December 18, 2024

North Carolina Department of Environmental Quality
Division of Waste Management – Special Remediation Branch
Pre-Regulatory Landfill Unit
1646 Mail Service Center
Raleigh, NC 27699-1646

Attention: Mr. Sean Gallagher via email: sean.gallagher@deq.nc.gov
Environmental Engineer

Reference: **Geophysical Survey Report**
Southside Park Landfill – City Owned Parcels
Toomey Ave., Charlotte, Mecklenburg County, North Carolina
NCDEQ ID No. NONCD0000807
NCDEQ Task Order 807RI-7
S&ME Project No. 215952

Dear Mr. Gallagher:

S&ME, Inc. (S&ME), submits this geophysical survey report for the Southside Park Landfill (City Owned Parcels Only) site located in Charlotte, North Carolina as requested by the Pre-Regulatory Landfill Unit. **Figure 1** shows the site location. These services were performed in accordance with our proposal (No. 215952F, October 30, 2024) and the terms of Contract Number N42621-B, dated January 4, 2022, between NCDEQ and S&ME.

Geophysical Survey Methodology and Field Services

On November 13, 2023, S&ME completed an FDEM survey within the requested area in an effort to identify the extent of the existing landfill (**Figure 2**). A brief description of the geophysical technique is presented in the following paragraphs.

Frequency Domain Electromagnetics (FDEM)

FDEM measures subsurface conductivity as lateral changes in conductivity of the subsurface typically indicate lateral changes in the subsurface materials (e.g., generally more conductive buried landfill material/debris compared to surrounding soils). FDEM measurements are collected by inducing (from a transmitter) a frequency-varying magnetic field and measuring (with a receiver) the amplitude and phase shift of an induced secondary magnetic field. The secondary magnetic field is created by subsurface conductive materials behaving as an inductor as the primary magnetic field passed through them. Both the conductivity and in-phase components of the electromagnetic field are recorded as a weighted average based on the dipole center distance (separation between the transmitter and receiver) and orientation (vertical versus horizontal) of the FDEM instrument. The "terrain" conductivity phase component, which is also referred to as the quadrature phase component, is measured in milliSiemens per meter (mS/m) and provides a measurement of conductivity. The in-phase mode, measured in parts per thousand (ppt), is responsive to metallic objects/materials.

We used a GF Instruments CMD Explorer electromagnetic conductivity meter in general accordance with ASTM D6639 "*Standard Guide for Using the Frequency Domain Electromagnetic Method for Subsurface Investigations.*" The CMD Explorer system utilizes three separate dipole center distances effectively providing three separate weighted bulk average exploration depths of 7, 14, and 22 feet in the vertical dipole mode. FDEM data profiles were generally acquired along perpendicular lines spaced approximately 100 feet or less between each transect using a sub-meter GPS as positioning support (**Figure 2**). Data path locations were generally based on access.

The CMD data transfer software was used to download and interpolate data, and Golden Software's Surfer® was used to grid and plot the data (**Figures 3 through 14**). Presenting multiple bulk average ranges for the FDEM data allows for an additional qualitative assessment associated with subsurface material contrasts at depth. The FDEM data has been presented in two plots (Plots A and B) to provide both opaque and semi-transparent overlays on aerial images, respectively. The semi-transparent view allows for spatial comparison between the FDEM data and site features present in the aerial.

Results

The following summarizes the results of the geophysical services:

- FDEM terrain conductivity responses for the 7, 14, and 22 feet weighted bulk average exploration depths generally range between about 0 and 100 mS/m (**Figures 3 through 8**), and the in-phase component of the FDEM data responses generally range between about -30 and 30 ppt (**Figures 9 through 14**).
- Based on experience, typical terrain conductivities of buried landfill waste materials are greater than about 20 mS/m, whereas typical background conductivity values are typically less than 20 mS/m. As such, it appears that lateral variations in subsurface materials consistent with possible buried waste materials can be identified in the conductivity data sets collected within the surveyed area.
- Approximate interpreted landfill extents within the surveyed areas are presented in the figures (black dashed lines). The interpreted extents of possible landfill material were also provided separately at approximate 25-foot increments in a digital spreadsheet format.
- Several isolated areas/targets associated with buried metallic features (in-phase responses) that are unrelated to known surficial targets such as reinforced concrete, fences, man-made structures, cars, trash cans, etc. can also be identified in the FDEM data sets. Based on the limited number of in-phase responses identified within the interpreted waste limits, it appears that buried metal at this site is likely relatively small.

Limitations

Regardless of the thoroughness of a geophysical survey, there is always a possibility that actual conditions may not match the interpretations. The results should be considered accurate only to the degree implied by the methods used and the method's limitations and data coverage. Accordingly, the possibility exists that not all features at a project site will be located due to either subsurface soil conditions or the occurrence of features outside the lateral limits and below the depth of penetration of the method used. As with most surface geophysical methods, resolution of the subsurface also decreases with depth. As such, the size and/or contrast of features compared to the imaged subsurface media must be significant enough to produce the anticipated response. The location and/or determination (or the lack thereof) of potential buried features is based on our review of the provided information and of the geophysical survey. Under no circumstances does S&ME assume any responsibility for damage resulting from the presence of subsurface features that may exist but were not

identified by our survey. The geophysical method used for this survey also has inherent limitations. Site metallic features (e.g., fences, vehicles, etc.) and overhead transmission lines can produce a false electromagnetic response. FDEM is also limited in capability to resolve vertical variations of the subsurface in the data.

Closure

S&ME appreciates the opportunity to assist you during this phase of the project. If you should have any questions concerning this report or if we may be of further assistance, please contact Tom Raymond.

Sincerely,

S&ME, Inc.

