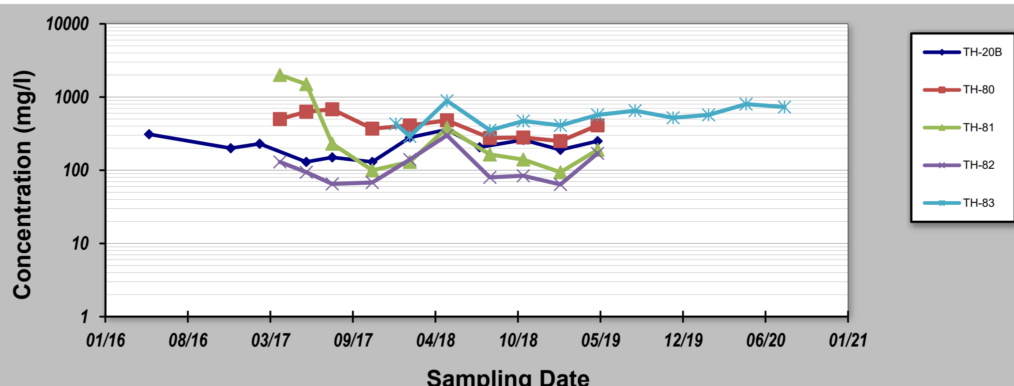
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	11-Feb-21	Job ID:	09215600.11
Facility Name:	SCLF	Constituent:	TDS
Conducted By:	FCH	Concentration Units:	mg/l

Sampling Event	Sampling Date	TH-20B	TH-80	TH-81	TH-82	TH-83		
		TDS CONCENTRATION (mg/l)						
1	May-16	310						
2	Sep-16							
3	Oct-16							
4	Nov-16	200						
5	Dec-16							
6	Jan-17							
7	Feb-17	230						
8	Mar-17		500	2000	130			
9	Apr-17							
10	May-17							
11	Jun-17	130	630	1500	94			
12	Aug-17	150	680	230	65			
13	Nov-17	130	370	100	68			
14	Jan-18					430		
15	Feb-18	280	410	130	140	290		
16	May-18	360	480	380	300	890		
17	Jul-18	206						
18	Aug-18		276	164	80	352		
19	Nov-18	260	280	140	84	470		
20	Feb-19	190	250	94	64	410		
21	May-19	250	410	190	170	570		
22	Aug-19					650		
23	Nov-19					520		
24	Feb-20					570		
25	May-20					800		
26	Aug-20					730		
27								
28								
29								
30								
Coefficient of Variation:		0.32	0.34	1.38	0.61	0.33		
Mann-Kendall Statistic (S):		3	-22	-19	1	31		
Confidence Factor:		55.4%	97.1%	94.6%	50.0%	98.1%		
Concentration Trend:		No Trend	Decreasing	Prob. Decreasing	No Trend	Increasing		



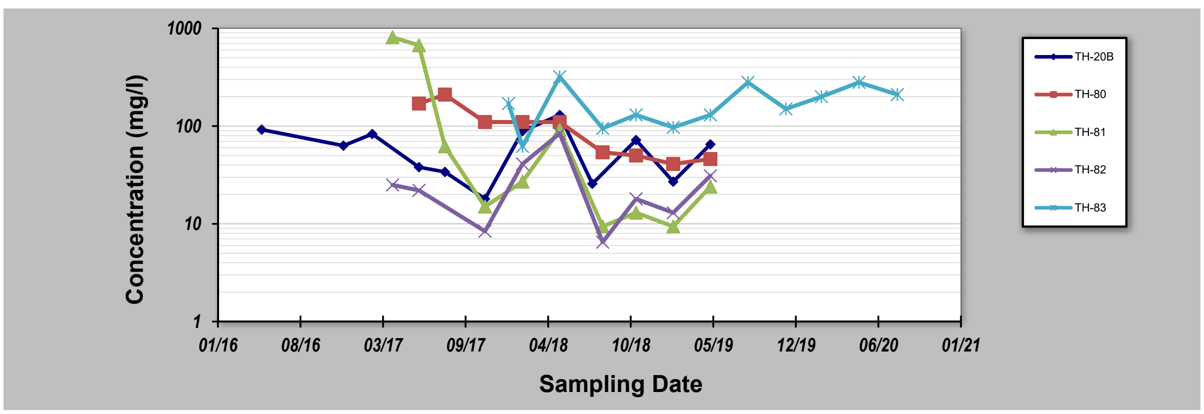
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	11-Feb-21	Job ID:	09215600.11
Facility Name:	SCLF	Constituent:	Chloride
Conducted By:	FCH	Concentration Units:	mg/l

Sampling Event	Sampling Date	CHLORIDE CONCENTRATION (mg/l)						
	Sampling Point ID:	TH-20B	TH-80	TH-81	TH-82	TH-83		
1	May-16	92						
2	Sep-16							
3	Oct-16							
4	Nov-16	63						
5	Dec-16							
6	Jan-17							
7	Feb-17	83						
8	Mar-17		130 j4	810	25			
9	Apr-17							
10	May-17							
11	Jun-17	38	170	670	22			
12	Aug-17	34	210	62	4.3 i			
13	Nov-17	18	110	15	8.4			
14	Jan-18					170		
15	Feb-18	89	110	27	41	62		
16	May-18	130	110	91	84	320		
17	Jul-18	25.7						
18	Aug-18		53.9	9.4	6.5	94.9		
19	Nov-18	72	50	13	18	130		
20	Feb-19	27	41	9.4	13	97		
21	May-19	65	46	24	31	130		
22	Aug-19					280		
23	Nov-19					150		
24	Feb-20					200		
25	May-20					280		
26	Aug-20					210		
27								
28								
29								
30								
	Coefficient of Variation:	0.55	0.59	1.74	0.86	0.47		
	Mann-Kendall Statistic (S):	-12	-29	-26	-2	24		
	Confidence Factor:	77.0%	100.0%	98.9%	54.0%	94.2%		
	Concentration Trend:	Stable	Decreasing	Decreasing	Stable	Prob. Increasing		



Notes:

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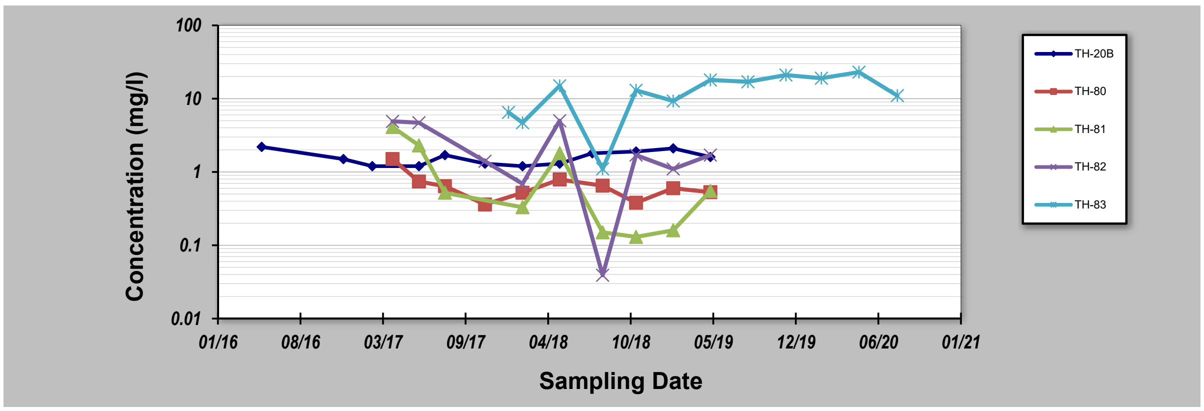
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	11-Feb-21	Job ID:	09215600.11
Facility Name:	SCLF	Constituent:	Ammonia
Conducted By:	FCH	Concentration Units:	mg/l

Sampling Point ID:		TH-20B	TH-80	TH-81	TH-82	TH-83		
Sampling Event	Sampling Date	AMMONIA CONCENTRATION (mg/l)						
1	May-16	2.2						
2	Sep-16							
3	Oct-16							
4	Nov-16	1.5						
5	Dec-16							
6	Jan-17							
7	Feb-17	1.2						
8	Mar-17		1.5	4.1	4.9			
9	Apr-17							
10	May-17							
11	Jun-17	1.2	0.74	2.3	4.7			
12	Aug-17	1.7	0.64	0.52	0.02 u			
13	Nov-17	1.3	0.36	.025 u	1.4			
14	Jan-18					6.5		
15	Feb-18	1.2	0.52	0.33	0.69	4.7		
16	May-18	1.3	0.79	1.8	5	15		
17	Jul-18	1.8						
18	Aug-18		0.65	0.15	0.039	1.1		
19	Nov-18	1.9	0.38	0.13	1.7	13		
20	Feb-19	2.1	0.6	0.16	1.1	9.3		
21	May-19	1.6	0.53	0.55	1.7	18		
22	Aug-19					17		
23	Nov-19					21		
24	Feb-20					19		
25	May-20					23		
26	Aug-20					11		
27								
28								
29								
30								
Coefficient of Variation:		0.23	0.48	1.22	0.83	0.52		
Mann-Kendall Statistic (S):		14	-15	-18	-9	34		
Confidence Factor:		81.0%	89.2%	96.2%	79.2%	99.0%		
Concentration Trend:		No Trend	Stable	Decreasing	Stable	Increasing		



Notes:

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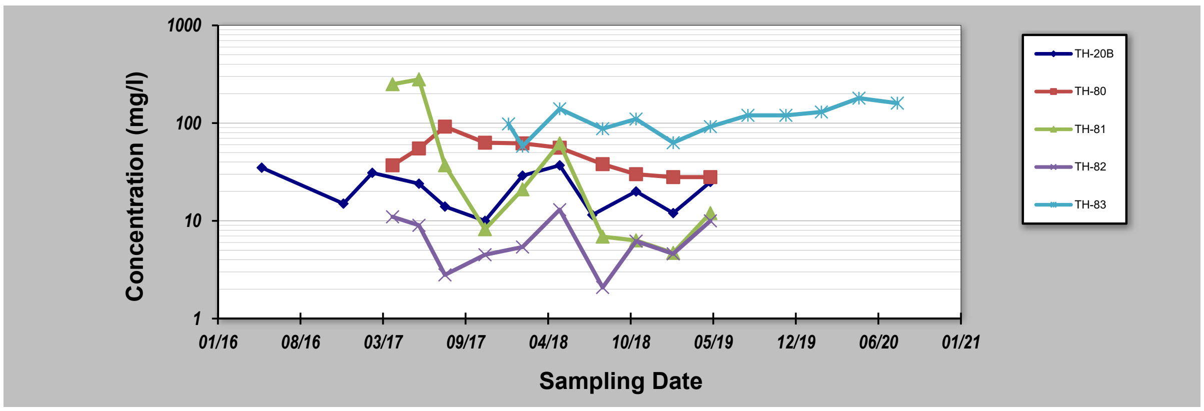
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	11-Feb-21	Job ID:	09215600.11
Facility Name:	SCLF	Constituent:	Sodium
Conducted By:	FCH	Concentration Units:	mg/l

Sampling Event	Sampling Date	TH-20B	TH-80	TH-81	TH-82	TH-83		
		SODIUM CONCENTRATION (mg/l)						
1	May-16	35						
2	Sep-16							
3	Oct-16							
4	Nov-16	15						
5	Dec-16							
6	Jan-17							
7	Feb-17	31						
8	Mar-17		37	250	11			
9	Apr-17							
10	May-17							
11	Jun-17	24	55	280	9			
12	Aug-17	14	92	37	2.8			
13	Nov-17	10	63	8.2	4.5			
14	Jan-18					98		
15	Feb-18	29	62	21	5.4	58		
16	May-18	37	56	62	13	140		
17	Jul-18	11.5						
18	Aug-18		38	6.89	2.08	87.7		
19	Nov-18	20	30	6.3	6.2	110		
20	Feb-19	12	28	4.7	4.6	63		
21	May-19	25	28	12	10	92		
22	Aug-19					120		
23	Nov-19					120		
24	Feb-20					130		
25	May-20					180		
26	Aug-20					160		
27								
28								
29								
30								
Coefficient of Variation:		0.44	0.42	1.53	0.54	0.32		
Mann-Kendall Statistic (S):		-12	-24	-27	-1	35		
Confidence Factor:		77.0%	98.2%	99.2%	50.0%	99.2%		
Concentration Trend:		Stable	Decreasing	Decreasing	Stable	Increasing		



Notes:

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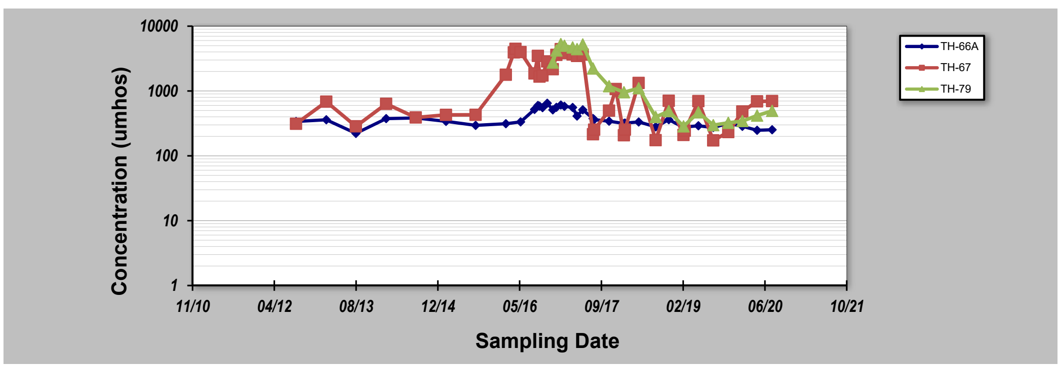
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	11-Feb-21	**Job ID:**	09215600.11
Facility Name:	SCLF	**Constituent:**	Conductivity
Conducted By:	FCH	**Concentration Units:**	umhos

Sampling Point ID:		TH-66A	TH-67	TH-79				
Sampling Event	**Sampling Date**	**CONDUCTIVITY CONCENTRATION (umhos)**						
1	Aug-12	339	312					
2	Feb-13	360	684					
3	Aug-13	222	285					
4	Feb-14	375	634					
5	Aug-14	384	390					
6	Feb-15	340	428					
7	Aug-15	295	429					
8	Feb-16	313	1780					
9	Apr-16		3932					
10	Apr-16		4463					
11	May-16	334	3973					
12	Aug-16	520	1864					
13	Aug-16	598	3472					
14	Sep-16	584	1666					
15	Sep-16	554	1732					
16	Oct-16	648	2857					
17	Nov-16	512	2166	2740				
18	Dec-16	560	3600	4214				
19	Jan-17	608	4412	5291				
20	Feb-17	580	3830	4980				
21	Mar-17	558	3653	4692				
22	Apr-17	411	3468	4421				
23	May-17	513	3630	5212				
24	Aug-17	376	215	2221				
25	Aug-17	362.0	253					
26	Nov-17	342.1	497.4	1183				
27	Dec-17		1071					
28	Feb-18	315.6	207.7	956				
29	Feb-18	320.1	253.5					
30	May-18	333.0	1329	1102				
31	Aug-18	279.8	174.5	397				
32	Nov-18	361.7	706	488.9				
33	Feb-19	274.4	209.6	284.8				
34	Feb-19	278.5	243.8					
35	May-19	291	697	468.3				
36	Aug-19	273.5	172.9	297.1				
37	Nov-19	317	232.4	322.7				
38	Feb-20	285.1	482.6	343.9				
39	May-20	248	691	417.3				
40	Aug-20	252.4	698	494.1				
Coefficient of Variation:		0.31	0.96	0.98				
Mann-Kendall Statistic (S):		-226	-152	-116				
Confidence Factor:		99.9%	96.1%	>99.9%				
Concentration Trend:		Decreasing	Decreasing	Decreasing				



Notes:

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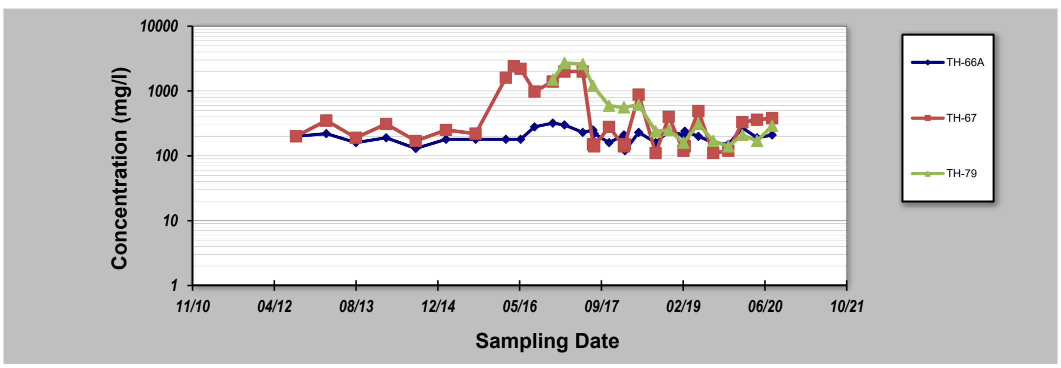
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	11-Feb-21	Job ID:	09215600.11
Facility Name:	SCLF	Constituent:	TDS
Conducted By:	FCH	Concentration Units:	mg/l

Sampling Event	Sampling Date	TH-66A	TH-67	TH-79				
		TDS CONCENTRATION (mg/l)						
1	Aug-12	200	200					
2	Feb-13	220	350					
3	Aug-13	160	190					
4	Feb-14	190	310					
5	Aug-14	130	170					
6	Feb-15	180	250					
7	Aug-15	180	220					
8	Feb-16	180	1600					
9	Apr-16		2400					
10	Apr-16							
11	May-16	180	2200					
12	Aug-16	280	980					
13	Aug-16							
14	Sep-16							
15	Sep-16							
16	Oct-16							
17	Nov-16	320	1400	1500				
18	Dec-16							
19	Jan-17							
20	Feb-17	300	2000	2700				
21	Mar-17							
22	Apr-17							
23	May-17	230	2000	2600				
24	Aug-17	250	150	1200				
25	Aug-17	220	140					
26	Nov-17	160	280	590				
27	Dec-17							
28	Feb-18	210	140	560				
29	Feb-18	120	150					
30	May-18	230	880	610				
31	Aug-18	160	110	238				
32	Nov-18	240	400	250				
33	Feb-19	210	120	160				
34	Feb-19	240	140					
35	May-19	200	490	310				
36	Aug-19	160	110	170				
37	Nov-19	150	120	140				
38	Feb-20	270	330	210				
39	May-20	190	360	170				
40	Aug-20	210	380	290				
	Coefficient of Variation:	0.23	1.15	1.15				
	Mann-Kendall Statistic (S):	10	-78	-77				
	Confidence Factor:	56.6%	91.5%	>99.9%				
	Concentration Trend:	No Trend	Prob. Decreasing	Decreasing				



Notes:

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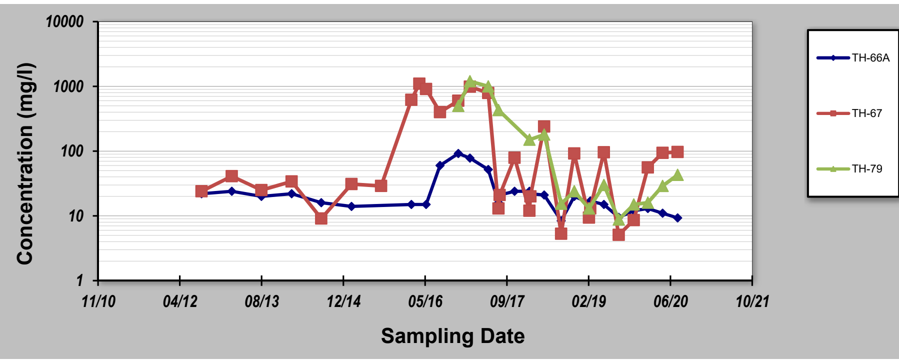
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 11-Feb-21
Facility Name: SCLF
Conducted By: FCH
Job ID: 09215600.11
Constituent: Chloride
Concentration Units: mg/l

Sampling Event	Sampling Date	CHLORIDE CONCENTRATION (mg/l)						
	Sampling Point ID:	TH-66A	TH-67	TH-79				
1	Aug-12	22	24					
2	Feb-13	24	41					
3	Aug-13	20	25					
4	Feb-14	22	34					
5	Aug-14	16	9.1					
6	Feb-15	14	31					
7	Aug-15	4.9 i	29					
8	Feb-16	15	620					
9	Apr-16		1100					
10	Apr-16							
11	May-16	15	910					
12	Aug-16	60	400					
13	Aug-16							
14	Sep-16							
15	Sep-16							
16	Oct-16							
17	Nov-16	92	600	500				
18	Dec-16							
19	Jan-17							
20	Feb-17	78	990	1200				
21	Mar-17							
22	Apr-17							
23	May-17	52	790	1000				
24	Aug-17	16	13	430				
25	Aug-17	21	21					
26	Nov-17	24	79	180 j4				
27	Dec-17							
28	Feb-18	24	12	150				
29	Feb-18	22	20					
30	May-18	21	240	180				
31	Aug-18	8.4	5.3	15.4				
32	Nov-18	20	92	24				
33	Feb-19	16	9.4	13				
34	Feb-19	17	13					
35	May-19	15	96	30				
36	Aug-19	9.5	5.1	8.8				
37	Nov-19	12	8.6	15				
38	Feb-20	13	56	16				
39	May-20	11	94	29				
40	Aug-20	9.3	97	43				
	Coefficient of Variation:	0.83	1.56	1.57				
	Mann-Kendall Statistic (S):	-152	-54	-51				
	Confidence Factor:	99.9%	82.7%	99.4%				
	Concentration Trend:	Decreasing	No Trend	Decreasing				



Notes:

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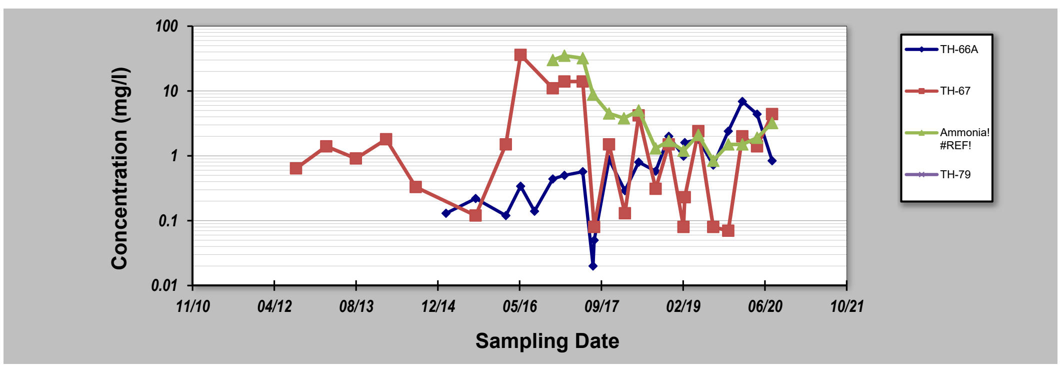
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	11-Feb-21	**Job ID:**	09215600.11
Facility Name:	SCLF	**Constituent:**	Ammonia
Conducted By:	FCH	**Concentration Units:**	mg/l

	Sampling Point ID:	TH-66A	TH-67	TH-79				
Sampling Event	**Sampling Date**	**AMMONIA CONCENTRATION (mg/l)**						
1	Aug-12		0.64					
2	Feb-13		1.4					
3	Aug-13		0.91					
4	Feb-14		1.8					
5	Aug-14		0.33					
6	Feb-15	0.13	0.05i					
7	Aug-15	0.22	0.12					
8	Feb-16	0.12	1.5					
9	Apr-16							
10	Apr-16							
11	May-16	0.34	36					
12	Aug-16	0.14	5.8 j4					
13	Aug-16							
14	Sep-16							
15	Sep-16							
16	Oct-16							
17	Nov-16	0.44	11	30				
18	Dec-16							
19	Jan-17							
20	Feb-17	0.5	14	35				
21	Mar-17							
22	Apr-17							
23	May-17	0.57	14	32				
24	Aug-17	0.02	0.02 u	8.8				
25	Aug-17	0.05	0.08					
26	Nov-17	0.88	1.5	4.5				
27	Dec-17							
28	Feb-18	.09 i	.025 u	3.8				
29	Feb-18	0.29	0.13					
30	May-18	0.8	4.2	5				
31	Aug-18	0.58	0.31	1.3				
32	Nov-18	2	1.5	1.7				
33	Feb-19	0.99	0.08	1.2				
34	Feb-19	1.6	0.23					
35	May-19	1.8	2.4	2.1				
36	Aug-19	0.72	0.08	0.84				
37	Nov-19	2.4	0.07	1.5				
38	Feb-20	6.9	2	1.5				
39	May-20	4.4	1.4	1.9				
40	Aug-20	0.84	4.4	3.2				
	Coefficient of Variation:	1.38	1.96	1.44				
	Mann-Kendall Statistic (S):	161	-24	-63				
	Confidence Factor:	>99.9%	70.3%	99.8%				
	Concentration Trend:	Increasing	No Trend	Decreasing				



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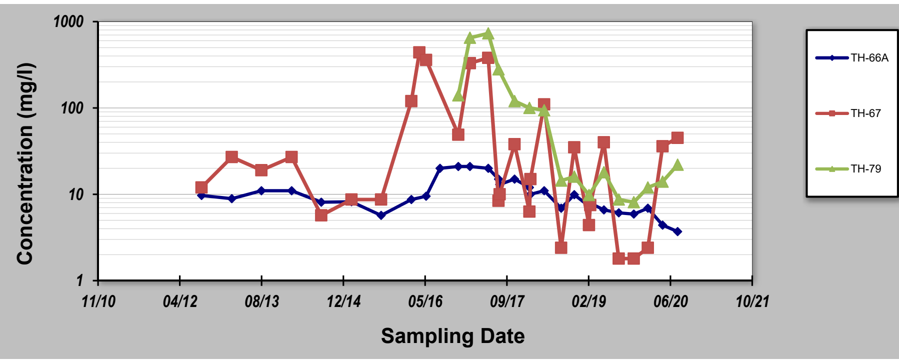
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	11-Feb-21	Job ID:	09215600.11
Facility Name:	SCLF	Constituent:	Sodium
Conducted By:	FCH	Concentration Units:	mg/l

