NORTHROP GRUMMAN

Northrop Grumman Corporation
Aerospace Systems

Military Aircraft Systems
925 South Oyster Bay Road
Bethpage, New York 11714-3582

April 2, 2018

Mr. Jason Pelton
New York State Department of Environmental Conservation
625 Broadway, 12th Floor
Albany, New York 12233-7015

Subject: Preliminary Design Plan for In-Situ Thermal Remedial Wells
VOC Source Area Remediation
Operable Unit 3, Former Grumman Settling Ponds, Bethpage, New York

Electronic transmission only. Hard copy available upon request.

Dear Mr. Pelton:

Northrop Grumman Systems Corporation (Northrop Grumman) is submitting this Preliminary Design Plan (Plan) to the New York State Department of Environmental Conservation (NYSDEC) for approval to proceed with thermal remedial well installation at the Bethpage Community Park (Park) as the first element of the Operable Unit 3 Volatile Organic Compound (VOC) Source Area in-situ thermal remedy (ISTR). The purpose of this Plan and our request for NYSDEC's approval in advance of the Remedial Action Work Plan, is to accelerate the overall schedule for remedy construction. Moreover, NYSDEC's approval of this Plan would help Northrop Grumman to reach a timely agreement with the Town of Oyster Bay (Town), whose approval of Park access is also necessary to construction of the remedy.

Delineation of VOCs in the Park was conducted in 2014-2015, with supplemental sampling conducted in 2017 to refine the target treatment zone for the remedy. Total VOC contours at different depth intervals in the target treatment zone (**Attachment 1**) were prepared for design purposes based on the data presented in the VOC Source Area Pre-Design Report (Arcadis 2015) and Pre-Design Report Addendum (Arcadis 2018). The remedial well locations and depths were designed by TerraTherm, Inc., Northrop Grumman's remedial contractor, to thermally treat soil within the lower permeability zone (LPZ) in the Park to less than 10 milligrams per kilogram (mg/kg) total VOCs, consistent with the NYSDEC-approved Remedial Design Work Plan (EMAGIN/ENVIRON 2016).

Construction of the ISTR remedial well network is planned to be completed in two phases. The first phase, for which approval is now being requested, includes abandoning existing piezometers and monitoring wells within the treatment area (locations shown in **Attachment 2**) and drilling of boreholes and installing well casings for ISTR heater wells, vacuum extraction wells, temperature monitoring points, and multi-phase extraction wells (**Attachment 3**). The second phase of work, including installation of heater elements, interconnection cables, and process piping, will be conducted following NYSDEC's approval of the Remedial Action Work Plan, which will be submitted in the second quarter of 2018.

The ISTR wells will be installed using sonic drilling methods to minimize vertical cross-contamination by polychlorinated biphenyls (PCBs) in the soil overlying the VOC source area and to reduce the volume of investigation derived waste (IDW). IDW will be characterized for PCBs, VOCs, RCRA metals, and other constituents as required by the selected disposal facility.

Health and safety procedures in the Site-Specific Health and Safety Plan (HASP; Arcadis, 2016) will be followed for the work, including air monitoring for VOCs and particulates in accordance with the Community Air Monitoring Plan (CAMP) included in the HASP.

A lined pad will be constructed for equipment decontamination. Decontamination fluids will be collected, containerized in 55-gallon drums, and temporarily stored at the Northrop Grumman facility pending characterization. The fluids will either be treated in the on-site groundwater remedial system or disposed at a permitted off-site facility, as appropriate. Drilling equipment encountering PCBs will be decontaminated according to the requirements of 40 CFR §761.79.

We respectfully request that NYSDEC complete the review of this Plan to facilitate its approval by Wednesday, April 9, 2018, so that we can proceed with finalizing an access agreement with the Town, preparing detailed remedial costs, and contracting for the construction of the remedy, which we plan to begin implementing in the third quarter of 2018.

Should you have any questions, feel free to contact us.

Thank you,

Edward J. Hannon
Director ESHM
925 South Oyster Bay Road
Bethpage, NY 11714
516-575-2333

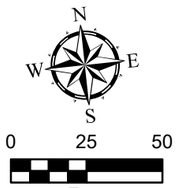
Attachments:
Attachment 1 – TVOC Contours
Attachment 2 – Wells to be Abandoned
Attachment 3 – Treatment Point Layout and Construction Details

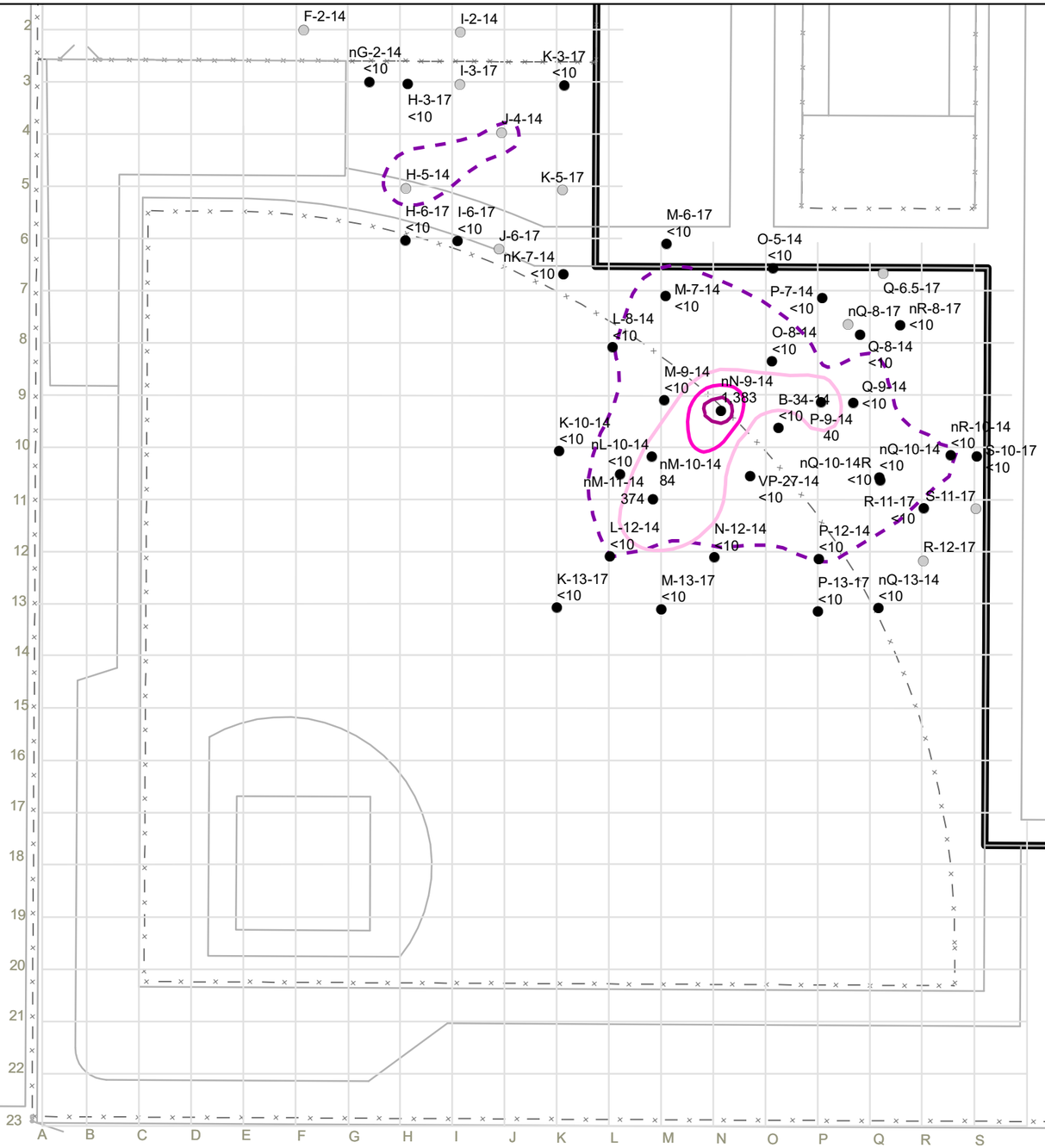
cc: D. Hesler
J. Balmat
B. Lais
S. Karpinski

Attachment 1

TVOC Contours

Figure 1
Total VOCs Distribution in Soil
2014 to 2017 (40-42 ft)
Bethpage Community Park
Bethpage, NY





Legend

- TVOC Soil Sample Location (2014 to 2017)
- 374 TVOC Concentration, mg/kg
- TVOC Soil Boring Location (Interval not sampled)
- Contour 40ft 10ppm
- Contour 40ft 500ppm
- Contour 40ft 1000ppm
- TVOCs >10ppm 40-55ft (2014)

