Remedial Investigation Report
Geophysical Services
East End Park – NONCD0000823
Durham, Durham County, North Carolina
Task Order 823DP-3
S&ME Project No. 23050630AA

PREPARED FOR:

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

PREPARED BY:

S&ME, Inc.
3201 Spring Forest Road
Raleigh, NC 27616

April 29, 2024

April 29, 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. Kevin Kelt via email: Kevin.Kelt@deq.nc.gov
Hydrogeologist

Reference: **Remedial Investigation Report - Geophysical Services**
East End Park – 1200 North Alston Avenue
Durham, Durham County, North Carolina
NCDEQ ID No. NONCD0000823
NCDEQ Task Order 823DP-3
S&ME Project No. 23050630AA

Dear Mr. Kelt:

S&ME, Inc. (S&ME) is submitting this report to NCDEQ summarizing the results of the Remedial Investigation Activities (Geophysical Survey) conducted at the above-referenced site in Durham, North Carolina. S&ME completed this investigation in general conformance with S&ME Proposal No. 23050630AA, dated March 20, 2024, for Task Order 823DP-3 and under the terms of Contract Number N42621-B, dated January 4, 2022, between NCDEQ and S&ME. The attached report includes the results of the following tasks.

- Geophysical Survey

We appreciate the opportunity to provide environmental consulting services to NCDEQ. Please contact us if you have any questions about the information included in this report.

Sincerely,

S&ME, Inc.

Jason B. Cox, P.G. (GA)
Project Geophysicist / Manager
jcox@smeinc.com

Gerald Paul
Senior Project Manager
jpaul@smeinc.com

Senior Reviewed by: Thomas P. Raymond, P.E., P.M.P.

Attachment: *Remedial Investigation Report – Geophysical Services*

Table of Contents

List of Figures

1.0 Project Information

The East End Park site is a pre-regulatory landfill (NCDEQ ID No. NONCD0000823) that is currently owned by The City of Durham. The East End Park Landfill is currently used as a park by the City of Durham and contains a picnic shelter, playground equipment, tennis courts, and one building. The site consists of two parcels (Durham County PIN # 0831470827 and 0831384161). In the eastern parcel *(# 0831470827)* the northern portion of the parcel consists of the park and the southern portion contains two buildings formerly used as a sign and signal shop and a maintenance facility.

In December 2022, a study was published by Duke University Graduate Student Enikoe Biharit, which involved the screening of soil at the East Durham Park for lead contamination. The East Durham Park was chosen for this study based on the historical use of the incinerator on the site. During the study, the top inch of the soils were screened for lead using a handheld X-ray fluorescence (XRF) analyzer and 62 samples were collected at the East Durham Park. Results from the investigation found exceedances of the lead NCDEQ Preliminary Soil Remediation Goal (PSRG) of 400 milligrams per kilogram (mg/kg) in 15 of the 62 samples collected. The samples which exceeded the lead Residential PSRG were located generally around the southeastern portion of the site. *The PSRG for lead was changed to 200 mg/kg in 2024.*

In July 2023, Mid-Atlantic Associates, Inc. conducted additional screening and confirmation sampling at the East Durham Park. Locations for this investigation were based on areas of the park that exceeded the lead PSRG in the initial Duke University study. During the advancement of the sample borings, glass and porcelain were found at depths of 12 inches below ground surface (bgs). Results from this investigation indicated several locations at the park which exceeded the Residential PSRG for lead. Based on the results, areas of East Durham Park were closed to the public.

The following reports were completed by S&ME to assess the noted waste disposal areas following the initial investigations by others:

- *Remedial Investigation Report – First Phase Activities – East End Park – 1200 North Alston Ave,* Project No. 23050630 dated February 26, 2024.
- *Remedial Investigation Report –Soil Cover Evaluation – East End Park – 1200 North Alston Ave.,* Project No. 23050630 dated March 6, 2024.

In an attempt to further assess the waste disposal area and approximate the vertical and horizontal extents of the waste materials, S&ME has completed a geophysical survey of the park property using the Frequency Domain Electromagnetic (FDEM) method. The following sections detail the findings of the geophysical survey.

2.0 Methodology and Field Services

On April 2, 2024, we completed an FDEM survey within the accessible portions of the requested survey area (Figure 2). 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 highly conductive, metallic objects and/or material.

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 50 feet between each transect using a sub-meter GPS as positioning support (Figure 2). However, actual locations in several areas were limited based on access. The CMD data transfer software was used to download and interpolate the 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 imagery.

3.0 Results

The following summarizes the results of the FDEM survey performed at the site:

- 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 -20 and 20 ppt (Figures 9 through 14).
- Based on experience, typical terrain conductivities of buried landfill waste materials are greater than about 30 mS/m, whereas typical background conductivity values are typically less than 30 mS/m. As such, it appears that lateral variations in subsurface materials related to the buried landfill materials can be identified in the conductivity data sets. Several isolated areas and/or targets associated with buried metallic materials (in-phase responses) can also be identified in the FDEM data sets.
- Approximate interpreted landfill extents within the surveyed areas are presented in the figures. However, the interpreted limits are controlled by the property boundary and/or accessible limits

during the time of the survey, and as such, landfill materials may extend beyond the properties explored.

4.0 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 damages 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 have inherent limitations. Site metallic features (e.g., fences, vehicles, reinforced concrete, 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.

5.0 Sole Use Statement

This report is solely intended for use by NCDEQ for the services that were performed in accordance with S&ME Proposal No. 23050630AA, dated March 20, 2024 for Task Order 823DP-3 as authorized by NCDEQ.

6.0 Certification Acknowledgement

"I certify that to the best of my knowledge, after thorough investigation, the information contained in or accompanying this certification is true, accurate, and complete."

Gerald Paul / S&ME, Inc.
Name of Environmental Consultant / Company

April 29, 2024

Signature of Environmental Consultant Date

Gail L. Kluever, a Notary Public of said County and State, do hereby certify that Gerald Paul did personally appear and sign before me this day, produced proper identification in the form of Personally Known was duly sworn or affirmed, and declared that, he or she is the duly authorized environmental consultant referenced above and that, to the best of his or her knowledge and belief, after thorough investigation, the information contained in the above certification is true and accurate, and he or she then signed this Certification in my presence.

WITNESS my hand and official seal this 29th day of April, 2024.

Gail L. Kluever

Notary Public (signature)

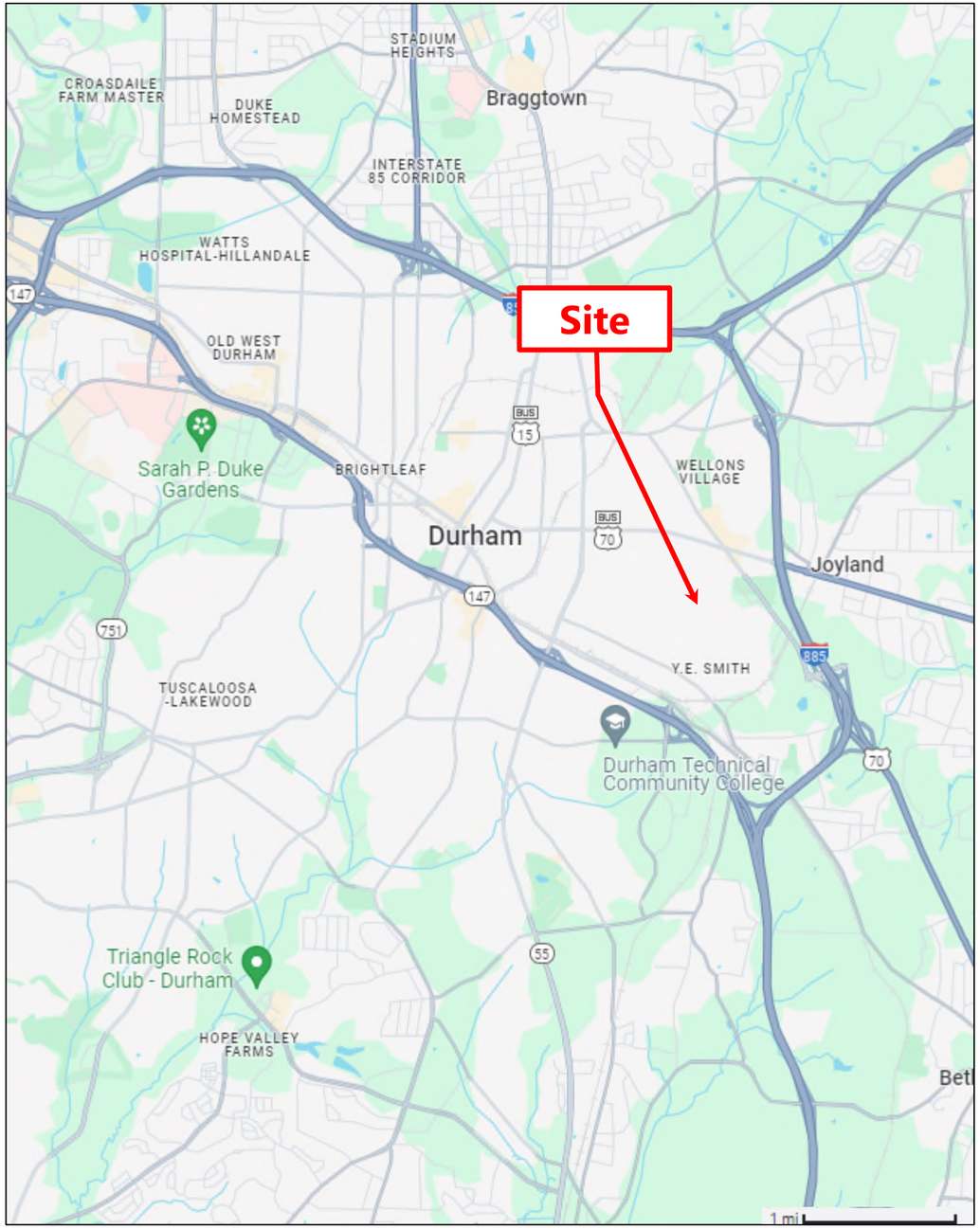
(OFFICIAL SEAL)