Sampling Point ID:		TH-66A	TH-67	TH-79
Sampling Event	**Sampling Date**	**SODIUM CONCENTRATION (mg/l)**		
1	Aug-12	9.7	12	
2	Feb-13	8.9	27	
3	Aug-13	11	19	
4	Feb-14	11	27	
5	Aug-14	8.1	5.7	
6	Feb-15	8.2	8.7	
7	Aug-15	5.7	8.7	
8	Feb-16	8.7	120	
9	Apr-16		440	
10	Apr-16			
11	May-16	9.5	360	
12	Aug-16	20	190 v	
13	Aug-16			
14	Sep-16			
15	Sep-16			
16	Oct-16			
17	Nov-16	21	49	140
18	Dec-16			
19	Jan-17			
20	Feb-17	21	330	650
21	Mar-17			
22	Apr-17			
23	May-17	20	380	730
24	Aug-17	15	8.4	280
25	Aug-17	13	10	
26	Nov-17	15	38	120
27	Dec-17			
28	Feb-18	12	6.3	100
29	Feb-18	10	15	
30	May-18	11	110	94
31	Aug-18	6.9	2.4	14.4
32	Nov-18	9.9	35	16
33	Feb-19	7.3	4.4	9.8
34	Feb-19	7.9	7.5	
35	May-19	6.6	40	18
36	Aug-19	6.1	1.8	8.7
37	Nov-19	5.9	1.8	8.1
38	Feb-20	6.9	2.4	12
39	May-20	4.4	36	14
40	Aug-20	3.7	45	22
Coefficient of Variation:		0.47	1.72	1.63
Mann-Kendall Statistic (S):		-151	-72	-74
Confidence Factor:		99.8%	90.8%	>99.9%
Concentration Trend:		Decreasing	Prob. Decreasing	Decreasing

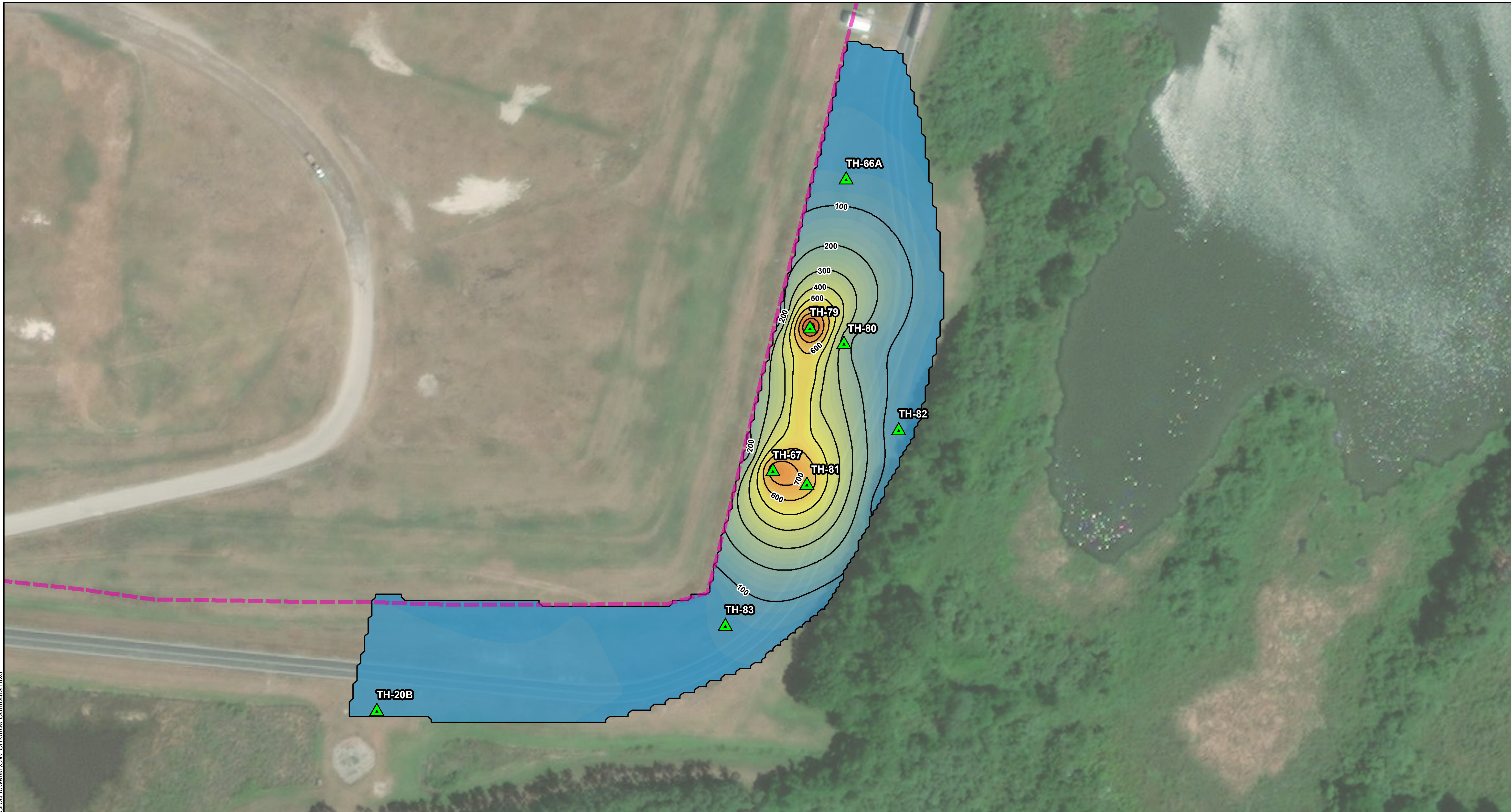


Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

Appendix B
Groundwater Concentration
Maps

Chloride Contours



Legend

Monitoring Well
Landfill Limits

Concentration (mg/L)

0	50	200	350	500	650	800
25	75	225	375	525	675	825
	100	250	400	550	700	850
	125	275	425	575	725	875
	150	300	450	600	750	900
	175	325	475	625	775	925
						950
						975
						1000

MAY 2017
GROUNDWATER CHLORIDE ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N

Document Path: C:\Users\4754tma\Documents\Groundwater\GW Chloride Contours.mxd

Legend

- Monitoring Well
- Landfill Limits

Concentration (mg/L)

0, 25, 50, 75, 100, 125, 150, 175, 200, 225, 250, 275, 300, 325, 350, 375, 400, 425, 450, 475, 500, 525, 550, 575, 600, 625, 650, 675, 700, 725, 750, 775, 800, 825, 850, 875, 900, 925, 950, 975, 1000

AUGUST 2017
GROUNDWATER CHLORIDE ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N

Document Path: C:\Users\4754tmal\Documents\Groundwater\GW Chloride Contours.mxd

Legend

- Monitoring Well
- Landfill Limits

Concentration (mg/L)

0	50	200	350	500	650	800	950
25	75	225	375	525	675	825	975
	100	250	400	550	700	850	1000
	125	275	425	575	725	875	
	150	300	450	600	750	900	
	175	325	475	625	775	925	

NOVEMBER 2017
GROUNDWATER CHLORIDE ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

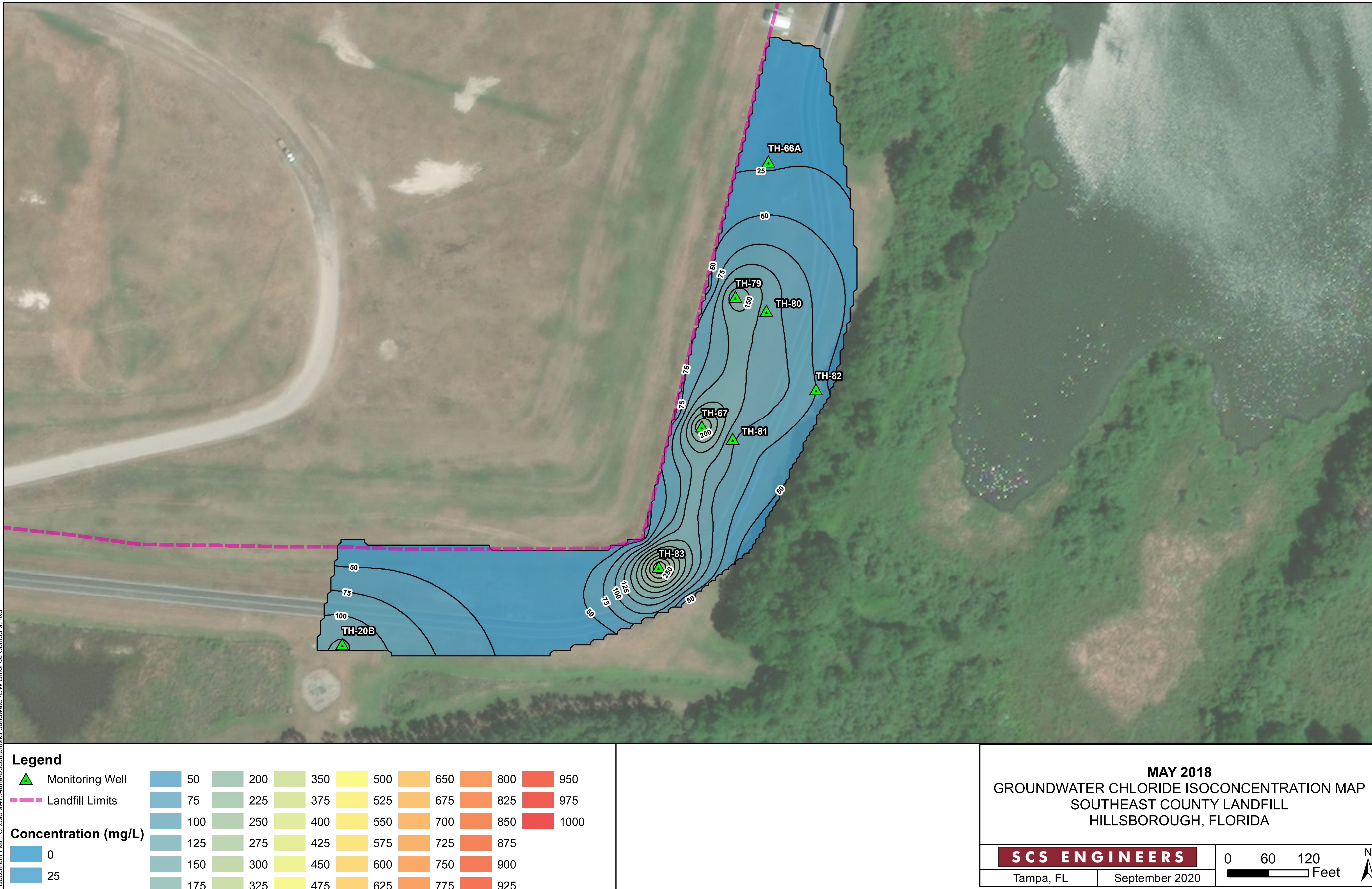
SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N

Document Path: C:\Users\4754tma\Documents\Groundwater\GW Chloride Contours.mxd



MAY 2018
GROUNDWATER CHLORIDE ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS

Tampa, FL | September 2020

Legend

- Monitoring Well
- Landfill Limits

Concentration (mg/L)

0, 25, 50, 75, 100, 125, 150, 175, 200, 225, 250, 275, 300, 325, 350, 375, 400, 425, 450, 475, 500, 525, 550, 575, 600, 625, 650, 675, 700, 725, 750, 775, 800, 825, 850, 875, 900, 925, 950, 975, 1000

JULY 2018
GROUNDWATER CHLORIDE ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N

Document Path: C:\Users\4754tmal\Documents\Groundwater\GW Chloride Contours.mxd

Legend

Monitoring Well

Landfill Limits

Concentration (mg/L)

0	50	200	350	500	650	800	950
25	75	225	375	525	675	825	975
	100	250	400	550	700	850	1000
	125	275	425	575	725	875	
	150	300	450	600	750	900	
	175	325	475	625	775	925	

FEBRUARY 2019

GROUNDWATER CHLORIDE ISOCONCENTRATION MAP

SOUTHEAST COUNTY LANDFILL

HILLSBOROUGH, FLORIDA

SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N

Document Path: C:\Users\4754tma\Documents\Groundwater\GW Chloride Contours.mxd

Legend

- Monitoring Well
- Landfill Limits

Concentration (mg/L)

0, 25, 50, 75, 100, 125, 150, 175, 200, 225, 250, 275, 300, 325, 350, 375, 400, 425, 450, 475, 500, 525, 550, 575, 600, 625, 650, 675, 700, 725, 750, 775, 800, 825, 850, 875, 900, 925, 950, 975, 1000

MAY 2019
GROUNDWATER CHLORIDE ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS
Tampa, FL | September 2020

0 60 120 Feet
N

Document Path: C:\Users\4754tmal\Documents\Groundwater\GW Chloride Contours.mxd

Legend

- Monitoring Well
- Landfill Limits

Concentration (mg/L)

0	50	200	350	500	650	800	950	
25	75	225	375	525	675	825	975	
	100	250	400	550	700	850	1000	
	125	275	425	575	725	875		
	150	300	450	600	750	900		
	175	325	475	625	775	925		

AUGUST 2019
GROUNDWATER CHLORIDE ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS
Tampa, FL | September 2020

0 60 120 Feet
N

Document Path: C:\Users\4754tma\Documents\Groundwater\GW Chloride Contours.mxd

Legend

- Monitoring Well
- Landfill Limits

Concentration (mg/L)

0, 25, 50, 75, 100, 125, 150, 175, 200, 225, 250, 275, 300, 325, 350, 375, 400, 425, 450, 475, 500, 525, 550, 575, 600, 625, 650, 675, 700, 725, 750, 775, 800, 825, 850, 875, 900, 925, 950, 975, 1000

NOVEMBER 2019
GROUNDWATER CHLORIDE ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N

Legend

Monitoring Well

Landfill Limits

Concentration (mg/L)

0	50	200	350	500	650	800	950
25	75	225	375	525	675	825	975
	100	250	400	550	700	850	1000
	125	275	425	575	725	875	
	150	300	450	600	750	900	
	175	325	475	625	775	925	

FEBRUARY 2020
GROUNDWATER CHLORIDE ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N

Document Path: C:\Users\4754tmal\Documents\Groundwater\GW Chloride Contours.mxd

Legend

Monitoring Well

Landfill Limits

Concentration (mg/L)

0
25
50
75
100
125
150
175
200
225
250
275
300
325
350
375
400
425
450
475
500
525
550
575
600
625
650
675
700
725
750
775
800
825
850
875
900
925
950
975
1000

MAY 2020
GROUNDWATER CHLORIDE ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N

Document Path: C:\Users\4754tma\Documents\Groundwater\GW Chloride Contours.mxd

Legend

Monitoring Well

Landfill Limits

Concentration (mg/L)

0	50	200	350	500	650	800	950
25	75	225	375	525	675	825	975
	100	250	400	550	700	850	1000
	125	275	425	575	725	875	
	150	300	450	600	750	900	
	175	325	475	625	775	925	

AUGUST 2020
GROUNDWATER CHLORIDE ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS

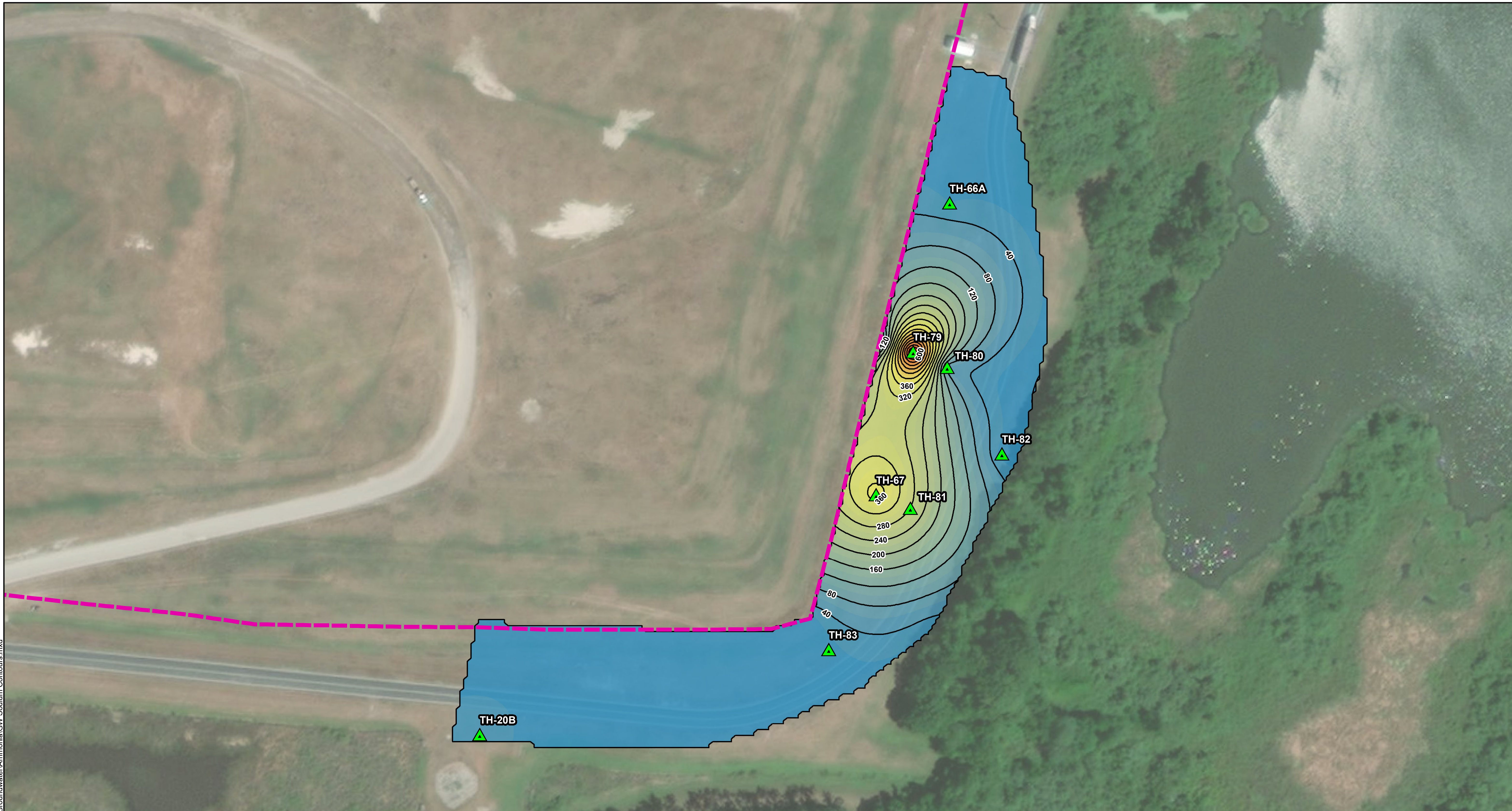
Tampa, FL | September 2020

0 60 120 Feet

N

Document Path: C:\Users\4754tma\Documents\Groundwater\GW Chloride Contours.mxd

Sodium Contours



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Legend

- Monitoring Well
- Landfill Limits

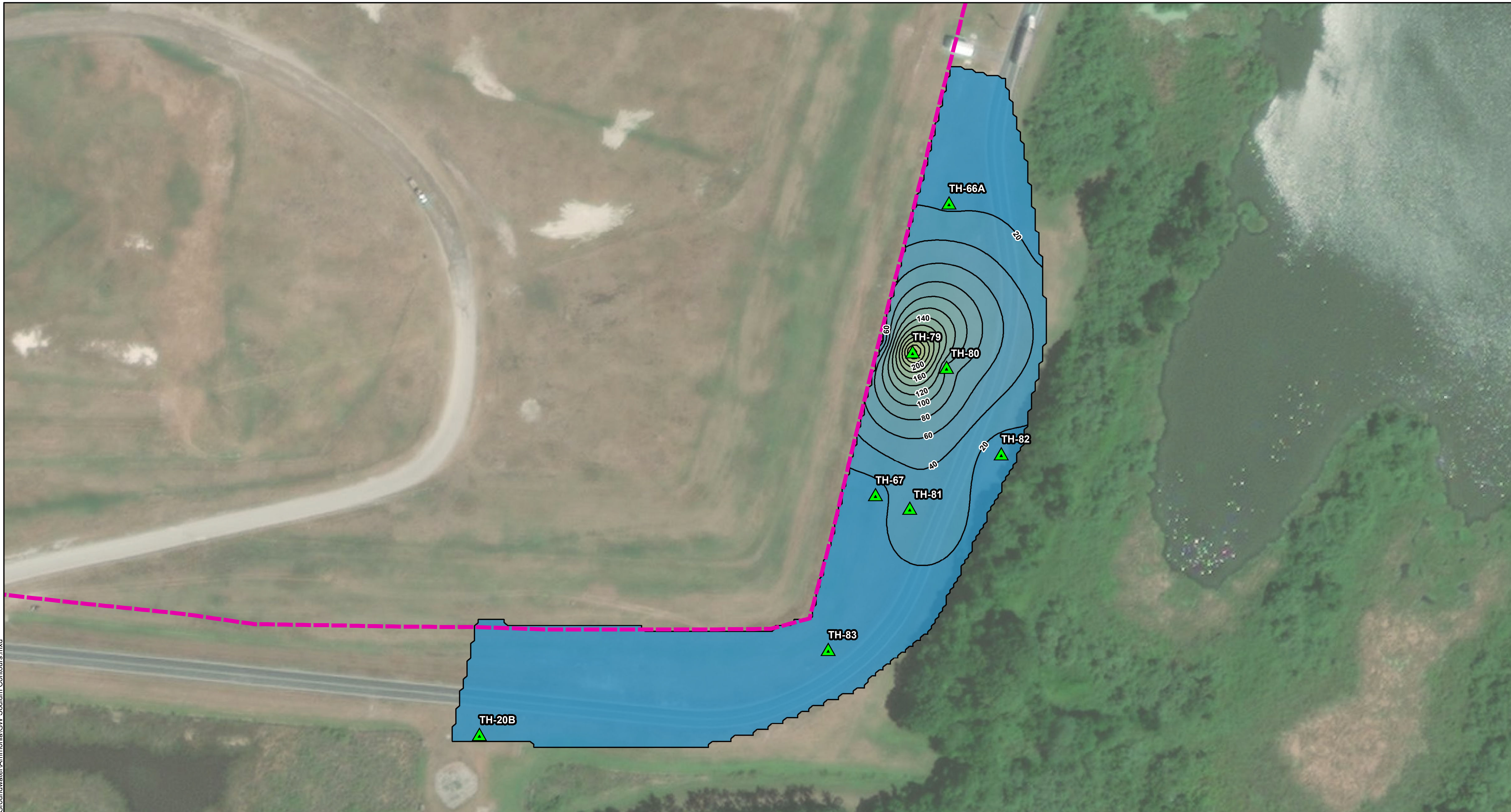
Concentration (mg/L)

0	40	140	240	340	440	540
20	60	160	260	360	460	560
	80	180	280	380	480	580
	100	200	300	400	500	600
	120	220	320	420	520	620
						640
						660
						680
						700
						720

MAY 2017
GROUNDWATER SODIUM
ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS
Tampa, FL | September 2020

0 60 120 Feet
N



Legend

- Monitoring Well
- Landfill Limits

Concentration (mg/L)

0, 20, 40, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240, 260, 280, 300, 320, 340, 360, 380, 400, 420, 440, 460, 480, 500, 520, 540, 560, 580, 600, 620, 640, 660, 680, 700, 720

AUGUST 2017

GROUNDWATER SODIUM
ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N

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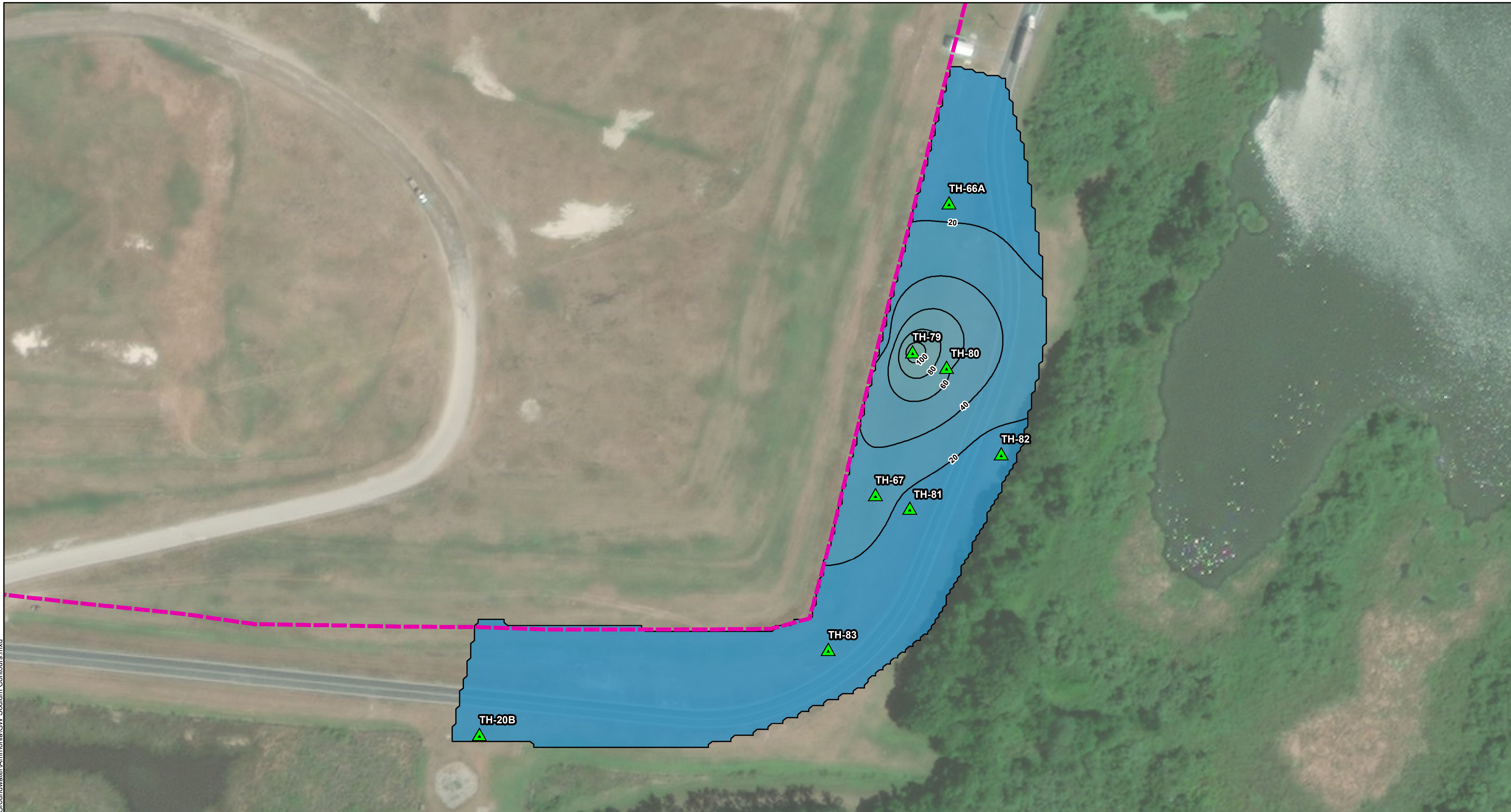