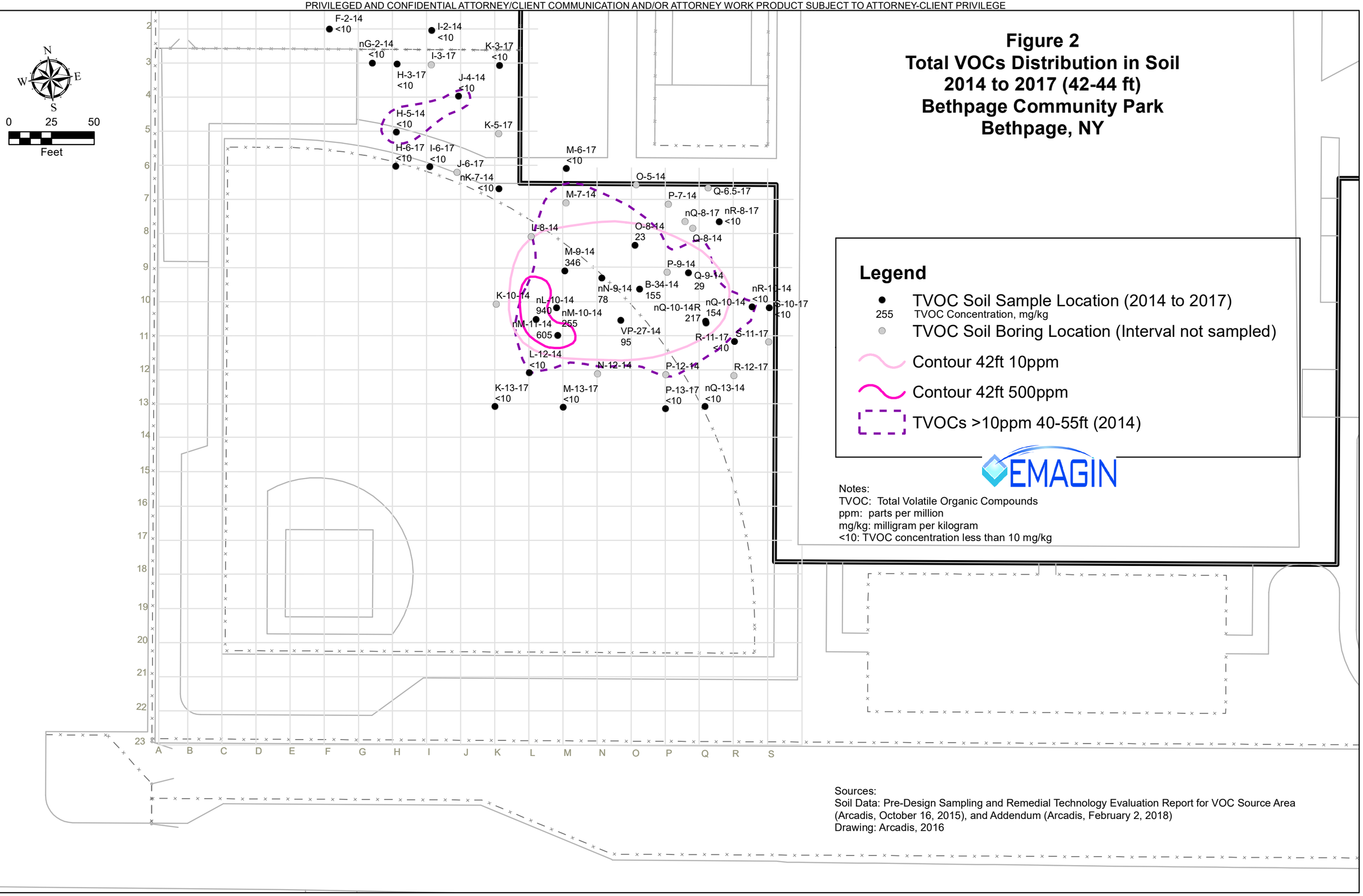
EMAGIN

Notes:
TVOC: Total Volatile Organic Compounds
ppm: parts per million
mg/kg: milligram per kilogram
<10: TVOC concentration less than 10 mg/kg

Sources:
Soil Data: Pre-Design Sampling and Remedial Technology Evaluation Report for VOC Source Area (Arcadis, October 16, 2015), and Addendum (Arcadis, February 2, 2018)
Drawing: Arcadis, 2016

O:\Projects\7AS301_Bethpage\GIS_Projects\2018\2018_TVOC_Soil_Plume_Update\Area 1 - TVOC Soil Plume Delineation_2018 (40-42 ft) (rev2 KGB 1-2018).mxd

Figure 2
Total VOCs Distribution in Soil
2014 to 2017 (42-44 ft)
Bethpage Community Park
Bethpage, NY



Legend

- TVOC Soil Sample Location (2014 to 2017)
- 255 TVOC Concentration, mg/kg
- TVOC Soil Boring Location (Interval not sampled)
- Contour 42ft 10ppm
- Contour 42ft 500ppm
- TVOCs >10ppm 40-55ft (2014)

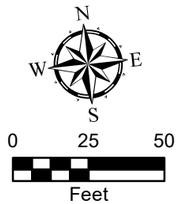
EMAGIN

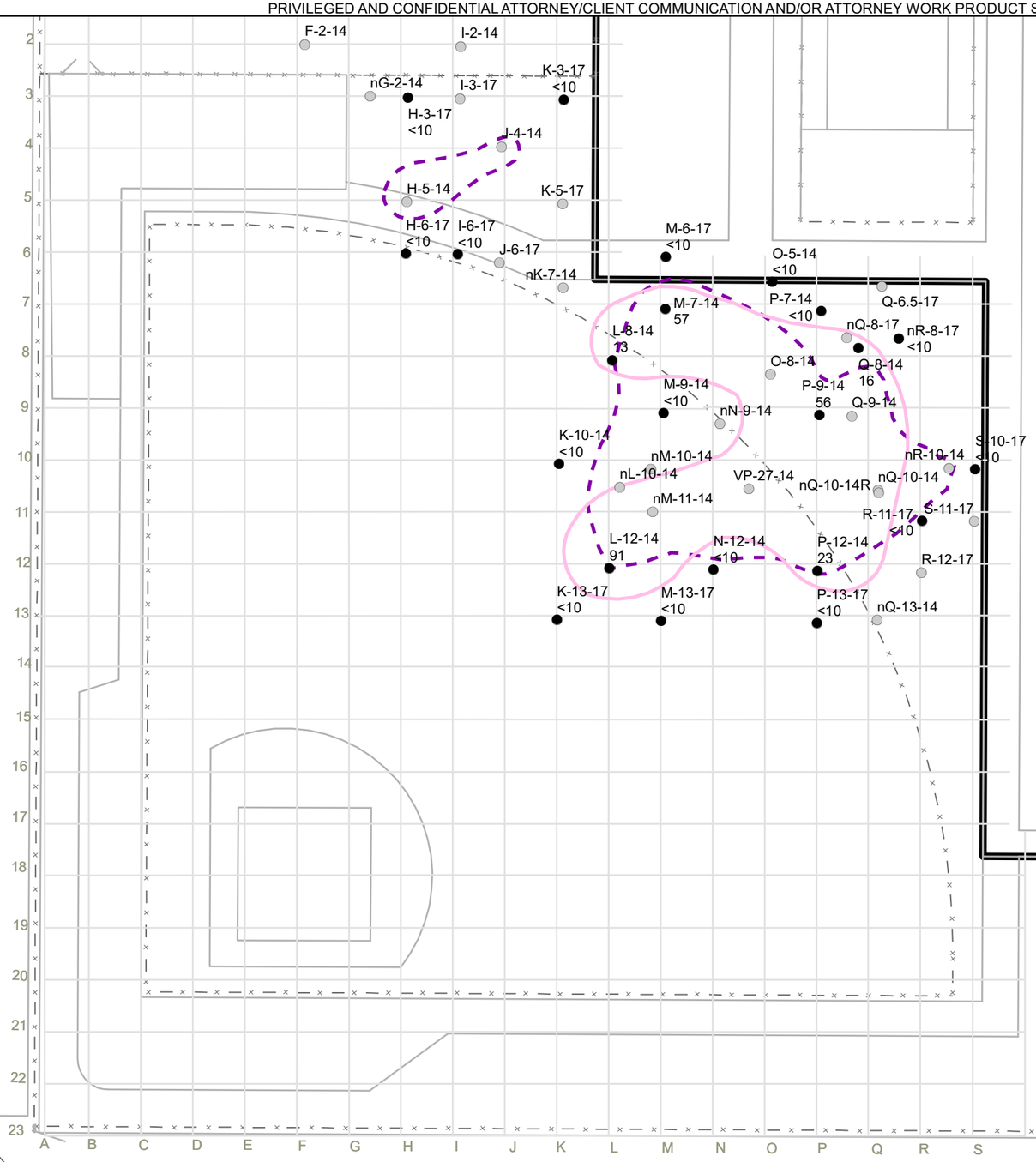
Notes:
TVOC: Total Volatile Organic Compounds
ppm: parts per million
mg/kg: milligram per kilogram
<10: TVOC concentration less than 10 mg/kg

Sources:
Soil Data: Pre-Design Sampling and Remedial Technology Evaluation Report for VOC Source Area (Arcadis, October 16, 2015), and Addendum (Arcadis, February 2, 2018)
Drawing: Arcadis, 2016

O:\Projects\7AS301_Bethpage\GIS_Projects\2018\2018_TVOC_Soil_Plume_Update\Area 1 - TVOC Soil Plume Delineation_2018 (42-44 ft) (rev2 KGB 1-2018).mxd

Figure 3
Total VOCs Distribution in Soil
2014 to 2017 (44-46 ft)
Bethpage Community Park
Bethpage, NY





Legend

- TVOC Soil Sample Location (2014 to 2017)
  91 TVOC Concentration, mg/kg
- TVOC Soil Boring Location (Interval not sampled)
- Contour 44ft 10ppm
- TVOCs >10ppm 40-55ft (2014)