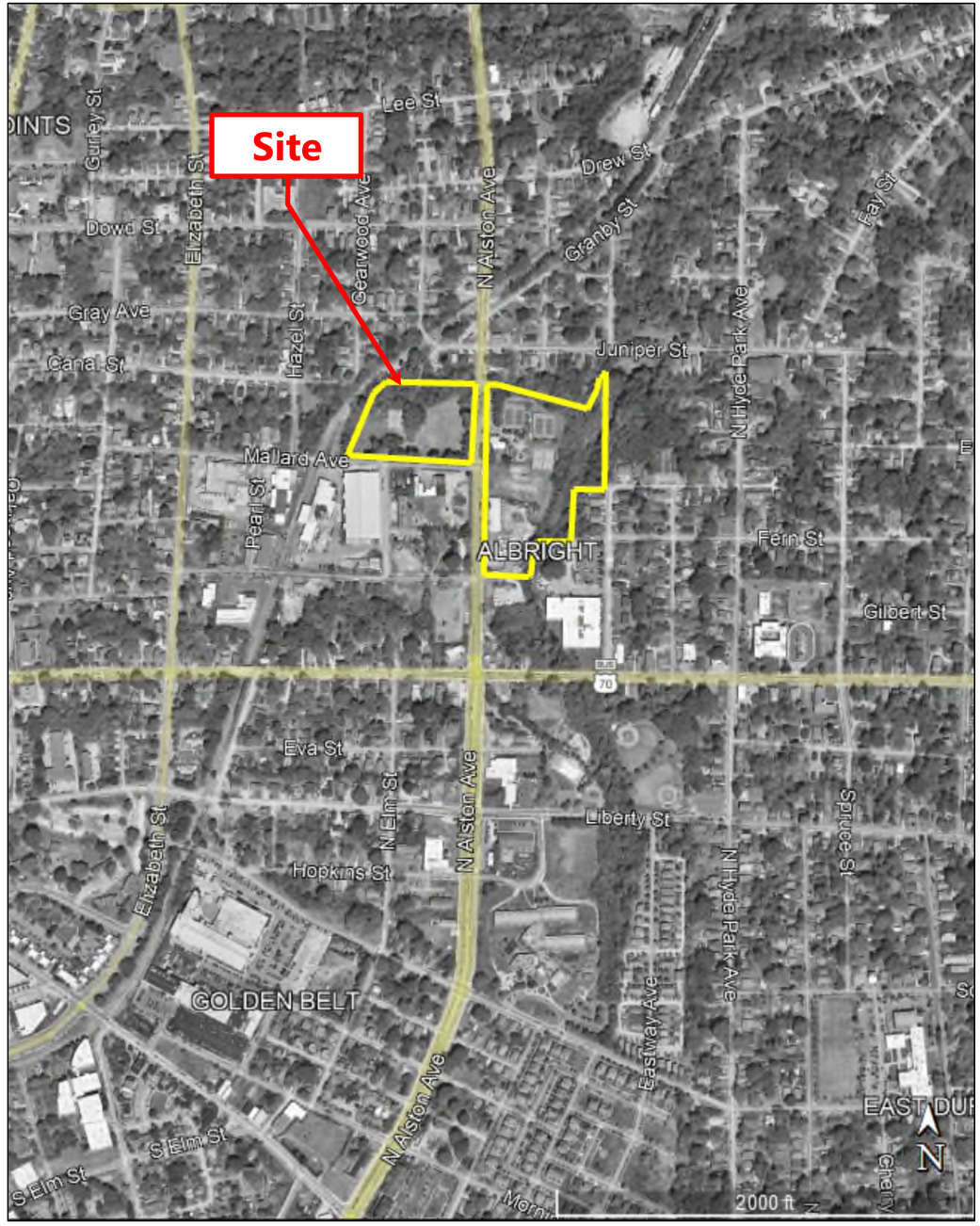
Gail L. Kluever NOTARY PUBLIC Wake County, NC My Comm. Exp. 07-26-2026

My commission expires: 7/26/2026

Figures

REFERENCE:
GOOGLE EARTH PRO AERIAL PHOTOGRAPH (DATED APRIL 12, 2023). 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

EAST END PARK
NCDEQ ID No. NONCD0000823, TASK ORDER - 823DP-3
1200 NORTH ALSTON AVENUE
DURHAM, DURHAM COUNTY, NORTH CAROLINA

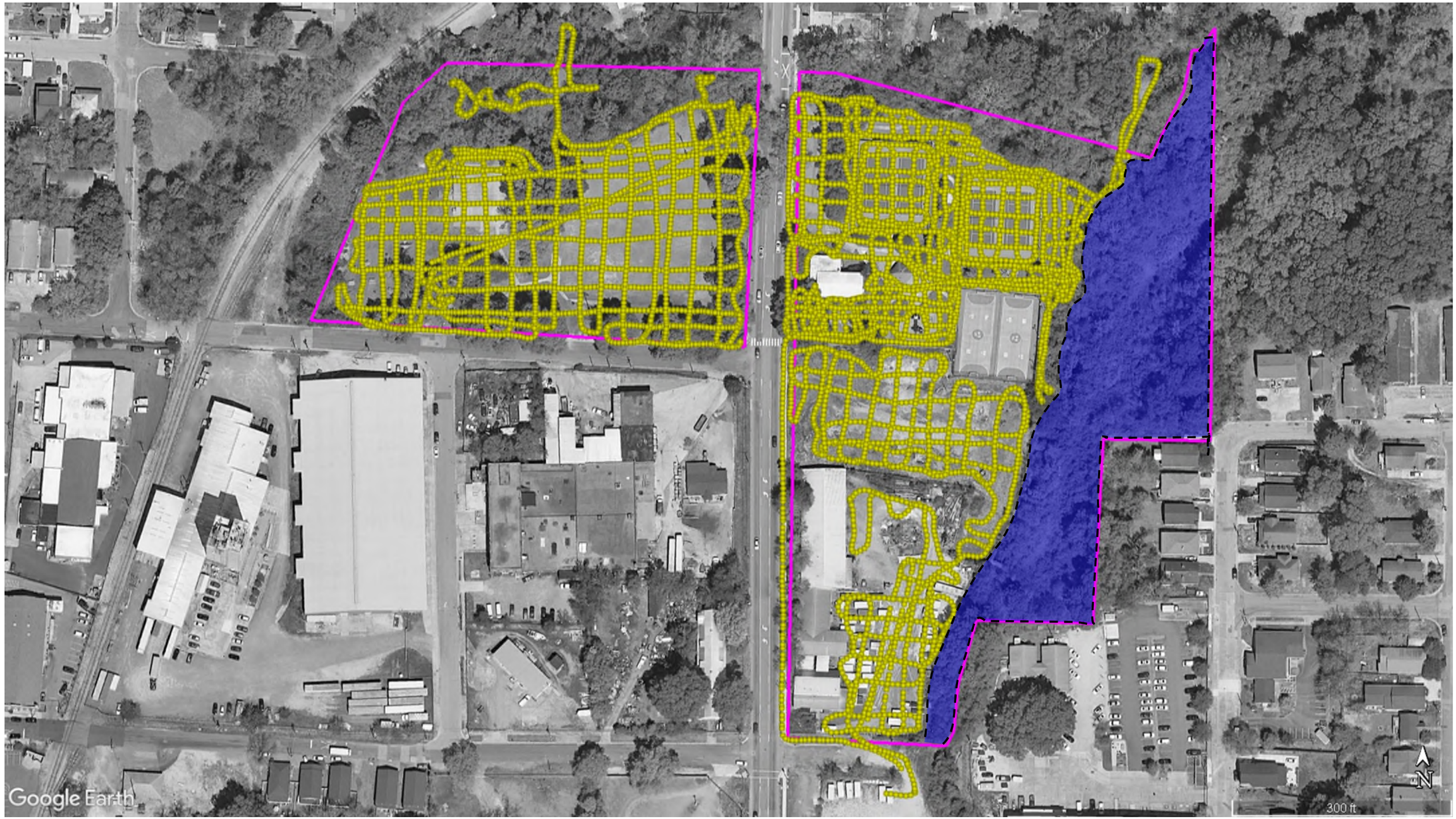
SCALE:
NOT TO SCALE

DATE:
4/29/2024

PROJECT NUMBER
23050630AA

FIGURE NO.
1

REFERENCE:
GOOGLE EARTH PRO AERIAL PHOTOGRAPH (DATED APRIL 12, 2023). THIS PLAN IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED AND NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.