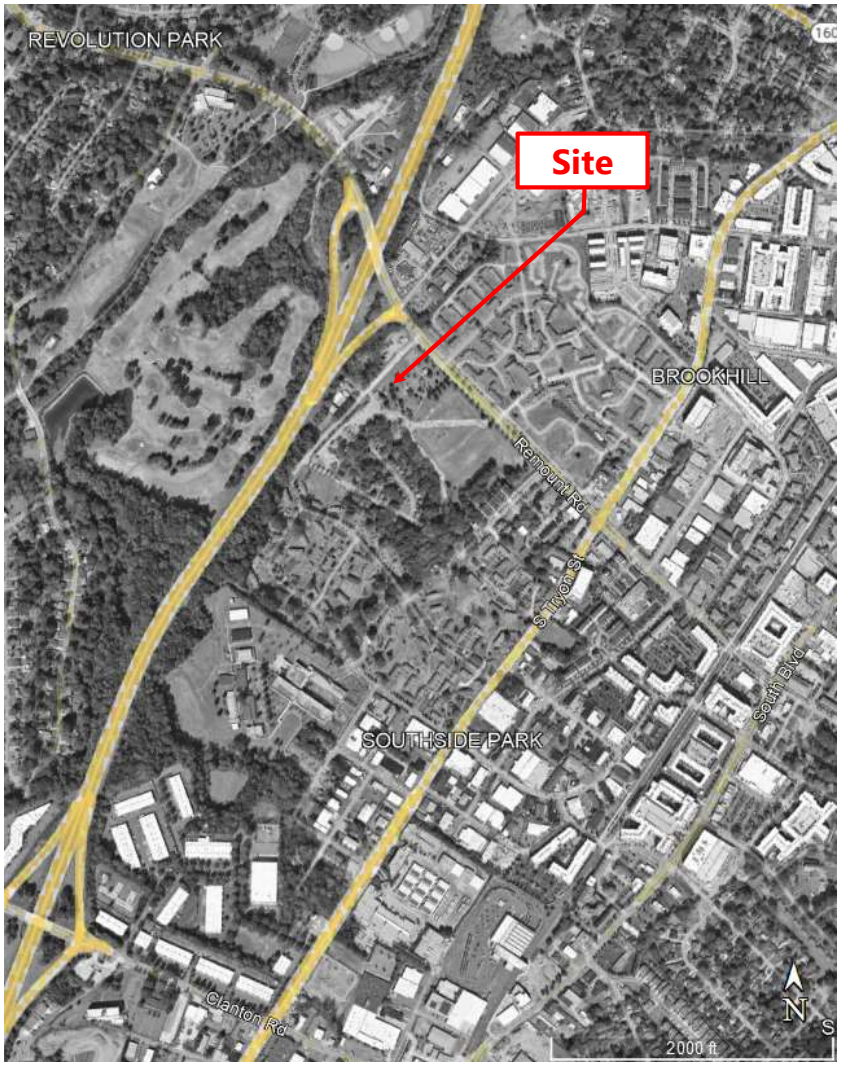
Jason B. Cox, PG (GA)
Project Geophysicist/Manager

Nadia Fantello
Geophysical Operations Manager

Thomas P. Raymond, P.E.
Principal Engineer/Project Manager
traymond@smeinc.com

Attachments: Figures 1 through 14

REFERENCE:
GOOGLE EARTH PRO AERIAL PHOTOGRAPH (DATED DECEMBER 13, 2021). THIS PLAN IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED AND NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.



SITE VICINITY PLAN

SOUTHSIDE PARK PRE-REG LANDFILL
CHARLOTTE, MECKLENBURG COUNTY, NORTH CAROLINA

SCALE:
NOT TO SCALE

DATE:
1/10/2025

PROJECT NUMBER
215952

FIGURE NO.
1

REFERENCE:
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LEGEND

FDEM Data Path

Requested Survey area

FDEM SURVEY DATA PATH

SOUTHSIDE PARK PRE-REG LANDFILL
CHARLOTTE, MECKLENBURG COUNTY, NORTH CAROLINA

SCALE:
AS SHOWN

DATE:
1/10/2025

PROJECT NUMBER
215952

FIGURE NO.
2

REFERENCE:
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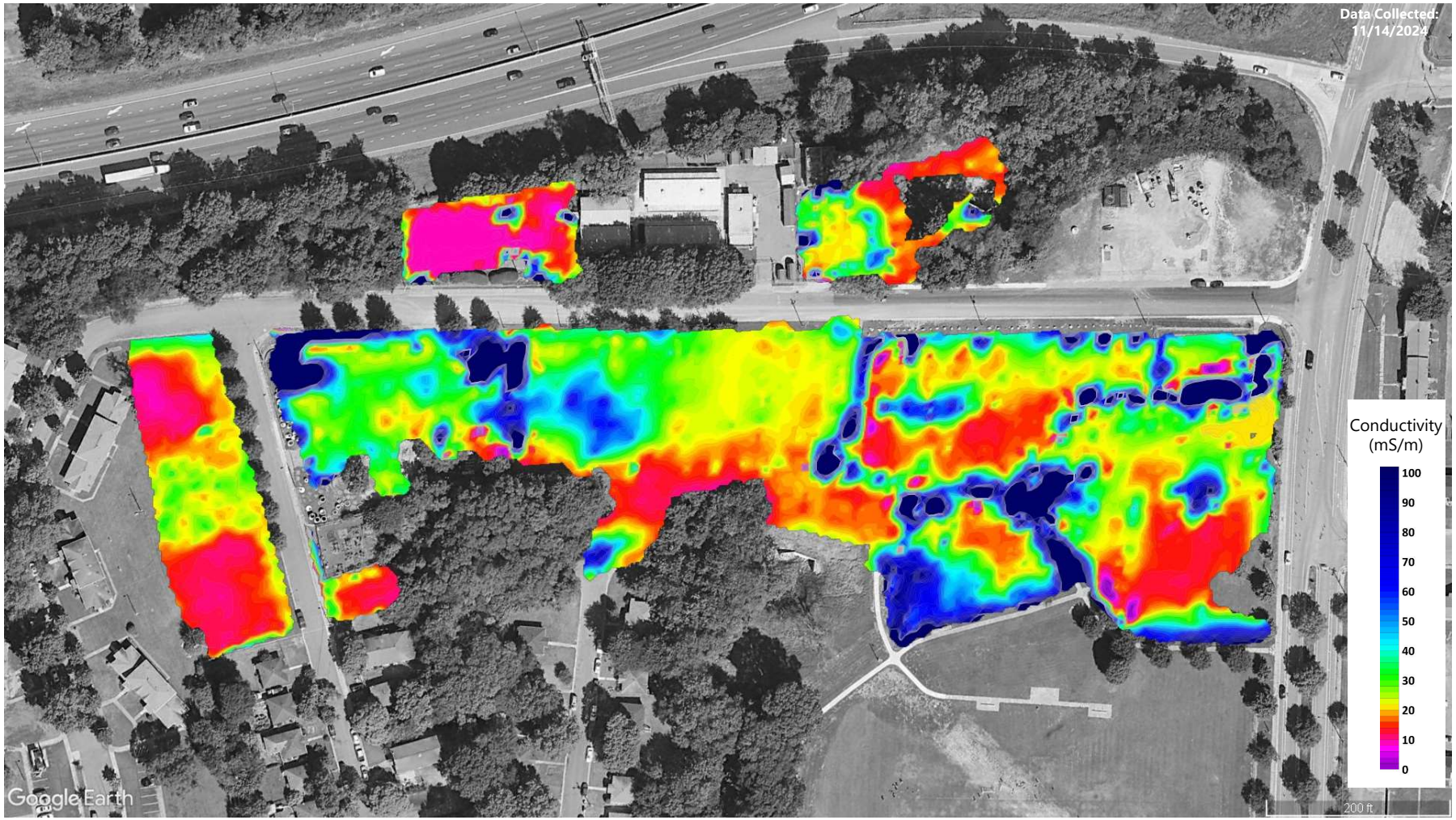