Legend

- Monitoring Well
- Landfill Limits

Concentration (mg/L)

0, 20, 40, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240, 260, 280, 300, 320, 340, 360, 380, 400, 420, 440, 460, 480, 500, 520, 540, 560, 580, 600, 620, 640, 660, 680, 700, 720

NOVEMBER 2017

GROUNDWATER SODIUM
ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N

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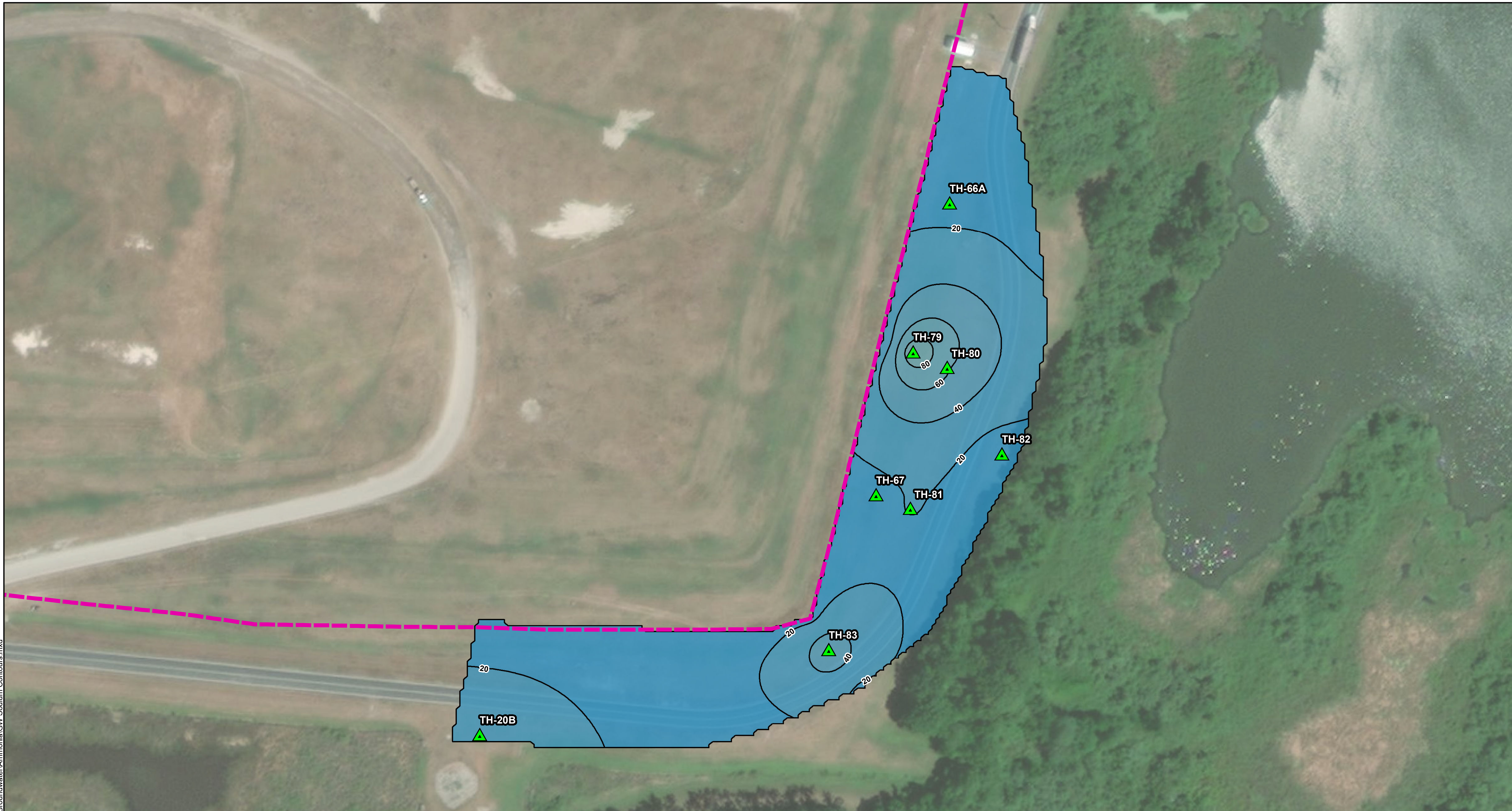

Legend

- Monitoring Well
- Landfill Limits

Concentration (mg/L)

0, 20, 40, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240, 260, 280, 300, 320, 340, 360, 380, 400, 420, 440, 460, 480, 500, 520, 540, 560, 580, 600, 620, 640, 660, 680, 700, 720

FEBRUARY 2018
GROUNDWATER SODIUM
ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N

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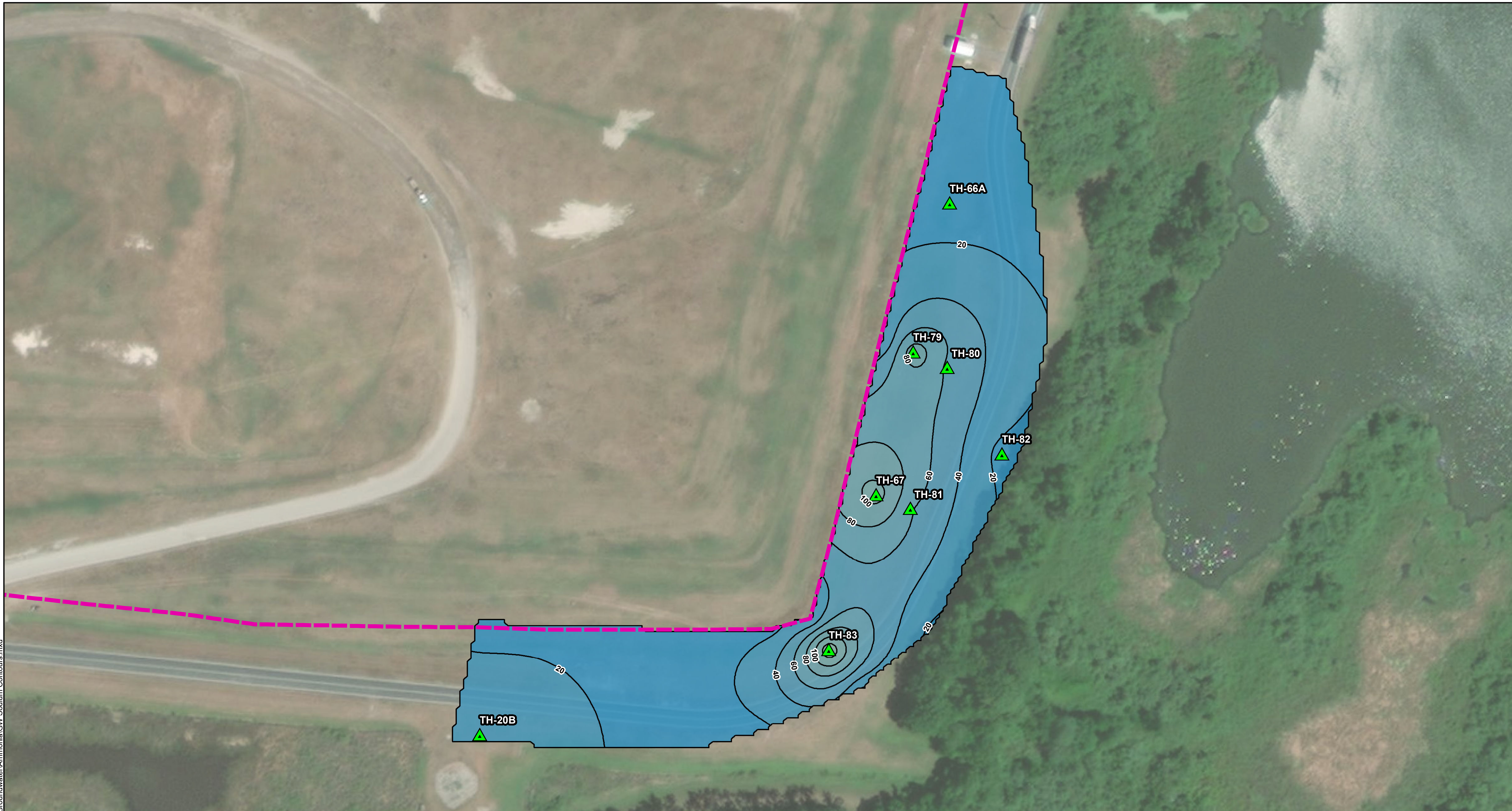

Legend

Monitoring Well

Landfill Limits

Concentration (mg/L)

0, 20, 40, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240, 260, 280, 300, 320, 340, 360, 380, 400, 420, 440, 460, 480, 500, 520, 540, 560, 580, 600, 620, 640, 660, 680, 700, 720

MAY 2018

GROUNDWATER SODIUM
ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N

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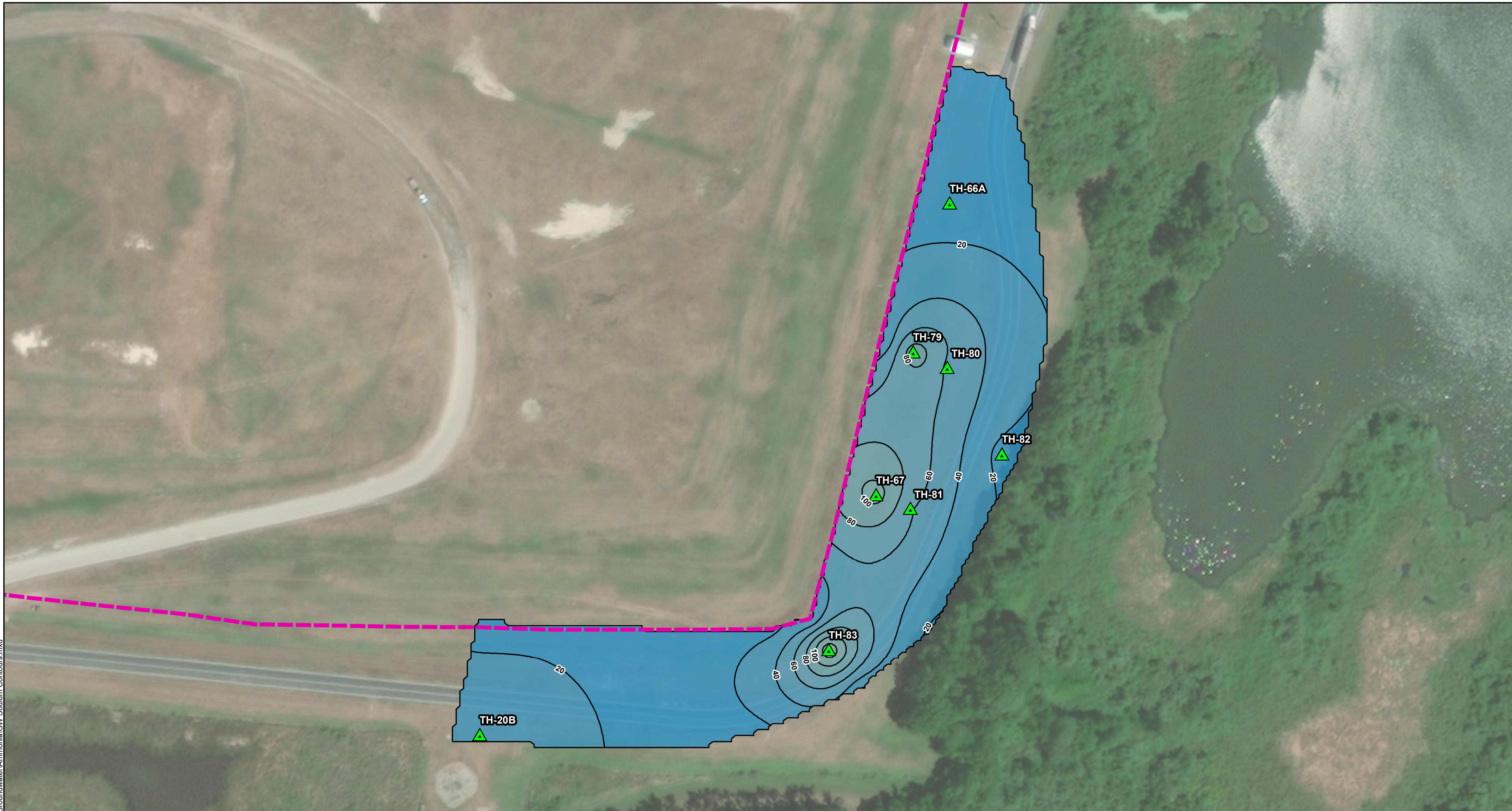


Legend

Monitoring Well	40	140	240	340	440	540	640
Landfill Limits	60	160	260	360	460	560	660
Concentration (mg/L)	80	180	280	380	480	580	680
0	100	200	300	400	500	600	700
20	120	220	320	420	520	620	720

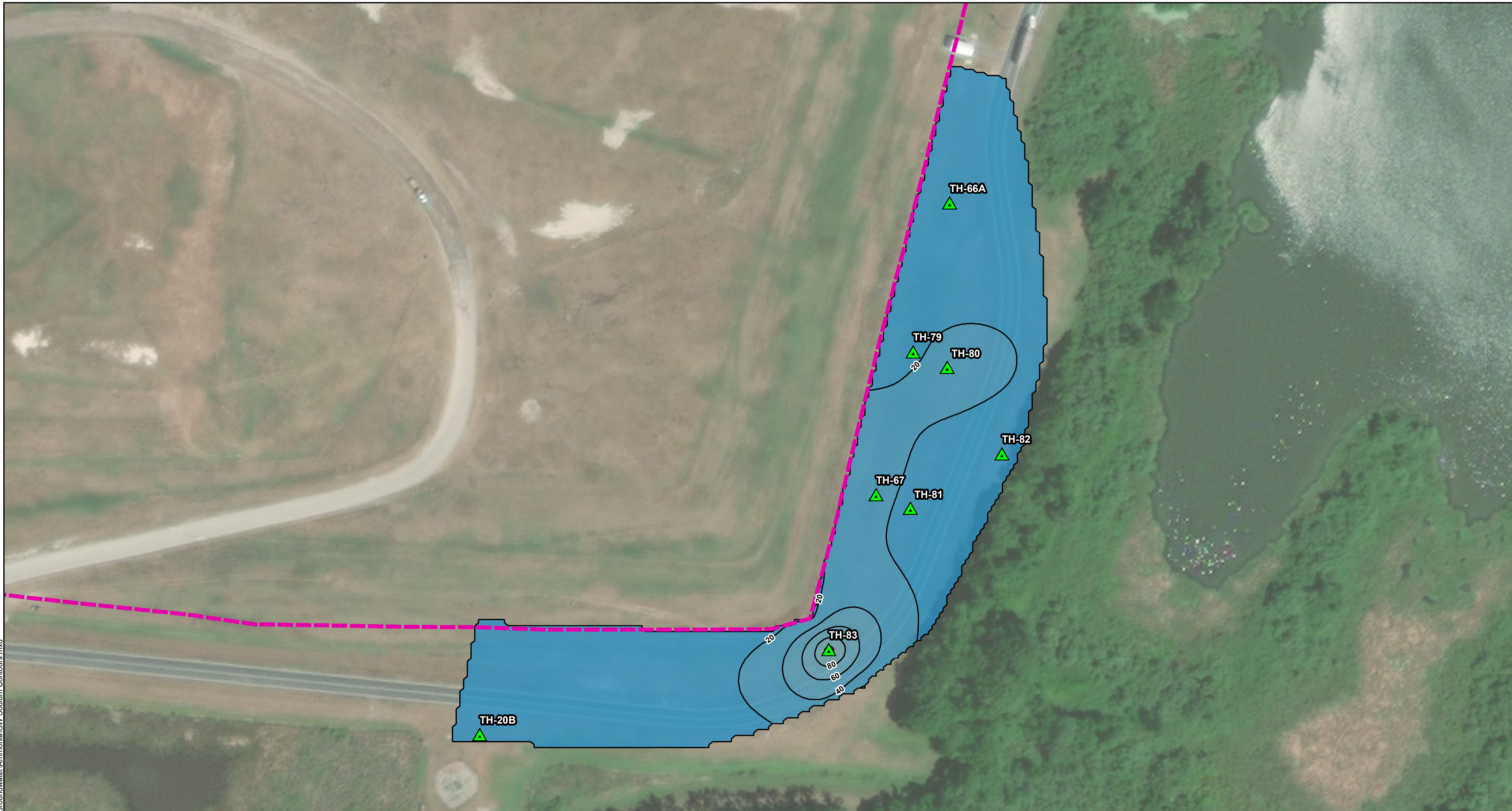
MAY 2018
GROUNDWATER SODIUM
ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N



Legend

Monitoring Well

Landfill Limits

Concentration (mg/L)

0	40	140	240	340	440	540	640
20	60	160	260	360	460	560	660
	80	180	280	380	480	580	680
	100	200	300	400	500	600	700
	120	220	320	420	520	620	720

NOVEMBER 2018
GROUNDWATER SODIUM
ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

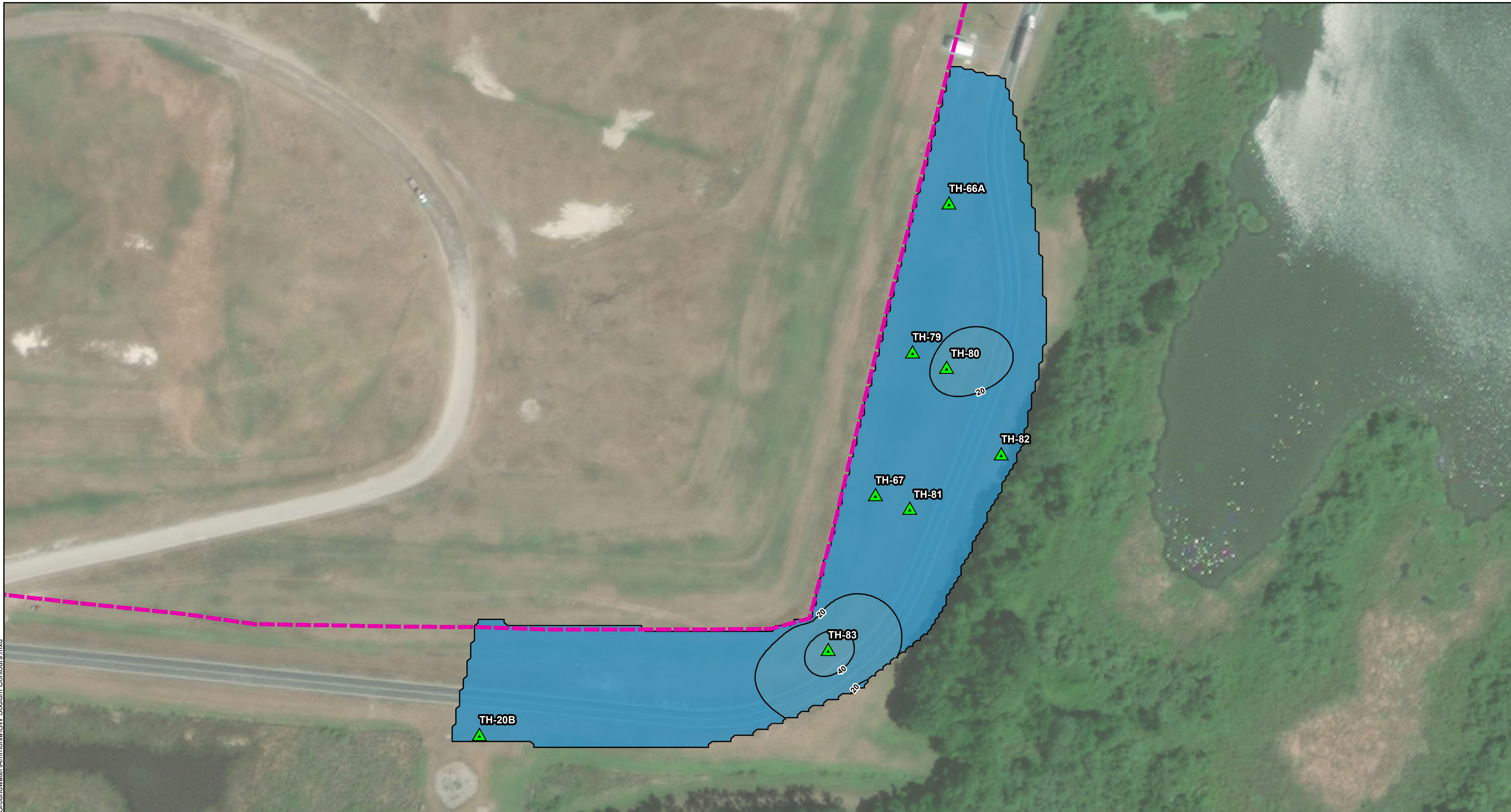
SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N

Document Path: C:\Users\4754tmal\Documents\Groundwater\Ammonia\GW Sodium Contours.mxd



Legend

Monitoring Well

Landfill Limits

Concentration (mg/L)

0	40	140	240	340	440	540	640
20	60	160	260	360	460	560	660
	80	180	280	380	480	580	680
	100	200	300	400	500	600	700
	120	220	320	420	520	620	720

FEBRUARY 2019
GROUNDWATER SODIUM
ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N

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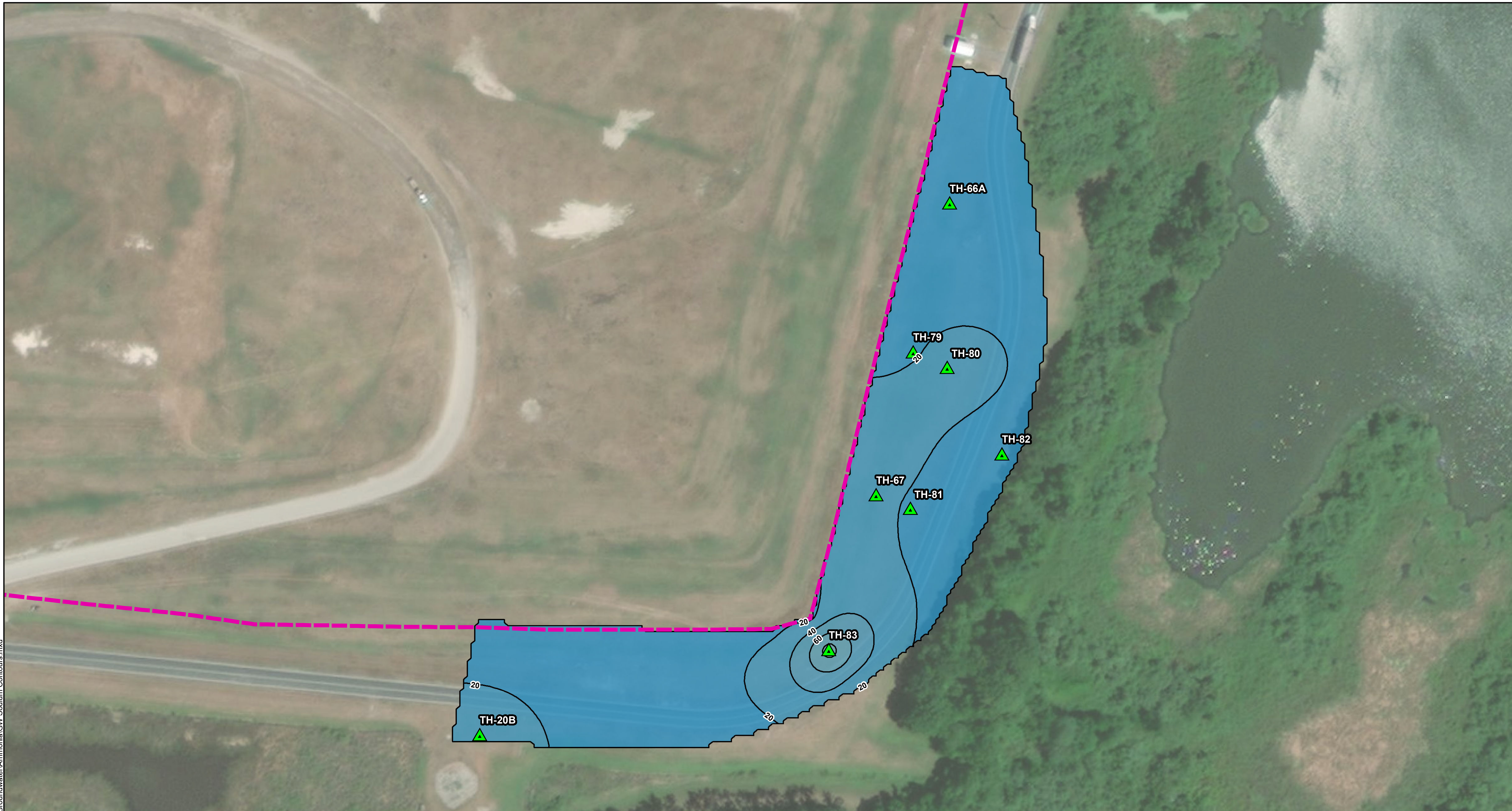

Legend

- Monitoring Well
- Landfill Limits

Concentration (mg/L)

0, 20, 40, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240, 260, 280, 300, 320, 340, 360, 380, 400, 420, 440, 460, 480, 500, 520, 540, 560, 580, 600, 620, 640, 660, 680, 700, 720

MAY 2019
GROUNDWATER SODIUM
ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