LEGEND

FDEM Data Path

Requested Survey area

Inaccessible Areas

FDEM SURVEY DATA PATH

EAST END PARK
NCDEQ ID No. NONCD0000823, TASK ORDER - 823DP-3
1200 NORTH ALSTON AVENUE
DURHAM, DURHAM COUNTY, NORTH CAROLINA

SCALE:
AS SHOWN

DATE:
4/29/2024

PROJECT NUMBER
23050630AA

FIGURE NO.
2

REFERENCE:
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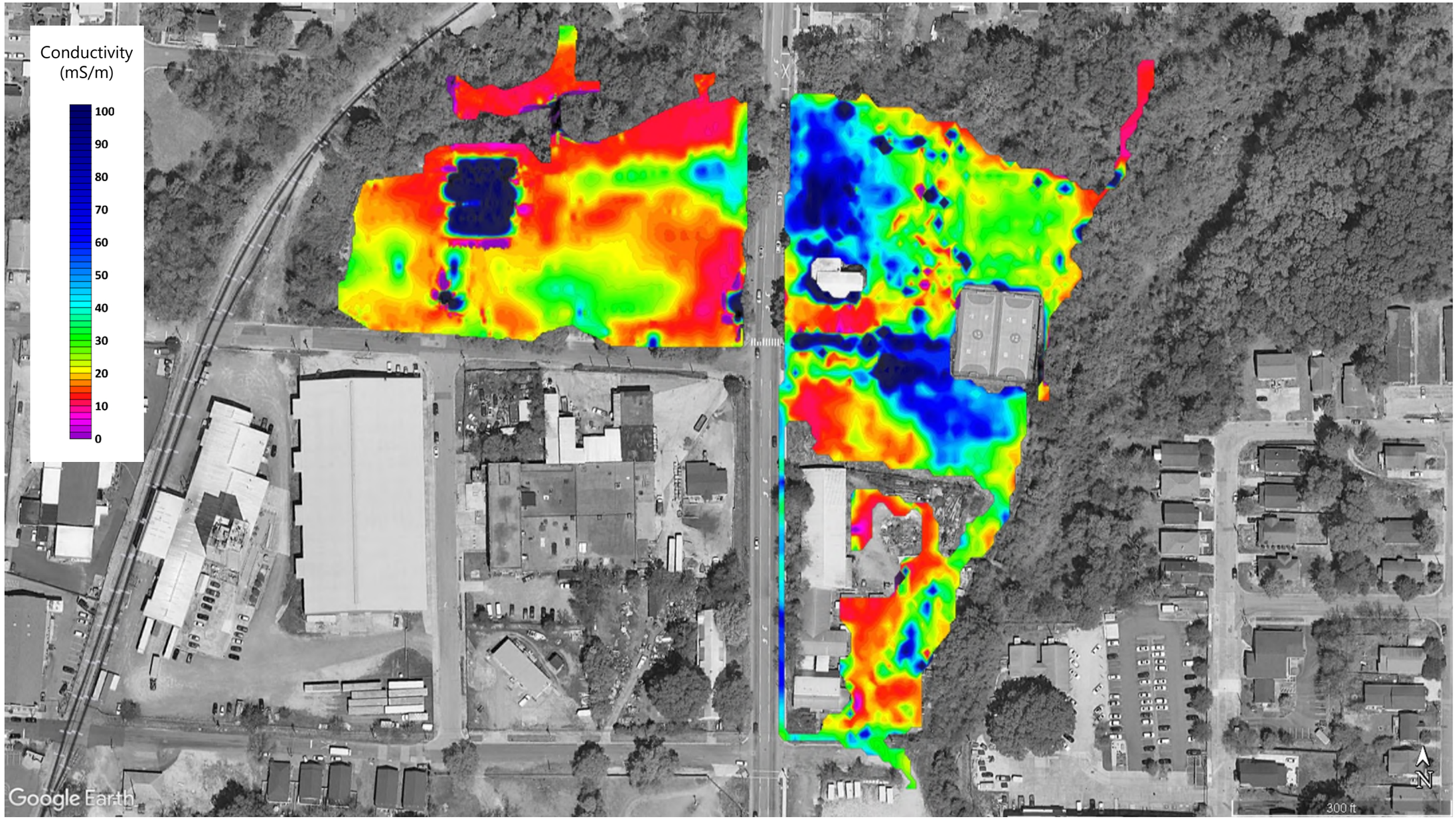

FDEM CONDUCTIVITY DATA PLOT A - OPAQUE (7 FEET)

EAST END PARK
NCDEQ ID No. NONCD0000823, TASK ORDER - 823DP-3
1200 NORTH ALSTON AVENUE
DURHAM, DURHAM COUNTY, NORTH CAROLINA

SCALE:
AS SHOWN

DATE:
4/29/2024

PROJECT NUMBER
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FIGURE NO.
3

REFERENCE:
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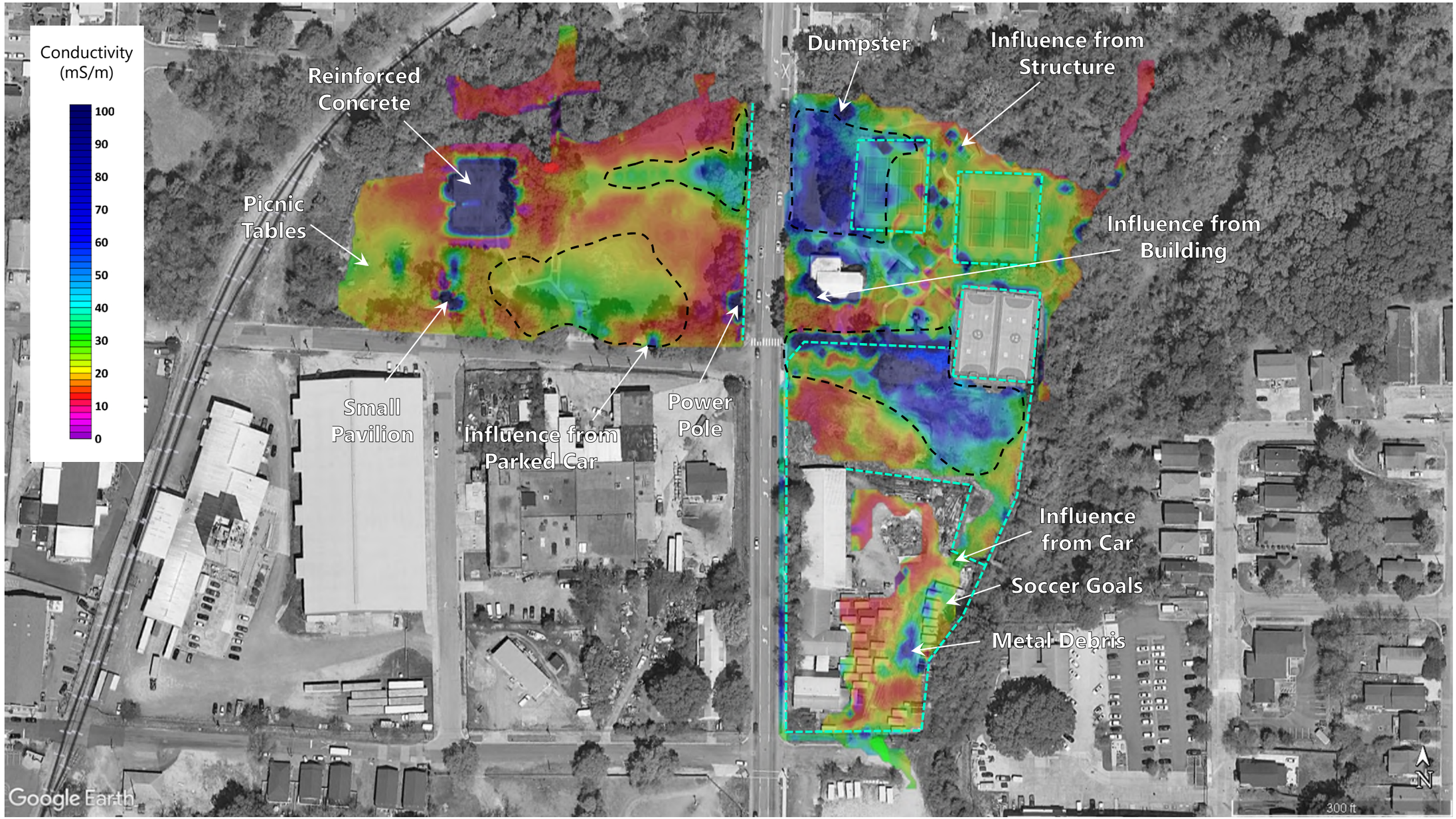