FDEM CONDUCTIVITY DATA PLOT A - OPAQUE (7 FEET)

SOUTHSIDE PARK PRE-REG LANDFILL
CHARLOTTE, MECKLENBURG COUNTY, NORTH CAROLINA

SCALE:
AS SHOWN

DATE:
1/10/2025

PROJECT NUMBER
215952

FIGURE NO.
3

REFERENCE:
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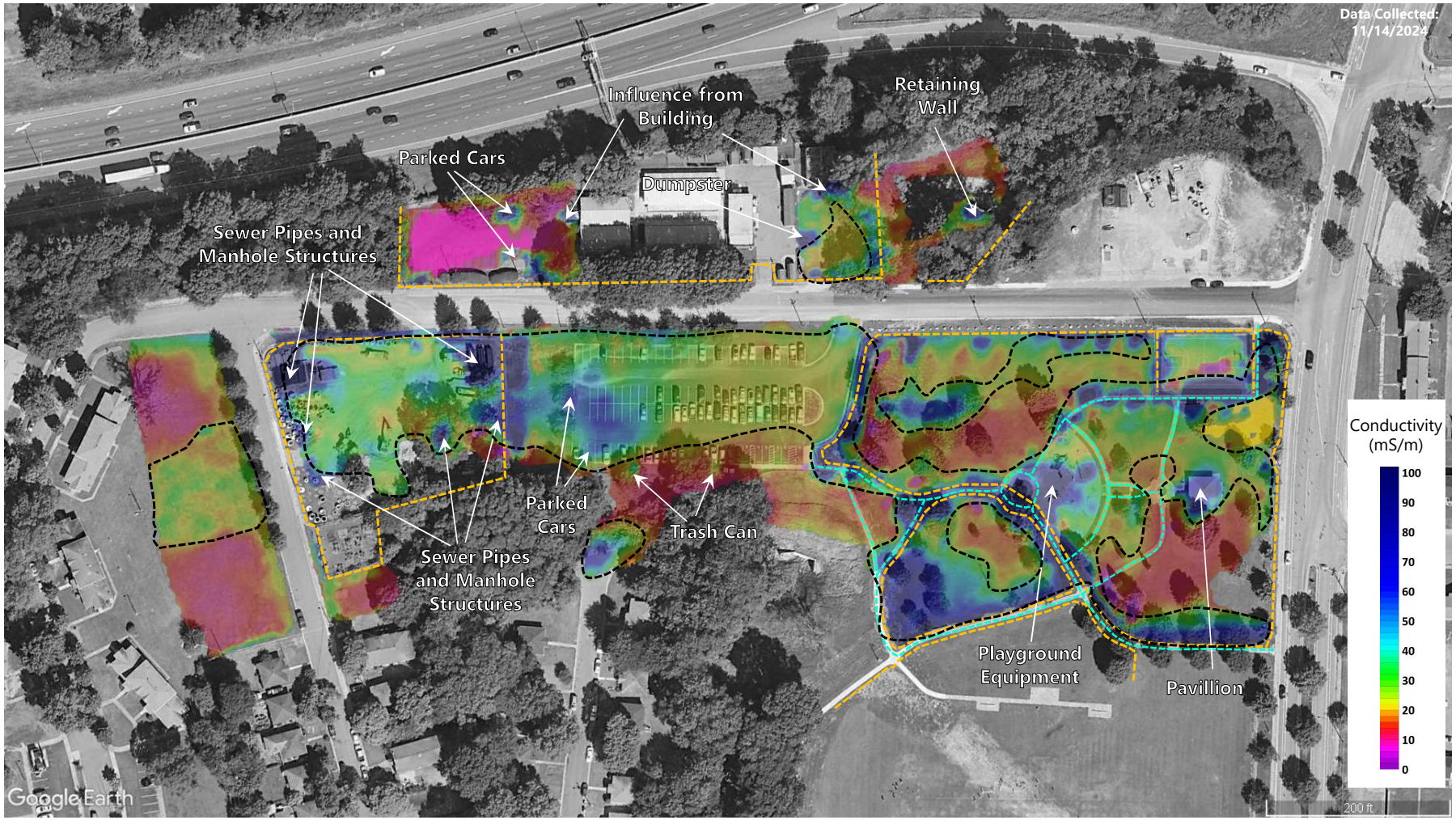

LEGEND

Interpreted Extent of Possible Landfill

Reinforced Concrete Sidewalks

Fencing and Handrails

FDEM CONDUCTIVITY DATA PLOT B - SEMI-TRANSPARENT (7 FEET)