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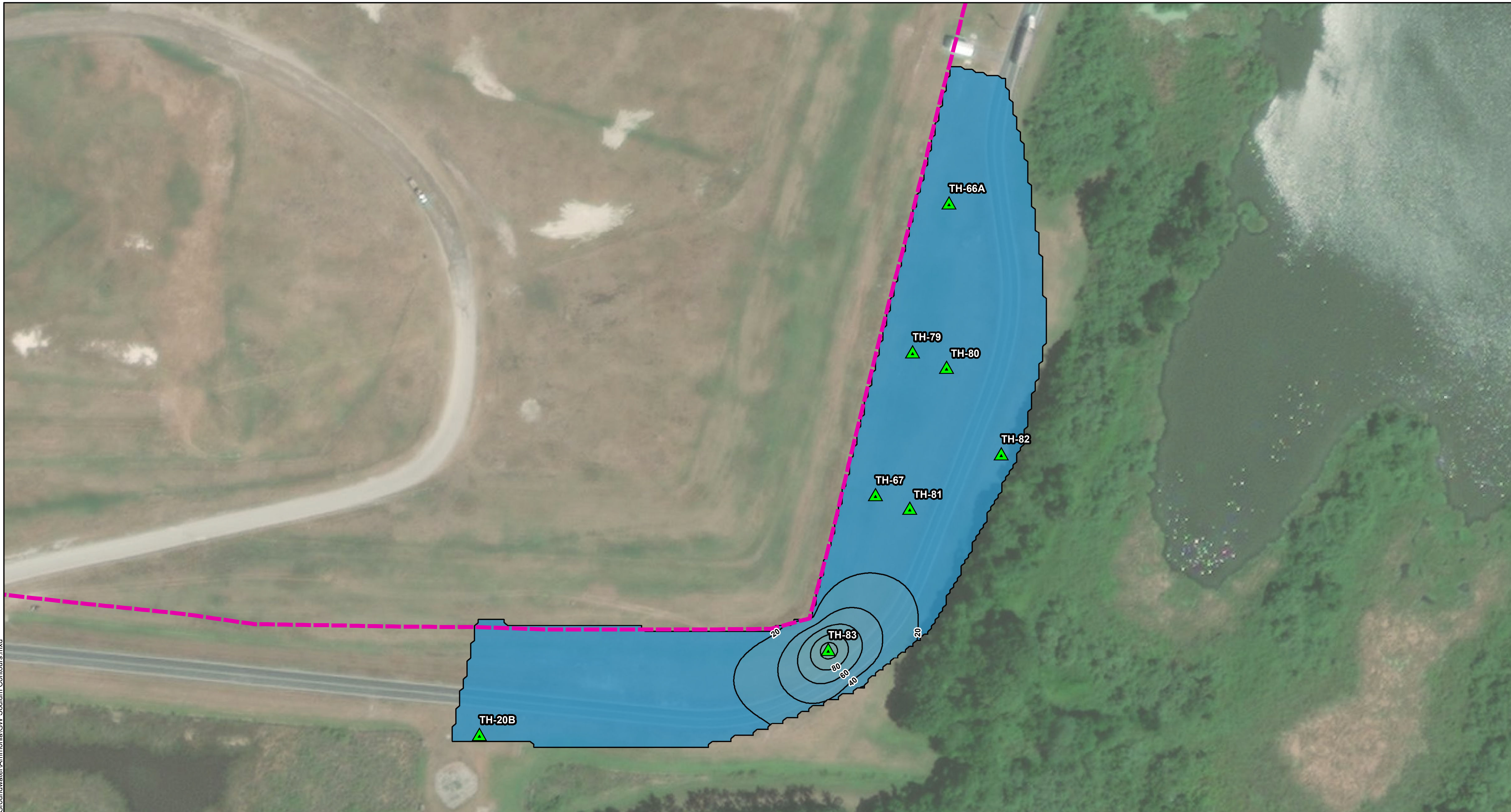


Legend

- Monitoring Well
- Landfill Limits

Concentration (mg/L)

0, 20, 40, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240, 260, 280, 300, 320, 340, 360, 380, 400, 420, 440, 460, 480, 500, 520, 540, 560, 580, 600, 620, 640, 660, 680, 700, 720

NOVEMBER 2019
GROUNDWATER SODIUM
ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

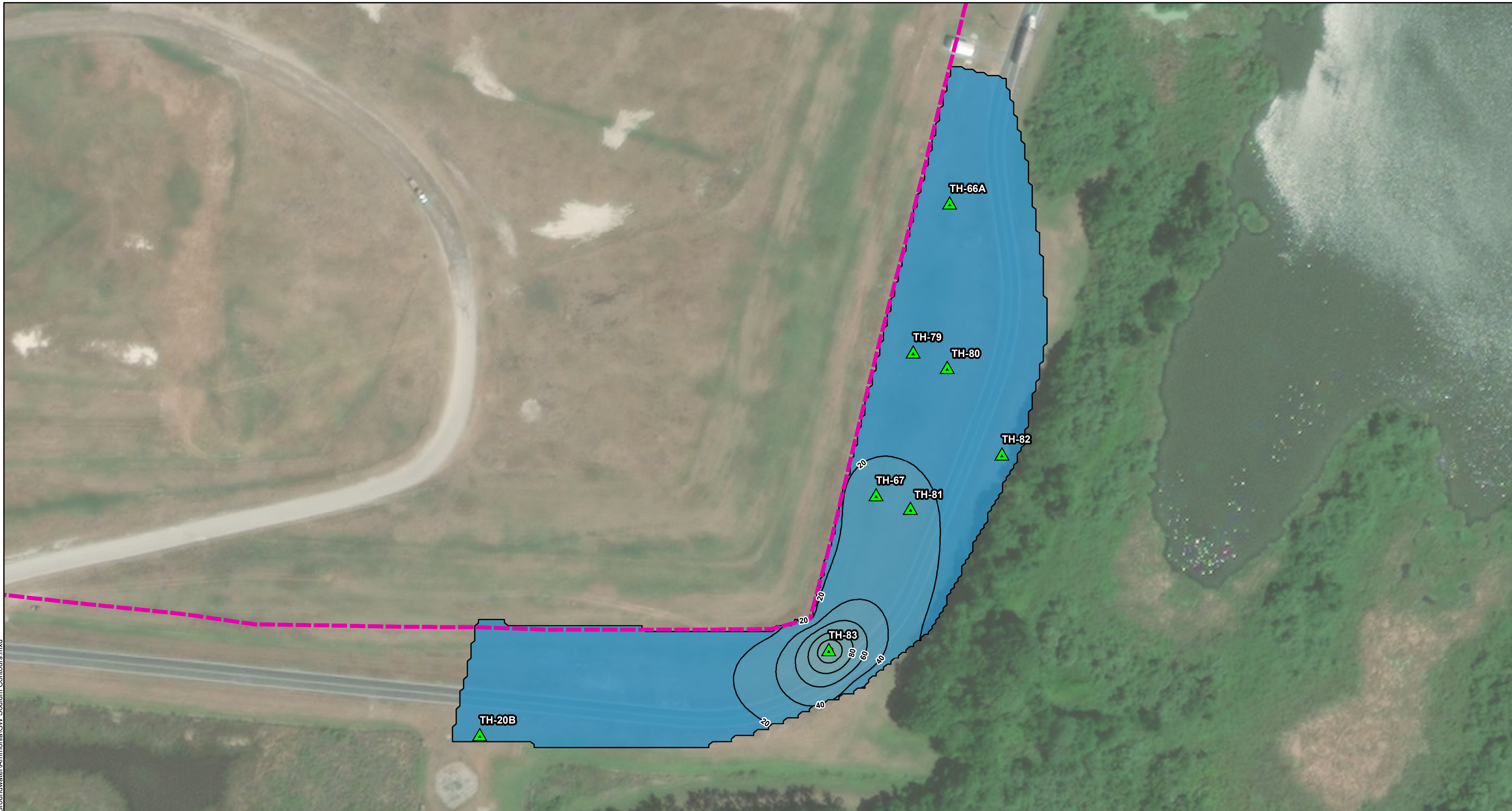
SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N

Document Path: C:\Users\4754tma\Documents\Groundwater\Ammonia\GW Sodium Contours.mxd



Legend

- Monitoring Well
- Landfill Limits

Concentration (mg/L)

0, 20, 40, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240, 260, 280, 300, 320, 340, 360, 380, 400, 420, 440, 460, 480, 500, 520, 540, 560, 580, 600, 620, 640, 660, 680, 700, 720

FEBRUARY 2020
GROUNDWATER SODIUM
ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

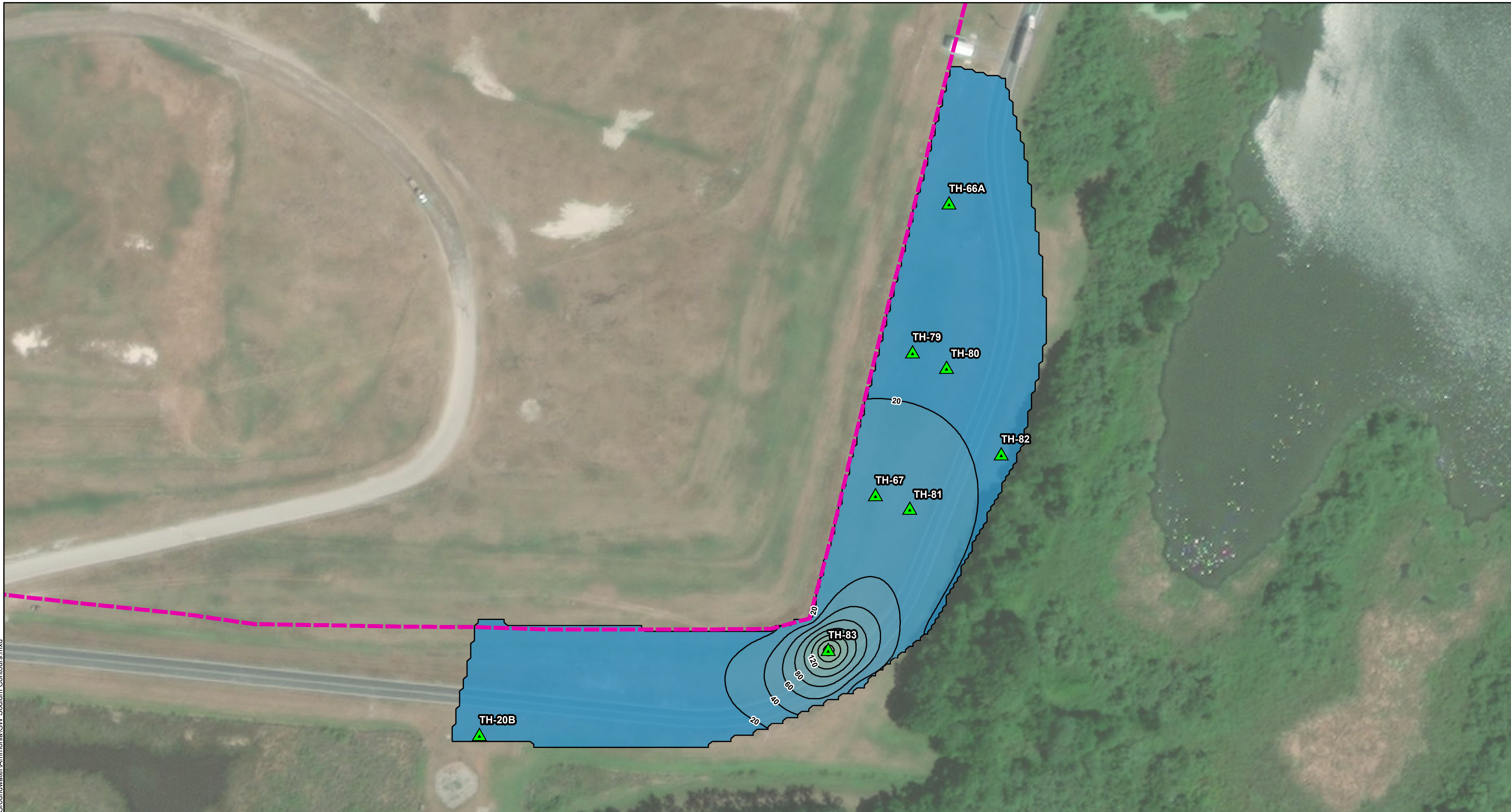
SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N

Document Path: C:\Users\4754tma\Documents\Groundwater\Ammonia\GW Sodium Contours.mxd



Legend

Monitoring Well
Landfill Limits

Concentration (mg/L)

0	40	140	240	340	440	540	640
20	60	160	260	360	460	560	660
	80	180	280	380	480	580	680
	100	200	300	400	500	600	700
	120	220	320	420	520	620	720

MAY 2020
GROUNDWATER SODIUM
ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N

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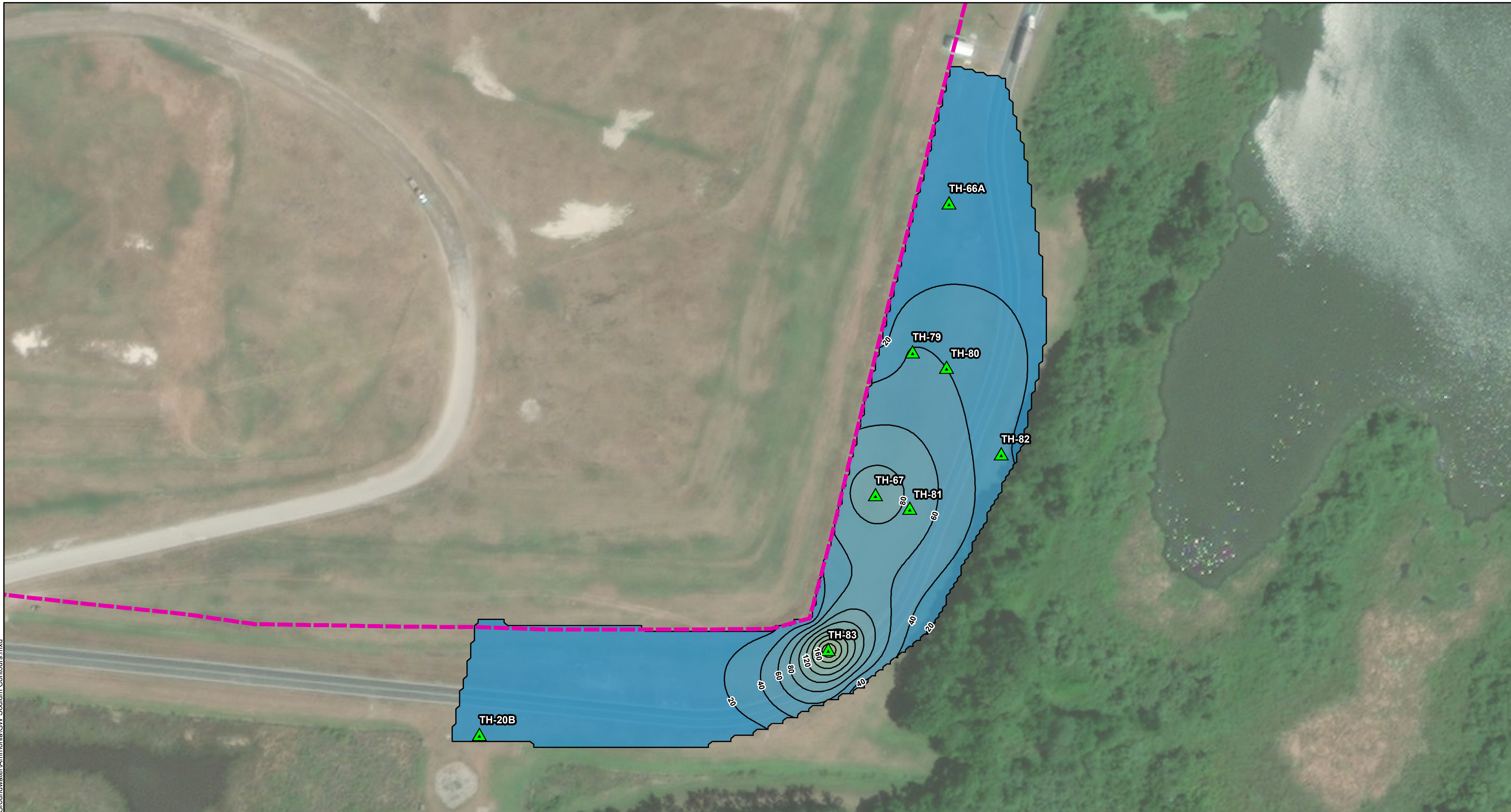


Legend

- Monitoring Well
- Landfill Limits

Concentration (mg/L)

0	40	140	240	340	440	540	640
20	60	160	260	360	460	560	660
	80	180	280	380	480	580	680
	100	200	300	400	500	600	700
	120	220	320	420	520	620	720

AUGUST 2020
GROUNDWATER SODIUM ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS

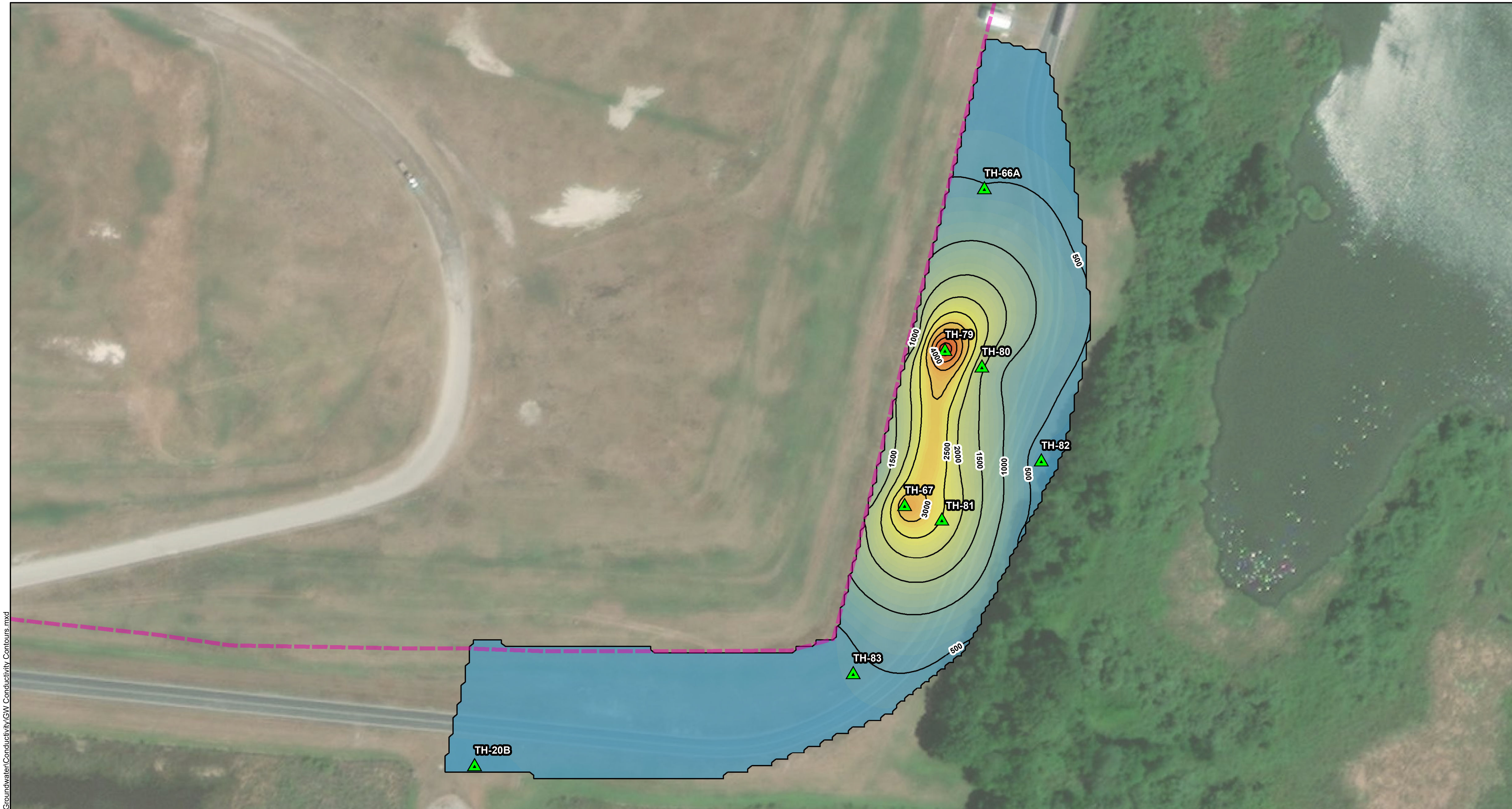
Tampa, FL | September 2020

0 60 120 Feet

N

Document Path: C:\Users\4754tma\Documents\Groundwater\Ammonia\GW Sodium Contours.mxd

Conductivity Contours



Legend

- Monitoring Well
- Landfill Limits

Conductivity

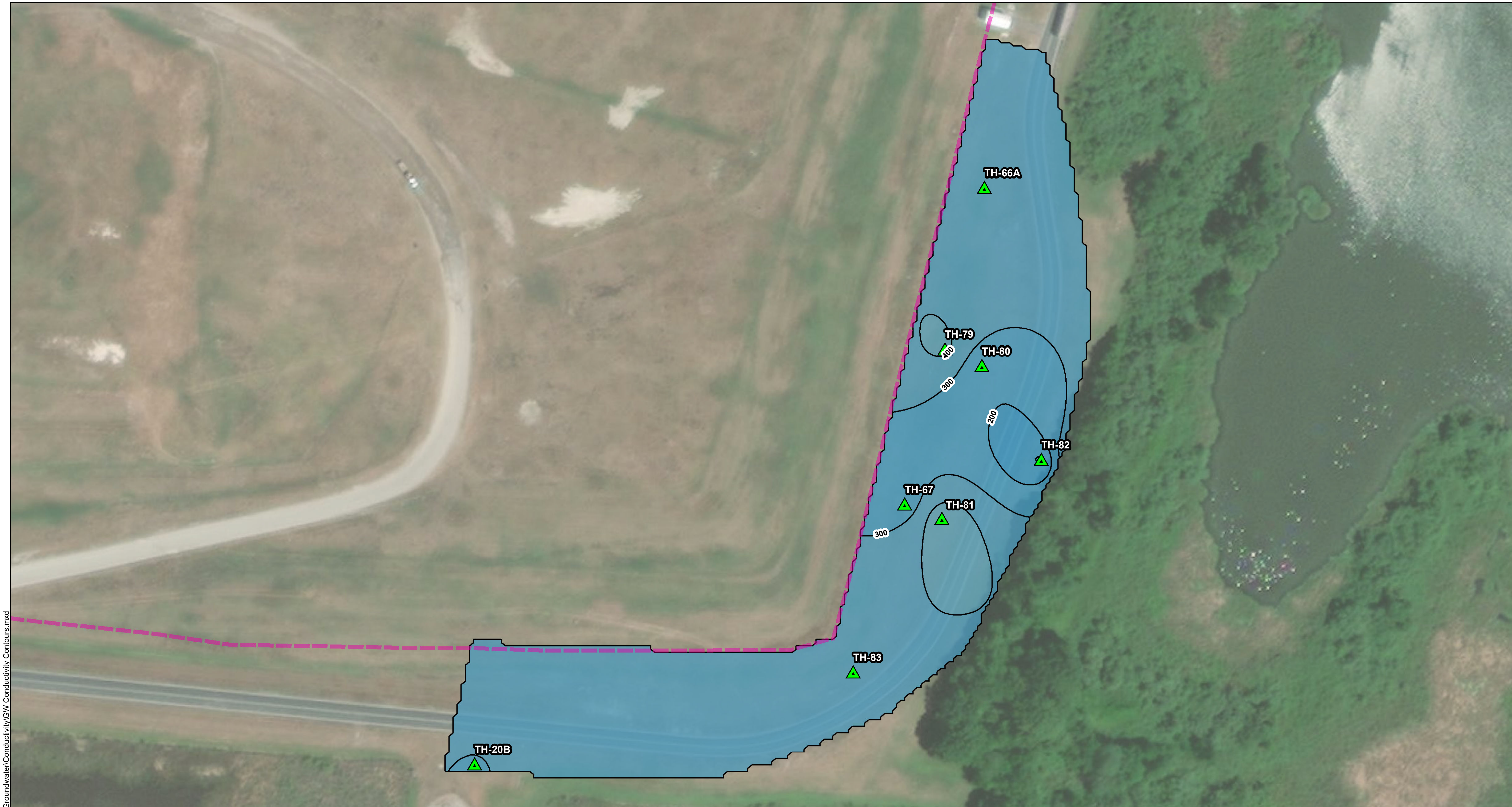
0	200	700	1200	1700	2200	2700	3200	3700	4200	4700	
100	300	800	1300	1800	2300	2800	3300	3800	4300	4800	
	400	900	1400	1900	2400	2900	3400	3900	4400	4900	
	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	
	600	1100	1600	2100	2600	3100	3600	4100	4600		

MAY 2017
GROUNDWATER CONDUCTIVITY
ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS
Tampa, FL | September 2020

0 60 120 Feet
N

Document Path: C:\Users\4754tmal\Documents\Groundwater\Conductivity\GW Conductivity Contours.mxd



Legend

Monitoring Well

Landfill Limits

Conductivity

0, 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1500, 1600, 1700, 1800, 1900, 2000, 2100, 2200, 2300, 2400, 2500, 2600, 2700, 2800, 2900, 3000, 3100, 3200, 3300, 3400, 3500, 3600, 3700, 3800, 3900, 4000, 4100, 4200, 4300, 4400, 4500, 4600, 4700, 4800, 4900, 5000

AUGUST 2017
GROUNDWATER CONDUCTIVITY
ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N

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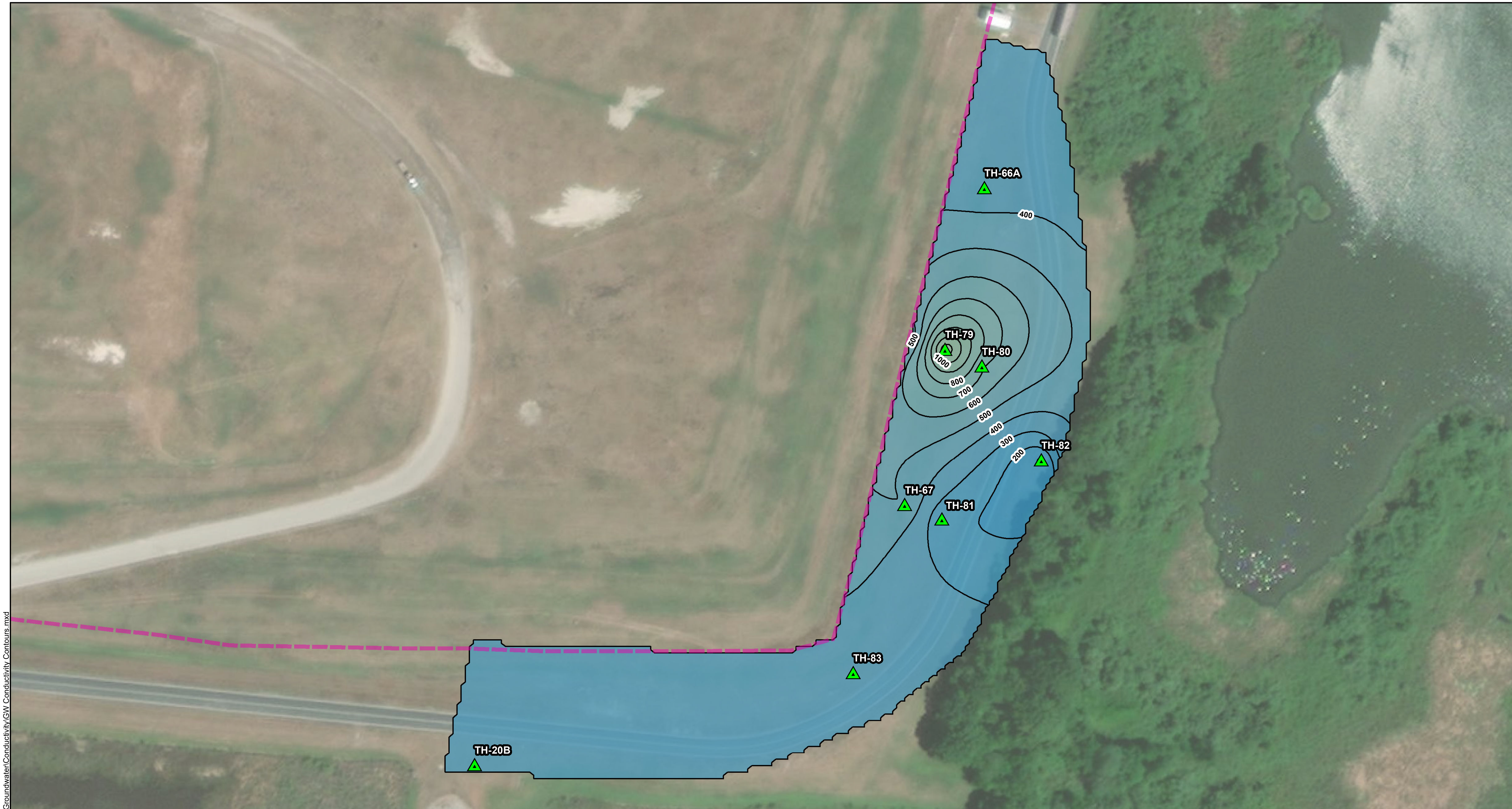