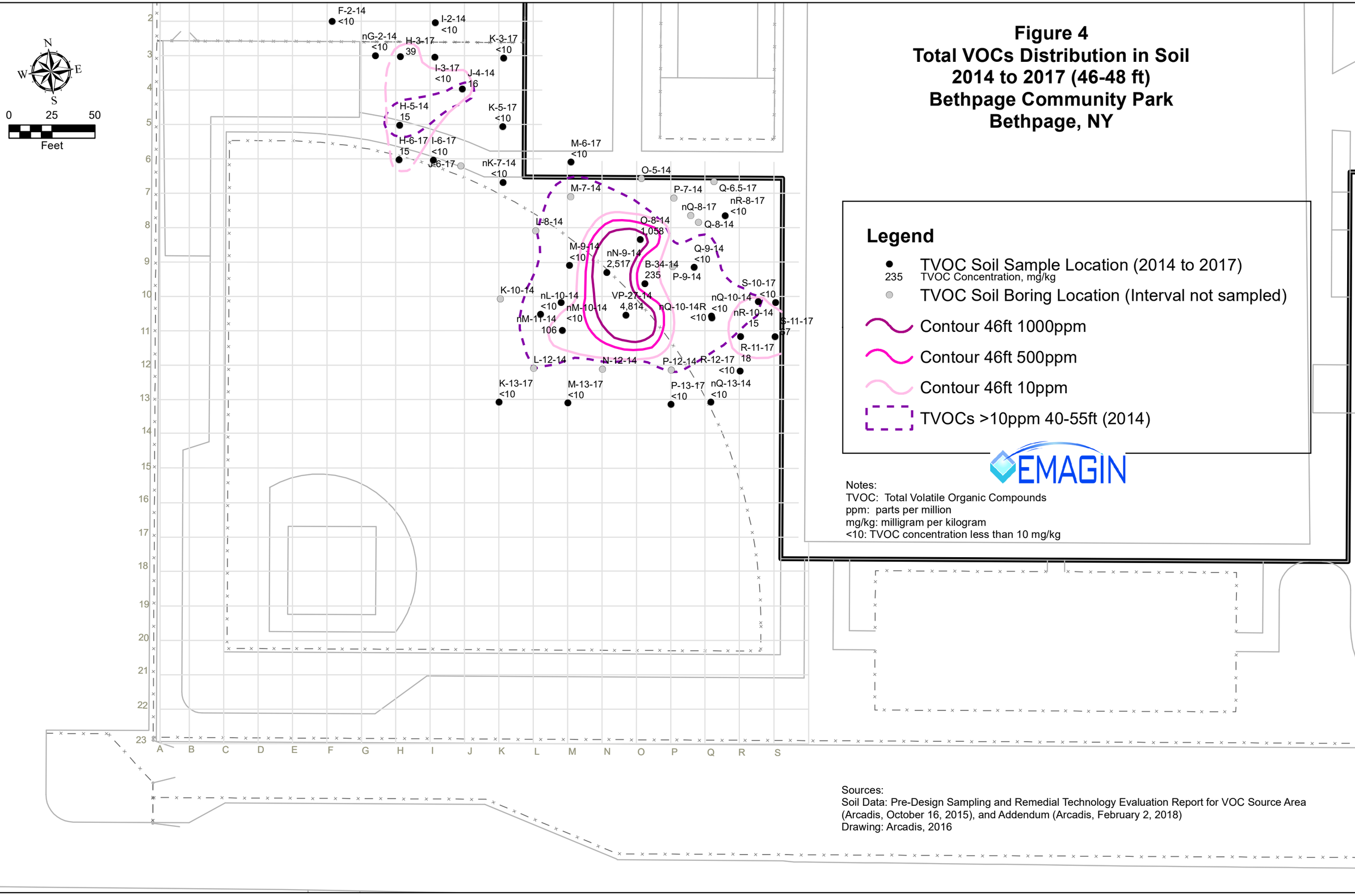
EMAGIN

Notes:
TVOC: Total Volatile Organic Compounds
ppm: parts per million
mg/kg: milligram per kilogram
<10: TVOC concentration less than 10 mg/kg

Sources:
Soil Data: Pre-Design Sampling and Remedial Technology Evaluation Report for VOC Source Area (Arcadis, October 16, 2015), and Addendum (Arcadis, February 2, 2018)
Drawing: Arcadis, 2016

O:\Projects\7AS301_Bethpage\GIS_Projects\2018\2018_TVOC_Soil_Plume_Update\Area 1 - TVOC Soil Plume Delineation_2018 (44-46 ft) (rev2 KCB 1-2018).mxd

Figure 4
Total VOCs Distribution in Soil
2014 to 2017 (46-48 ft)
Bethpage Community Park
Bethpage, NY



Legend

- TVOC Soil Sample Location (2014 to 2017)
- 235 TVOC Concentration, mg/kg
- TVOC Soil Boring Location (Interval not sampled)
- Contour 46ft 1000ppm
- Contour 46ft 500ppm
- Contour 46ft 10ppm
- TVOCs >10ppm 40-55ft (2014)

EMAGIN

Notes:
TVOC: Total Volatile Organic Compounds
ppm: parts per million
mg/kg: milligram per kilogram
<10: TVOC concentration less than 10 mg/kg

Sources:
Soil Data: Pre-Design Sampling and Remedial Technology Evaluation Report for VOC Source Area (Arcadis, October 16, 2015), and Addendum (Arcadis, February 2, 2018)
Drawing: Arcadis, 2016

O:\Projects\7AS301_Bethpage\GIS_Projects\2018\2018_TVOC_Soil_Plume_Update\Area 1 - TVOC Soil Plume Delineation_2018 (46-48 ft) (rev2 KCB 1-2018).mxd

Figure 5
Total VOCs Distribution in Soil
2014 to 2017 (48-50 ft)
Bethpage Community Park
Bethpage, NY

N
W E
S
0 25 50
Feet

F-2-14
I-2-14
nG-2-14 <10
H-3-17 <10
K-3-17 <10
J-4-14
H-5-14
H-6-17 <10
I-6-17 42
J-6-17 <10
nK-7-14 <10
M-6-17 <10
O-5-14 <10
Q-6.5-17 <10
M-7-14 <10
P-7-14 <10
nQ-8-17 <10
nR-8-17 46
L-8-14 <10
O-8-14 265
Q-8-14 <10
nS-8-17 48
M-9-14 <10
Q-9-14 <10
B-34-14 521
nN-9-14 84
P-9-14 236
K-10-14 <10
nL-10-14 <10
S-10-17 <10
nQ-10-14 <10
nM-10-14 <10
nQ-10-14R <10
nR-10-14 <10
nM-11-14 <10
VP-27-14 29
S-11-17 <10
L-12-14 <10
N-12-14 <10
P-12-14 <10
R-11-17 90
R-12-17 <10
K-13-17 <10
M-13-17 <10
P-13-17 <10
nQ-13-14 <10

A B C D E F G H I J K L M N O P Q R S
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23

Legend

- TVOC Soil Sample Location (2014 to 2017)
- 236 TVOC Concentration, mg/kg
- TVOC Soil Boring Location (Interval not sampled)
- Contour 48ft 500ppm
- Contour 48ft 10ppm
- TVOCs >10ppm 40-55ft (2014)

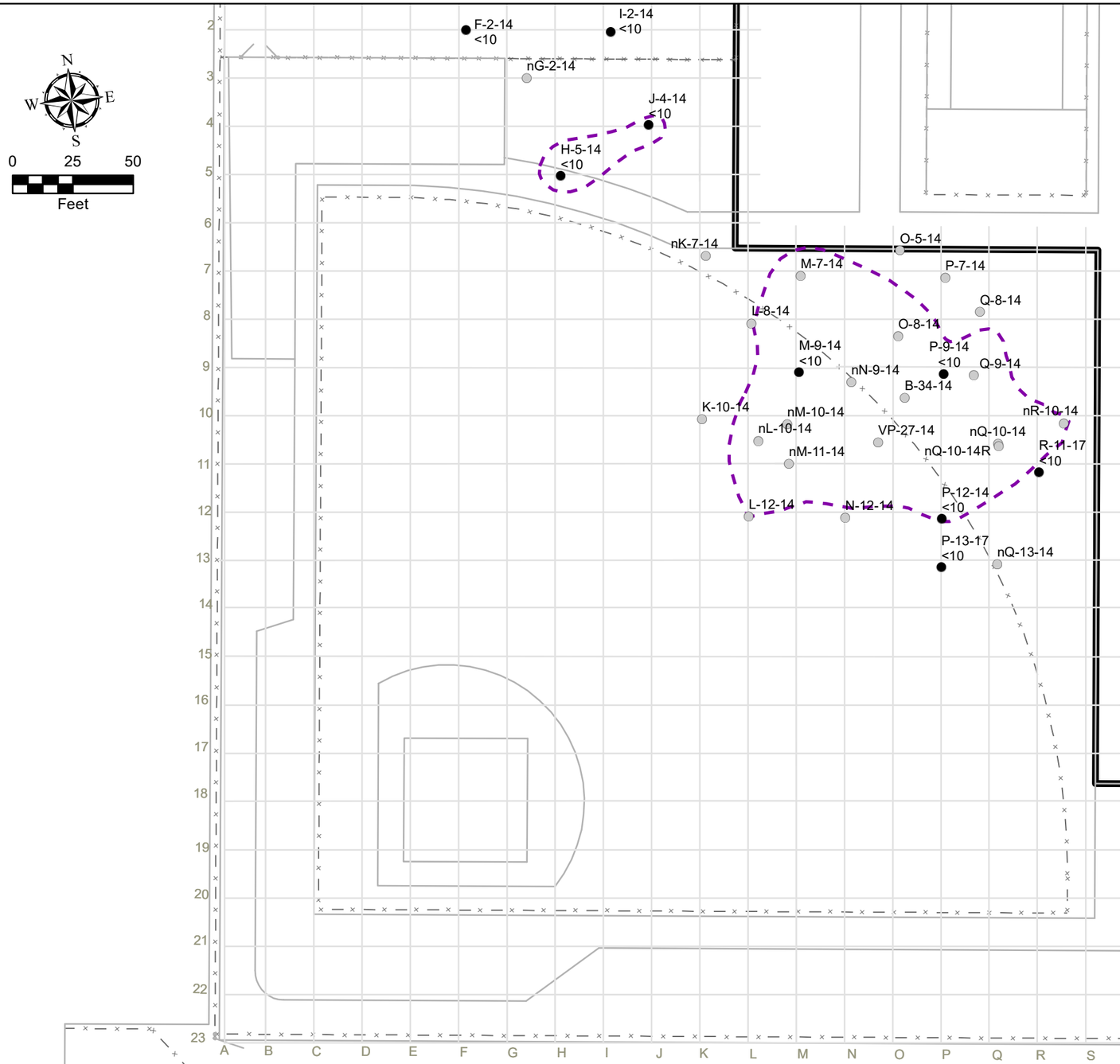
EMAGIN

Notes:
TVOC: Total Volatile Organic Compounds
ppm: parts per million
mg/kg: milligram per kilogram
<10: TVOC concentration less than 10 mg/kg

Sources:
Soil Data: Pre-Design Sampling and Remedial Technology Evaluation Report for VOC Source Area (Arcadis, October 16, 2015), and Addendum (Arcadis, February 2, 2018)
Drawing: Arcadis, 2016

O:\Projects\7AS301_Bethpage\GIS_Projects\2018\2018_TVOC_Soil_Plume_Update\Area 1 - TVOC Soil Plume Delineation_2018 (48-50 ft) (rev2 KCB 1-2018).mxd

Figure 6
Total VOCs Distribution in Soil
2014 to 2017 (50-52 ft)
Bethpage Community Park
Bethpage, NY



Legend

- TVOC Soil Sample Location (2014 to 2017)
- TVOC Soil Boring Location (Interval not sampled)
- TVOCs >10ppm 40-55ft (2014)