SOUTHSIDE PARK PRE-REG LANDFILL
CHARLOTTE, MECKLENBURG COUNTY, NORTH CAROLINA

SCALE: AS SHOWN

DATE: 1/10/2025

PROJECT NUMBER 215952

FIGURE NO. 4

REFERENCE:
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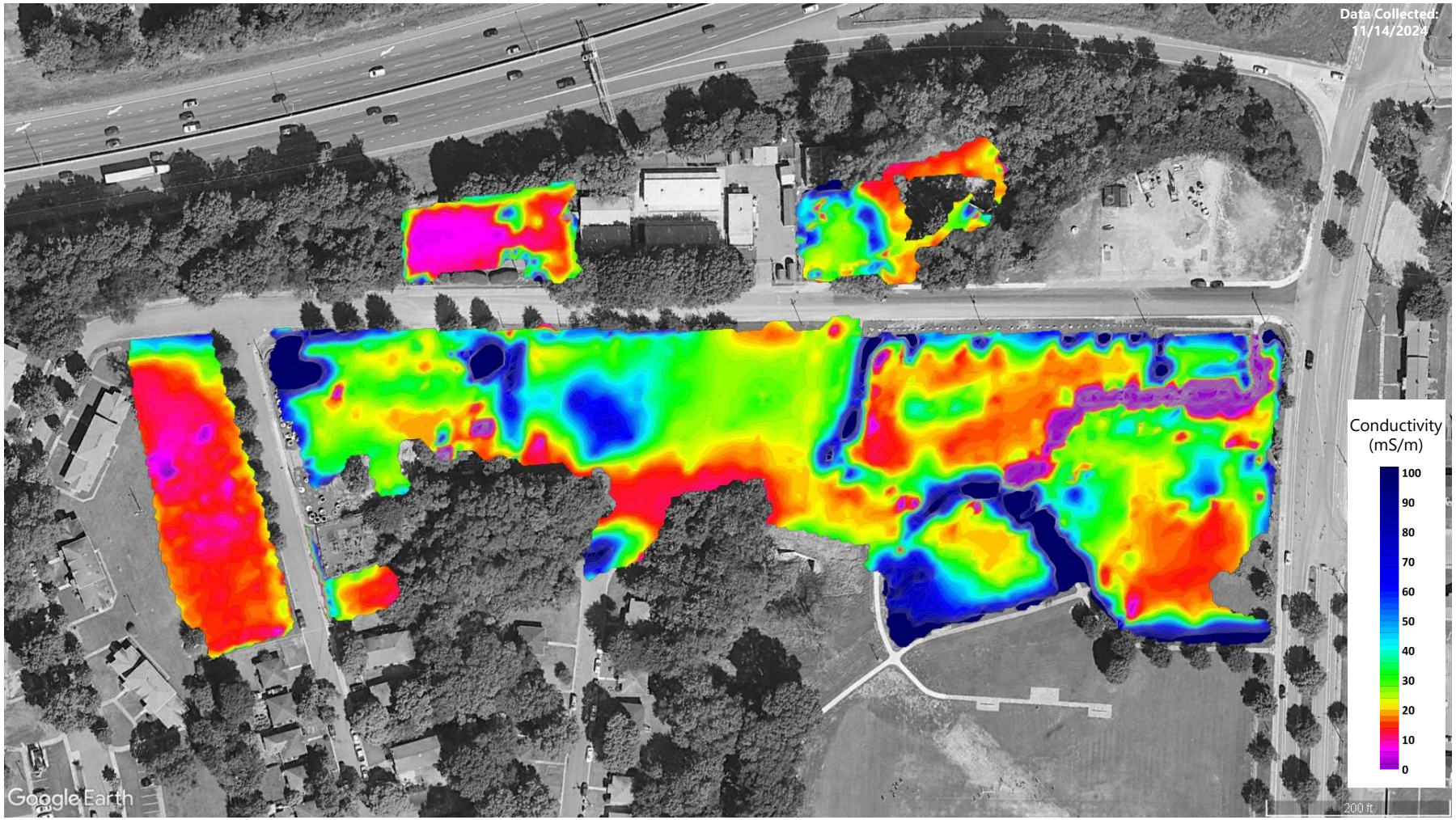

FDEM CONDUCTIVITY DATA PLOT A - OPAQUE (14 FEET)

SOUTHSIDE PARK PRE-REG LANDFILL
CHARLOTTE, MECKLENBURG COUNTY, NORTH CAROLINA

SCALE:
AS SHOWN

DATE:
1/10/2025

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FIGURE NO.
5

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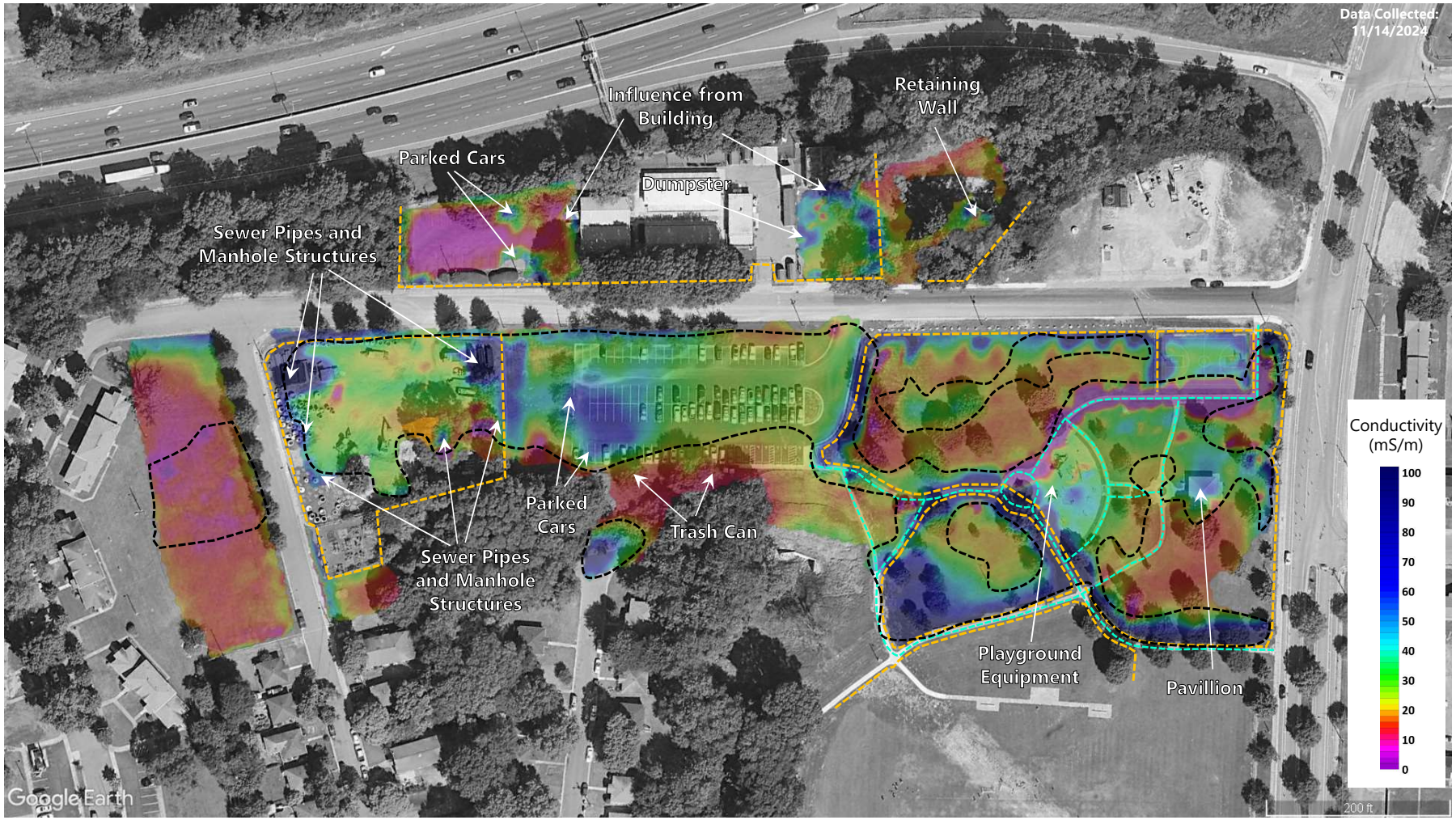

LEGEND

Interpreted Extent of Possible Landfill

Reinforced Concrete Sidewalks

Fencing and Handrails

FDEM CONDUCTIVITY DATA PLOT B - SEMI-TRANSPARENT (14 FEET)