Legend

Monitoring Well

Landfill Limits

Conductivity

0	200	700	1200	1700	2200	2700	3200	3700	4200	4700
100	300	800	1300	1800	2300	2800	3300	3800	4300	4800
	400	900	1400	1900	2400	2900	3400	3900	4400	4900
	500	1000	1500	2000	2500	3000	3500	4000	4500	5000
	600	1100	1600	2100	2600	3100	3600	4100	4600	

NOVEMBER 2017
GROUNDWATER CONDUCTIVITY
ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

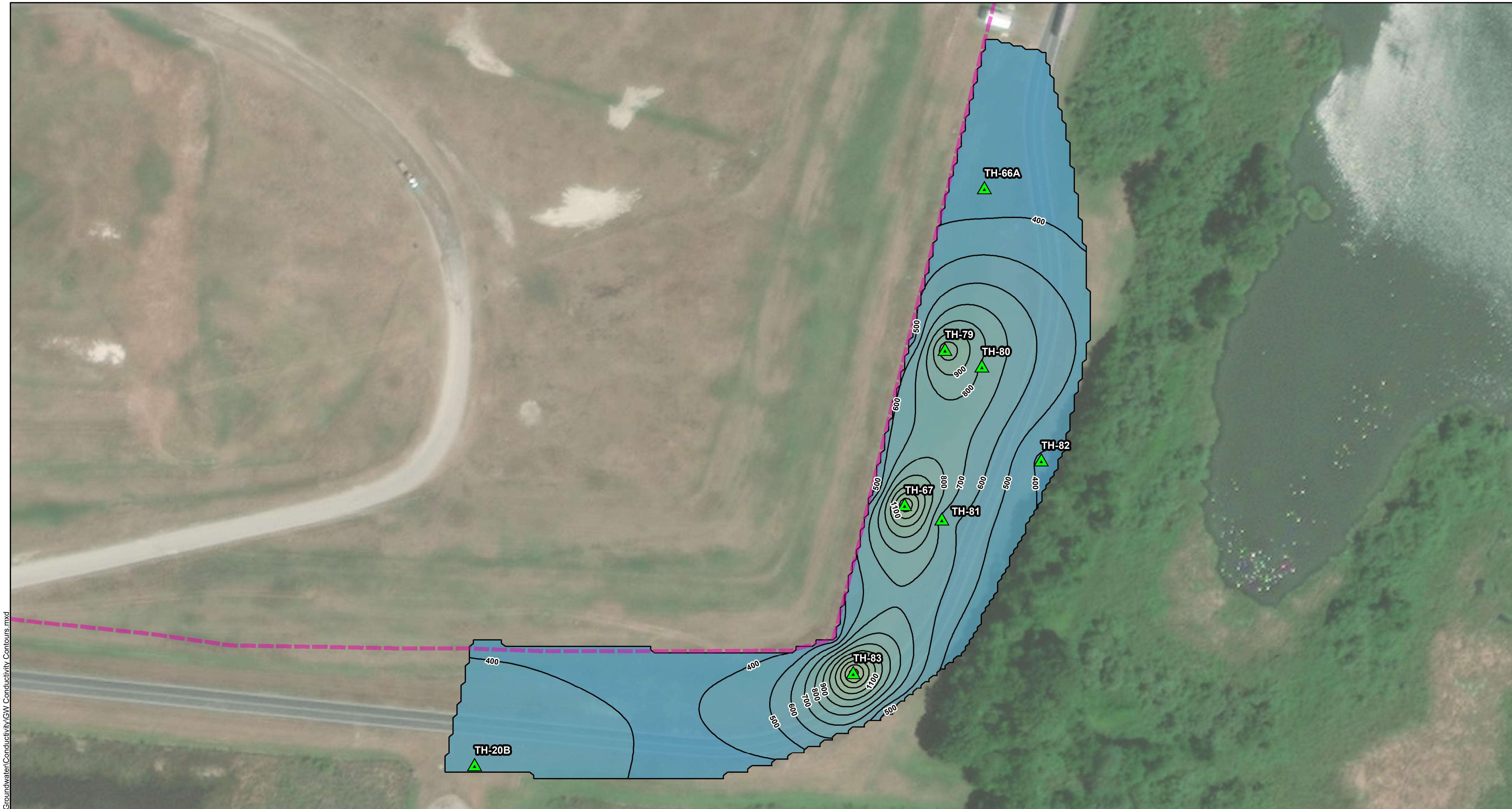
SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N

Document Path: C:\Users\4754tma\Documents\Groundwater\Conductivity\GW Conductivity Contours.mxd



Document Path: C:\Users\4754tmal\Documents\Groundwater\Conductivity\GW Conductivity Contours.mxd

Legend

Monitoring Well

Landfill Limits

Conductivity

0	200	700	1200	1700	2200	2700	3200	3700	4200	4700
100	300	800	1300	1800	2300	2800	3300	3800	4300	4800
	400	900	1400	1900	2400	2900	3400	3900	4400	4900
	500	1000	1500	2000	2500	3000	3500	4000	4500	5000
	600	1100	1600	2100	2600	3100	3600	4100	4600	

MAY 2018

GROUNDWATER CONDUCTIVITY
ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N

Legend

Monitoring Well	200	700	1200	1700	2200	2700	3200	3700	4200	4700
Landfill Limits	300	800	1300	1800	2300	2800	3300	3800	4300	4800
Conductivity	400	900	1400	1900	2400	2900	3400	3900	4400	4900
0	500	1000	1500	2000	2500	3000	3500	4000	4500	5000
100	600	1100	1600	2100	2600	3100	3600	4100	4600	

JULY 2018
GROUNDWATER CONDUCTIVITY
ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N

Document Path: C:\Users\4754tmal\Documents\Groundwater\Conductivity\GW Conductivity Contours.mxd

Legend

Monitoring Well

Landfill Limits

Conductivity

0	200	700	1200	1700	2200	2700	3200	3700	4200	4700
100	300	800	1300	1800	2300	2800	3300	3800	4300	4800
	400	900	1400	1900	2400	2900	3400	3900	4400	4900
	500	1000	1500	2000	2500	3000	3500	4000	4500	5000
	600	1100	1600	2100	2600	3100	3600	4100	4600	

FEBRUARY 2019
GROUNDWATER CONDUCTIVITY
ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N

Document Path: C:\Users\4754tmal\Documents\Groundwater\Conductivity\GW Conductivity Contours.mxd

Legend

Monitoring Well

Landfill Limits

Conductivity

0	200	700	1200	1700	2200	2700	3200	3700	4200	4700
100	300	800	1300	1800	2300	2800	3300	3800	4300	4800
	400	900	1400	1900	2400	2900	3400	3900	4400	4900
	500	1000	1500	2000	2500	3000	3500	4000	4500	5000
	600	1100	1600	2100	2600	3100	3600	4100	4600	

MAY 2019
GROUNDWATER CONDUCTIVITY
ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

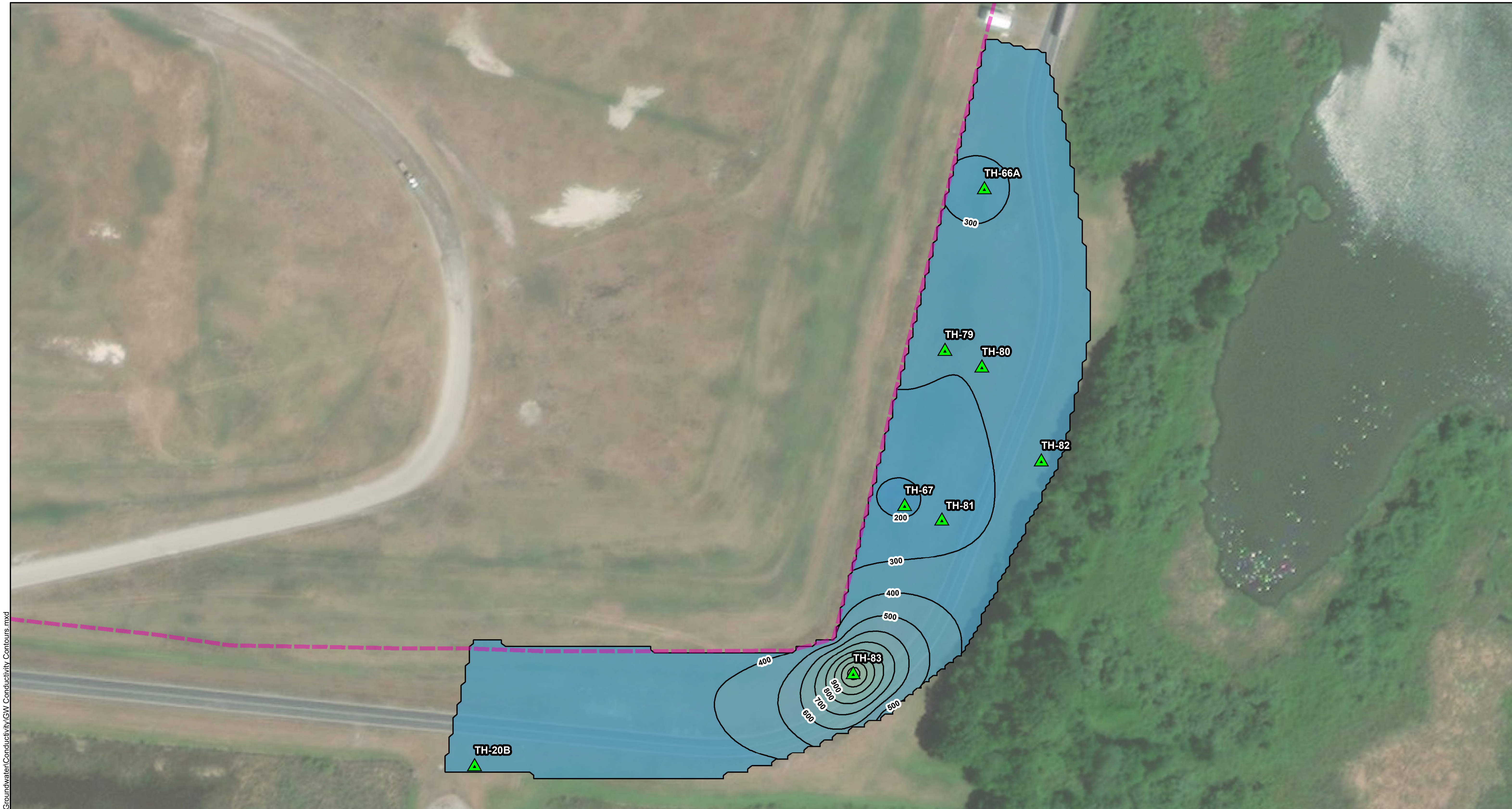
SCS ENGINEERS

Tampa, FL | September 2020

0 60 120
Feet

N

Document Path: C:\Users\4754tma\Documents\Groundwater\Conductivity\GW Conductivity Contours.mxd



Legend

Monitoring Well

Landfill Limits

Conductivity

0	200	700	1200	1700	2200	2700	3200	3700	4200	4700
100	300	800	1300	1800	2300	2800	3300	3800	4300	4800
	400	900	1400	1900	2400	2900	3400	3900	4400	4900
	500	1000	1500	2000	2500	3000	3500	4000	4500	5000
	600	1100	1600	2100	2600	3100	3600	4100	4600	

AUGUST 2019
GROUNDWATER CONDUCTIVITY
ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

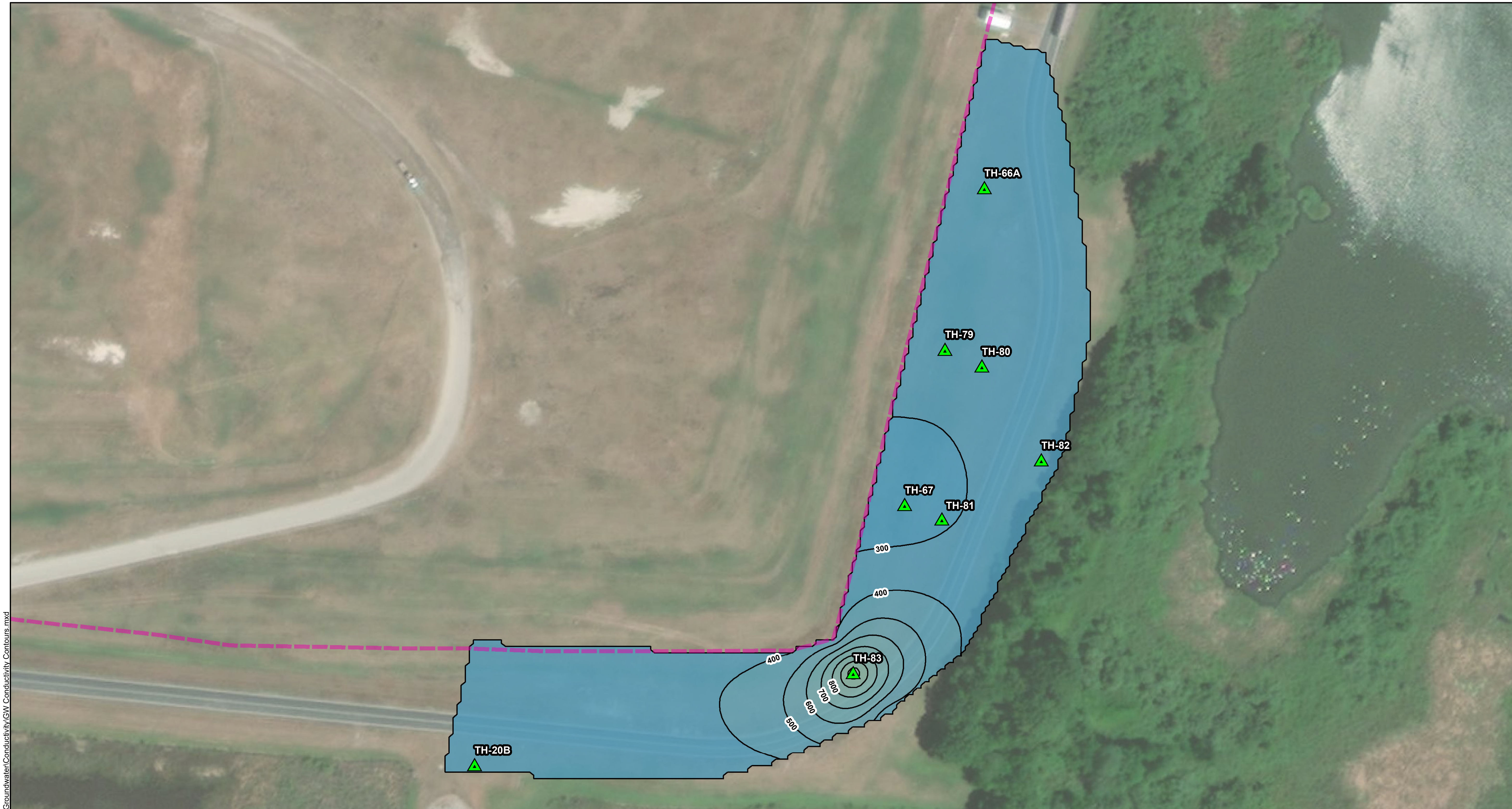
SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N

Document Path: C:\Users\4754tmal\Documents\Groundwater\Conductivity\GW Conductivity Contours.mxd



Document Path: C:\Users\4754tmal\Documents\Groundwater\Conductivity\GW Conductivity Contours.mxd

Legend

Monitoring Well

Landfill Limits

Conductivity

0	200	700	1200	1700	2200	2700	3200	3700	4200	4700
100	300	800	1300	1800	2300	2800	3300	3800	4300	4800
	400	900	1400	1900	2400	2900	3400	3900	4400	4900
	500	1000	1500	2000	2500	3000	3500	4000	4500	5000
	600	1100	1600	2100	2600	3100	3600	4100	4600	

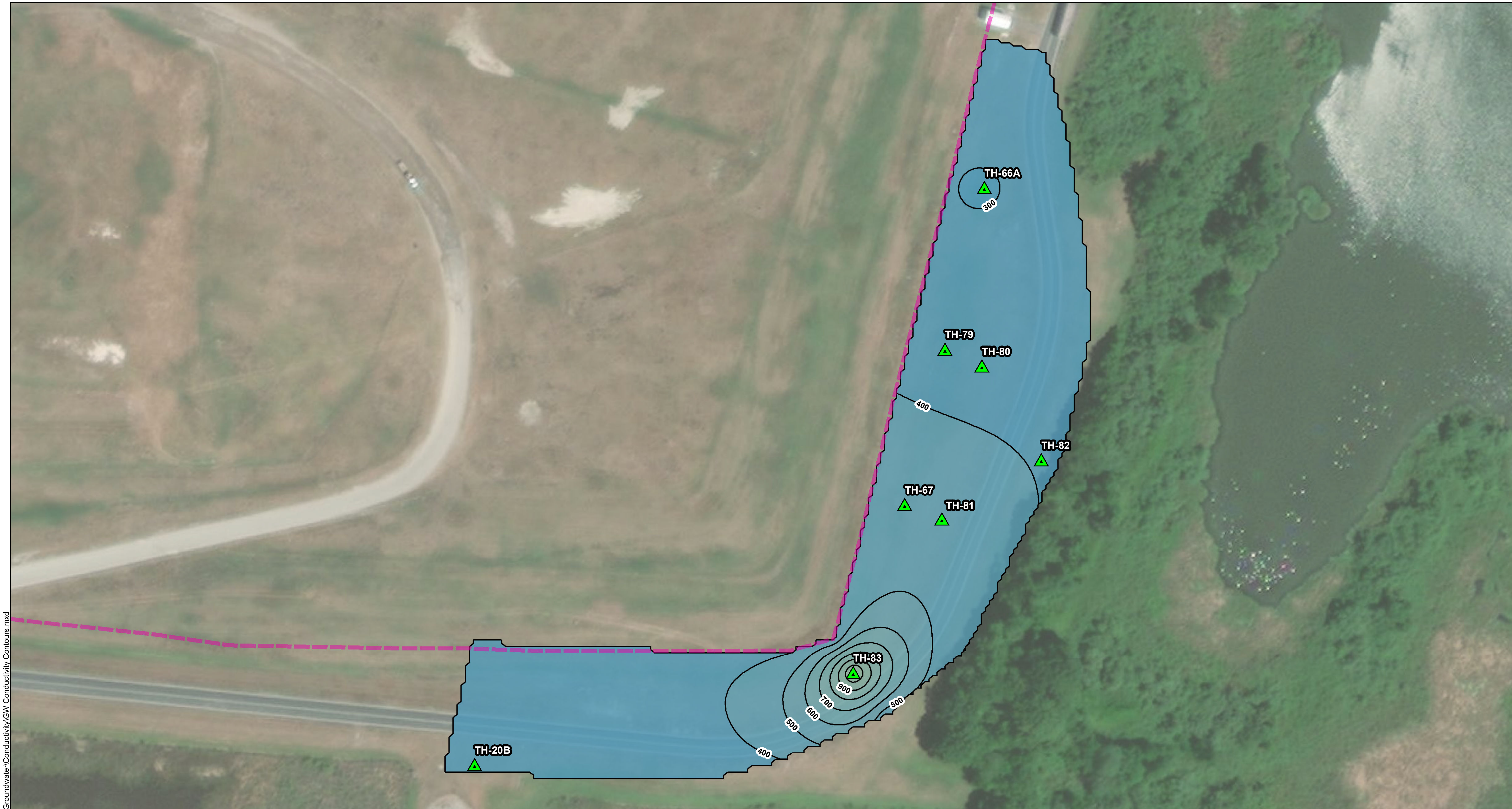
NOVEMBER 2019
GROUNDWATER CONDUCTIVITY
ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N



Legend

- Monitoring Well
- Landfill Limits

Conductivity

0	200	700	1200	1700	2200	2700	3200	3700	4200	4700
100	300	800	1300	1800	2300	2800	3300	3800	4300	4800
	400	900	1400	1900	2400	2900	3400	3900	4400	4900
	500	1000	1500	2000	2500	3000	3500	4000	4500	5000
	600	1100	1600	2100	2600	3100	3600	4100	4600	

FEBRUARY 2020
GROUNDWATER CONDUCTIVITY
ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

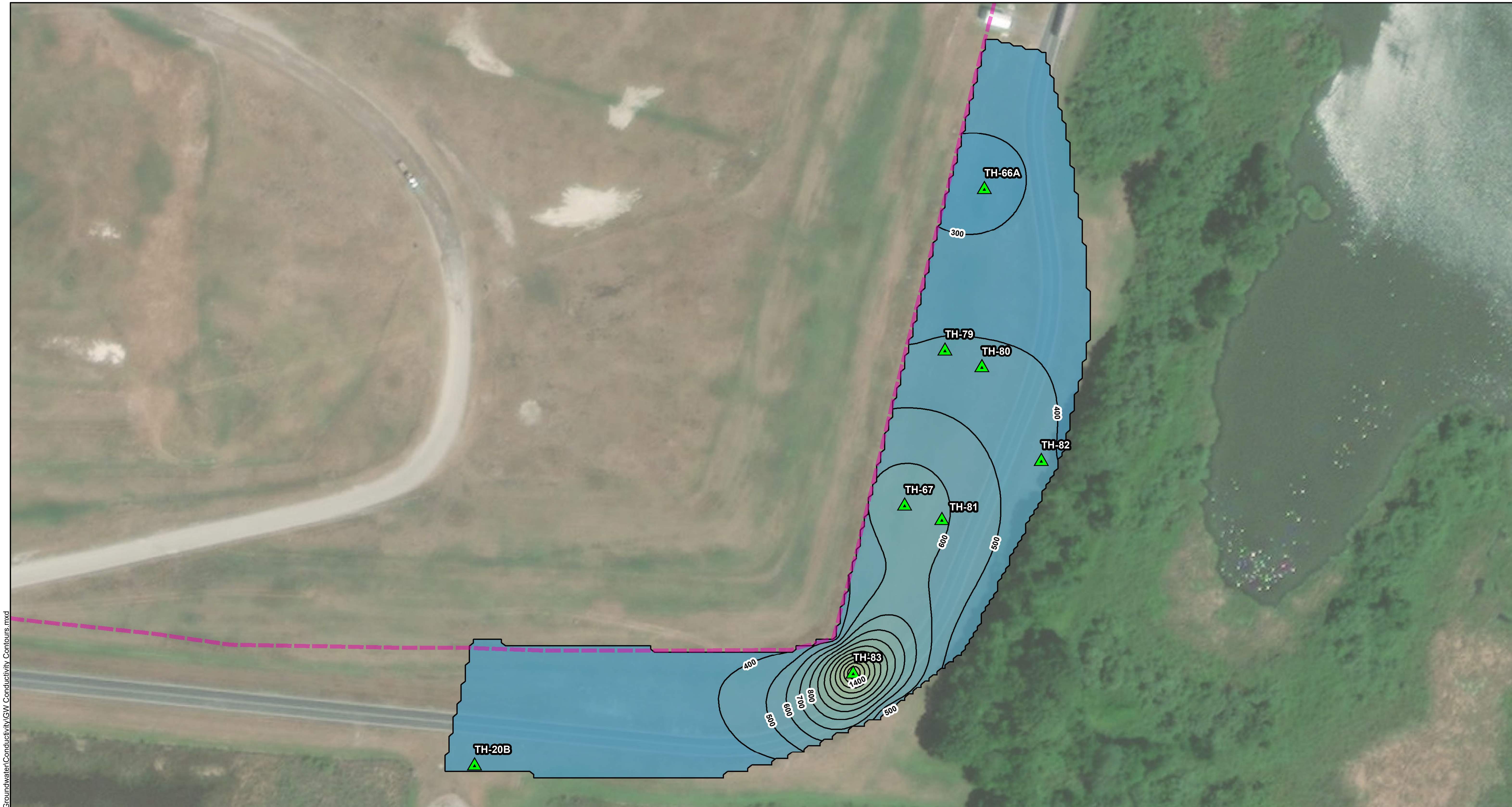
SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N

Document Path: C:\Users\4754tmal\Documents\Groundwater\Conductivity\GW Conductivity Contours.mxd



Legend

Monitoring Well

Landfill Limits

Conductivity

0	200	700	1200	1700	2200	2700	3200	3700	4200
100	300	800	1300	1800	2300	2800	3300	3800	4300
	400	900	1400	1900	2400	2900	3400	3900	4400
	500	1000	1500	2000	2500	3000	3500	4000	4500
	600	1100	1600	2100	2600	3100	3600	4100	4600

4700
4800
4900
5000

MAY 2020
GROUNDWATER CONDUCTIVITY
ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