LEGEND

Interpreted Extent of Possible Landfill

Fencing and Handrails

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

EAST END PARK
NCDEQ ID No. NONCD0000823, TASK ORDER - 823DP-3
1200 NORTH ALSTON AVENUE
DURHAM, DURHAM COUNTY, NORTH CAROLINA

SCALE:
AS SHOWN

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4/29/2024

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FIGURE NO.
4

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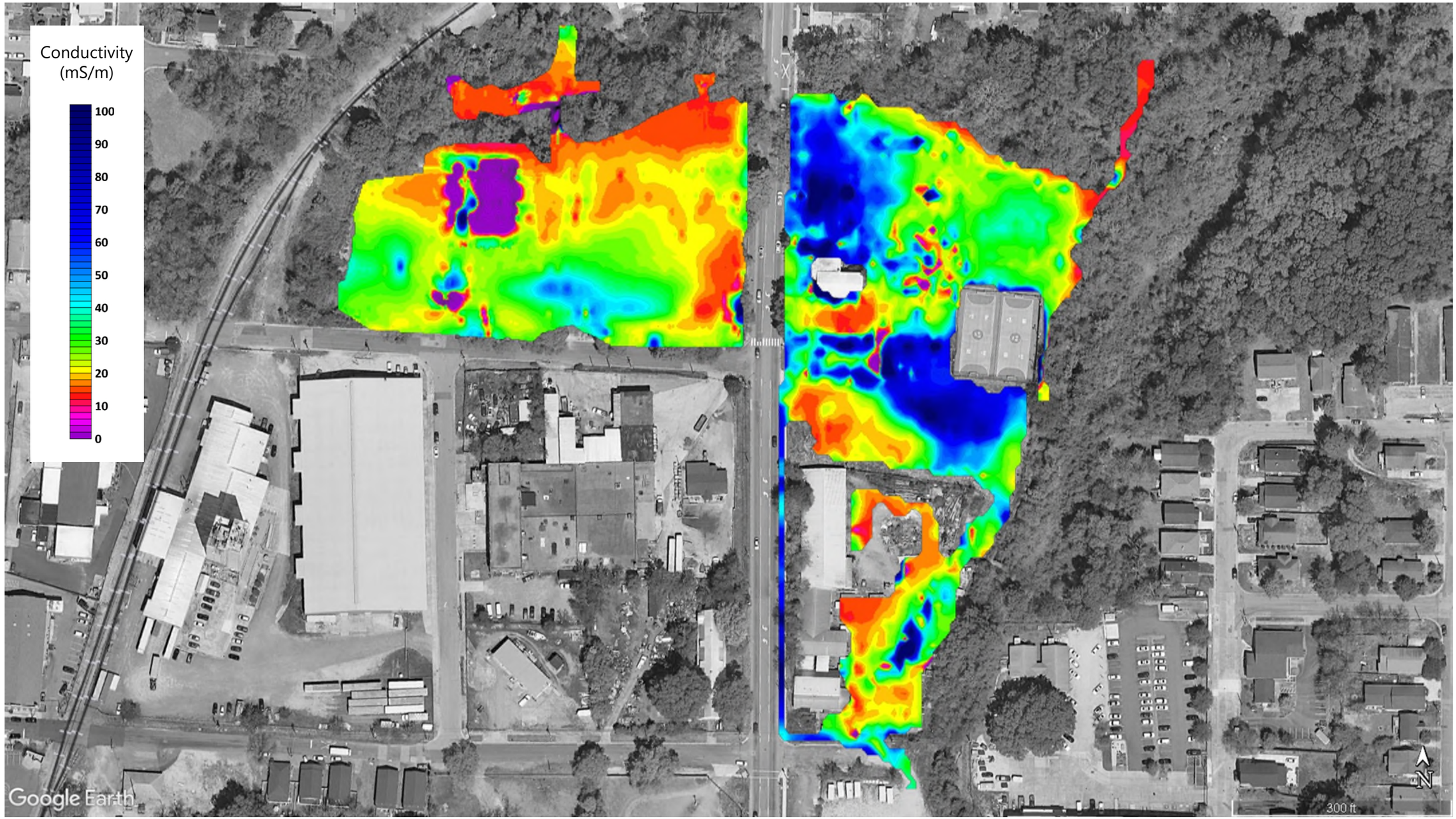

FDEM CONDUCTIVITY DATA PLOT A - OPAQUE (14 FEET)

EAST END PARK
NCDEQ ID No. NONCD0000823, TASK ORDER - 823DP-3
1200 NORTH ALSTON AVENUE
DURHAM, DURHAM COUNTY, NORTH CAROLINA

SCALE:
AS SHOWN

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FIGURE NO.
5

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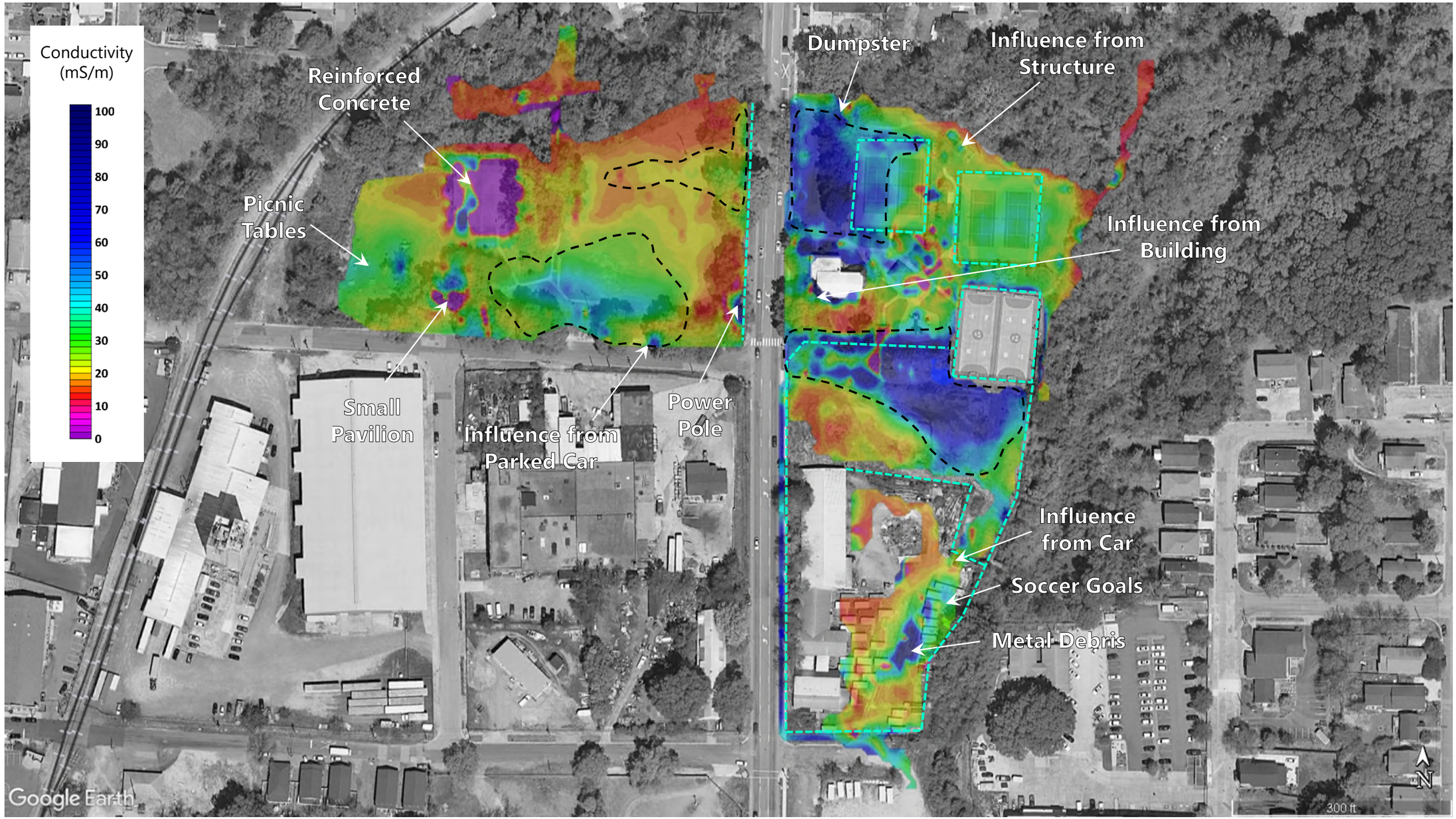