SOUTHSIDE PARK PRE-REG LANDFILL
CHARLOTTE, MECKLENBURG COUNTY, NORTH CAROLINA

SCALE: AS SHOWN

DATE: 1/10/2025

PROJECT NUMBER 215952

FIGURE NO. 6

REFERENCE:
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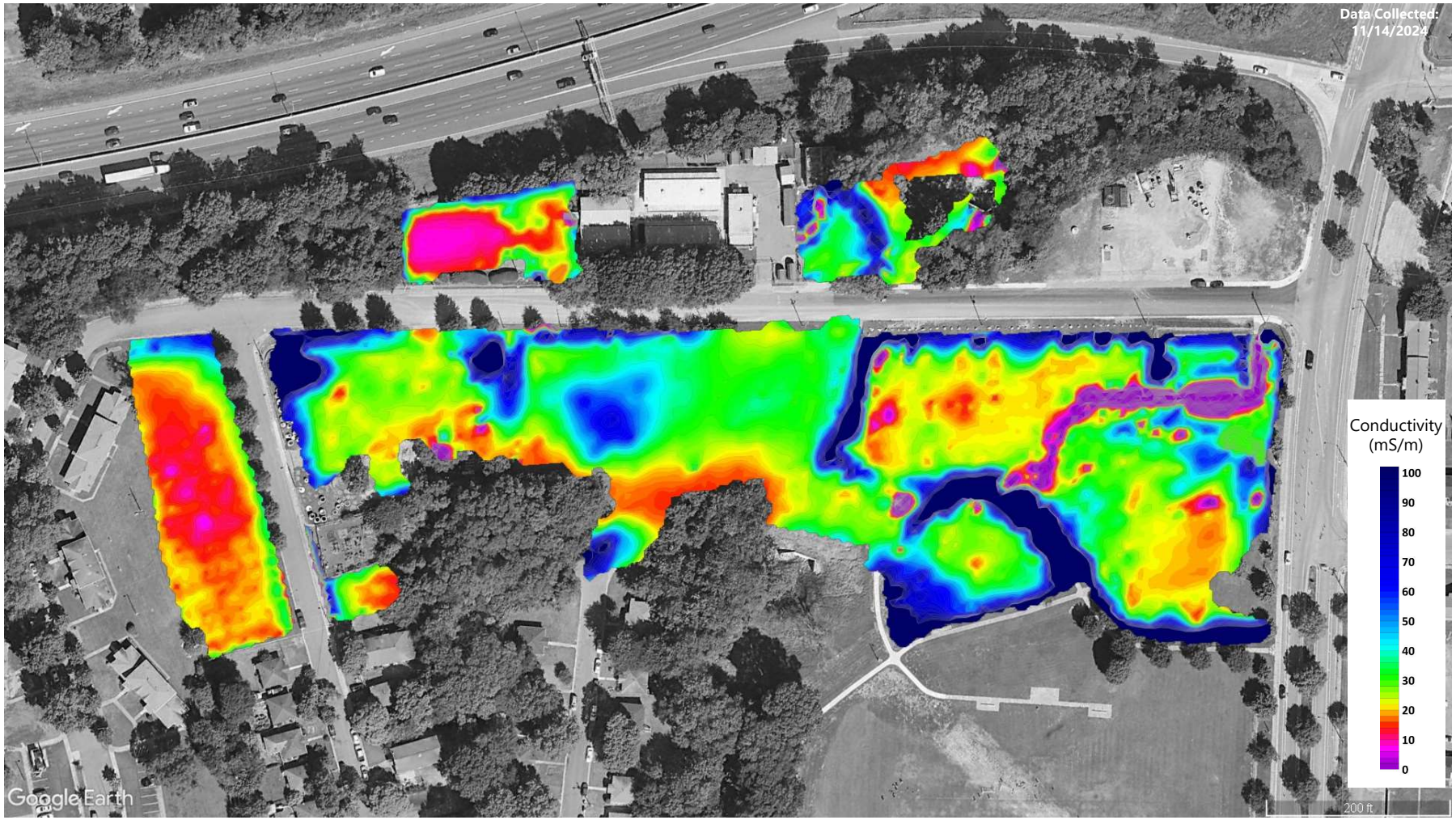

FDEM CONDUCTIVITY DATA PLOT A - OPAQUE (22 FEET)

SOUTHSIDE PARK PRE-REG LANDFILL
CHARLOTTE, MECKLENBURG COUNTY, NORTH CAROLINA

SCALE:
AS SHOWN

DATE:
1/10/2025

PROJECT NUMBER
215952

FIGURE NO.
7

REFERENCE:
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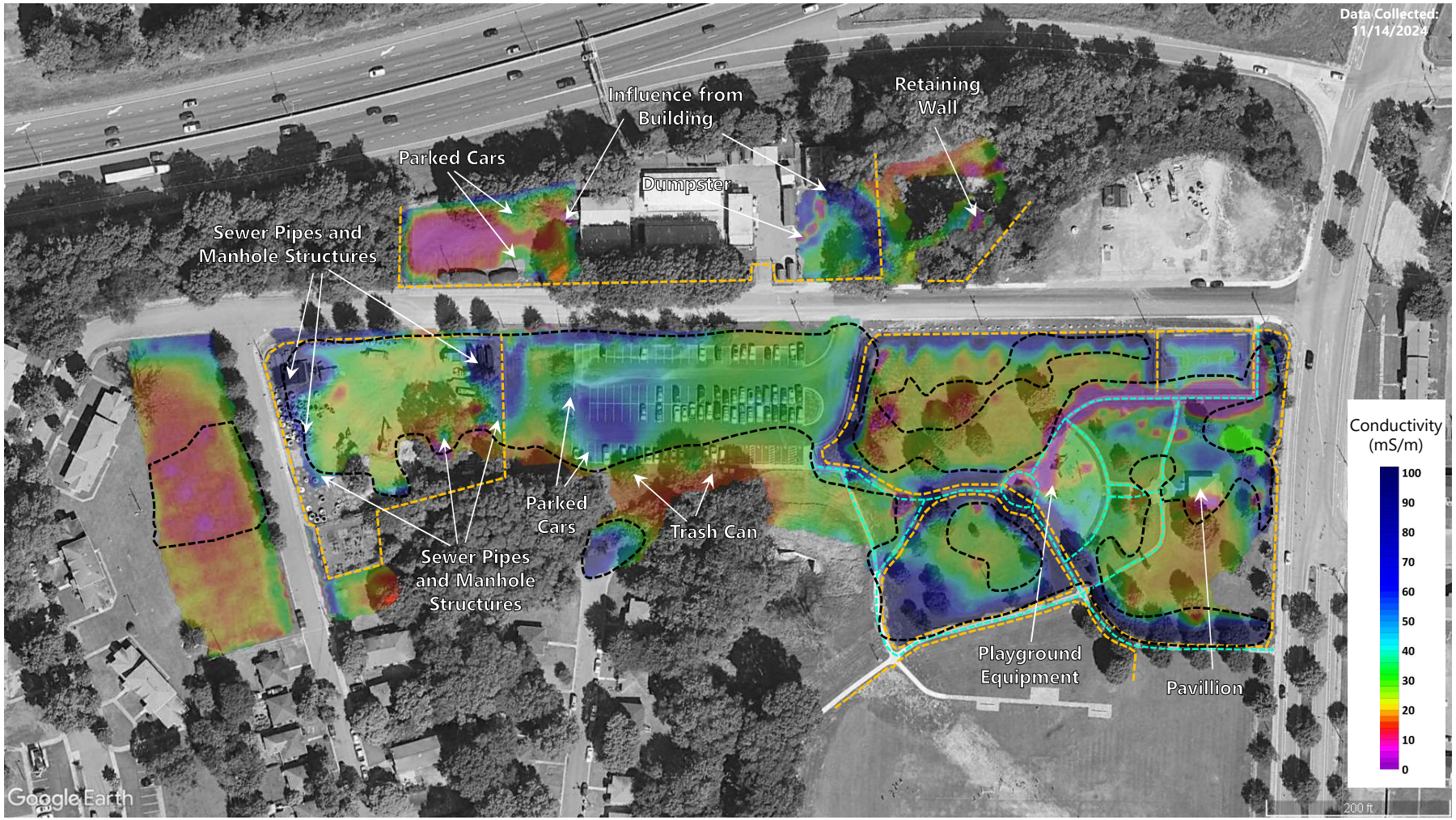