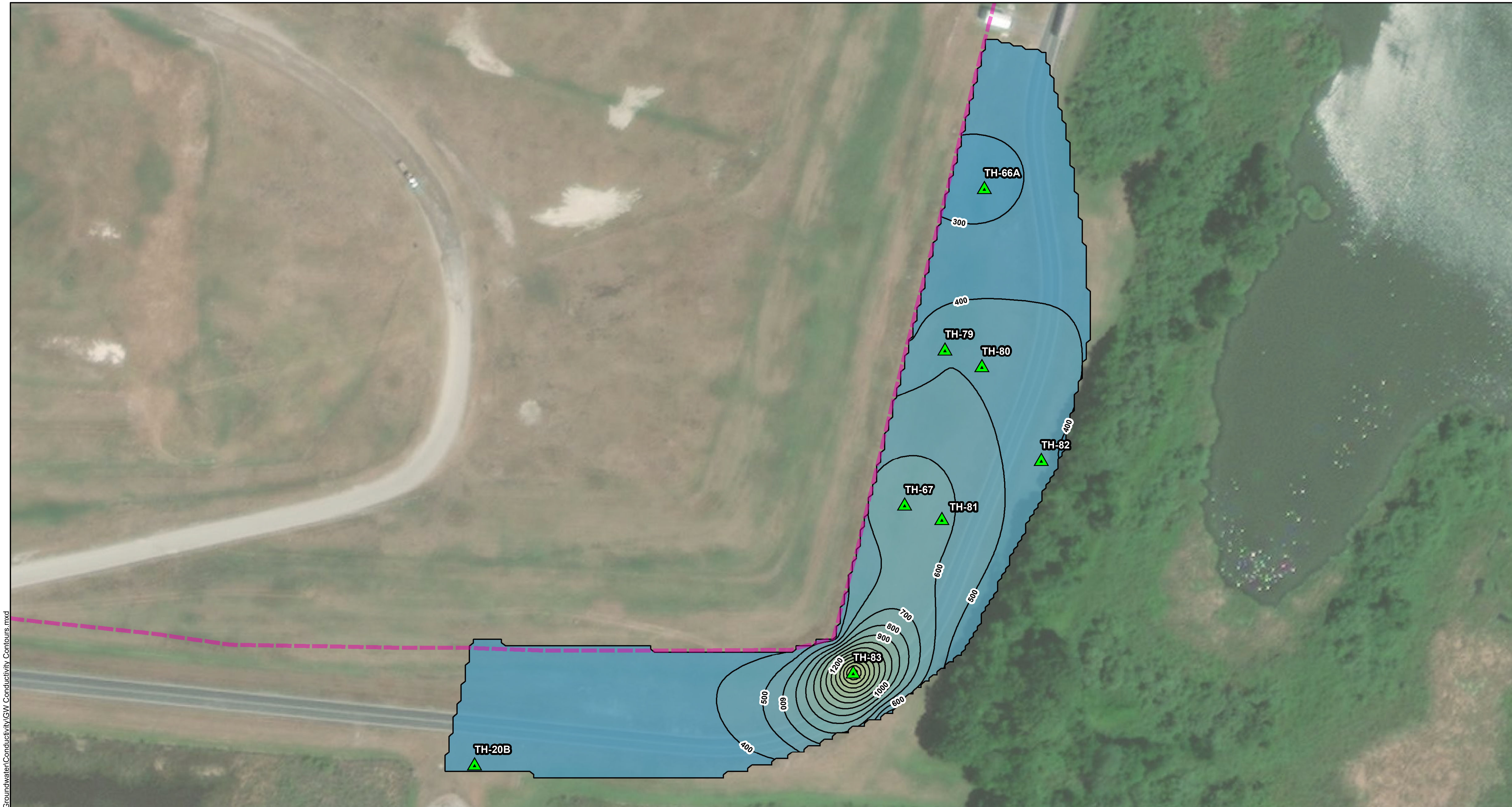
SCS ENGINEERS

Tampa, FL | September 2020

0 60 120 Feet

N

Document Path: C:\Users\4754tmal\Documents\Groundwater\Conductivity\GW Conductivity Contours.mxd



Legend

Monitoring Well

Landfill Limits

Conductivity

0	200	700	1200	1700	2200	2700	3200	3700	4200	4700
100	300	800	1300	1800	2300	2800	3300	3800	4300	4800
	400	900	1400	1900	2400	2900	3400	3900	4400	4900
	500	1000	1500	2000	2500	3000	3500	4000	4500	5000
	600	1100	1600	2100	2600	3100	3600	4100	4600	

AUGUST 2020
GROUNDWATER CONDUCTIVITY
ISOCONCENTRATION MAP
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH, FLORIDA

SCS ENGINEERS

Tampa, FL | September 2020

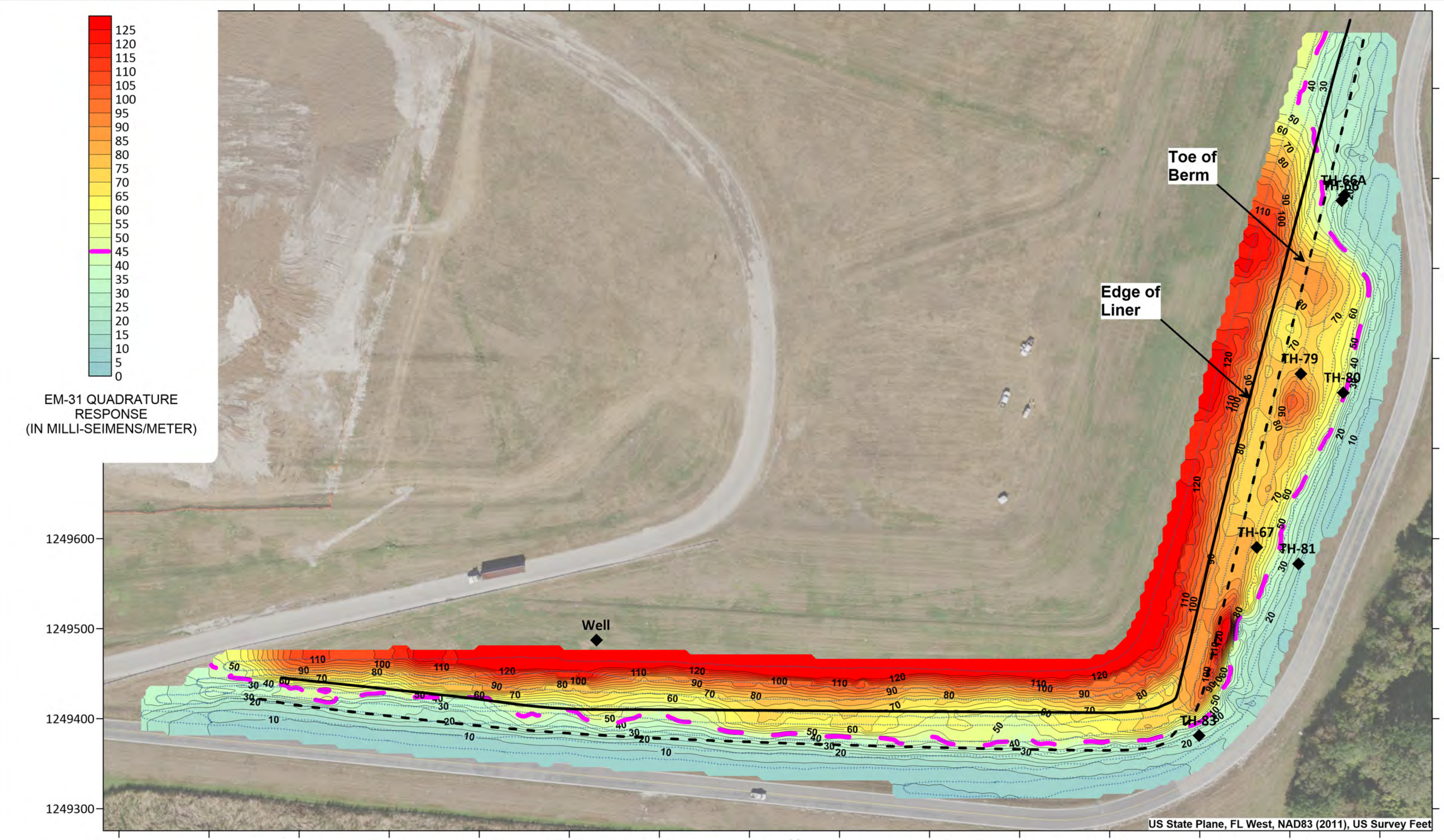
0 60 120 Feet

N

Appendix C
Subsurface
Conductivity Surveys

Figure 1

November 2016 Geoview Subsurface Conductivity Figure



EXPLANATION

CONTOUR OF EM31 TERRAIN CONDUCTIVITY RESPONSE (IN MILLI-SEIMENS PER METER)

++++ EM DATA STATIONS

LOCATION OF MONITORING WELL (WITH DESIGNATION)

APPROXIMATE EDGE OF AREA OF ELEVATED CONDUCTIVITY RESPONSE

GeoView A geophysical services company

FIGURE 1

COLOR CONTOUR MAP OF EM-31 TERRAIN CONDUCTIVITY RESPONSE

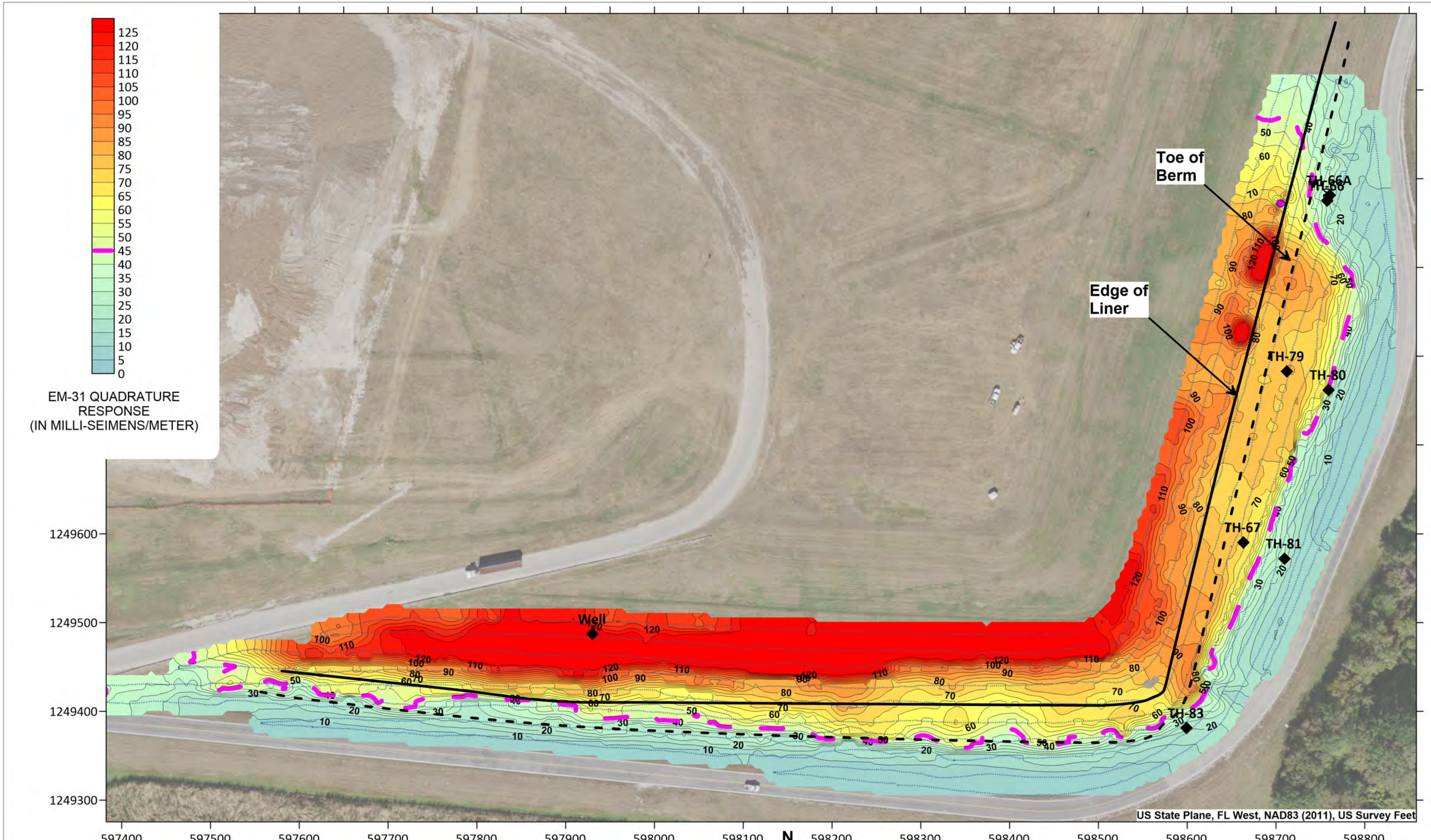
SOUTHEAST COUNTY LANDFILL
DATA COLLECTED NOVEMBER 10, 2016
LITHIA, FLORIDA

SCS ENGINEERS
TAMPA, FLORIDA

PROJECT: 24527.0
DATE: 07/02/19

Figure 2

November 2017 Geoview Subsurface Conductivity Figure



EXPLANATION

CONTOUR OF EM31 TERRAIN CONDUCTIVITY RESPONSE (IN MILLI-SEIMENS PER METER)

++++ EM DATA STATIONS

LOCATION OF MONITORING WELL (WITH DESIGNATION)

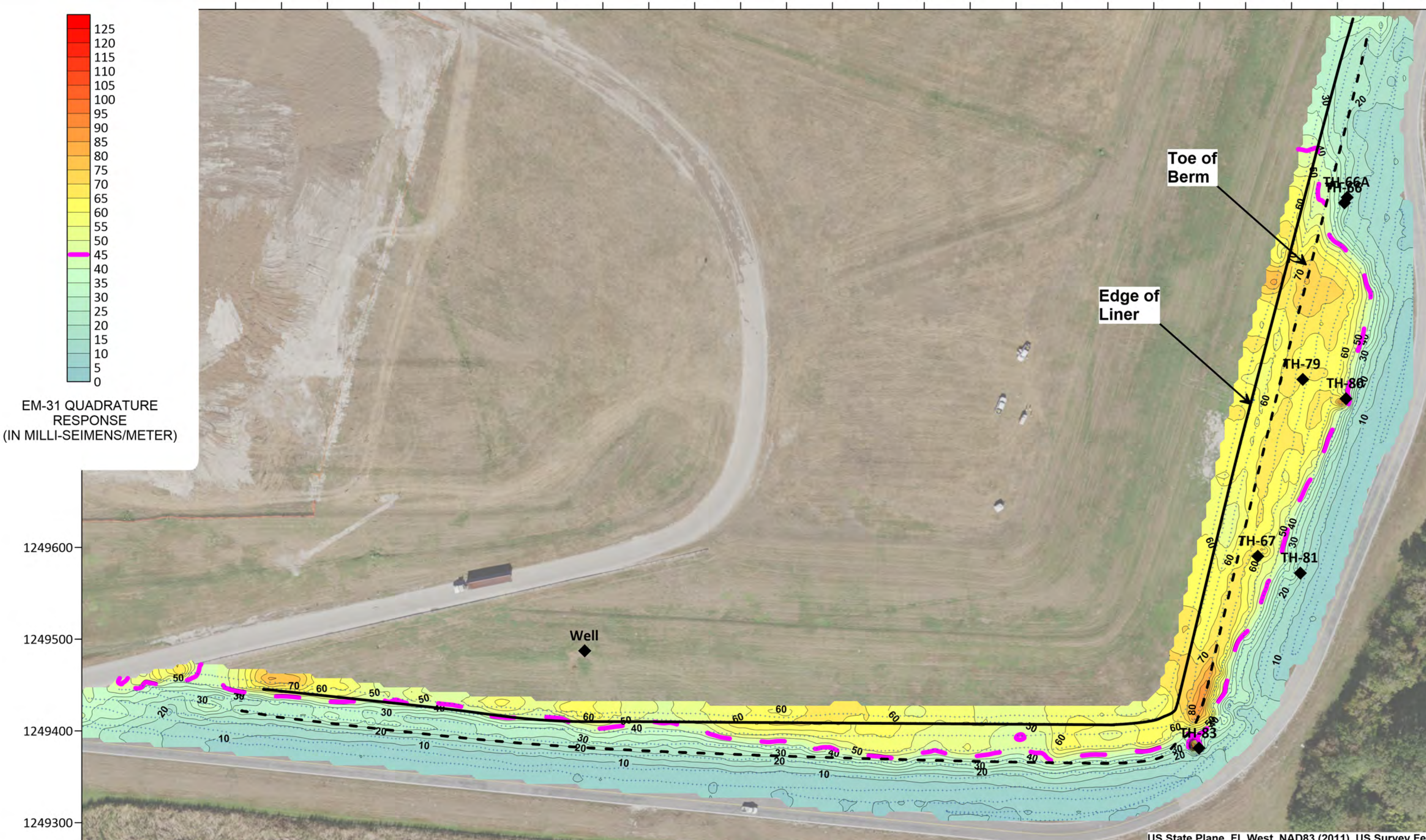
APPROXIMATE EDGE OF AREA OF ELEVATED CONDUCTIVITY RESPONSE

GeoView A geophysical services company

FIGURE 1	SOUTHEAST COUNTY LANDFILL DATA COLLECTED OCTOBER 11, 2017 LITHIA, FLORIDA	
COLOR CONTOUR MAP OF EM-31 TERRAIN CONDUCTIVITY RESPONSE	SCS ENGINEERS TAMPA, FLORIDA	PROJECT: 24527.1 DATE: 07/02/19

Figure 3

November 2018 Geoview Subsurface Conductivity Figure



N

0 50 100

EXPLANATION

CONTOUR OF EM31 TERRAIN CONDUCTIVITY RESPONSE (IN MILLI-SEIMENS PER METER)

++++ EM DATA STATIONS

LOCATION OF MONITORING WELL (WITH DESIGNATION)

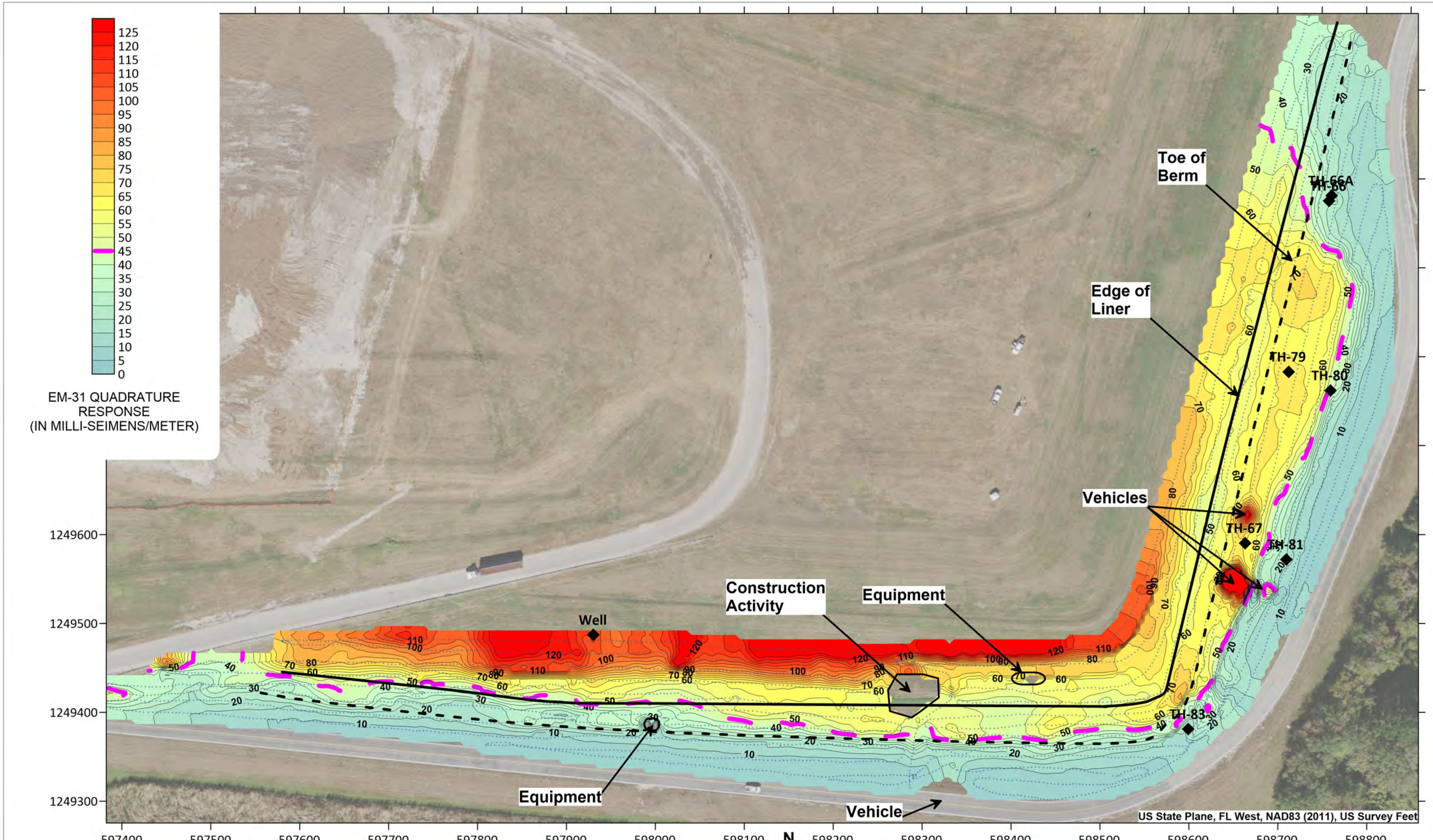
APPROXIMATE EDGE OF AREA OF ELEVATED CONDUCTIVITY RESPONSE

Geo View A geophysical services company

FIGURE 1	SOUTHEAST COUNTY LANDFILL DATA COLLECTED NOVEMBER 2, 2018 LITHIA, FLORIDA	
COLOR CONTOUR MAP OF EM-31 TERRAIN CONDUCTIVITY RESPONSE	SCS ENGINEERS TAMPA, FLORIDA	PROJECT: 24527.2 DATE: 07/02/19

Figure 4

May 2019 Geoview Subsurface Conductivity Figure



EXPLANATION

CONTOUR OF EM31 TERRAIN CONDUCTIVITY RESPONSE (IN MILLI-SEIMENS PER METER)

LOCATION OF MONITORING WELL (WITH DESIGNATION)

++++ EM DATA STATIONS

APPROXIMATE EDGE OF AREA OF ELEVATED CONDUCTIVITY RESPONSE

N

0 50 100

GeoView A geophysical services company

FIGURE 1

COLOR CONTOUR MAP OF EM-31 TERRAIN CONDUCTIVITY RESPONSE

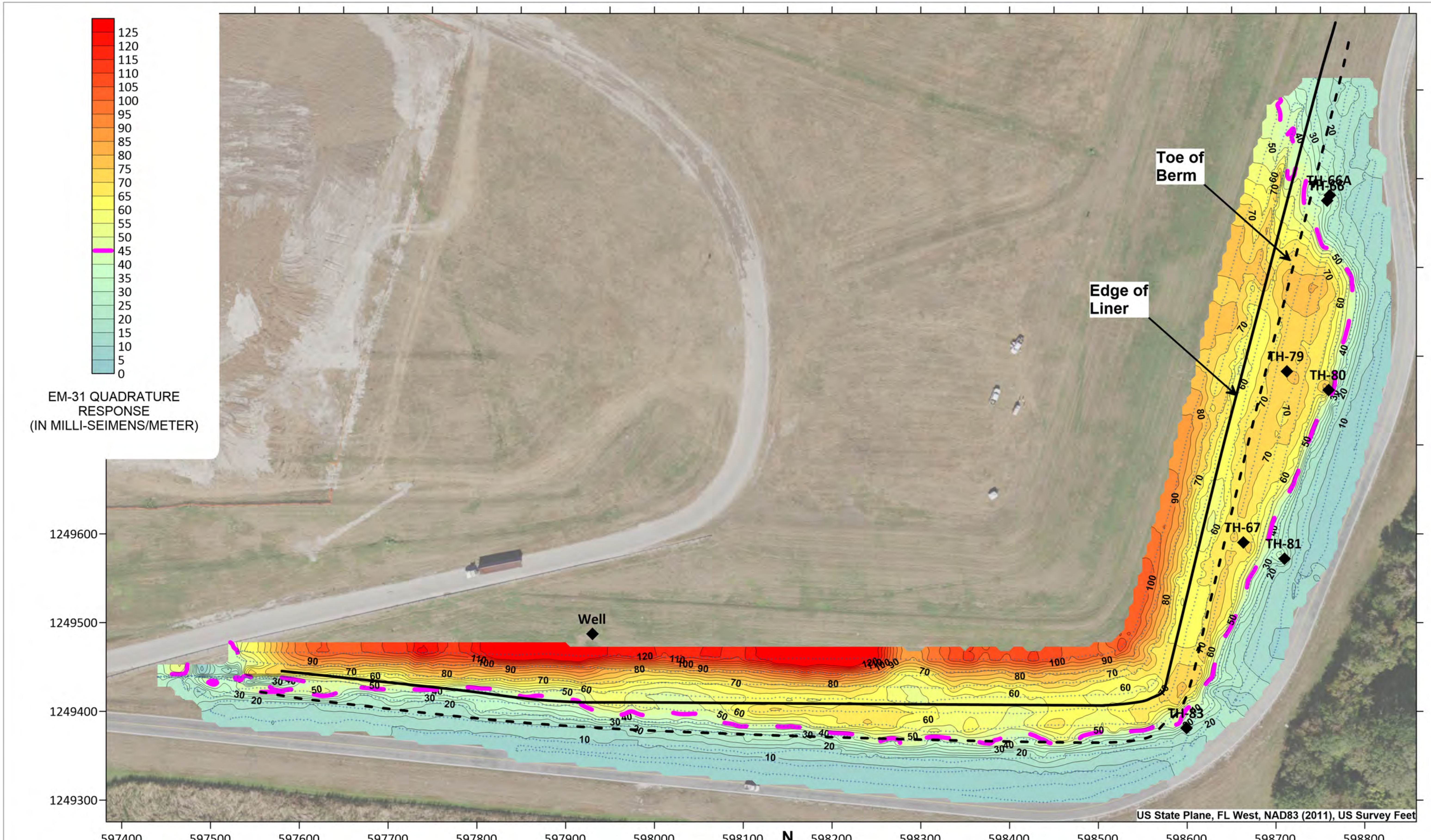
SOUTHEAST COUNTY LANDFILL
DATA COLLECTED MAY 8, 2019
LITHIA, FLORIDA

SCS ENGINEERS
TAMPA, FLORIDA

PROJECT: 24527.3
DATE: 07/02/19

Figure 5

October 2019 Geoview Subsurface Conductivity Figure



EXPLANATION

CONTOUR OF EM31 TERRAIN CONDUCTIVITY RESPONSE (IN MILLI-SEIMENS PER METER)

++++ EM DATA STATIONS

LOCATION OF MONITORING WELL (WITH DESIGNATION)