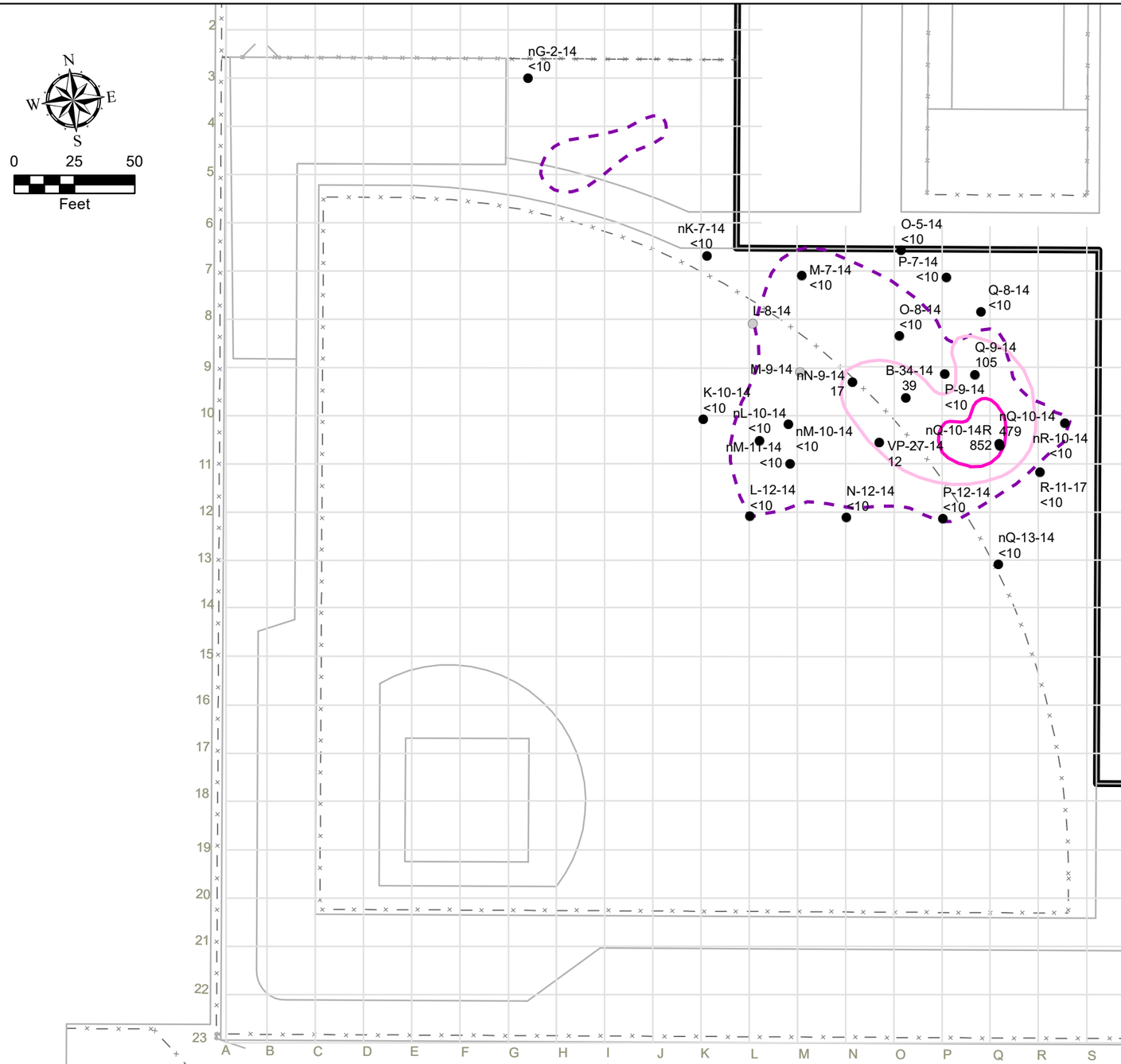
EMAGIN

Notes:
TVOC: Total Volatile Organic Compounds
ppm: parts per million
mg/kg: milligram per kilogram
<10: TVOC concentration less than 10 mg/kg

Sources:
Soil Data: Pre-Design Sampling and Remedial Technology Evaluation Report for VOC Source Area (Arcadis, October 16, 2015), and Addendum (Arcadis, February 2, 2018)
Drawing: Arcadis, 2016

O:\Projects\7AS301_Bethpage\GIS_Projects\2018\2018_TVOC_Soil_Plume_Update\Area 1 - TVOC Soil Plume Delineation_2018 (50-52 ft) (rev2 KCB 1-2018).mxd

Figure 7
Total VOCs Distribution in Soil
2014 to 2017 (52-54 ft)
Bethpage Community Park
Bethpage, NY



Legend

- TVOC Soil Sample Location (2014 to 2017)
- 852 TVOC Concentration, mg/kg
- TVOC Soil Boring Location (Interval not sampled)
- Contour 52ft 10ppm
- Contour 52ft 500ppm
- TVOCs >10ppm 40-55ft (2014)

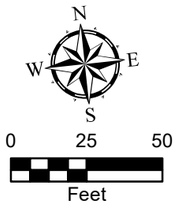
EMAGIN

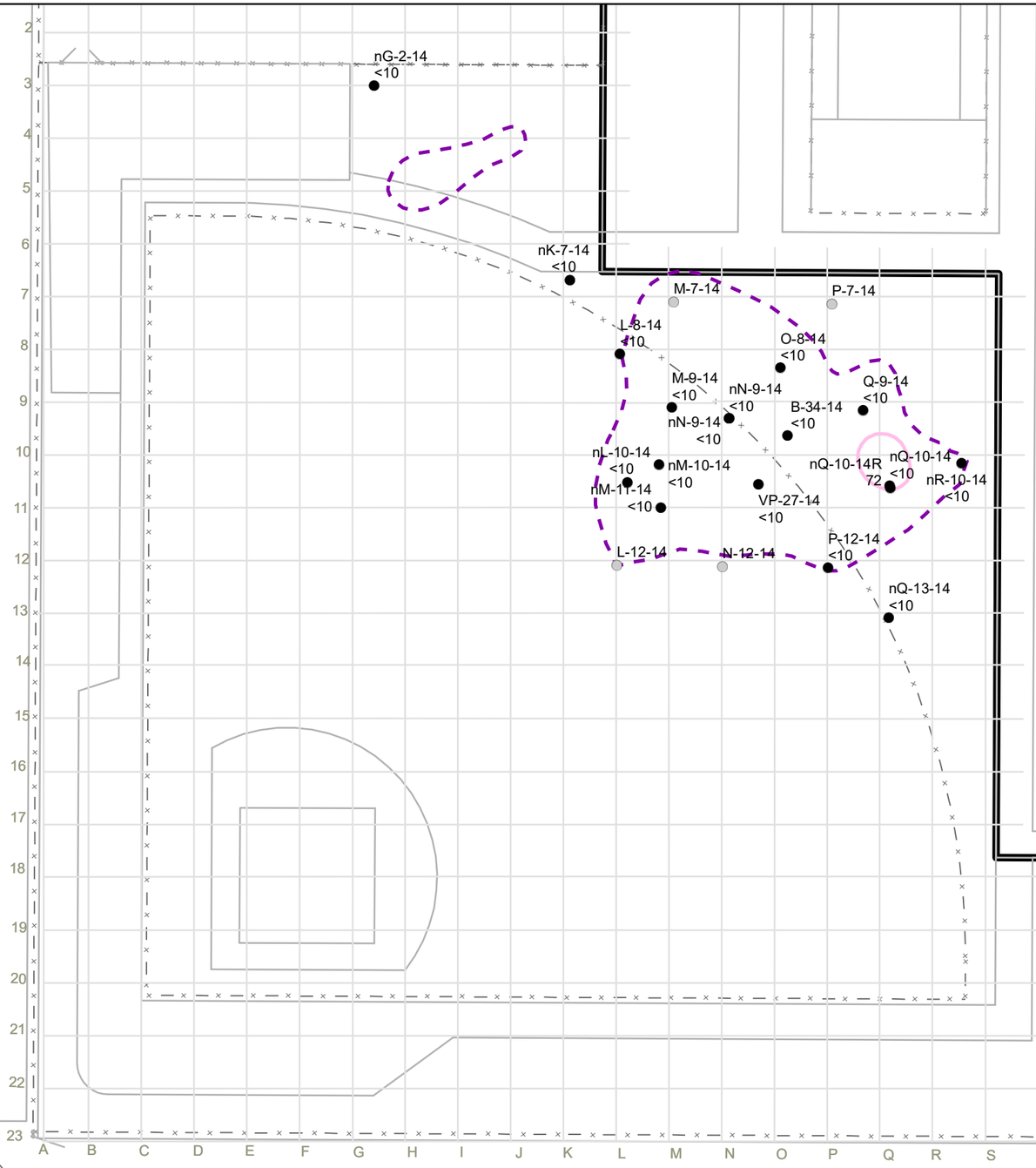
Notes:
TVOC: Total Volatile Organic Compounds
ppm: parts per million
mg/kg: milligram per kilogram
<10: TVOC concentration less than 10 mg/kg

Sources:
Soil Data: Pre-Design Sampling and Remedial Technology Evaluation Report for VOC Source Area (Arcadis, October 16, 2015), and Addendum (Arcadis, February 2, 2018)
Drawing: Arcadis, 2016

O:\Projects\7AS301_Bethpage\GIS_Projects\2018\2018_TVOC_Soil_Plume_Update\Area 1 - TVOC Soil Plume Delineation_2018 (52-54 ft) (rev2 KCB 1-2018).mxd

Figure 8
Total VOCs Distribution in Soil
2014 to 2017 (54-56 ft)
Bethpage Community Park
Bethpage, NY





Legend

- TVOC Soil Sample Location (2014 to 2017)
- 72 TVOC Concentration, mg/kg
- TVOC Soil Boring Location (Interval not sampled)
- Contour 54ft 10ppm
- TVOCs >10ppm 40-55ft (2014)