LEGEND

Interpreted Extent of Possible Landfill

Reinforced Concrete Sidewalks

Fencing and Handrails

FDEM CONDUCTIVITY DATA PLOT B - SEMI-TRANSPARENT (22 FEET)

SOUTHSIDE PARK PRE-REG LANDFILL
CHARLOTTE, MECKLENBURG COUNTY, NORTH CAROLINA

SCALE: AS SHOWN

DATE: 1/10/2025

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FIGURE NO. **8**

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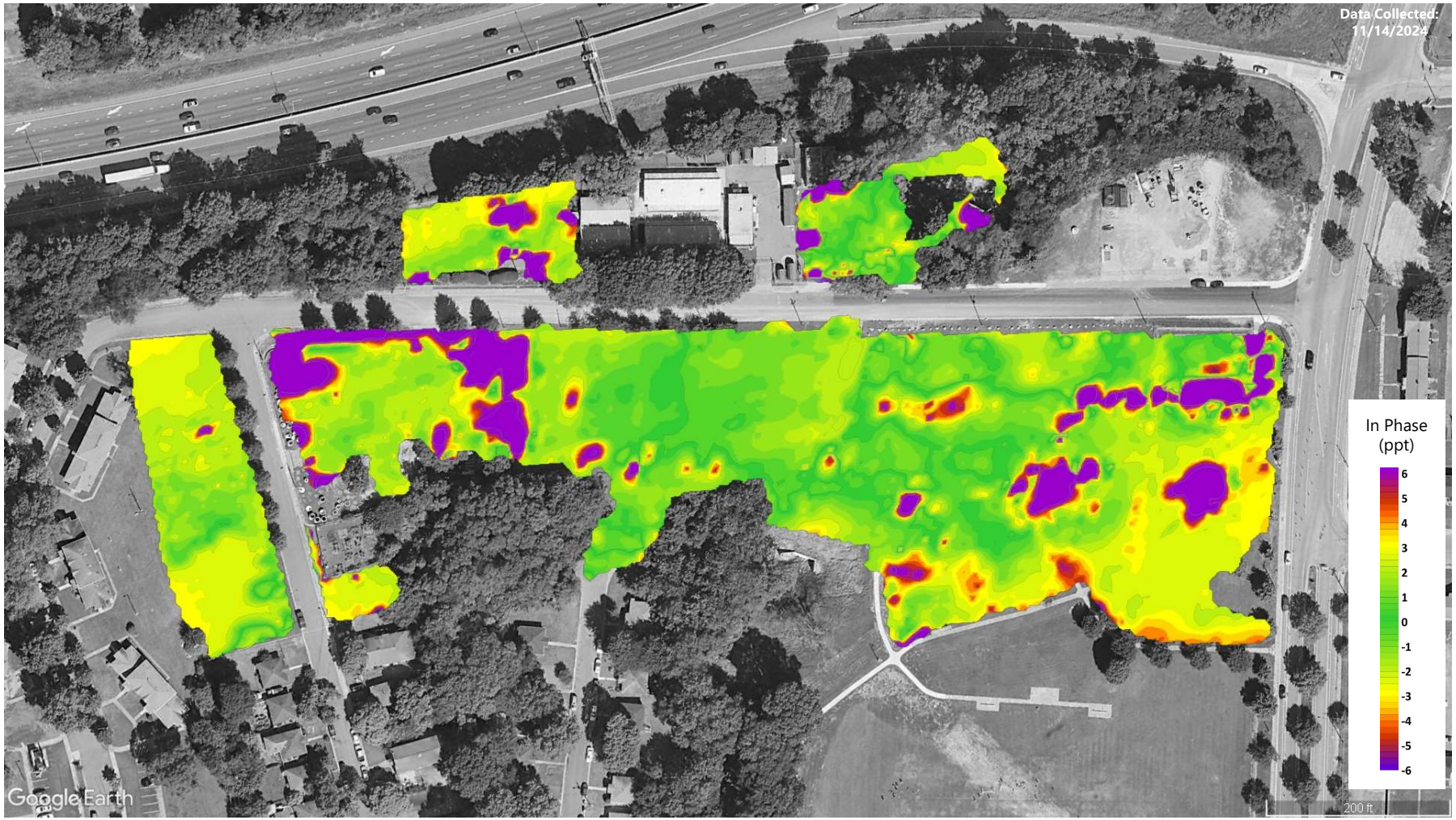

FDEM IN-PHASE DATA PLOT A - OPAQUE (7 FEET)

SOUTHSIDE PARK PRE-REG LANDFILL
CHARLOTTE, MECKLENBURG COUNTY, NORTH CAROLINA

SCALE: AS SHOWN

DATE: 1/10/2025

PROJECT NUMBER 215952

FIGURE NO. 9

REFERENCE:
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LEGEND

Interpreted Extent of Possible Landfill

Reinforced Concrete Sidewalks

Fencing and Handrails

FDEM IN-PHASE DATA PLOT B - SEMI-TRANSPARENT (7 FEET)