LEGEND

Interpreted Extent of Possible Landfill

Fencing and Handrails

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

EAST END PARK
NCDEQ ID No. NONCD0000823, TASK ORDER - 823DP-3
1200 NORTH ALSTON AVENUE
DURHAM, DURHAM COUNTY, NORTH CAROLINA

SCALE: AS SHOWN

DATE: 4/29/2024

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FIGURE NO. 6

REFERENCE:
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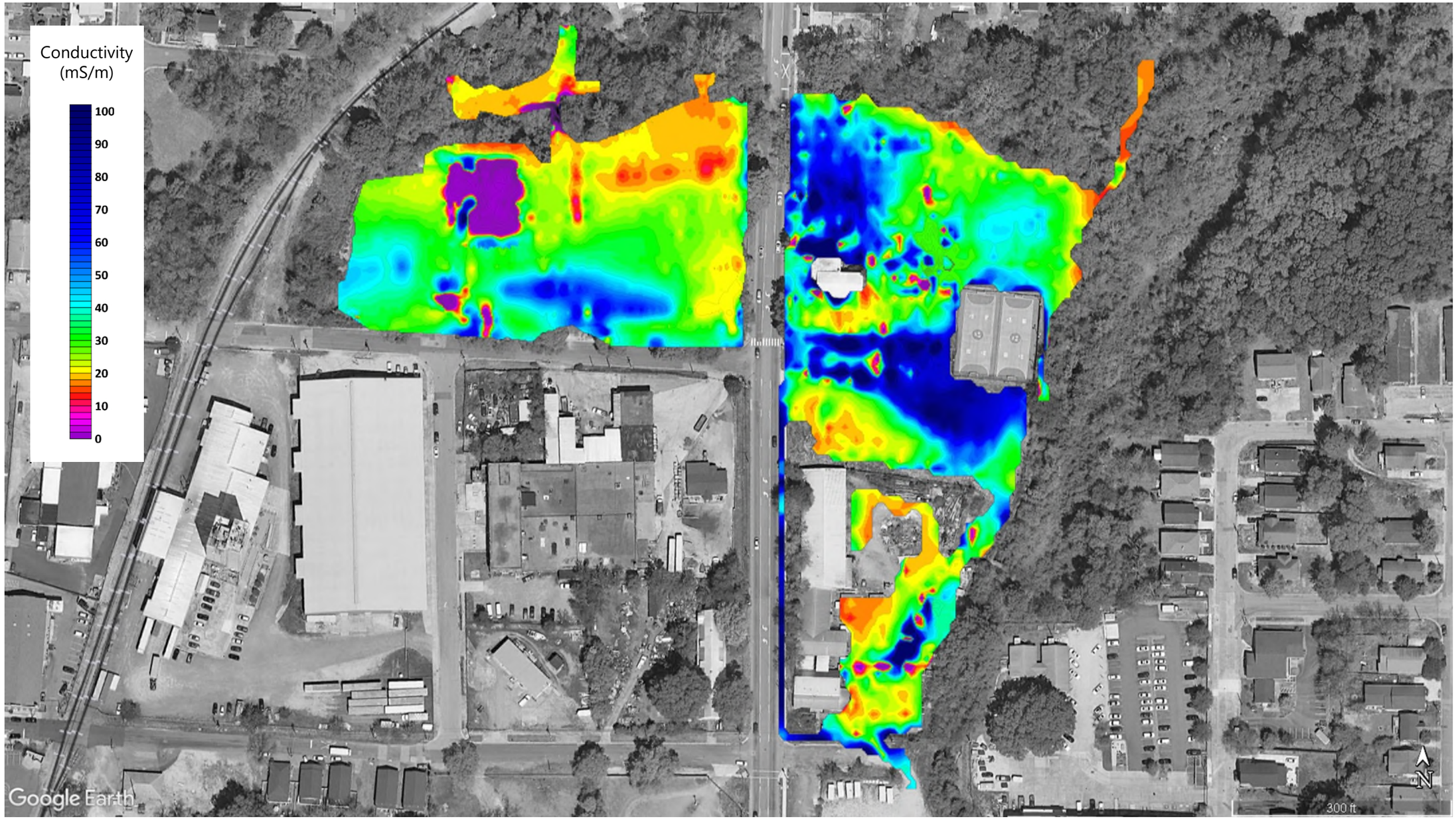

FDEM CONDUCTIVITY DATA PLOT A - OPAQUE (22 FEET)

EAST END PARK
NCDEQ ID No. NONCD0000823, TASK ORDER - 823DP-3
1200 NORTH ALSTON AVENUE
DURHAM, DURHAM COUNTY, NORTH CAROLINA

SCALE:
AS SHOWN

DATE:
4/29/2024

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FIGURE NO.
7

REFERENCE:
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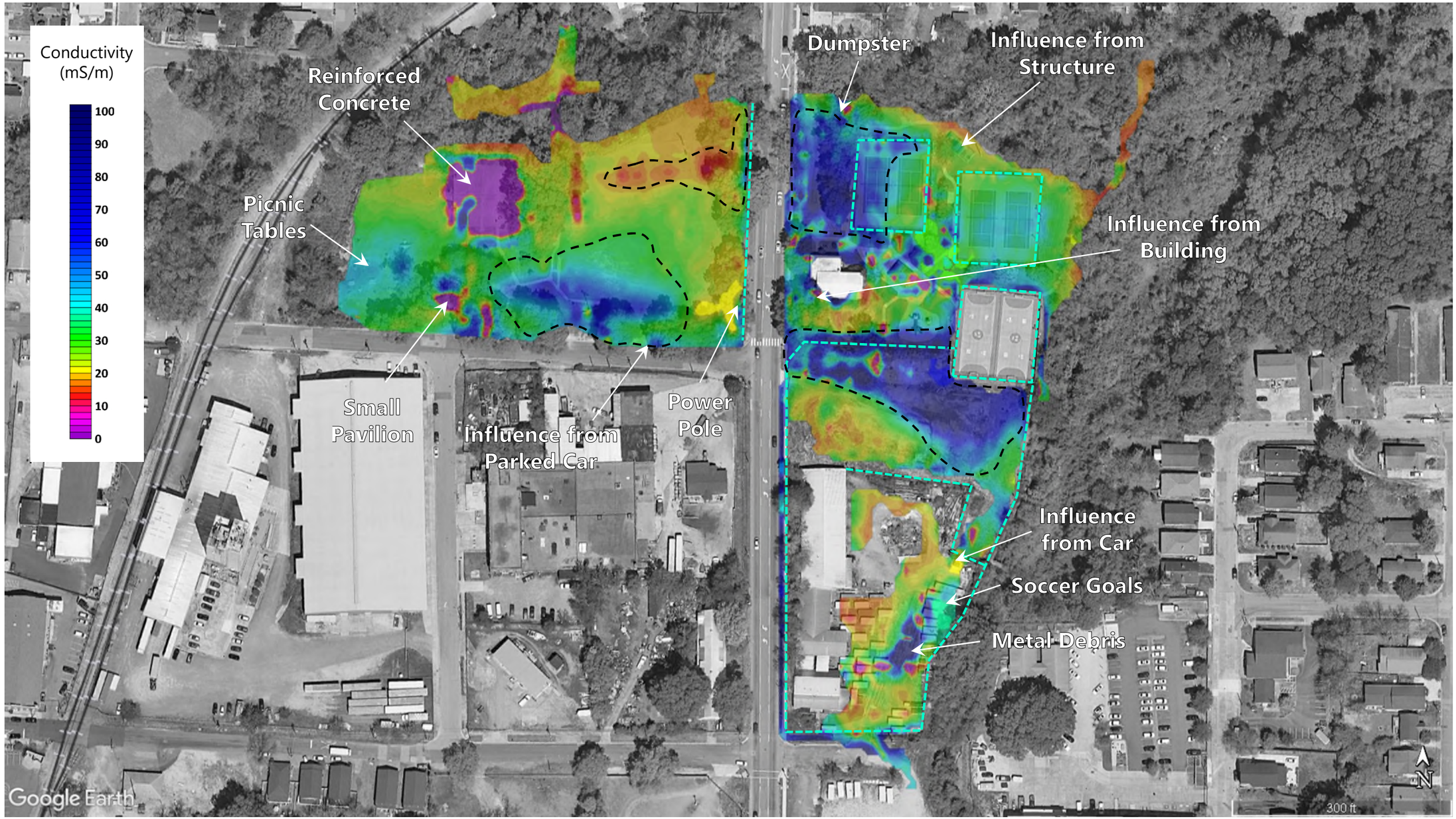