APPROXIMATE EDGE OF AREA OF ELEVATED CONDUCTIVITY RESPONSE

GeoView A geophysical services company

FIGURE 1

COLOR CONTOUR MAP OF EM-31 TERRAIN CONDUCTIVITY RESPONSE

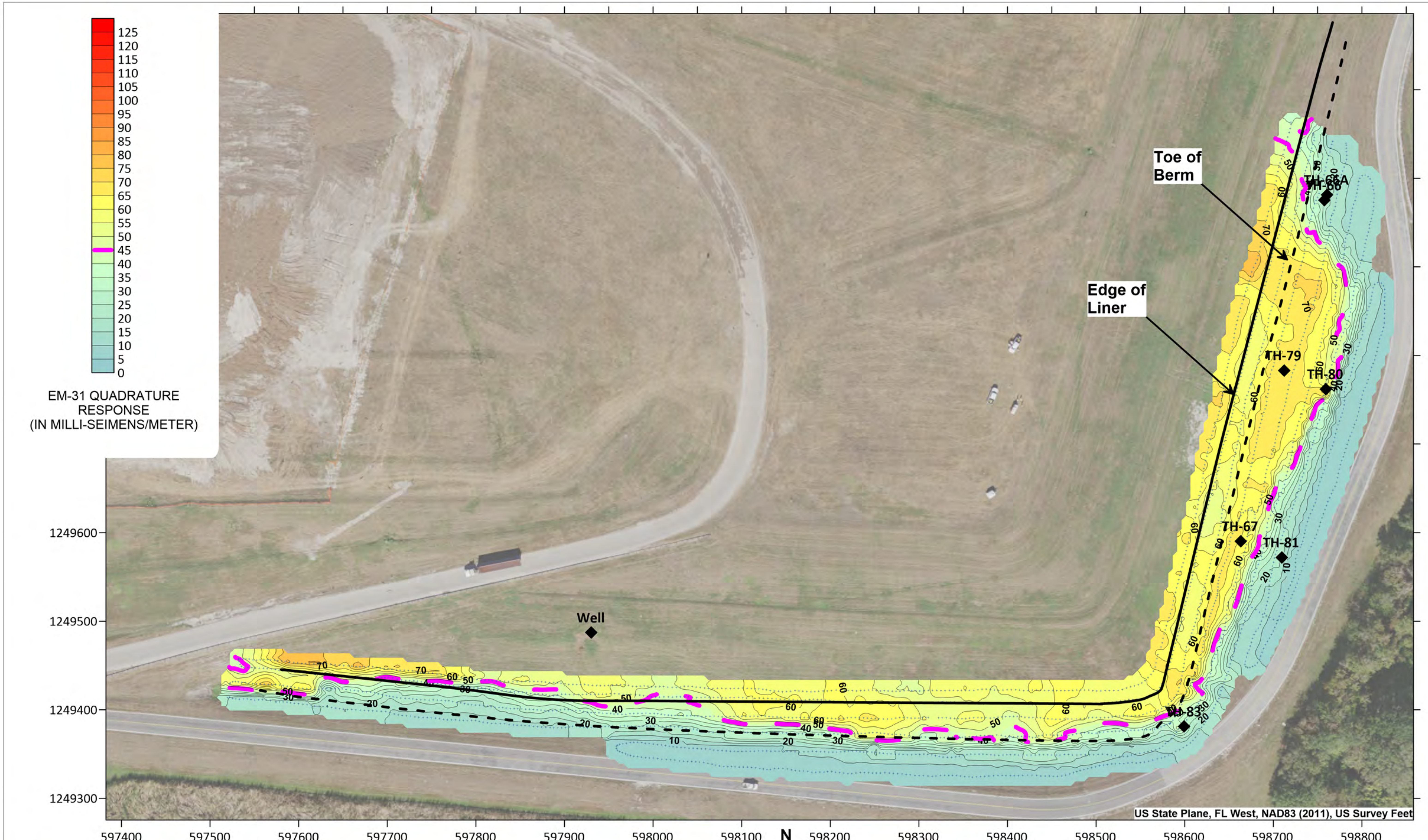
SOUTHEAST COUNTY LANDFILL
DATA COLLECTED OCTOBER 8, 2019
LITHIA, FLORIDA

SCS ENGINEERS
TAMPA, FLORIDA

PROJECT: 24527.5
DATE: 10/14/19

Figure 6

December 2019 Geoview Subsurface Conductivity Figure



EXPLANATION

CONTOUR OF EM31 TERRAIN CONDUCTIVITY RESPONSE (IN MILLI-SEIMENS PER METER)

++++ EM DATA STATIONS

LOCATION OF MONITORING WELL (WITH DESIGNATION)

APPROXIMATE EDGE OF AREA OF ELEVATED CONDUCTIVITY RESPONSE

GeoView A geophysical services company

FIGURE 1

COLOR CONTOUR MAP OF EM-31 TERRAIN CONDUCTIVITY RESPONSE

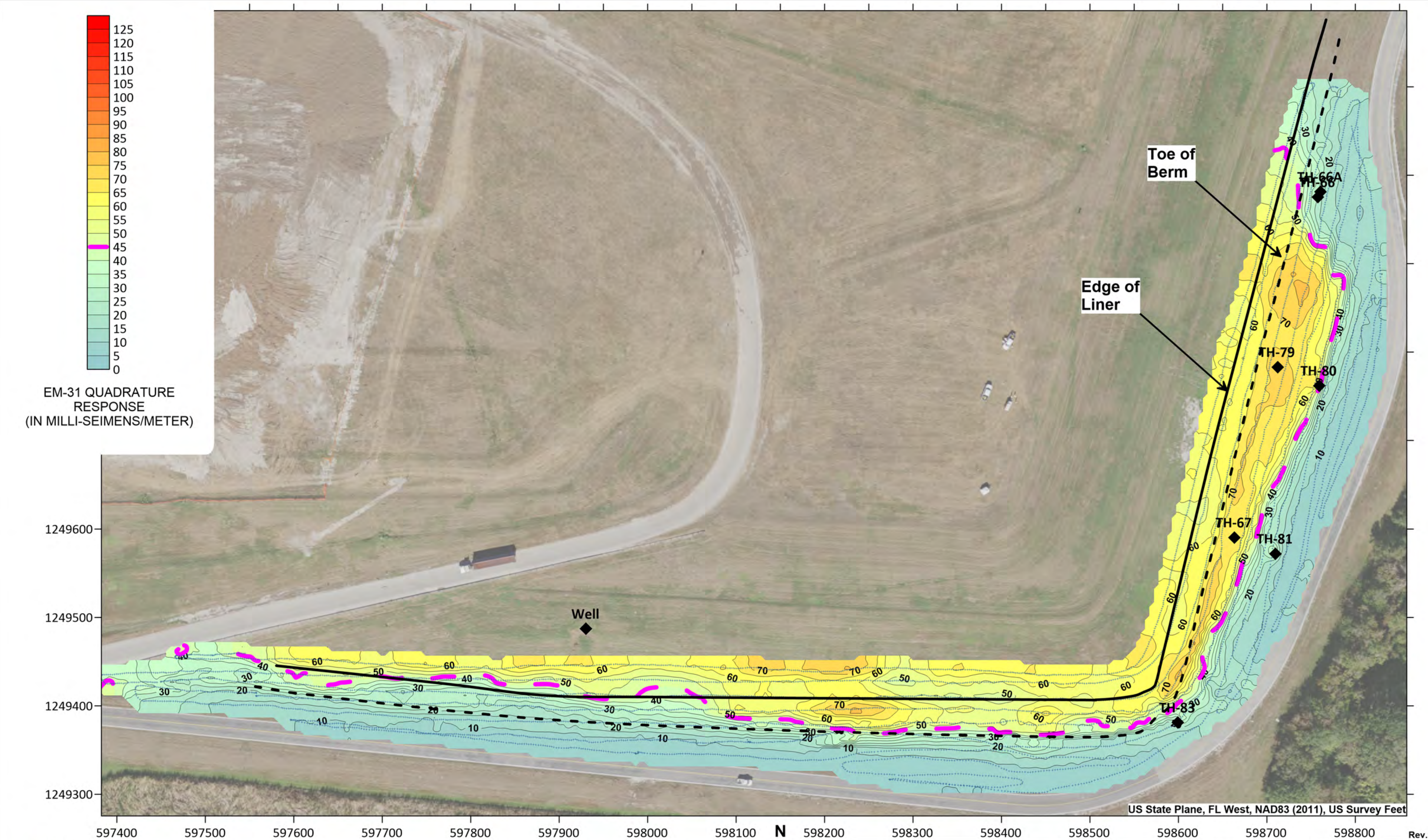
SOUTHEAST COUNTY LANDFILL
DATA COLLECTED DECEMBER 11, 2019
LITHIA, FLORIDA

SCS ENGINEERS
TAMPA, FLORIDA

PROJECT: 24527.7
DATE: 12/11/19

Figure 7

July 2020 Geoview Subsurface Conductivity Figure



EXPLANATION

CONTOUR OF EM31 TERRAIN CONDUCTIVITY RESPONSE (IN MILLI-SEIMENS PER METER)

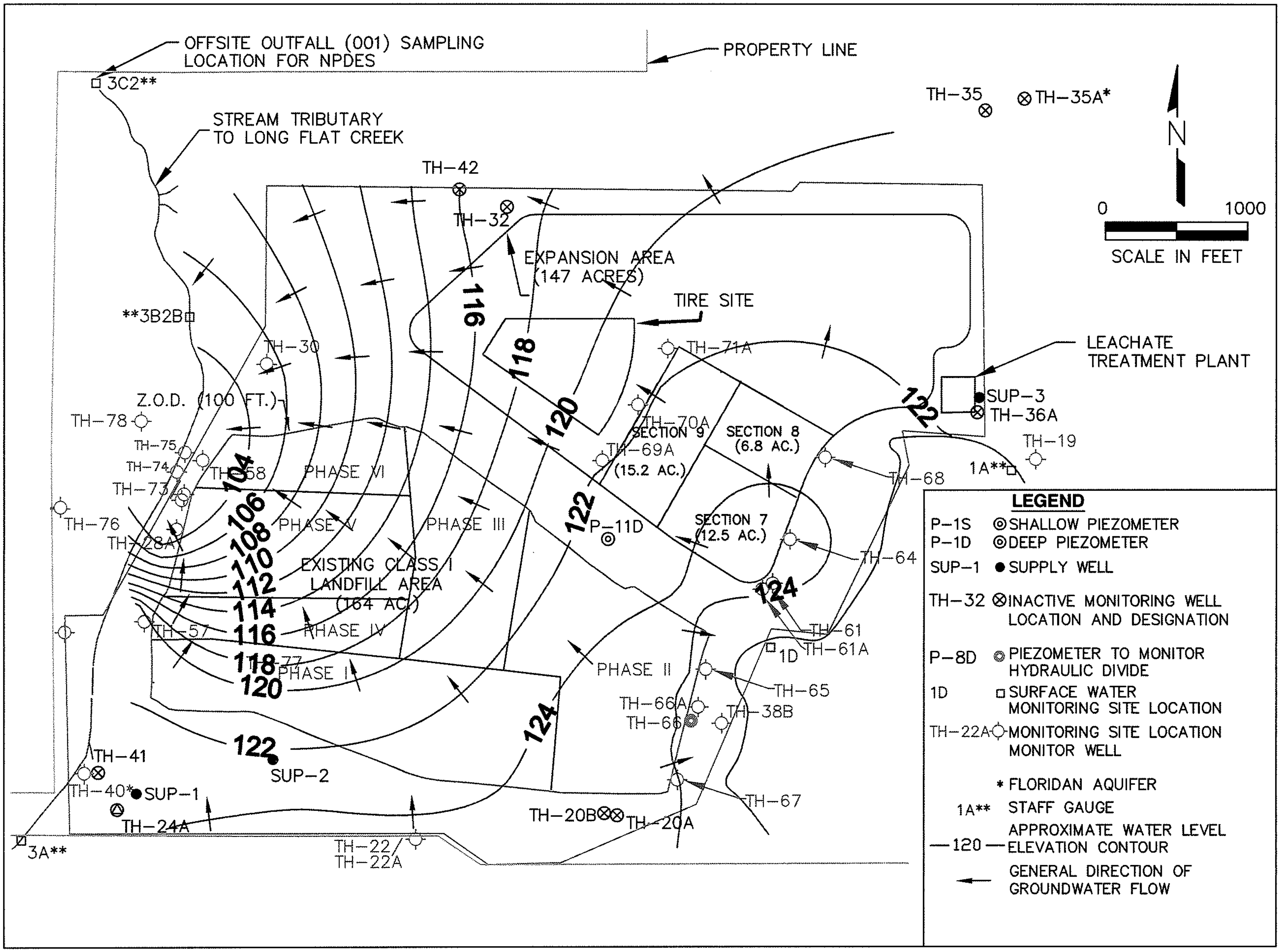
++++ EM DATA STATIONS

LOCATION OF MONITORING WELL (WITH DESIGNATION)

APPROXIMATE EDGE OF AREA OF ELEVATED CONDUCTIVITY RESPONSE

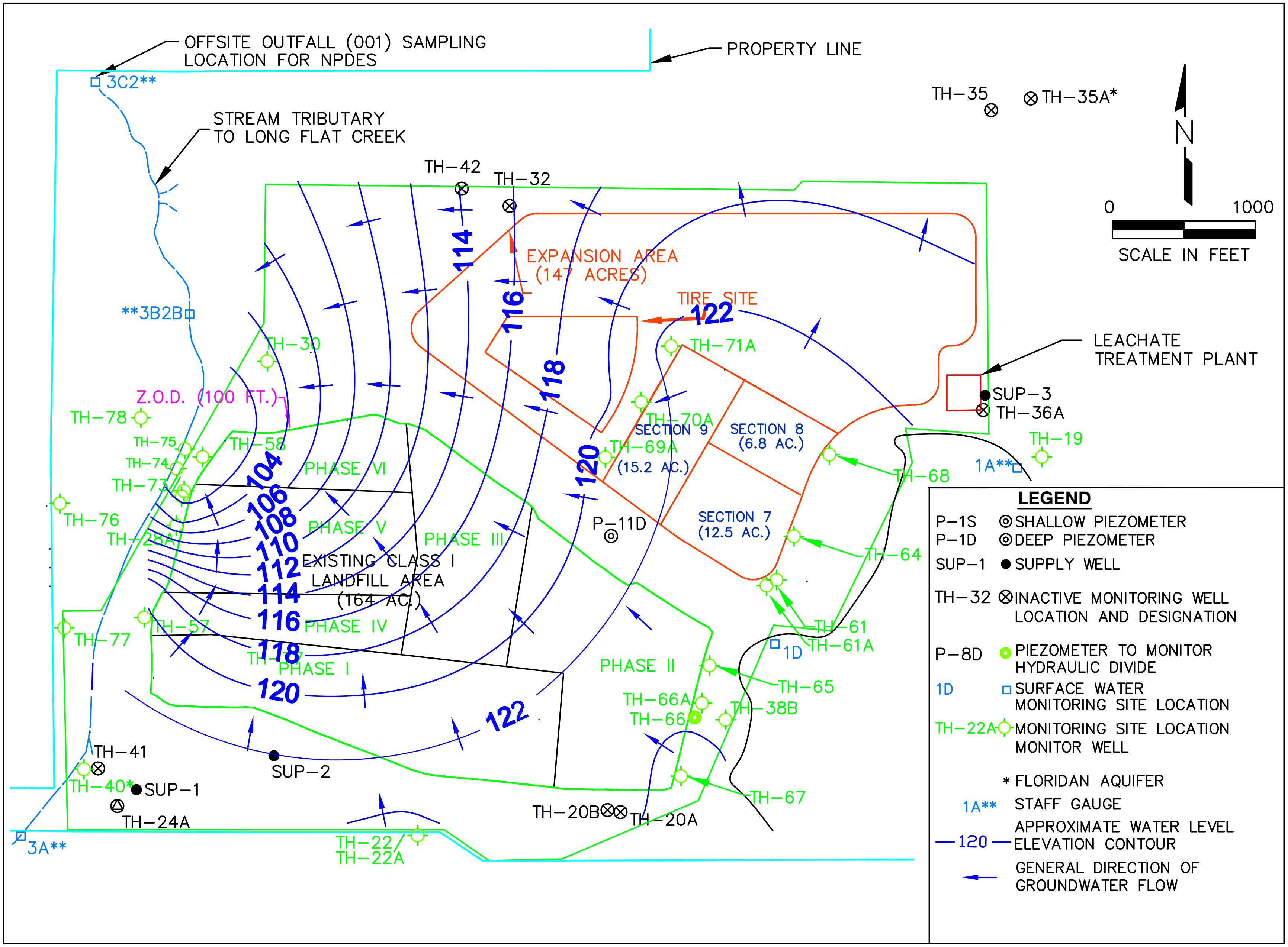
GeoView A geophysical services company	FIGURE 1	SOUTHEAST COUNTY LANDFILL DATA COLLECTED JULY 23, 2020 LITHIA, FLORIDA	
	COLOR CONTOUR MAP OF EM-31 TERRAIN CONDUCTIVITY RESPONSE	SCS ENGINEERS TAMPA, FLORIDA	PROJECT: 24527.8 DATE: 08/01/20