SOUTHSIDE PARK PRE-REG LANDFILL
CHARLOTTE, MECKLENBURG COUNTY, NORTH CAROLINA

SCALE:
AS SHOWN

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FIGURE NO.
10

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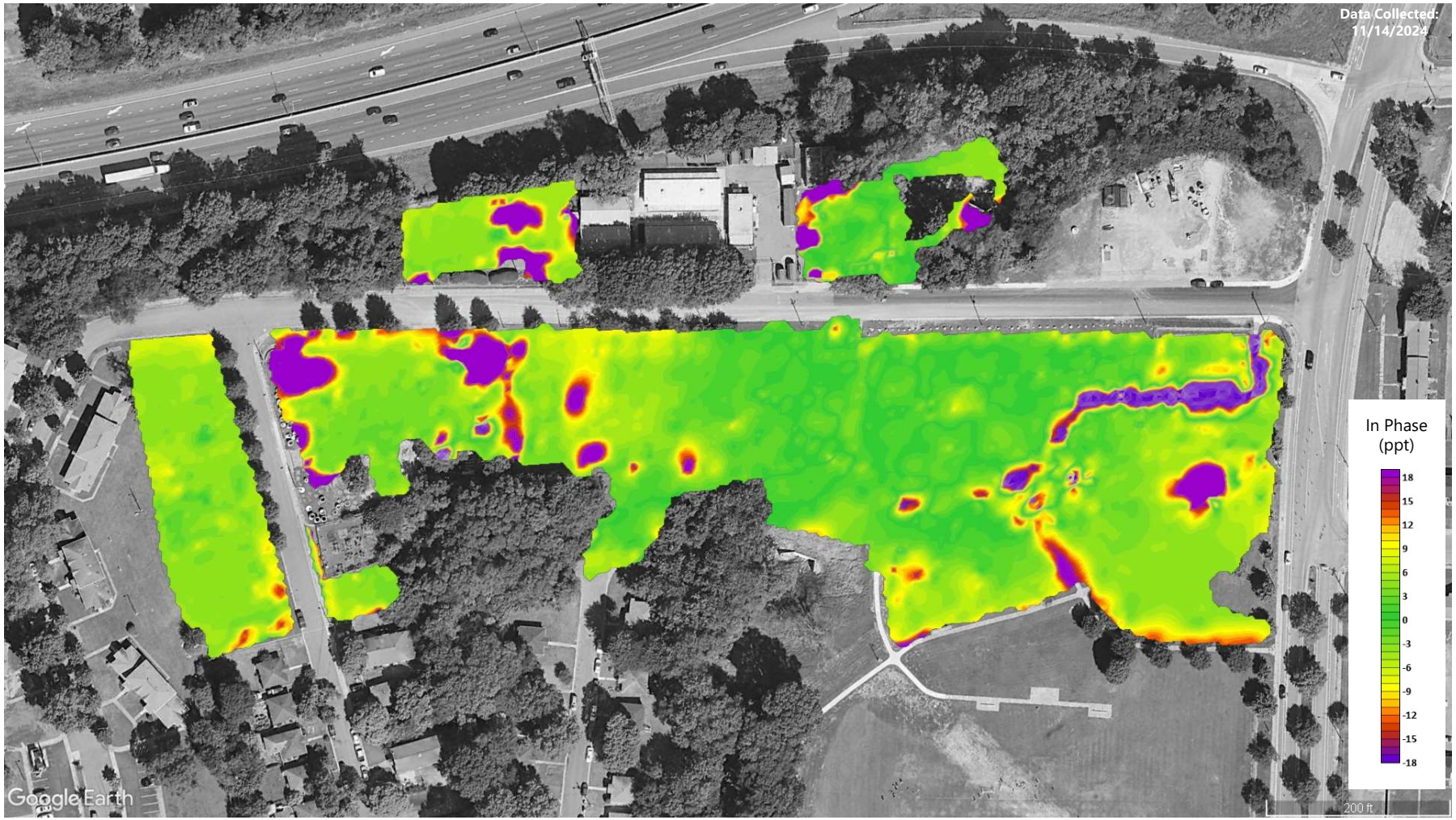

FDEM IN-PHASE DATA PLOT A- OPAQUE (14 FEET)

SOUTHSIDE PARK PRE-REG LANDFILL
CHARLOTTE, MECKLENBURG COUNTY, NORTH CAROLINA

SCALE:
AS SHOWN

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1/10/2025

PROJECT NUMBER
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FIGURE NO.
11

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LEGEND

Interpreted Extent of Possible Landfill

Reinforced Concrete Sidewalks

Fencing and Handrails

FDEM IN-PHASE DATA PLOT B - SEMI-TRANSPARENT (14 FEET)