LEGEND

Interpreted Extent of Possible Landfill

Fencing and Handrails

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

EAST END PARK
NCDEQ ID No. NONCD0000823, TASK ORDER - 823DP-3
1200 NORTH ALSTON AVENUE
DURHAM, DURHAM COUNTY, NORTH CAROLINA

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FIGURE NO.: 8

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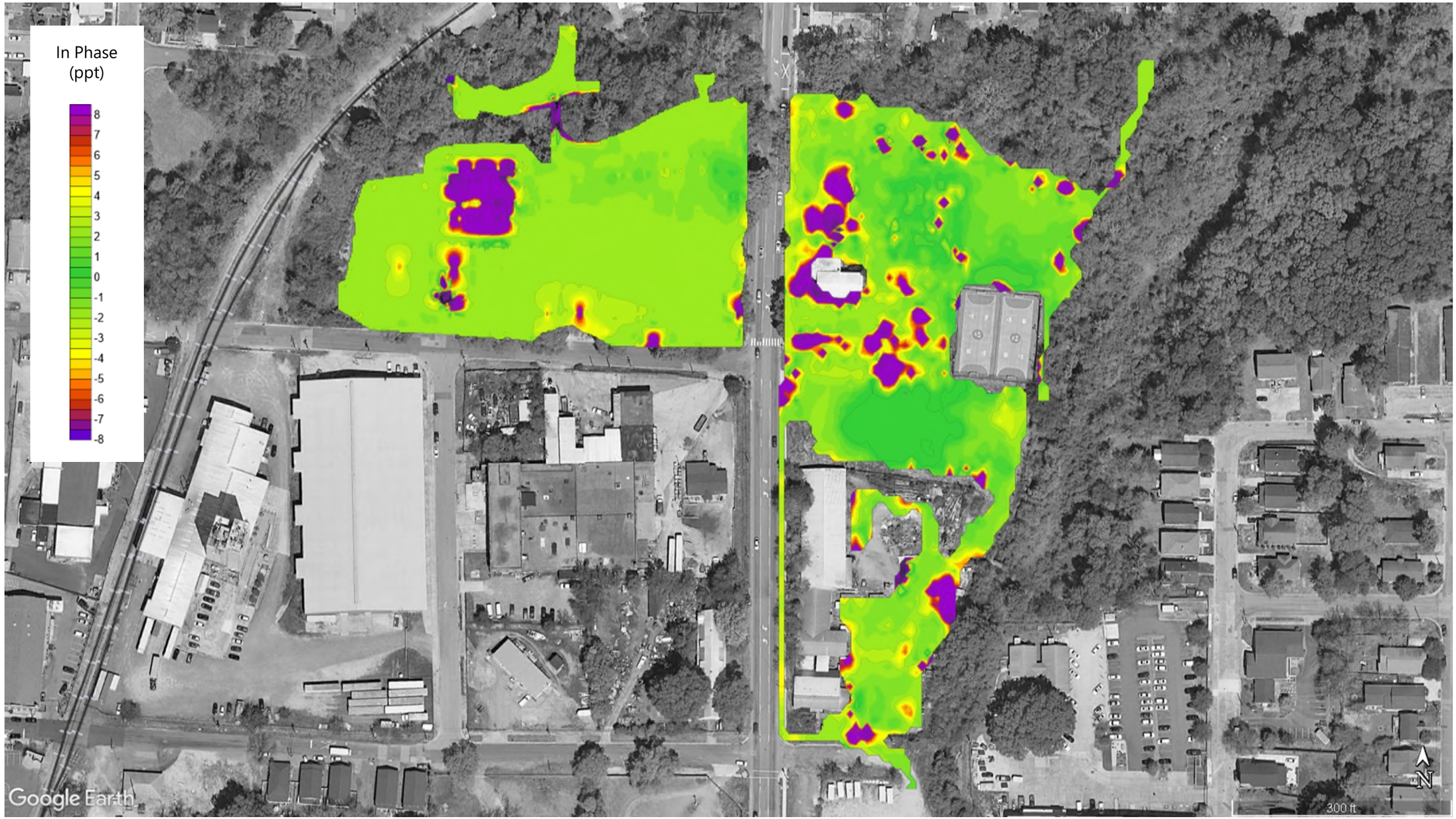

FDEM IN-PHASE DATA PLOT A - OPAQUE (7 FEET)

EAST END PARK
NCDEQ ID No. NONCD0000823, TASK ORDER - 823DP-3
1200 NORTH ALSTON AVENUE
DURHAM, DURHAM COUNTY, NORTH CAROLINA

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FIGURE NO.
9

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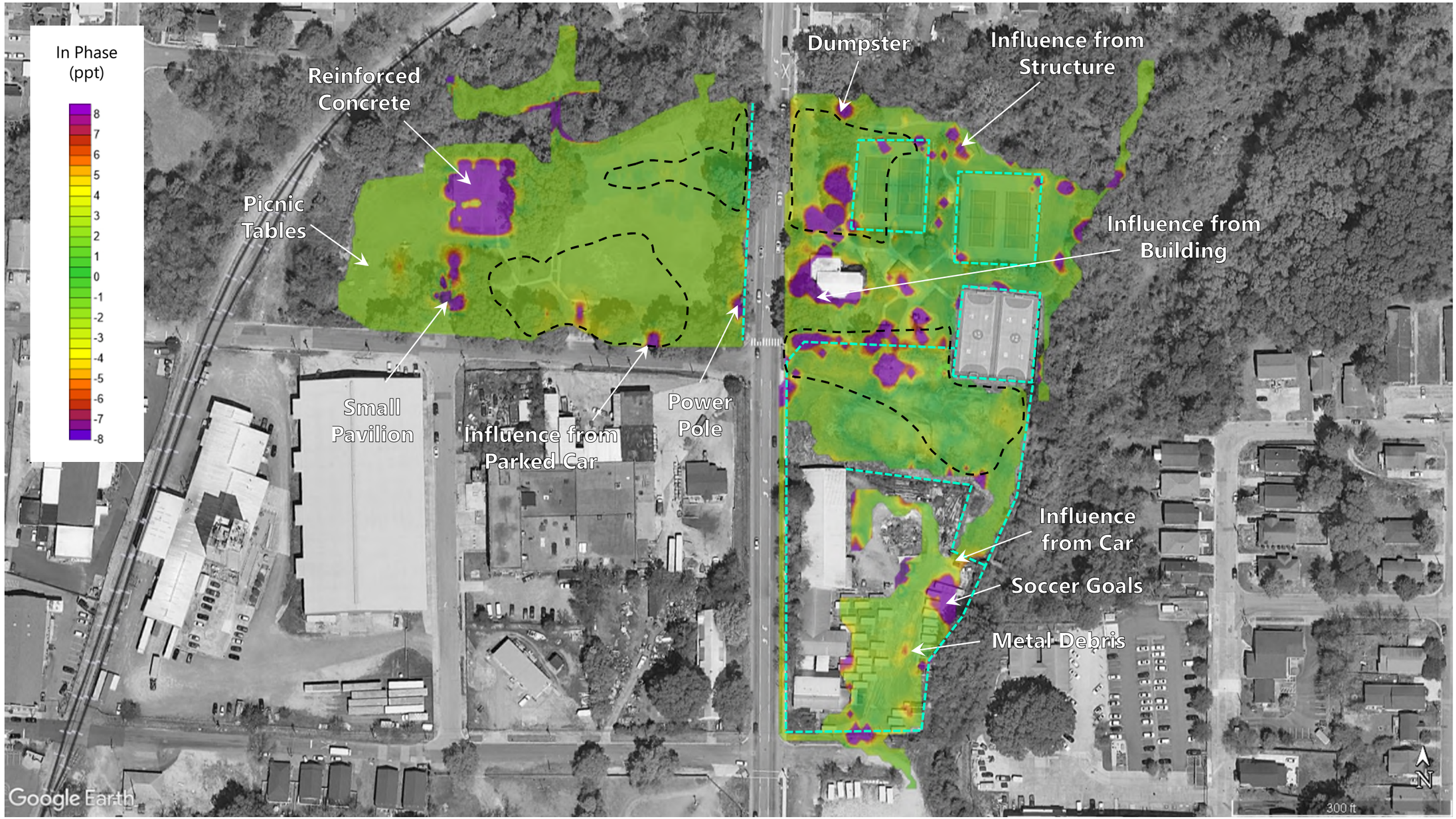