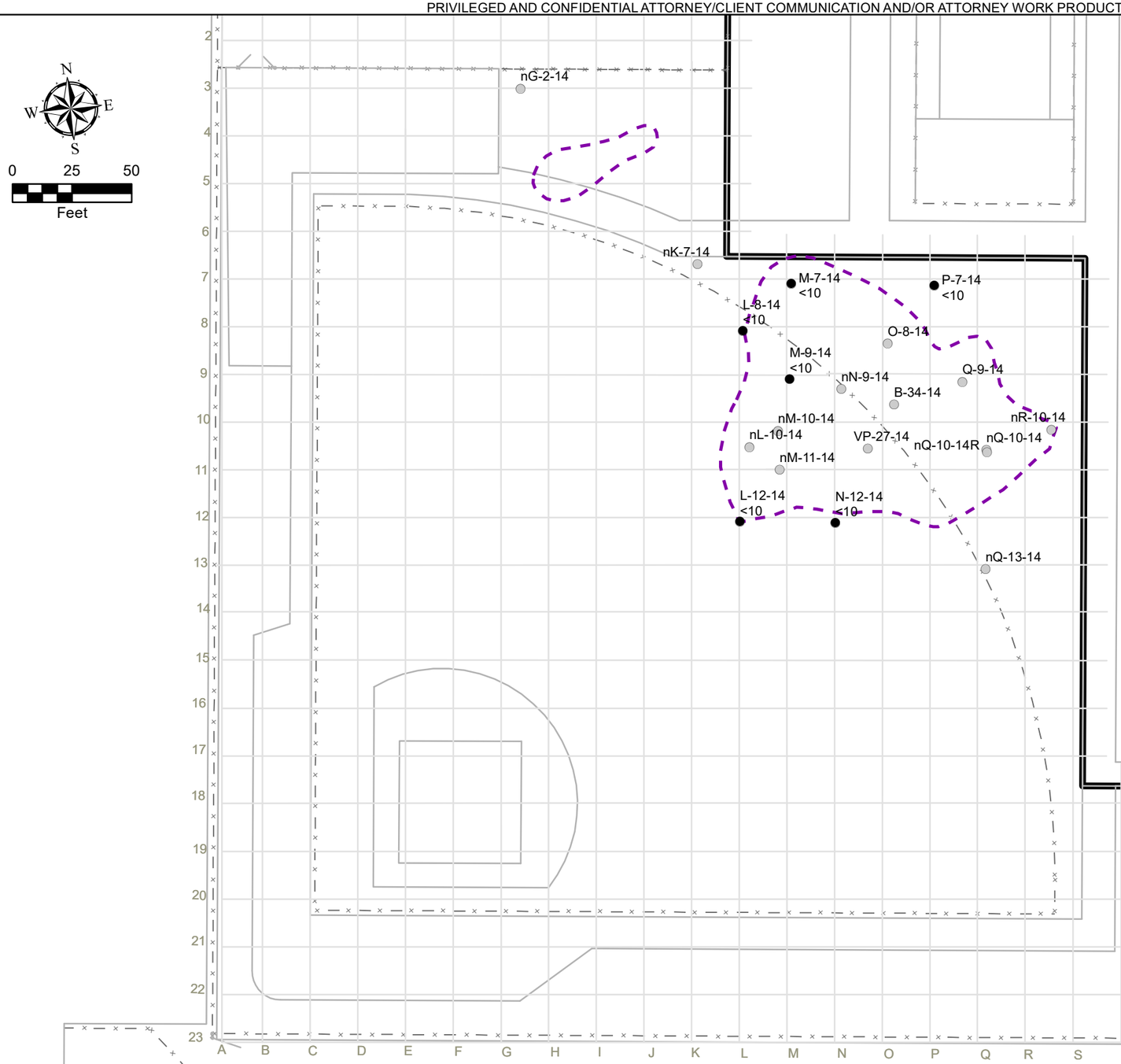
EMAGIN

Notes:
TVOC: Total Volatile Organic Compounds
ppm: parts per million
mg/kg: milligram per kilogram
<10: TVOC concentration less than 10 mg/kg

Sources:
Soil Data: Pre-Design Sampling and Remedial Technology Evaluation Report for VOC Source Area (Arcadis, October 16, 2015), and Addendum (Arcadis, February 2, 2018)
Drawing: Arcadis, 2016

O:\Projects\7AS301_Bethpage\GIS_Projects\2018\2018_TVOC_Soil_Plume_Update\Area 1 - TVOC Soil Plume Delineation_2018 (54-56 ft) (rev2 KCB 1-2018).mxd

Figure 9
Total VOCs Distribution in Soil
2014 to 2017 (56-58 ft)
Bethpage Community Park
Bethpage, NY



Legend

- TVOC Soil Sample Location (2014 to 2017)
- TVOC Soil Boring Location (Interval not sampled)
- TVOCs >10ppm 40-55ft (2014)

EMAGIN

Notes:
TVOC: Total Volatile Organic Compounds
ppm: parts per million
mg/kg: milligram per kilogram
<10: TVOC concentration less than 10 mg/kg

Sources:
Soil Data: Pre-Design Sampling and Remedial Technology Evaluation Report for VOC Source Area (Arcadis, October 16, 2015), and Addendum (Arcadis, February 2, 2018)
Drawing: Arcadis, 2016

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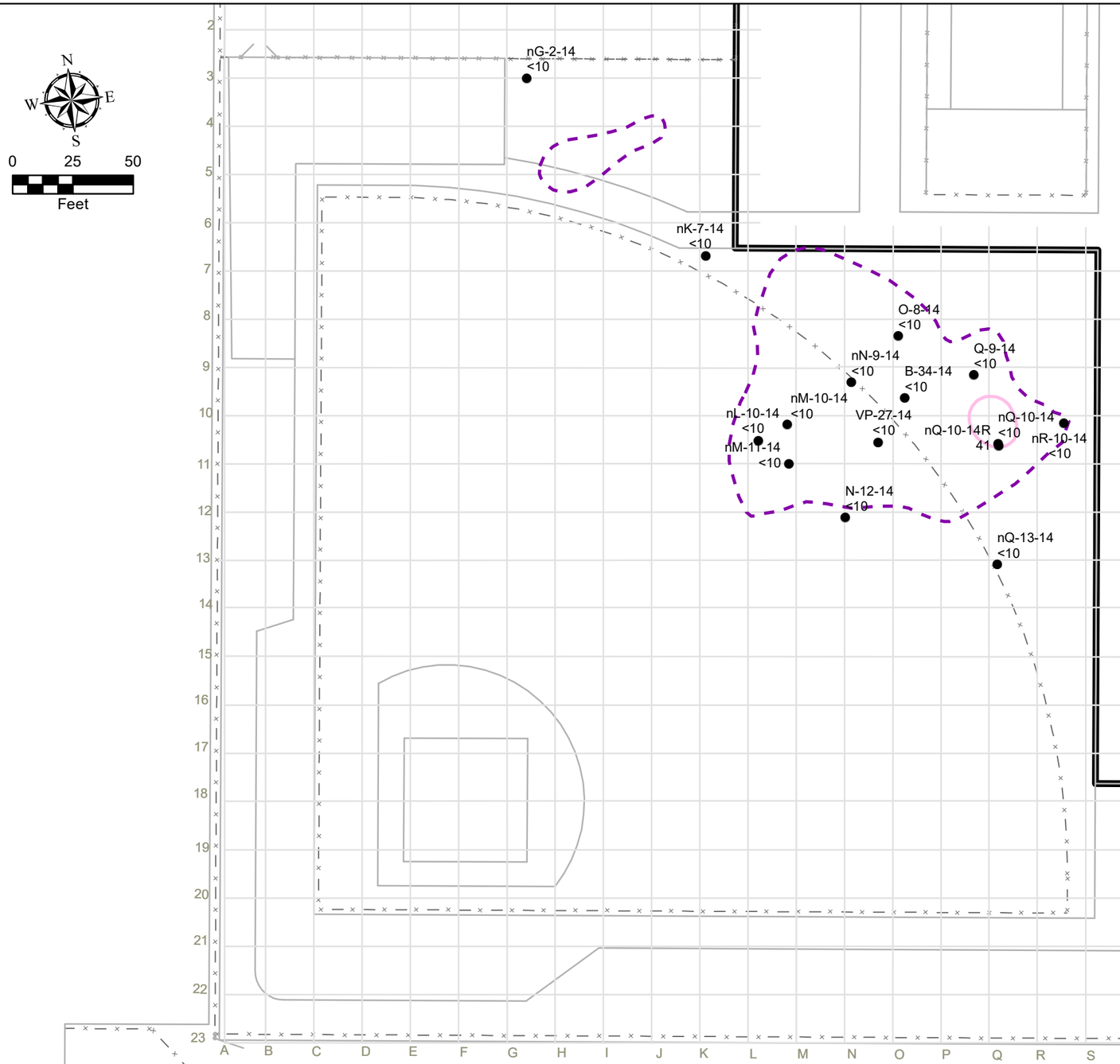
Figure 10
Total VOCs Distribution in Soil
2014 to 2017 (58-60 ft)
Bethpage Community Park
Bethpage, NY



Legend

- TVOC Soil Sample Location (2014 to 2017)
- 41 TVOC Concentration, mg/kg
- Contour 58ft 10ppm
- TVOCs >10ppm 40-55ft (2014)

EMAGIN

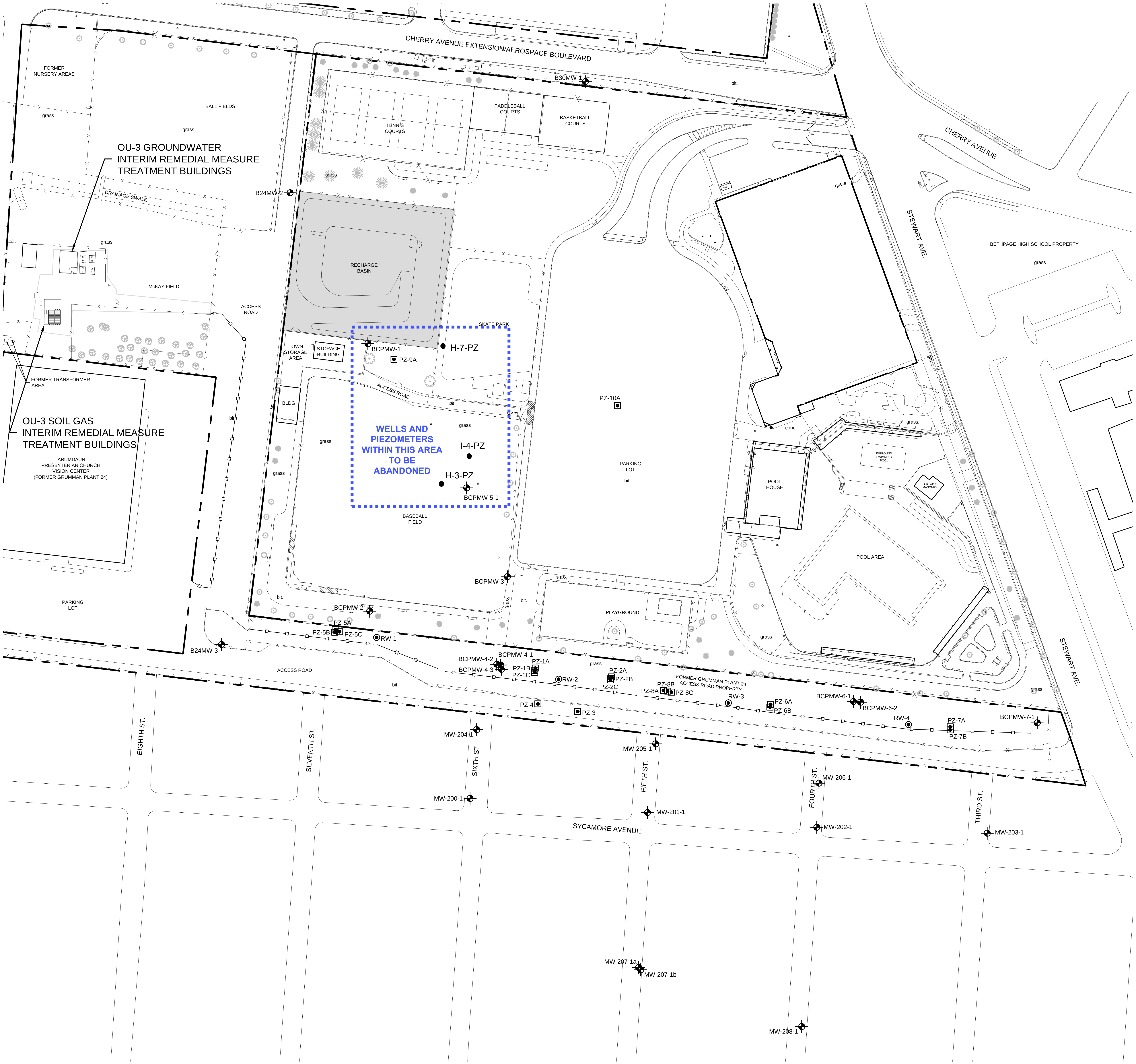
Notes:
TVOC: Total Volatile Organic Compounds
ppm: parts per million
mg/kg: milligram per kilogram
<10: TVOC concentration less than 10 mg/kg