SOUTHSIDE PARK PRE-REG LANDFILL
CHARLOTTE, MECKLENBURG COUNTY, NORTH CAROLINA

SCALE: AS SHOWN

DATE: 1/10/2025

PROJECT NUMBER 215952

FIGURE NO. **12**

REFERENCE:
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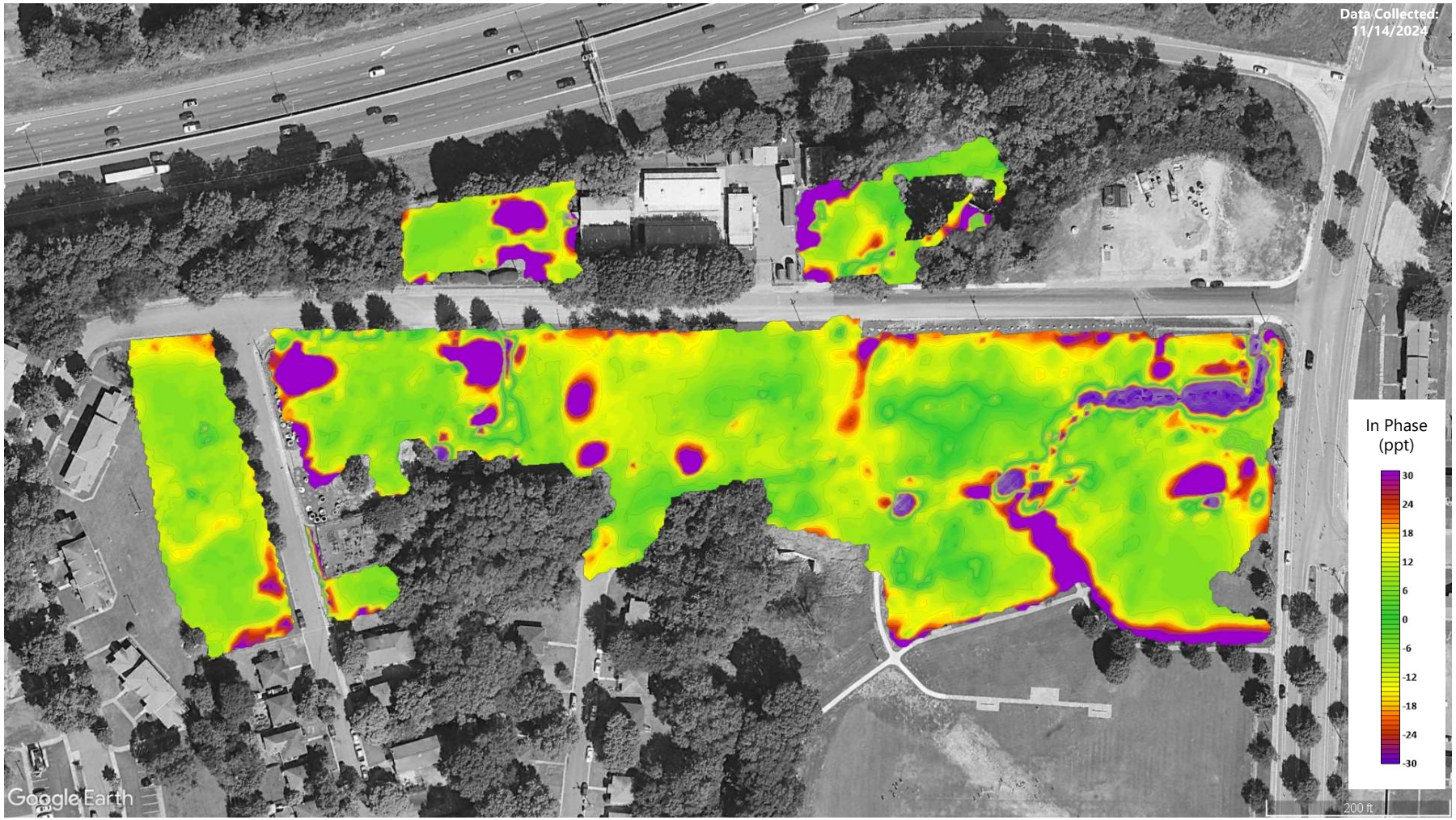

FDEM IN-PHASE DATA PLOT A- OPAQUE (22 FEET)

SOUTHSIDE PARK PRE-REG LANDFILL
CHARLOTTE, MECKLENBURG COUNTY, NORTH CAROLINA

SCALE:
AS SHOWN

DATE:
1/10/2025

PROJECT NUMBER
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FIGURE NO.
13

REFERENCE:
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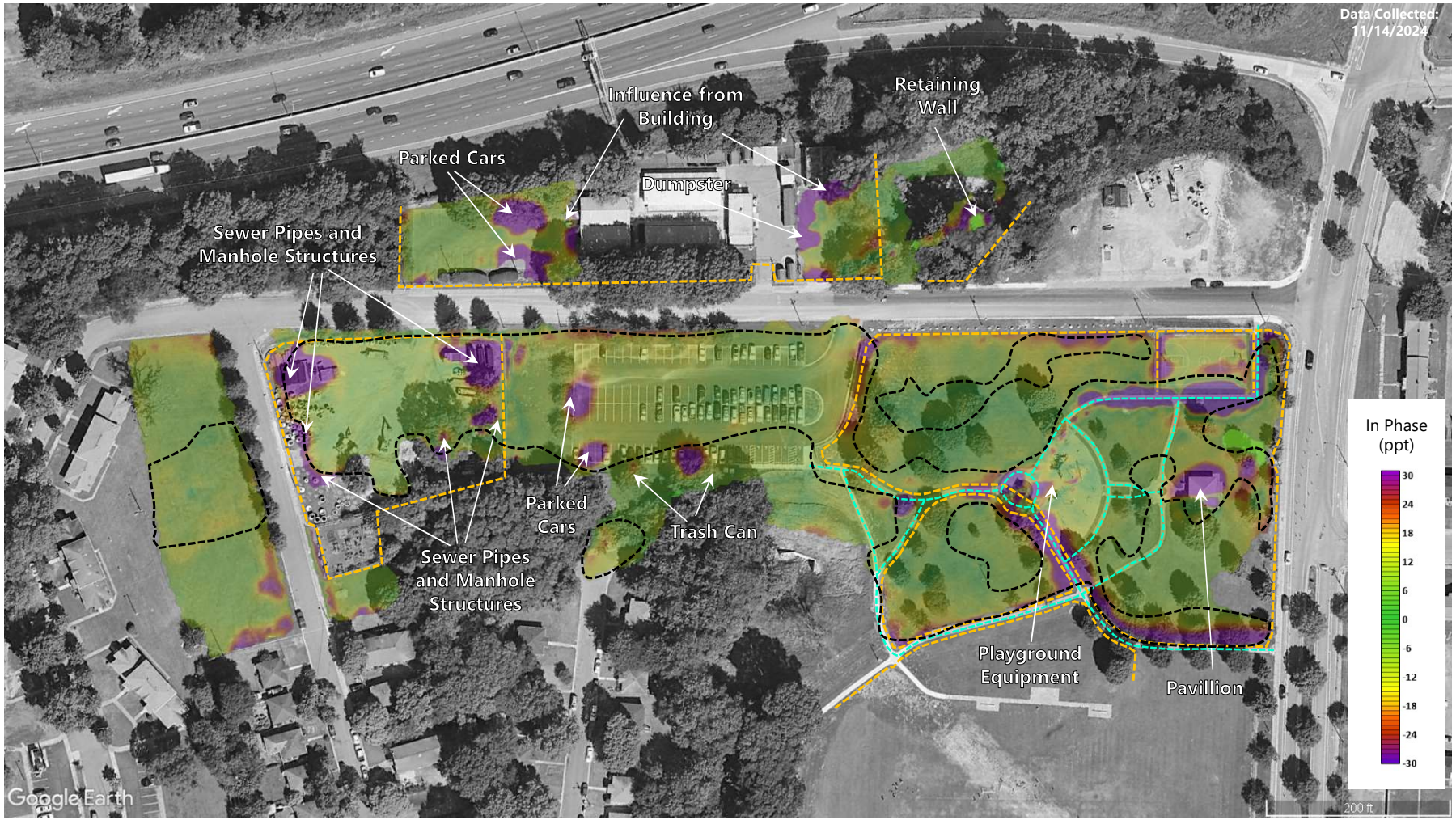

LEGEND

Interpreted Extent of Possible Landfill

Reinforced Concrete Sidewalks

Fencing and Handrails

FDEM IN-PHASE DATA PLOT B - SEMI-TRANSPARENT (22 FEET)

SOUTHSIDE PARK PRE-REG LANDFILL
CHARLOTTE, MECKLENBURG COUNTY, NORTH CAROLINA

SCALE: AS SHOWN

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FIGURE NO. **14**