LEGEND

Interpreted Extent of Possible Landfill

Fencing and Handrails

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

EAST END PARK
NCDEQ ID No. NONCD0000823, TASK ORDER - 823DP-3
1200 NORTH ALSTON AVENUE
DURHAM, DURHAM COUNTY, NORTH CAROLINA

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FIGURE NO.: 10

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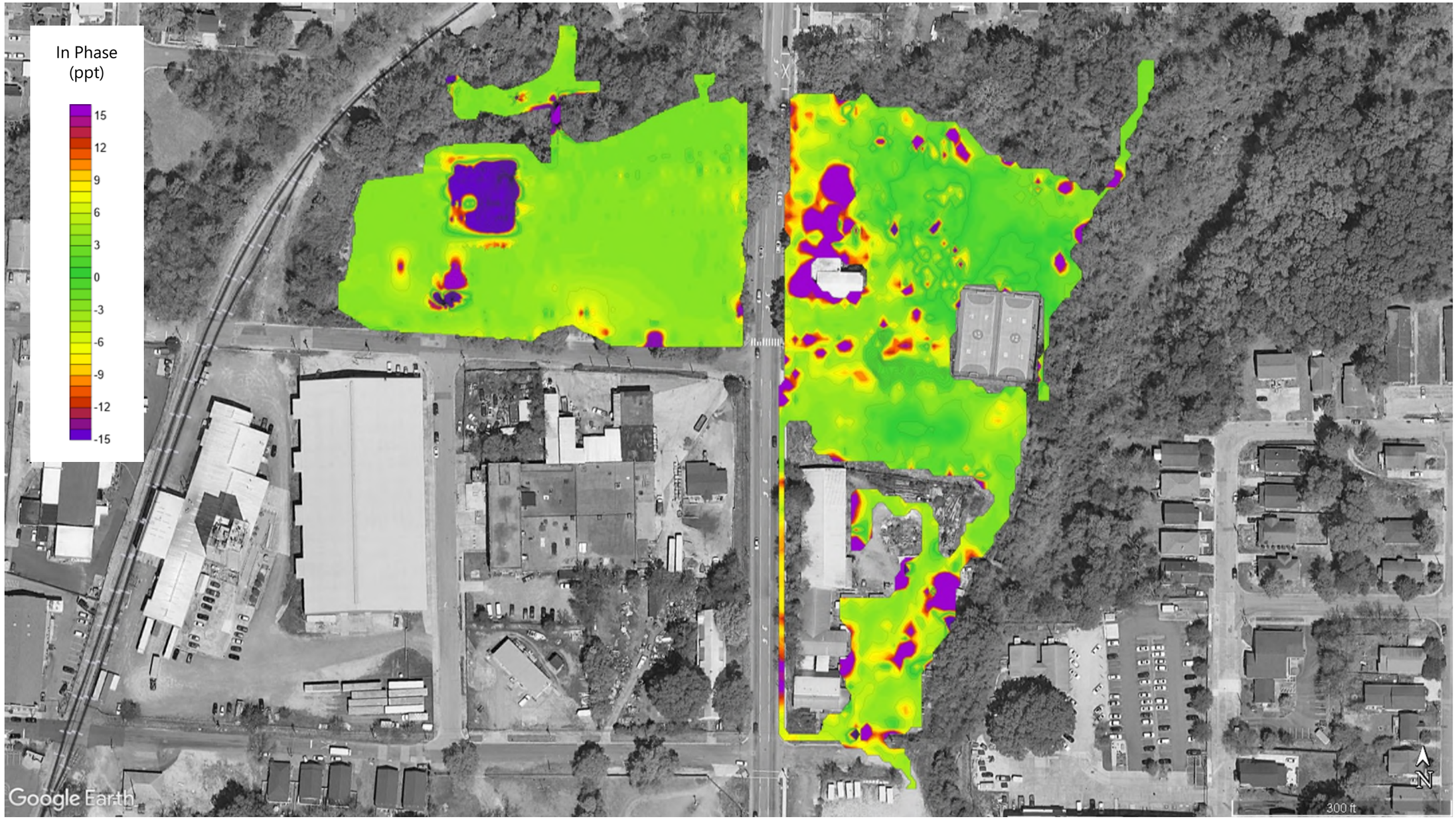

FDEM IN-PHASE DATA PLOT A- OPAQUE (14 FEET)

EAST END PARK
NCDEQ ID No. NONCD0000823, TASK ORDER - 823DP-3
1200 NORTH ALSTON AVENUE
DURHAM, DURHAM COUNTY, NORTH CAROLINA

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FIGURE NO.
11

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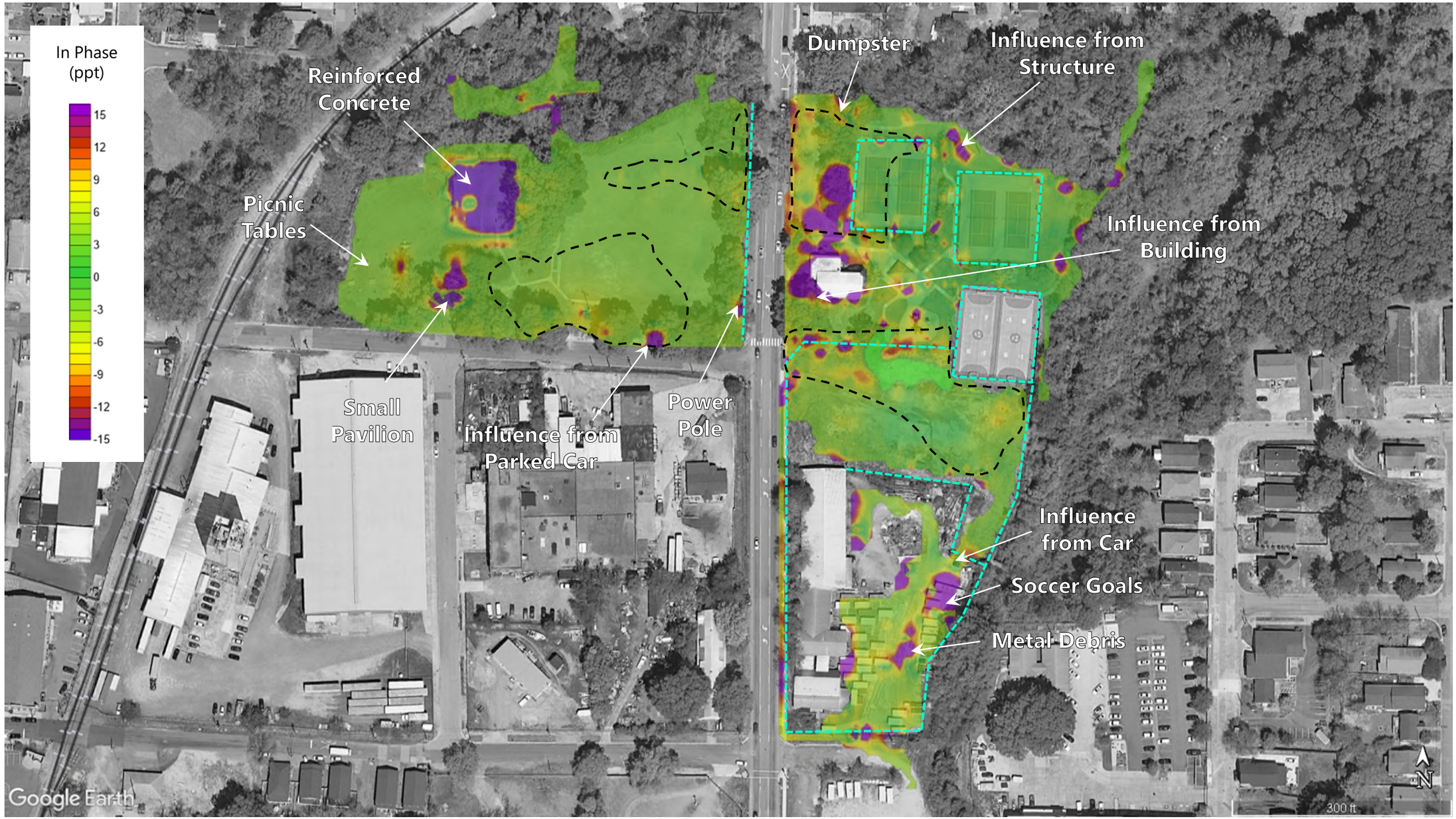

LEGEND

Interpreted Extent of Possible Landfill

Fencing and Handrails

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

EAST END PARK
NCDEQ ID No. NONCD0000823, TASK ORDER - 823DP-3
1200 NORTH ALSTON AVENUE
DURHAM, DURHAM COUNTY, NORTH CAROLINA