Sources:
Soil Data: Pre-Design Sampling and Remedial Technology Evaluation Report for VOC Source Area (Arcadis, October 16, 2015), and Addendum (Arcadis, February 2, 2018)
Drawing: Arcadis, 2016

O:\Projects\7AS301_Bethpage\GIS_Projects\2018\2018_TVOC_Soil_Plume_Update\Area 1 - TVOC Soil Plume Delineation_2018 (58-60 ft) (rev2 KCB 1-2018).mxd

Attachment 2

Wells to be Abandoned



EXPLANATION:

- NORTHROP GRUMMAN PROPERTY LINE
- x — x FENCE
- BASIN
- bit. BITUMINOUS PAVEMENT
- MW-200-1 MONITORING WELL
- RW-2 REMEDIAL WELL
- PZ-2C PIEZOMETER

NOTES:

1. MONITORING WELLS, REMEDIAL WELLS, AND PIEZOMETERS SURVEYED TO NORTH AMERICAN DATUM (NAD) 83.
2. PARK FEATURES SHOWN WERE PRESENT PRIOR TO TOWN OF OYSTER BAY REDEVELOPMENT IN 2005.

0 100' 200'
APPROXIMATE SCALE IN FEET

BETHPAGE PARK GROUNDWATER CONTAINMENT SYSTEM
OPERABLE UNIT 3
(FORMER GRUMMAN SETTLING PONDS)
BETHPAGE, NEW YORK

GROUNDWATER MONITORING NETWORK PLAN

ARCADIS Design & Consultancy for natural and built assets

FIGURE
4

Attachment 3

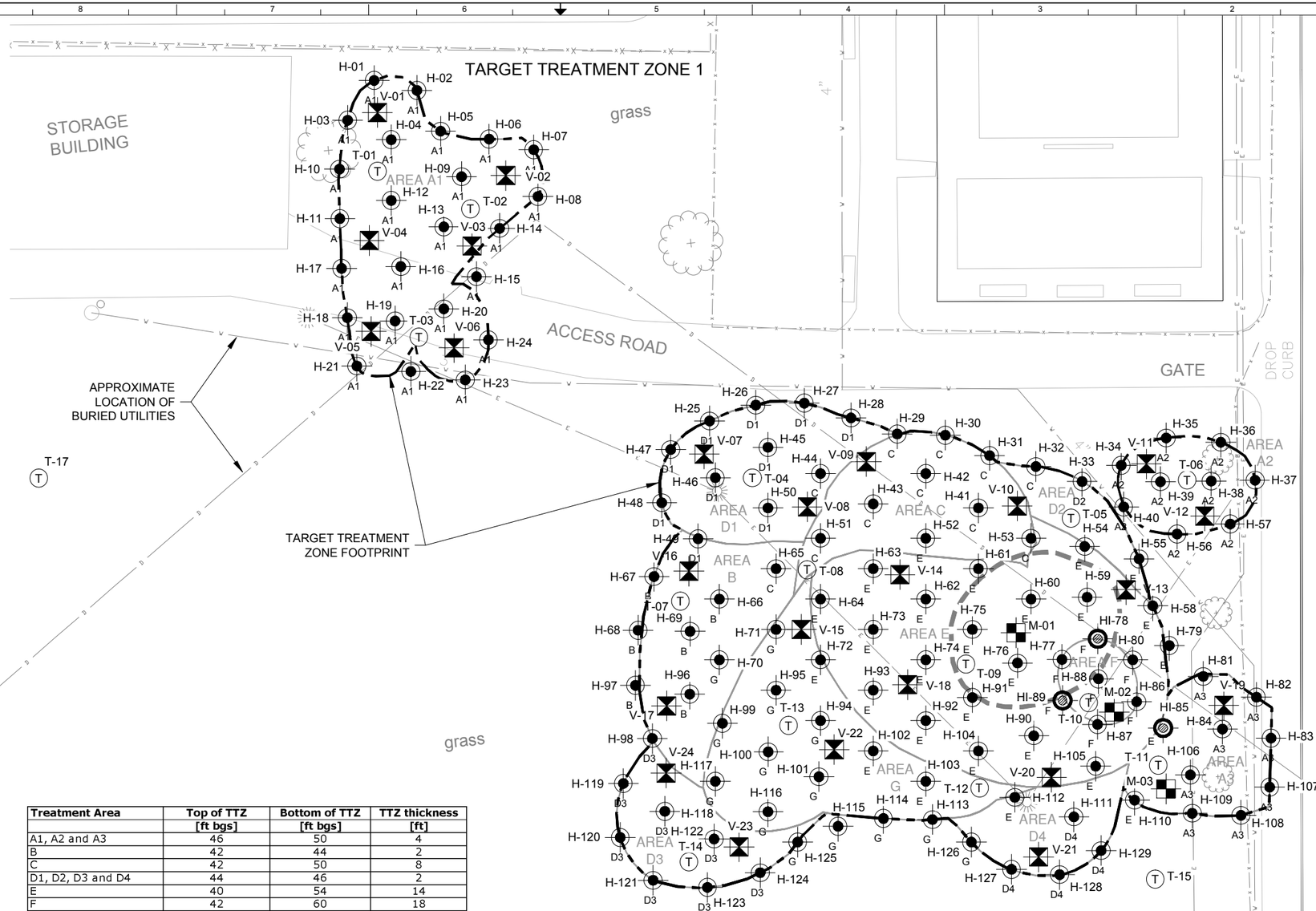
Treatment Point Layout and Construction Details

NOTES:

1. THE BASE MAP WAS DRAWN FROM A DRAWING ENTITLED, "SITE PLAN", PREPARED BY EMAGIN CREATIVE ENVIRONMENTAL SOLUTIONS AND WAS RECEIVED ELECTRONICALLY ON FEBRUARY 27, 2018 WITH AN ORIGINAL SCALE OF 1" = 100'.
2. BURIED UTILITIES WILL BE FIELD VERIFIED PRIOR TO PROJECT IMPLEMENTATION.
3. SELECT TEMPERATURE MONITORING POINTS MAY BE MODIFIED TO BE USED FOR PRESSURE MONITORING.

LEGEND:

- H / A1 — ISTD HEATER WELL LOCATIONS (H) (126 TOTAL) (A1) SUBAREA DESIGNATION
- HI — STEAM INJECTION HEATER (HI) (3 TOTAL)
- M — MULTIPHASE EXTRACTION WELLS (M) (3 TOTAL)
- V — VAPOR EXTRACTION WELLS (V) (24 TOTAL)
- T — TEMPERATURE MONITORING POINTS (TMP) (17 TOTAL)
- THERMAL TREATMENT ZONE (TTZ)
- TREATMENT SUBAREAS



Treatment Area	Top of TTZ [ft bgs]	Bottom of TTZ [ft bgs]	TTZ thickness [ft]
A1, A2 and A3	46	50	4
B	42	44	2
C	42	50	8
D1, D2, D3 and D4	44	46	2
E	40	54	14
F	42	60	18
G	40	48	8

TTZ: Target Treatment Zone

REV	DATE	DESCRIPTION		
A	3/9/2018	DESIGN SUBMITTAL	SG	RM
B	3/20/2018	CLIENT COMMENTS / DESIGN SUBMITTAL	SG	RM

SEAL

TERRATHERM
a Cascade Company
151 SUFFOLK LANE
GARDNER, MA 01440
(978) 730-1200
WWW.TERRATHERM.COM

IN-SITU THERMAL REMEDIATION
BETHPAGE, NEW YORK

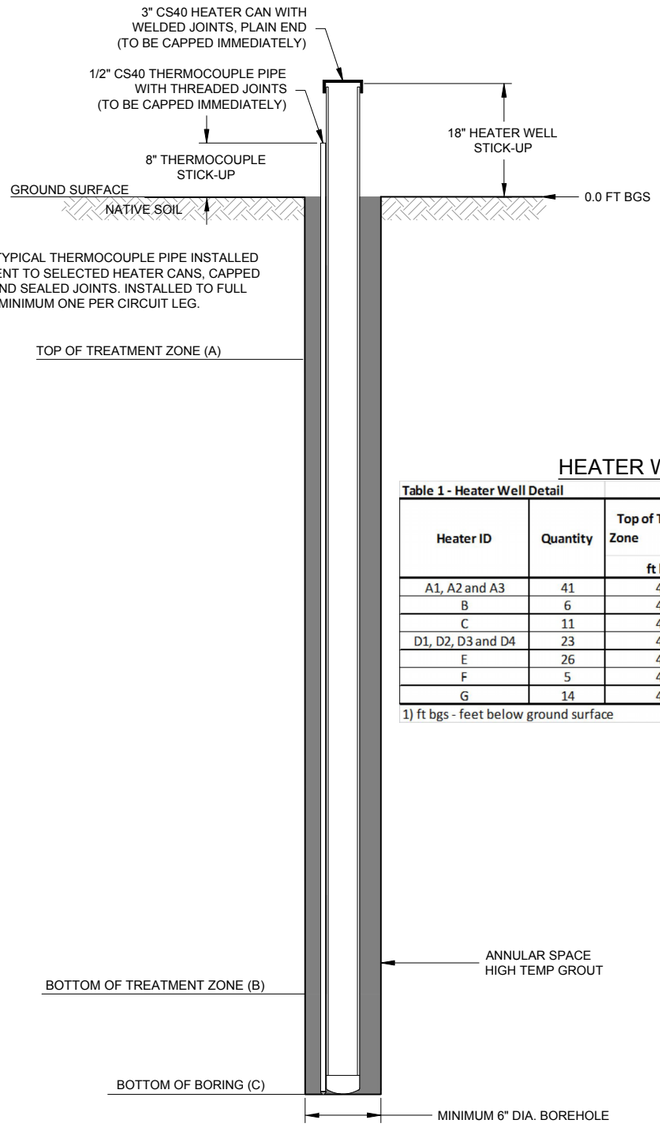
WELLFIELD LAYOUT

SCALE: AS SHOWN
SHEET SIZE: D
REV: B
REFERENCE NO.:
SHEET: 1 OF 1
DWG NO.: C102

PLOT DATE: 3/20/2018
FILE J:_ROJECTS\BETHPAGE, NY EMAGIN - NORTHRUP GRUMMAN OU3\01-DESIGN\001-DRAWINGS\S0001-IN-PROGRESS DWGS\C102-WELLFIELD LAYOUT.DWG
CTB FILE: TT-STANDARD.CTB