Appendix D
Semiannual Groundwater
Contours



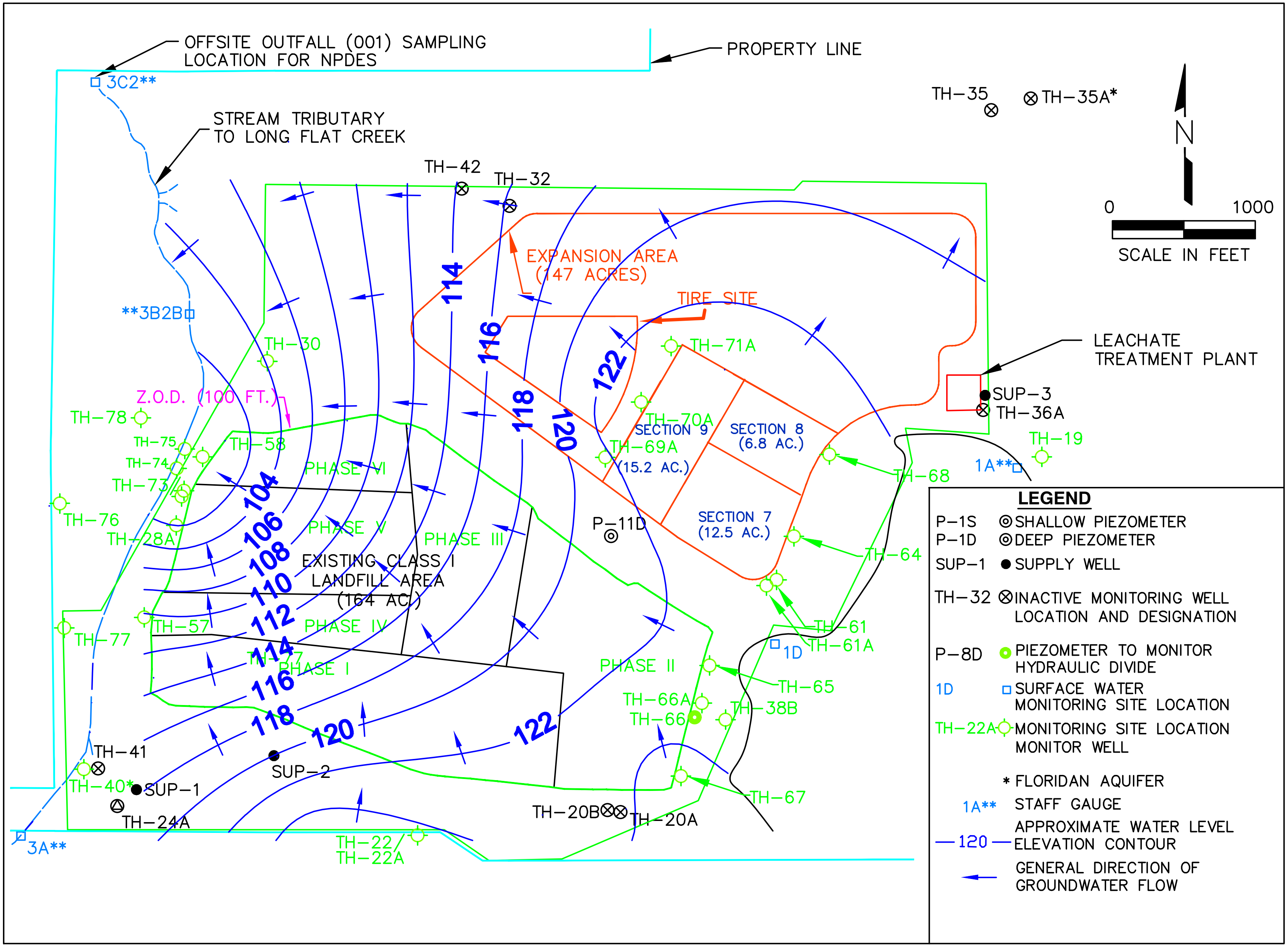
Southeast County Landfill

Groundwater Elevation Contour Diagram – August 24, 2015



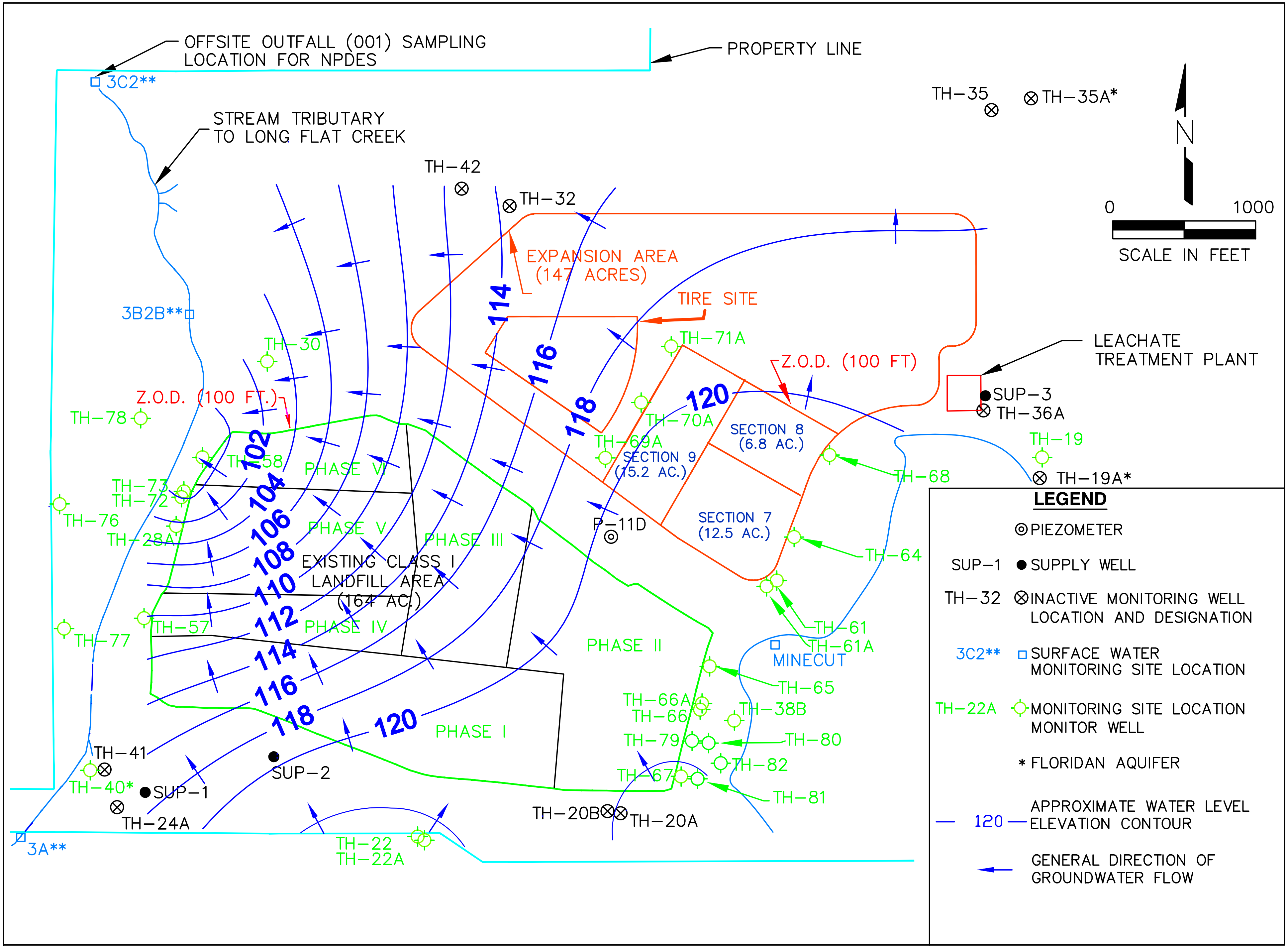
Southeast County Landfill

Groundwater Elevation Contour Diagram – February 22, 2016



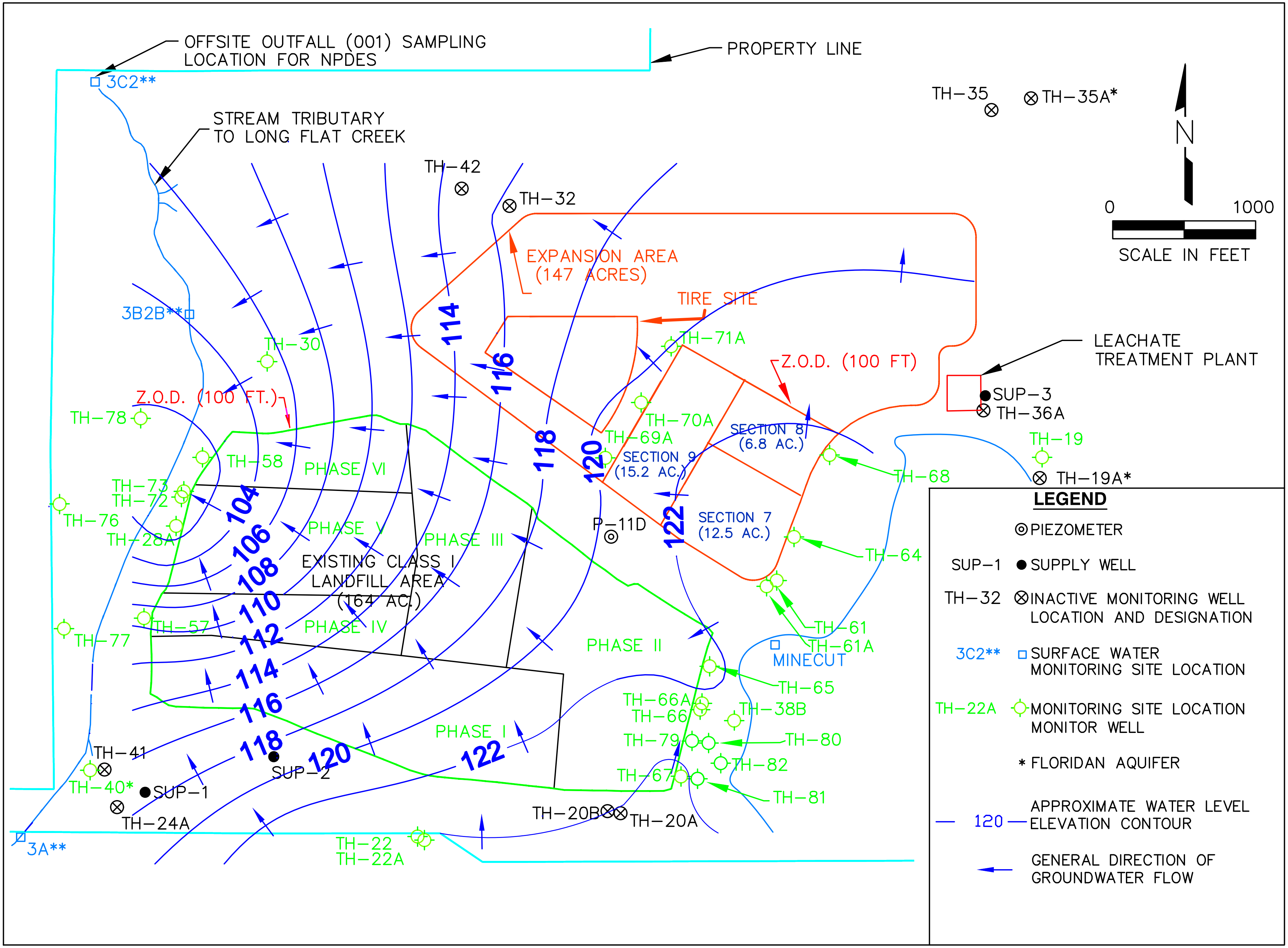
Southeast County Landfill

Groundwater Elevation Contour Diagram – August 8, 2016



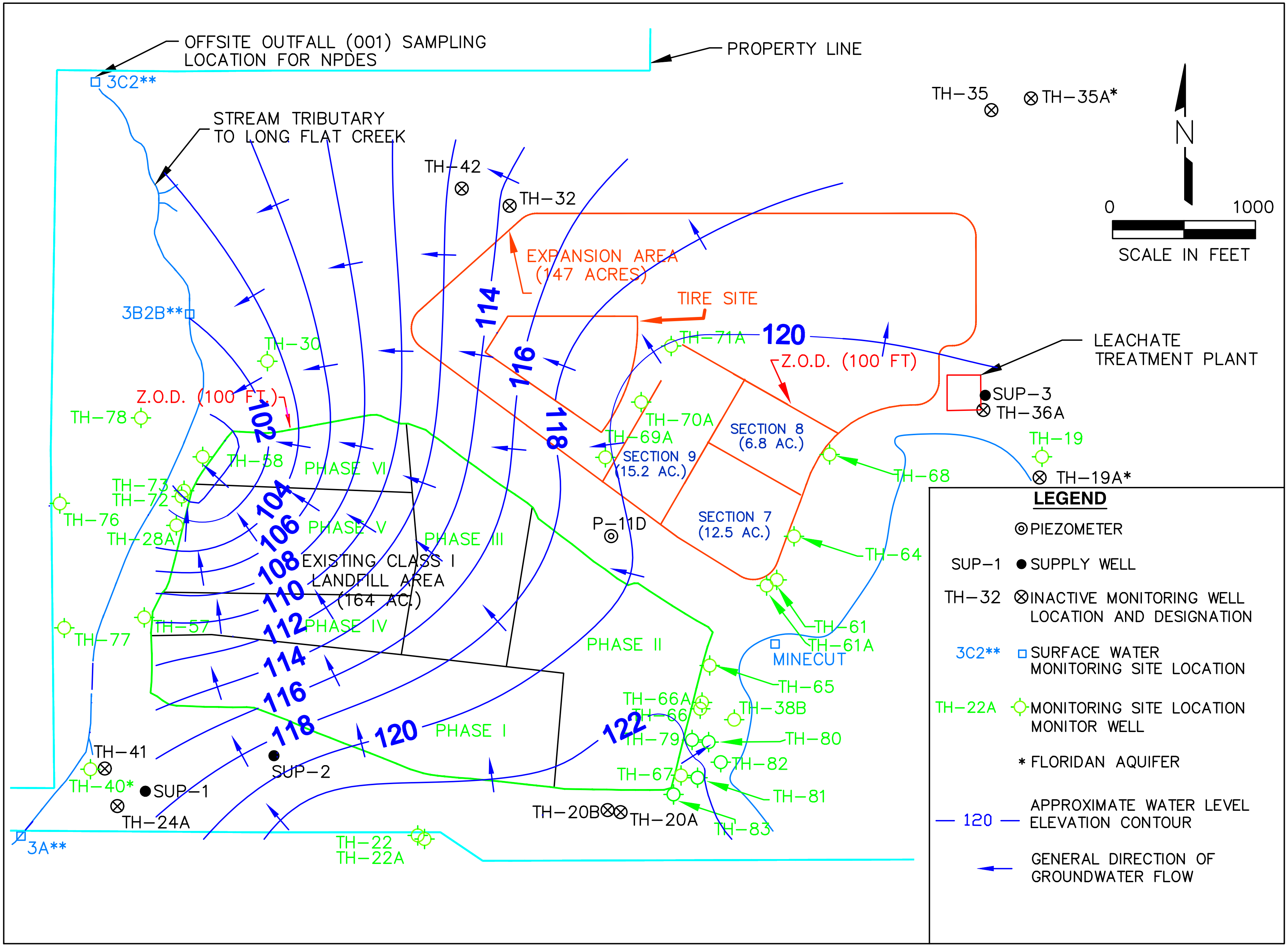
Southeast County Landfill

Surficial Aquifer Groundwater Elevation Contour Diagram – February 6, 2017



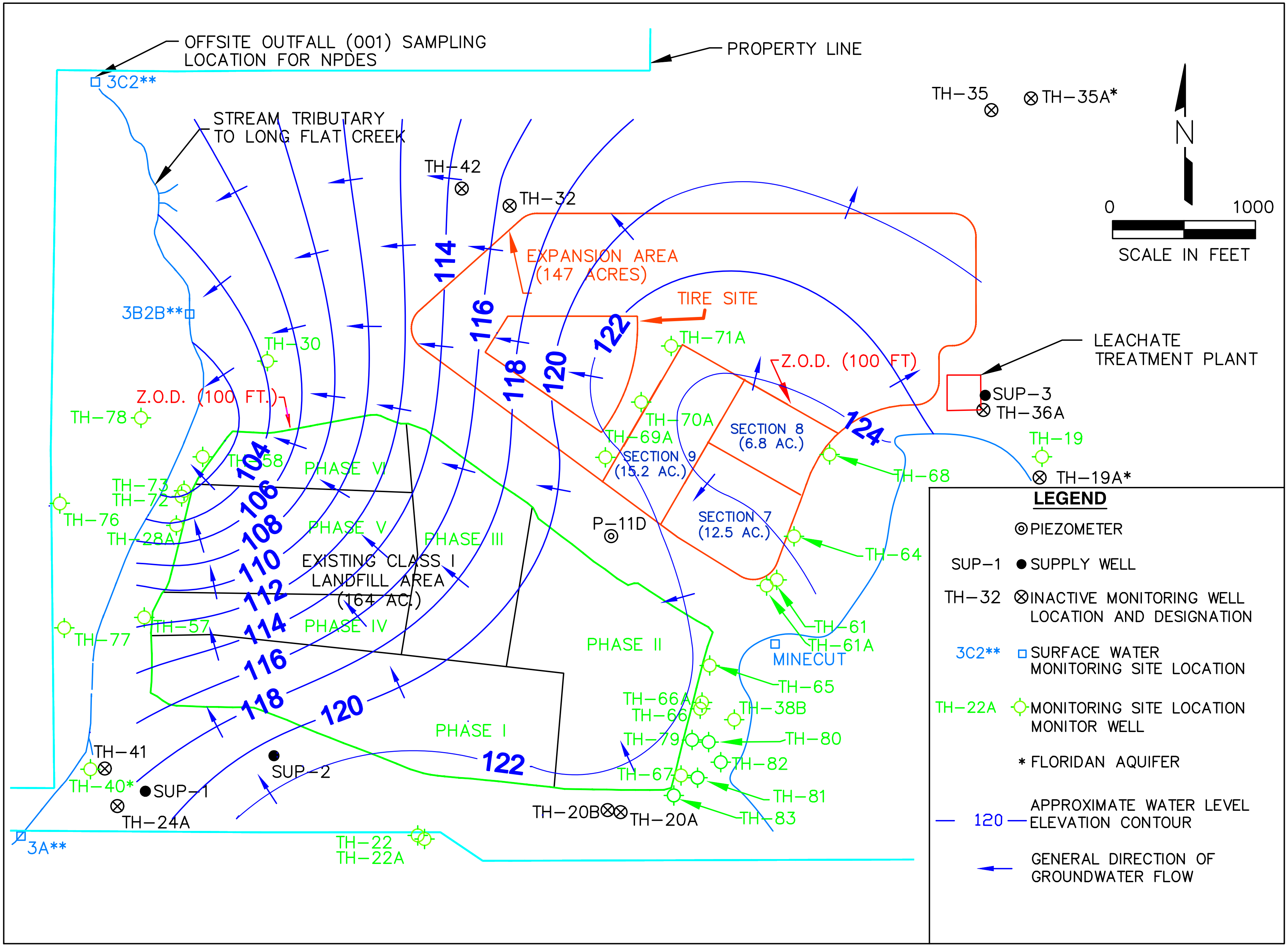
Southeast County Landfill

Surficial Aquifer Groundwater Elevation Contour Diagram − August 7, 2017



Southeast County Landfill

Surficial Aquifer Groundwater Elevation Contour Diagram – February 12, 2018



Southeast County Landfill

Surficial Aquifer Groundwater Elevation Contour Diagram – August 20, 2018

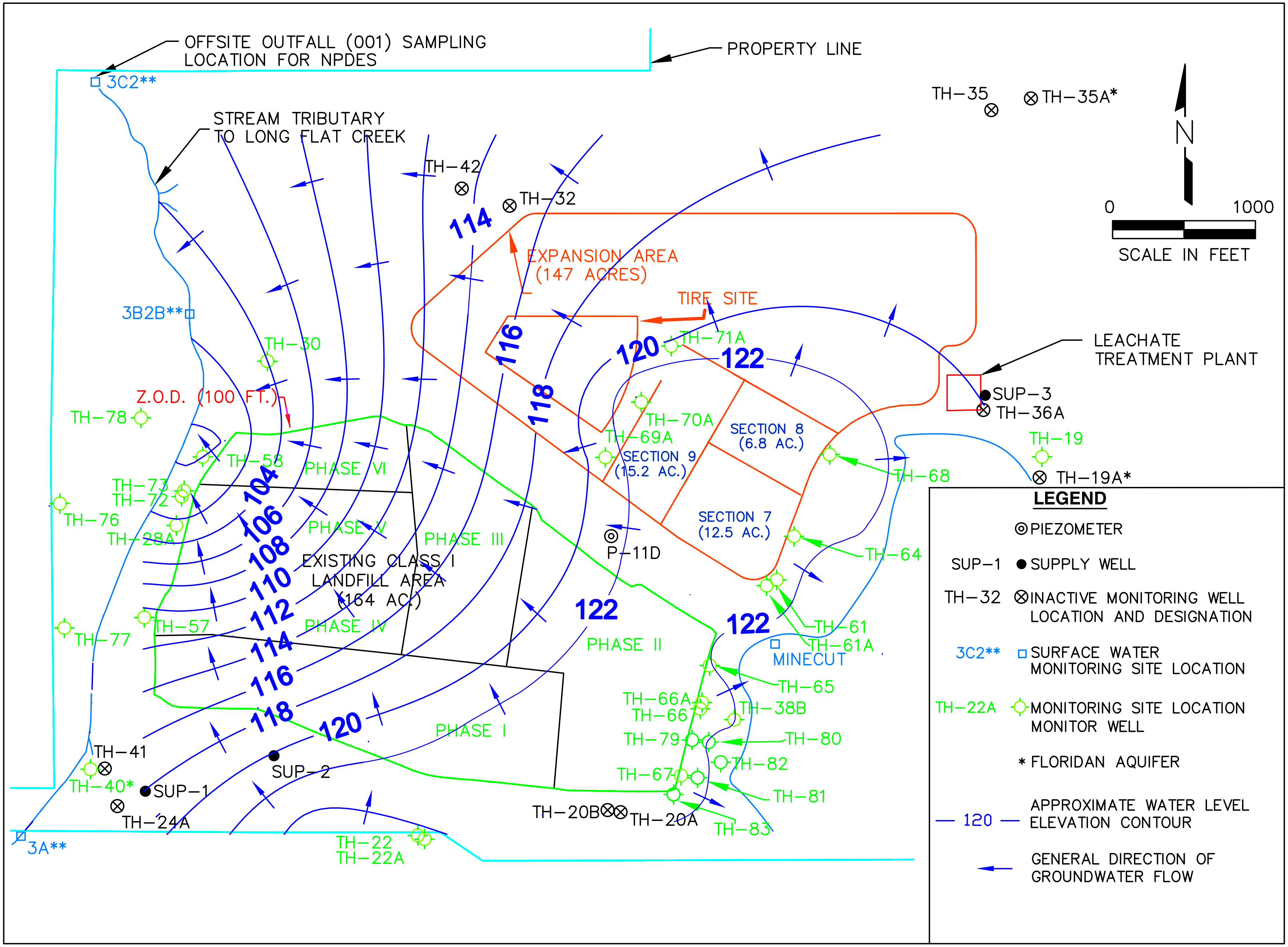
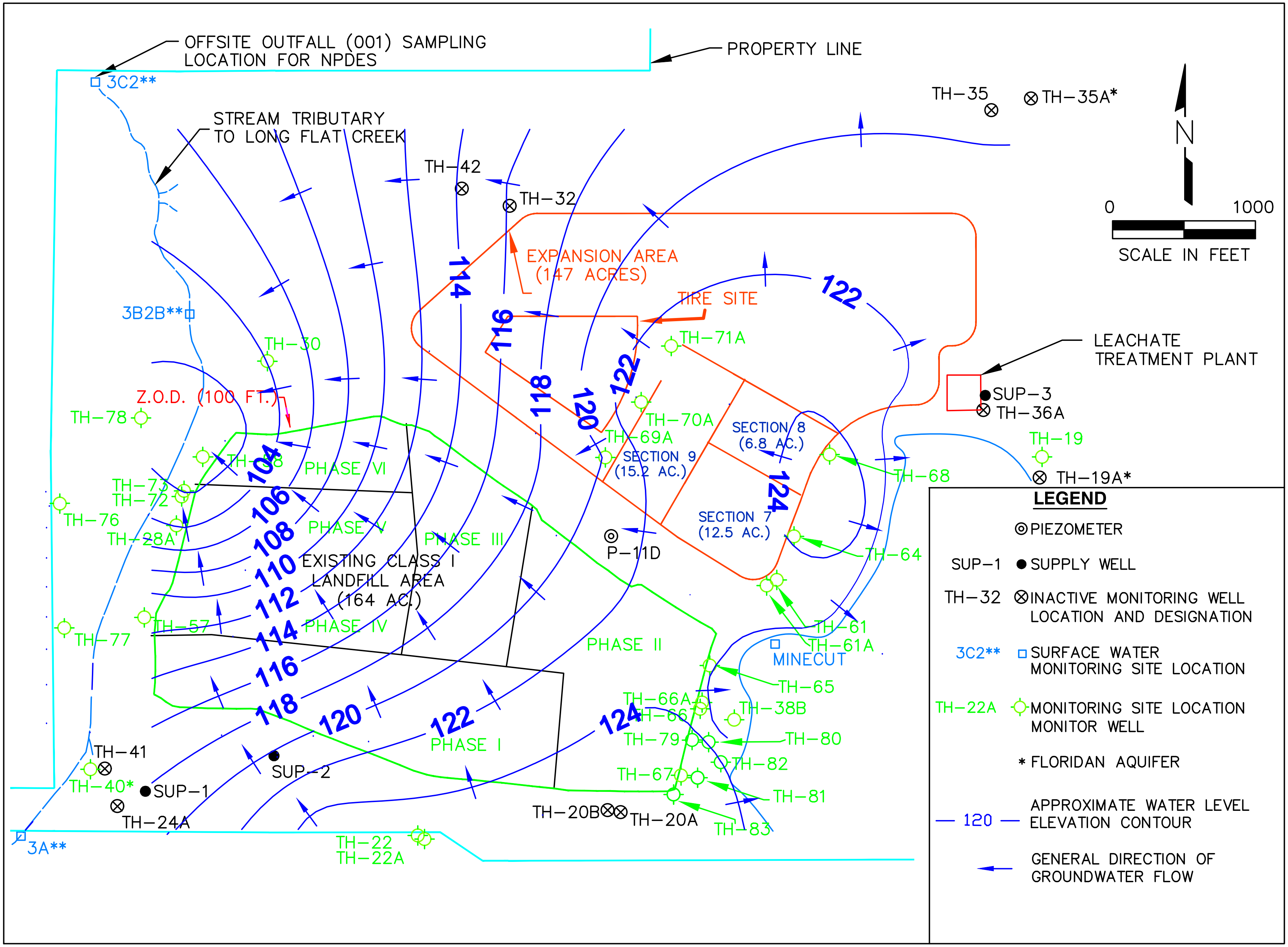


Figure 2 - Southeast County Landfill

Surficial Aquifer Groundwater Elevation Contour Diagram – February 11, 2019



Southeast County Landfill

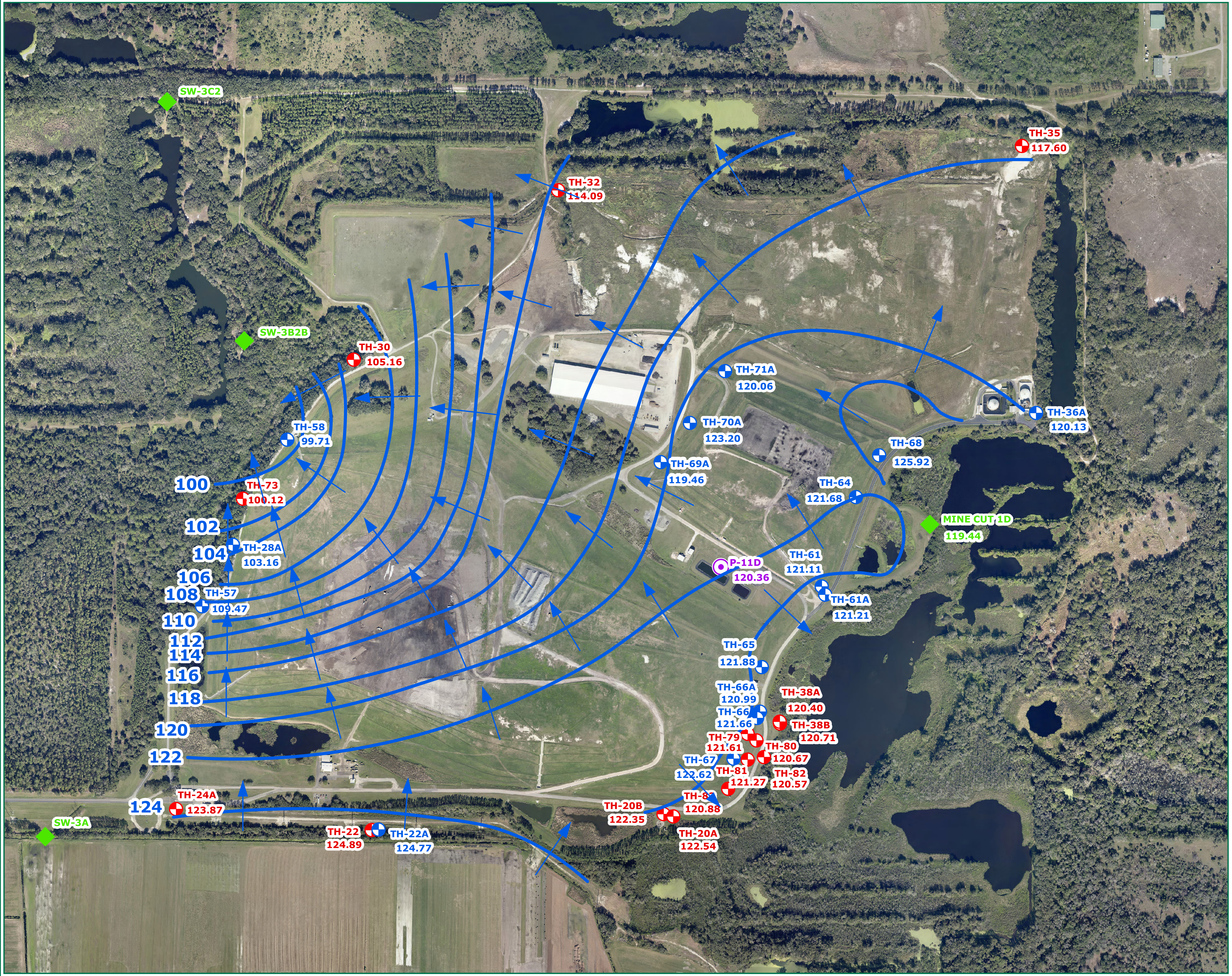
Surficial Aquifer Groundwater Elevation Contour Diagram – August 12, 2019

FIGURE 2

SOUTHEAST COUNTY LANDFILL SURFICIAL AQUIFER GROUNDWATER CONTOUR MAP

2020 AERIAL PHOTO

Hillsborough County Florida



Legend

Well Designation

- Surface Water Sites
- Piezometer
- Active Monitor Wells
- Inactive Monitor Wells (Used For Water Levels)

NOTE: Every reasonable effort has been made to assure the accuracy of this map. Hillsborough County does not assume any liability arising from use of this map. THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, either expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

SOURCE: This map has been prepared for the inventory of real property found within Hillsborough County and is compiled from recorded deeds, plats, and other public records; it has been based on BEST AVAILABLE data.

Users of this map are hereby notified that the aforementioned public primary information sources should be consulted for verification of the information contained on this map.

BSOC
332 N. Falkenburg Rd
Tampa,Fl 33619

0 0.06 0.12 Miles

Date: 05/15/2020 Path: U:\LANDFILL\Southeast Landfill Data\Southeast County Landfill Surficial Aquifer Groundwater Contour Map 2020_2.mxd

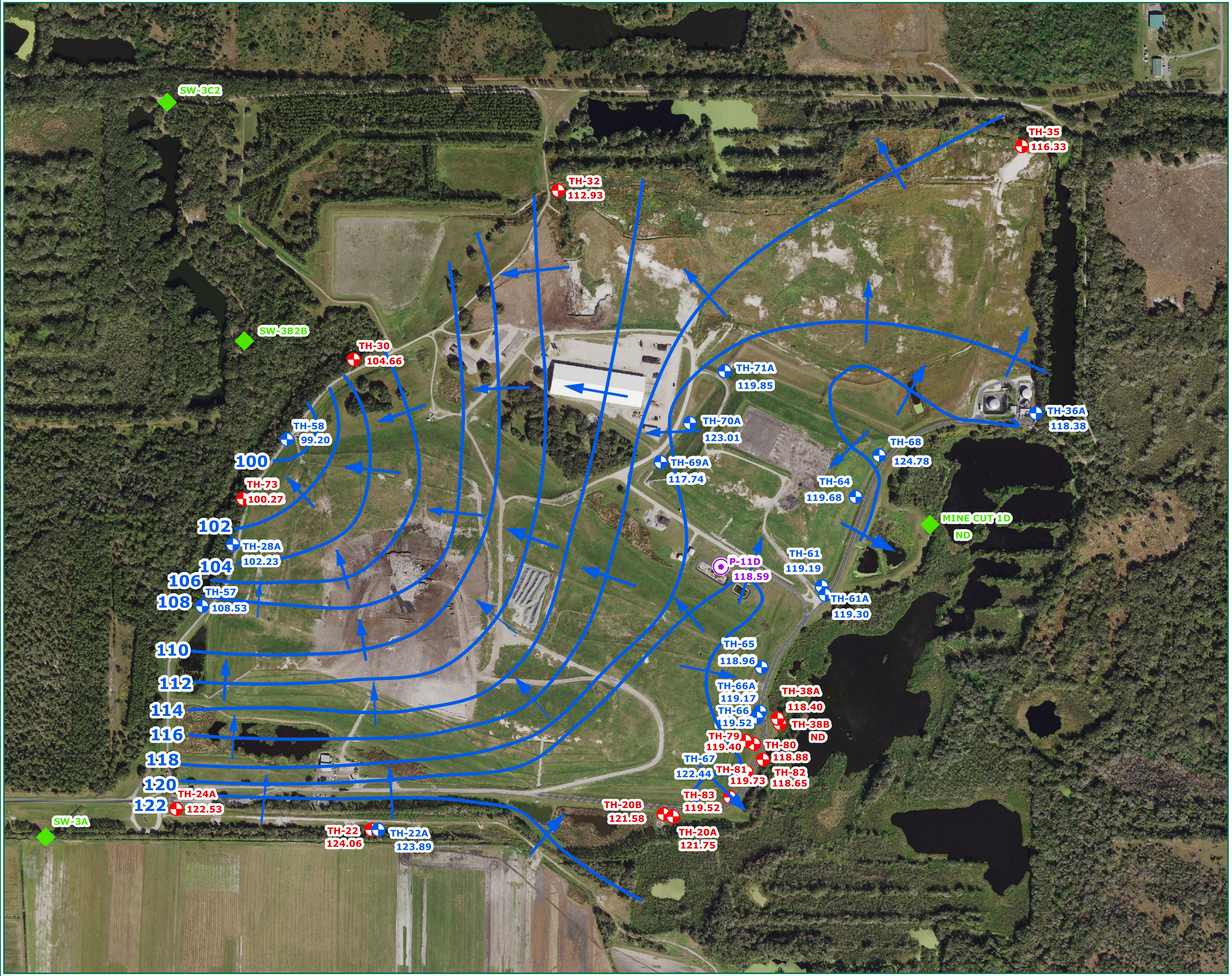
FIGURE 2

SOUTHEAST COUNTY LANDFILL
SURFICIAL AQUIFER GROUNDWATER
CONTOUR MAP
AUGUST 10th, 2020

2020 AERIAL PHOTO

Hillsborough County Florida

EST. 1834



Legend

Well Designation

- Surface Water Sites
- Piezometer
- Active Monitor Wells
- Inactive Monitor Wells (Used For Water Levels)

ND = No Data

0 500 1,000 Feet

N

NOTE: Every reasonable effort has been made to assure the accuracy of this map. Hillsborough County does not assume any liability arising from use of this map. THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, either expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

SOURCE: This map has been prepared for the inventory of real property found within Hillsborough County and is compiled from recorded deeds, plats, and other public records; it has been based on BEST AVAILABLE data.

Users of this map are hereby notified that the aforementioned public primary information sources should be consulted for verification of the information contained on this map.

BSOC
332 N. Falkenburg Rd
Tampa,Fl 33619

Date: 12/4/2020 Path: U:\LANDFILL\Southeast Landfill Data\Southeast County Landfill Surficial Aquifer Groundwater Contour Map August 10th 2020_2.mxd