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DATE: 4/29/2024

PROJECT NUMBER 23050630AA

FIGURE NO. **12**

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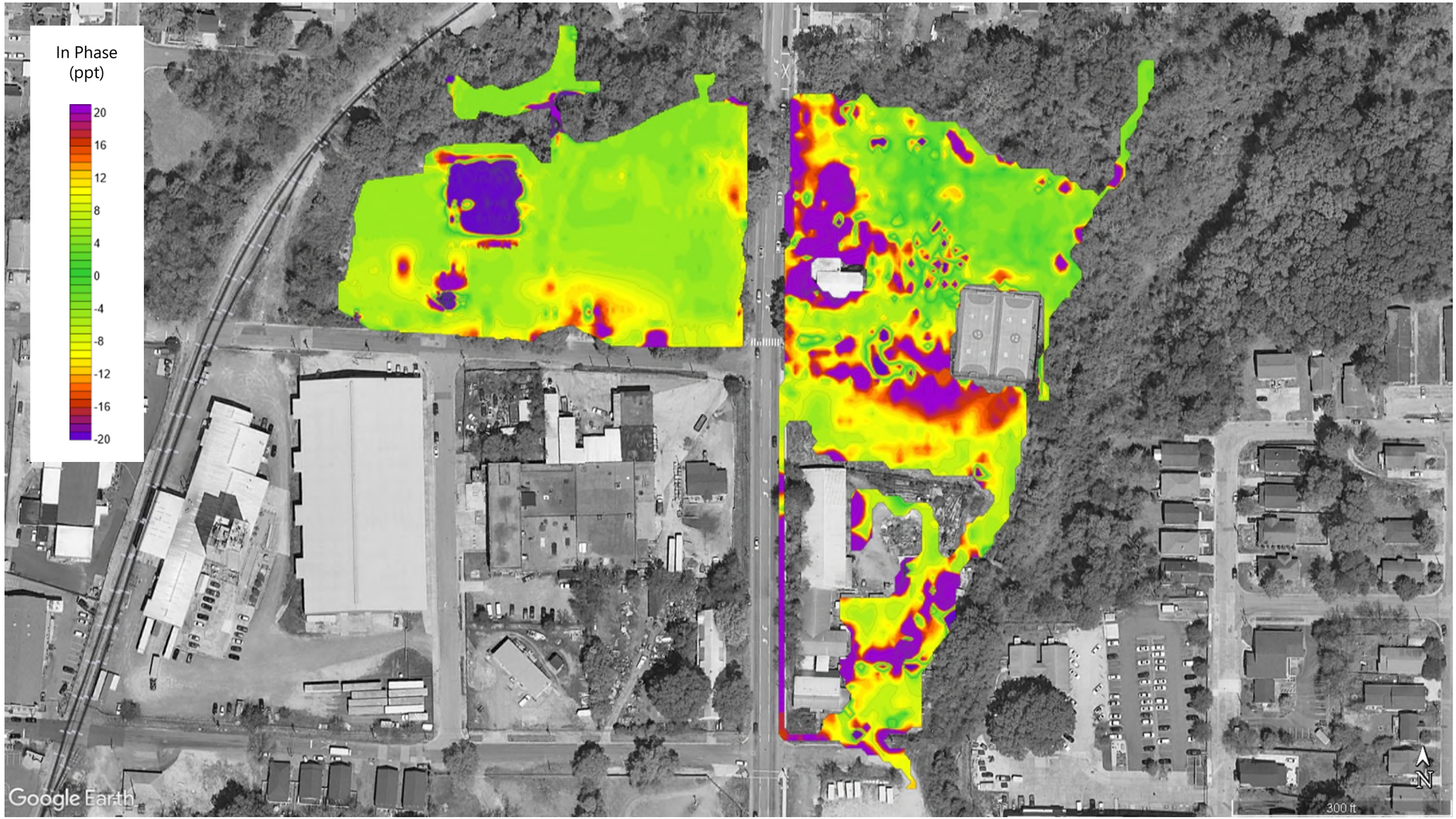

FDEM IN-PHASE DATA PLOT A- OPAQUE (22 FEET)

EAST END PARK
NCDEQ ID No. NONCD0000823, TASK ORDER - 823DP-3
1200 NORTH ALSTON AVENUE
DURHAM, DURHAM COUNTY, NORTH CAROLINA

SCALE:
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PROJECT NUMBER
23050630AA

FIGURE NO.
13

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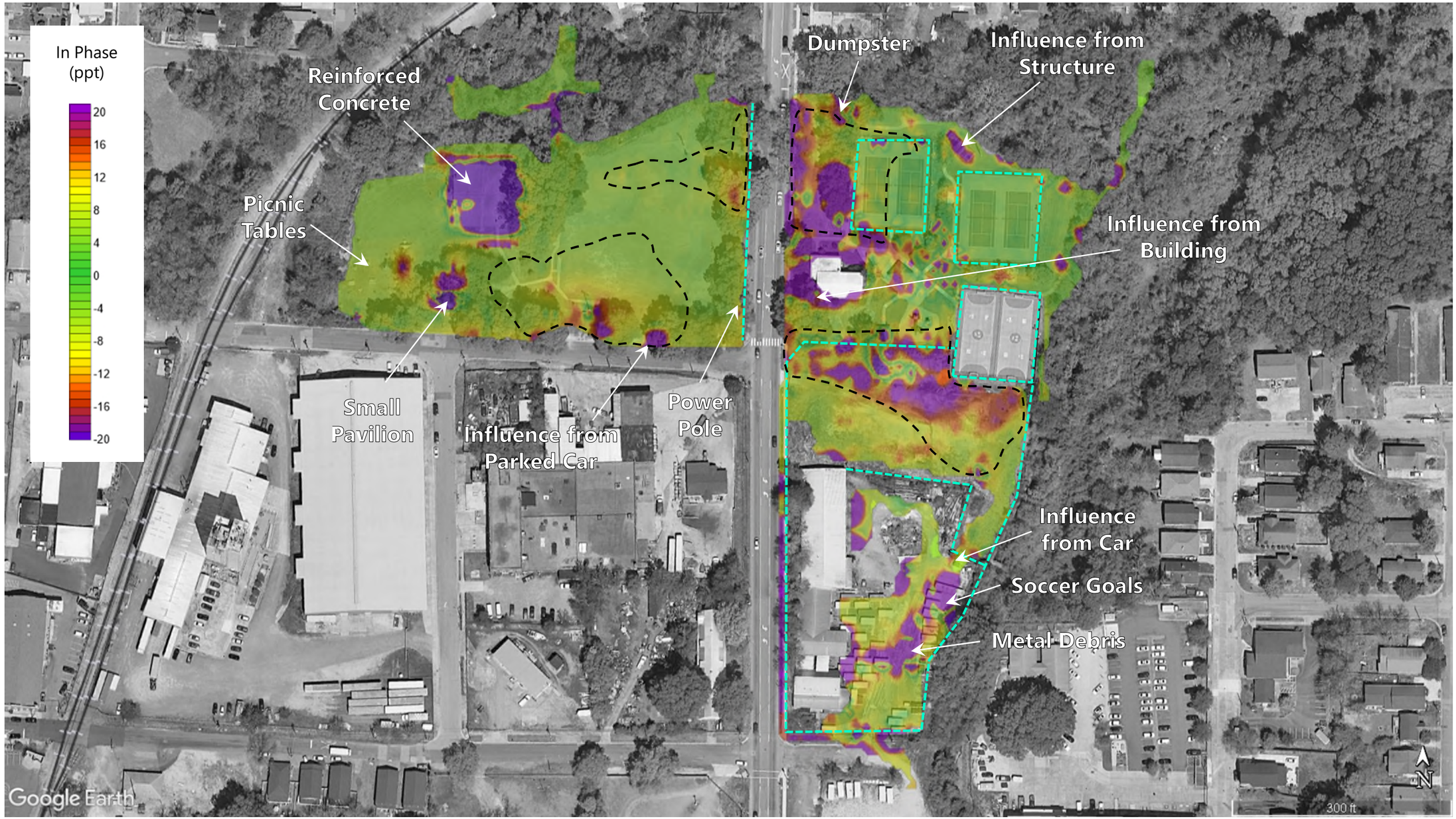

LEGEND

Interpreted Extent of Possible Landfill

Fencing and Handrails

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

EAST END PARK
NCDEQ ID No. NONCD0000823, TASK ORDER - 823DP-3
1200 NORTH ALSTON AVENUE
DURHAM, DURHAM COUNTY, NORTH CAROLINA

SCALE: AS SHOWN

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PROJECT NUMBER: 23050630AA

FIGURE NO.: 14