NOTES:

1. HEATERS WITHIN THE PCB AREA WILL BE INSULATED FROM ~18-33ft bgs
2. HEATERS WITHIN THE PCB AREA WILL BE INSTALLED USING ISOLATION CASING TO 30ft bgs TO AVOID CROSS CONTAMINATION OF DEEPER SOILS.



NOTE: TYPICAL THERMOCOUPLE PIPE INSTALLED ADJACENT TO SELECTED HEATER CANS, CAPPED ENDS AND SEALED JOINTS. INSTALLED TO FULL DEPTH MINIMUM ONE PER CIRCUIT LEG.

HEATER WELL SCHEDULE

Table 1 - Heater Well Detail

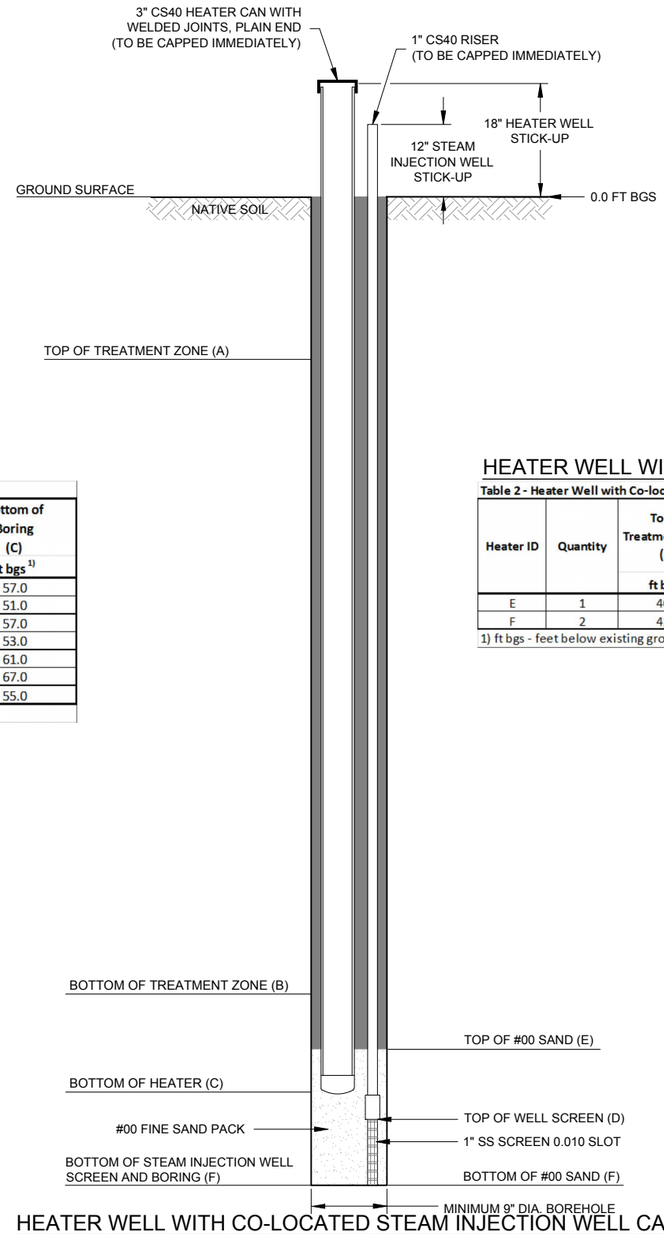
Heater ID	Quantity	Top of Treatment Zone (A)	Bottom of Treatment Zone (B)	Bottom of Boring (C)
		ft bgs [1]	ft bgs [1]	ft bgs [1]
A1, A2 and A3	41	46.0	50.0	57.0
B	6	42.0	44.0	51.0
C	11	42.0	50.0	57.0
D1, D2, D3 and D4	23	44.0	46.0	53.0
E	26	40.0	54.0	61.0
F	5	42.0	60.0	67.0
G	14	40.0	48.0	55.0

1) ft bgs - feet below existing ground surface

HEATER CAN TYPICAL DETAIL (H)

QTY (SEE TABLE 1) @ 3" CS40 PIPE

NOT TO SCALE



HEATER WELL WITH CO-LOCATED STEAM INJECTION WELL SCHEDULE

Table 2 - Heater Well with Co-located Steam Injection Well Detail

Heater ID	Quantity	Top of Treatment Zone (A)	Bottom of Treatment Zone (B)	Bottom of Heater (C)	Top of SIW Well Screen (D)	Top of #00 Sand Pack (E)	Bottom of SIW Well Screen and Boring (F)
		ft bgs [1]	ft bgs [1]	ft bgs [1]	ft bgs [1]	ft bgs [1]	ft bgs [1]
E	1	40.0	54.0	59.0	65.0	63.0	67.0
F	2	42.0	60.0	65.0	65.0	63.0	67.0

1) ft bgs - feet below existing ground surface

HEATER WELL WITH CO-LOCATED STEAM INJECTION WELL CAN TYPICAL DETAIL (HI)

QTY (SEE TABLE 2) @ 1" CS40 PIPE, "F-D" L X 1" SS WELL SCREEN WITH WELDED END CAP, 0.010 SLOT
1" CS40 RISER PIPE, 3" CS40 PIPE

NOT TO SCALE

REV	DATE	CAD	EMG	AB	SG	DL	CLIENT COMMENTS / DESIGN SUBMITTAL	RM	PM
B	3/20/2018	RH	AB	SG					
A	3/9/2018	RH	AB	SG			90% DESIGN SUBMITTAL	RM	CM

DESCRIPTION

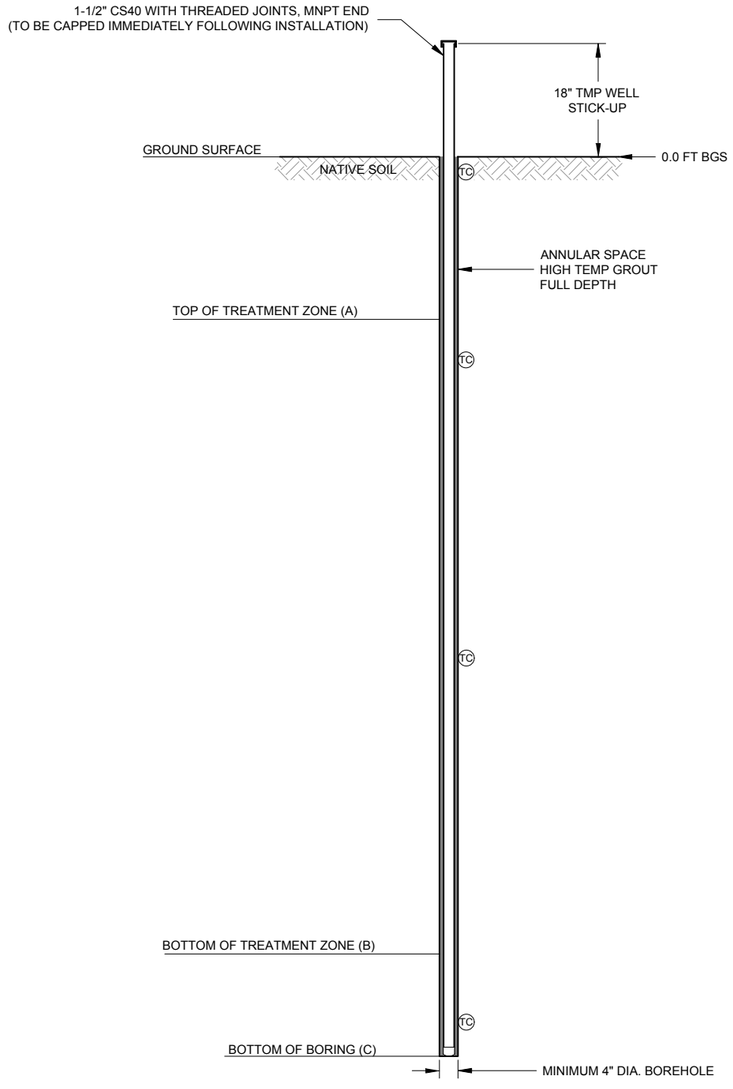
SEAL

TERRATHERM
a Cascade Company
151 SUFFOLK LANE
GARDNER, MA 01440
(978) 730-1200
WWW.TERRATHERM.COM

IN-SITU THERMAL REMEDIATION
BETHPAGE, NEW YORK

TYPICAL WELL CONSTRUCTION DETAILS

SCALE: NTS
SHEET SIZE: D
REV: B
REFERENCE NO.:
SHEET: 1 OF 3
DWG NO.: C103



TEMPERATURE MONITORING POINT (TMP)

QTY (SEE TABLE 3) 1-1/2" CS40 PIPE

TEMPERATURE MONITORING SENSOR DEPTHS
(SEE TABLE 3)
NOT TO SCALE

NOTES:

1. SELECT TEMPERATURE MONITORING POINTS MAY BE MODIFIED TO BE USED FOR PRESSURE MONITORING.

TEMPERATURE MONITORING POINT SCHEDULE

Table 3 - Temperature Monitoring Point Detail

TMP ID	Quantity	Top of Treatment Zone (A) ft bgs [1)]	Bottom of Treatment Zone (B) ft bgs [1)]	Bottom of Boring (C) ft bgs [1)]	Temperature Sensor Locations ft bgs [1)]
A1, A2 and A3	5	46.0	50.0	51.0	10'; 20'; 30'; 35'; 40'; 45'; 47'; 49'
B	1	42.0	44.0	45.0	10'; 20'; 30'; 35'; 40'; 43'
C	1	42.0	50.0	51.0	10'; 20'; 30'; 35'; 40'; 43'; 45'; 49'
D1, D2, D3 and D4	3	44.0	46.0	47.0	10'; 20'; 30'; 35'; 40'; 45'
E	1	40.0	54.0	55.0	10'; 20'; 30'; 35'; 40'; 45'; 50'; 53'
F	1	42.0	60.0	66.0	5'; 10'; 15'; 20'; 25'; 30'; 35'; 40'; 45'; 50'; 55'; 60'; 65'
G	2	40.0	48.0	49.0	10'; 20'; 30'; 35'; 40'; 45'; 47'
Monitoring Zone	3	40.0	60.0	67.0	10'; 20'; 30'; 35'; 40'; 45'; 50'; 55'; 60'; 65'

1) ft bgs - feet below existing ground surface

REV	DATE	CAD	ENG	DL	DESCRIPTION
B	3/20/2018	RH	AB	SG	CLIENT COMMENTS / DESIGN SUBMITTAL
A	3/9/2018	RH	AB	SG	90% DESIGN SUBMITTAL

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IN-SITU THERMAL REMEDIATION
HOBOKEN, NEW JERSEY

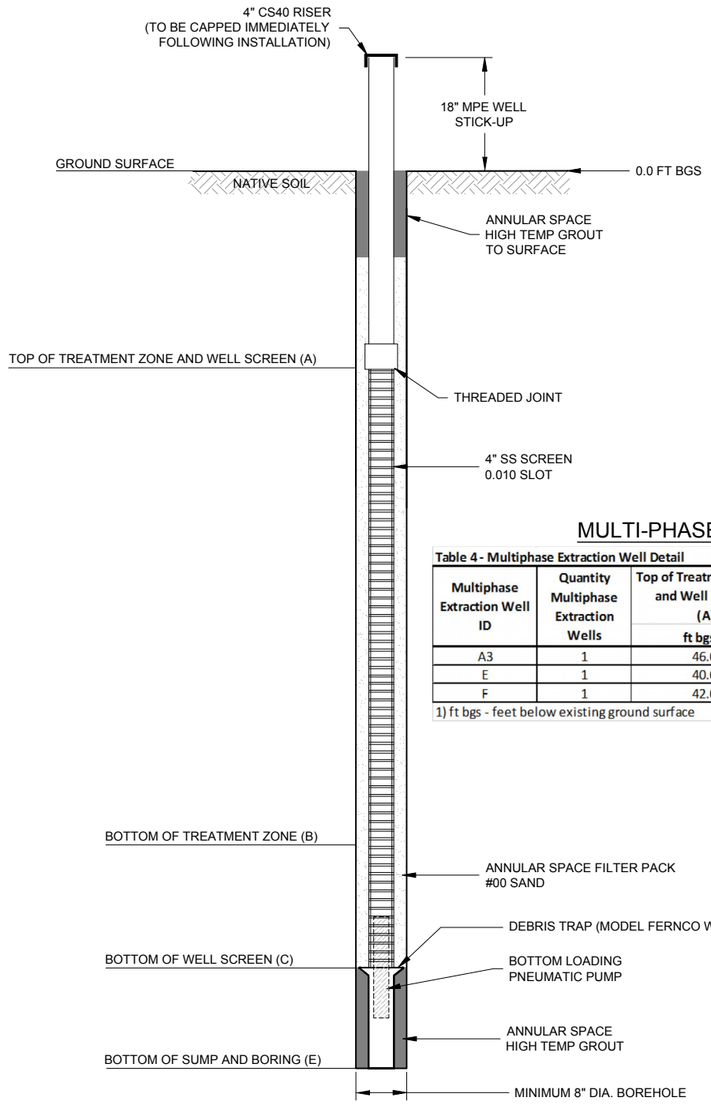
TYPICAL WELL CONSTRUCTION DETAILS

SCALE: NTS
SHEET SIZE: D
REV: B
REFERENCE NO.:
SHEET: 2 OF 3
DWG NO.: C103

PLOT DATE: 3/20/2018
FILE J:\...\PROJECTS\BETHPAGE_NY EMAGIN - NORTHROP GRUMMAN OU3\01-DESIGN\001-DRAWINGS\0001-IN-PROGRESS DWGS\C103-TYPICAL WELL DETAILS.DWG
CTB FILE: TT-STANDARD.CTB

NOTES:

1. WELLS WITHIN THE PCB AREA WILL BE INSULATED FROM ~18-33ft bgs
2. WELLS WITHIN THE PCB AREA WILL BE INSTALLED USING ISOLATION CASING TO 30 FT BGS TO AVOID CROSS CONTAMINATION WITH DEEPER SOILS.



MULTI-PHASE EXTRACTION WELL SCHEDULE

Table 4 - Multiphase Extraction Well Detail

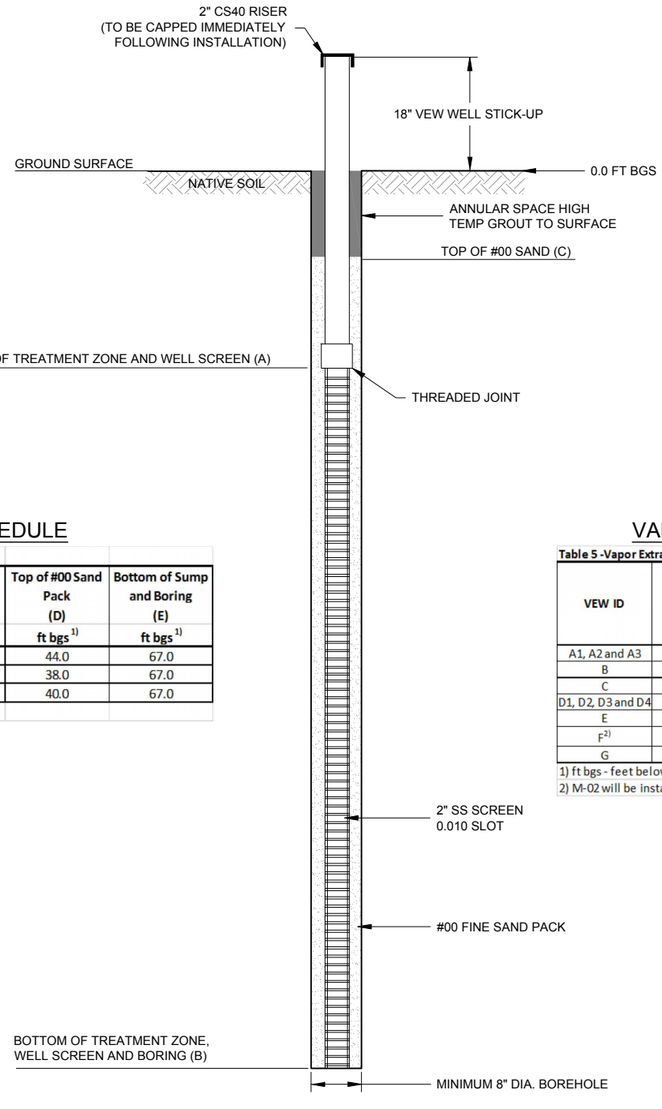
Multiphase Extraction Well ID	Quantity Multiphase Extraction Wells	Top of Treatment Zone and Well Screen (A)	Bottom of Treatment Zone (B)	Bottom of Well Screen (C)	Top of #00 Sand Pack (D)	Bottom of Sump and Boring (E)
		ft bgs [1)]	ft bgs [1)]	ft bgs [1)]	ft bgs [1)]	ft bgs [1)]
A3	1	46.0	50.0	65.0	44.0	67.0
E	1	40.0	54.0	65.0	38.0	67.0
F	1	42.0	60.0	65.0	40.0	67.0

1) ft bgs - feet below existing ground surface

MULTIPHASE EXTRACTION WELL (MPE)

QTY (SEE TABLE 4) "C-A" L X 4" SS WELL SCREEN, 0.010 SLOT
4" CS40 RISER PIPE

NOT TO SCALE



VAPOR EXTRACTION WELL SCHEDULE

Table 5 -Vapor Extraction Well Detail

VEW ID	Quantity	Top of Treatment Zone and Well Screen (A)	Bottom of Treatment Zone, Screen and Boring (B)	Top of #00 Sand Pack (C)
		ft bgs [1)]	ft bgs [1)]	ft bgs [1)]
A1, A2 and A3	9	46.0	50.0	44.0
B	2	42.0	44.0	40.0
C	2	42.0	50.0	40.0
D1, D2, D3 and D4	5	44.0	46.0	42.0
E	4	40.0	54.0	38.0
F [2)]	0	42.0	60.0	40.0
G	2	40.0	48.0	38.0

1) ft bgs - feet below existing ground surface
2) M-02 will be installed to provide both pneumatic and hydraulic control in Subarea F.

VAPOR EXTRACTION WELL (V)

QTY (SEE TABLE 3) (B-A) L X 2" SS WELL SCREEN, 0.010 SLOT
2" CS40 RISER PIPE

NOT TO SCALE

REV	DATE	CAD	EMG	AB	SG	DESCRIPTION
B	3/20/2018	RH	RH	AB	SG	CLIENT COMMENTS / DESIGN SUBMITTAL
A	3/9/2018				SG	90% DESIGN SUBMITTAL

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IN-SITU THERMAL REMEDIATION
HOBOKEN, NEW JERSEY

TYPICAL WELL CONSTRUCTION DETAILS

SCALE: NTS
SHEET SIZE: D
REV: B
REFERENCE NO.:
SHEET: 3 OF 3
DWG NO.: C103

PLOT DATE: 3/20/2018
FILE J:\...\PROJECTS\BETHPAGE, NY EMAGIN - NORTHRUP GRUMMAN OU3\01-DESIGN\001-DRAWINGS\0001-IN-PROGRESS DWG\SIC103-TYPICAL WELL DETAILS.DWG
CTB FILE: TT-STANDARD.CTB