



INTERIM LAND USE CONTROL IMPLEMENTATION PLAN



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION KENNEDY SPACE CENTER BREVARD COUNTY, FLORIDA

FACILITY: Launch Complex 39A
Solid Waste Management Unit 008

CONTAMINANTS: Volatile Organic Compounds in Groundwater; Arsenic, Barium, Copper, Lead, Nickel, PAHs, PCBs, Thallium, and TRPH in Soil;

CONTROL: Prohibit Groundwater Use and Residential Access to Soil

PURPOSE OF LAND USE CONTROL IMPLEMENTATION PLAN

This Interim Land Use Control Implementation Plan (LUCIP) has been prepared to inform current and potential future users of Launch Complex 39A (LC39A) of institutional controls that have been implemented at the site¹. Although most areas associated with LC39A do not pose current unacceptable risks to human health and the environment, a few areas that exceed Florida Department of Environmental Protection (FDEP) Industrial Soil Cleanup Target Levels (SCTLs) have been identified. Institutional land use controls (LUCs) are necessary to prohibit groundwater use and industrial and residential exposure to soils. Areas with Industrial SCTL exceedances are planned to be addressed through a series of interim measures (IM). Controls will include periodic inspection, condition certification, and agency notification.

WHY LAND USE CONTROLS ARE NEEDED

During the Resource Conservation and

Recovery Act (RCRA) Facility Investigation (RFI) conducted from March 1998 to May 2000 and RFI Addendum in 2003, soil, sediment, groundwater, and surface water were investigated. Contaminants of concern (COCs) were identified in each media. As a result of the elevated concentrations of polychlorinated biphenyls (PCBs) and polynuclear aromatic hydrocarbons (PAHs) detected in soils, a soil removal to FDEP Industrial SCTLs was conducted as part of an IM in 2000. A site-wide groundwater and soil investigation was conducted between December 2011 and October 2012 to further evaluate the contaminants resulting from former launch activities. The investigation confirmed the presence of COCs in groundwater and soil at concentrations greater than FDEP Groundwater Cleanup Target Levels (GCTLs) and SCTLs.

SITE DESCRIPTION

SWMU 008 includes a launch pad that was designed to support the Apollo program and later modified for space shuttle launch operations in 1975. Launches were conducted from 1981 to 2011. Acids, bases,

¹ This Interim LUCIP summarizes institutional controls regarding the NASA LC39A site. For detailed information on the site, consult the LC39A administrative file, which is available for review by contacting the KSC Environmental Assurance Branch at telephone number (321) 867-8402.

fuel compounds, grease, metals, oils, solvents, and oxidizer compounds have been used at the site. The quantities and locations of spills of any chemicals at the site are unknown. Stormwater runoff generated from the launch pad drains to various manmade grassed swales that radiate from the pad. The grassed swales discharge via culverts to a swale that runs parallel to the perimeter access road and discharges to receiving waters on the periphery of the site. The primary contaminants detected at LC39A are as follows: trichloroethene (TCE), cis-1,2-dichloroethene (cDCE), and vinyl chloride in groundwater; and arsenic, barium, copper, lead, nickel, PAHs, PCBs, thallium, and total recoverable petroleum hydrocarbon (TRPH) in soil.

SITE LOCATION

LC39A includes a launch pad surrounded by a grassy area located on the eastern end of Crawler Way (Figure 1). LC39A is located in Section 3, Township 22S, Range 37E, as shown on the 7.5-minute False Cape topographic quadrangle map. The groundwater and soil use control areas covered by the Interim LUCIP are provided on Figures 2 through 22. Coordinates of the corners of the groundwater LUC area are provided on Figure 3 and the soil LUC areas are provided on Figures 4 through 22. Coordinates are provided in the State Plane Coordinate System, North American Datum (NAD) of 1983, Florida East, meters.

SITE CONTAMINATION AND CONTROL

Groundwater at the site contains volatile organic compounds (VOCs) at concentrations

greater than FDEP GCTLs. Soils exceed the Industrial SCTLs for PAHs and PCBs and the following contaminated soil areas identified on Figure 2 have one or more COCs with exceedances of residential SCTLs:

Area	COC(s)	Area	COC(s)
1	Arsenic / Barium	23	PCBs
2	Barium	24	PCBs*
3	Barium	25	PCBs
4	Barium	26	Barium
5	PAHs ⁽¹⁾	27	Barium / Lead / PCBs*
6	PCBs	28	PAHs ⁽¹⁾
7	PCBs	29	PAHs ⁽¹⁾
8	PCBs*	30	Copper
9	Copper	31	PCBs
10	PAHs ⁽¹⁾	32	PCBs
11	Thallium	33	PCBs
12	Arsenic	34	PAHs ⁽¹⁾
13	PAHs ⁽¹⁾	35	PCBs* / PAHs ⁽¹⁾ / Barium / Lead
14	TPH	36	PAHs ⁽¹⁾ / PCBs / Barium
15	PCBs	37	Copper
16	Nickel	38	PAHs* ⁽¹⁾ / PCBs / Copper
17	Barium	39	PAHs* / PCBs / Copper
18	Arsenic	40	Barium
19	PCBs*	41	Barium
20	Eliminated	42	PAHs ⁽¹⁾ / PCBs / Copper
21	Eliminated	43	PCBs
22	Copper / PCBs		

* - Indicates exceedance of Industrial SCTL.

1 - PAHs present in soil are carcinogenic PAHs [evaluated together as benzo(a)pyrene equivalents (BaPEqs)].

The past, current, and projected future land use of LC39A is industrial in nature. Since groundwater exceeds GCTLs and soil exceeds residential and Industrial SCTLs, LUCs are required to prohibit the use of groundwater and to prohibit residential land use at the site until cleanup levels are achieved. The current and projected land use of LC39A does not include the use of site groundwater; therefore, there are no current or projected exposures to contaminants in groundwater. Indoor air quality shall also be evaluated prior to any construction within the groundwater use control area.

DECISION DOCUMENT

The Kennedy Space Center (KSC) Remediation Team determined that interim institutional controls should be implemented at LC39A. The interim institutional controls are temporary while investigation, interim measures, and corrective measures are in progress.

IMPLEMENTATION

Institutional controls will be implemented by the KSC Environmental Assurance Branch in accordance with their RCRA permit and a Land Use Control Assurance Plan included in a Memorandum of Agreement (MOA)² between NASA, FDEP, and United States Environmental Protection Agency (EPA),

² By separate MOA effective February 23, 2001, with the EPA and FDEP, KSC, on behalf of NASA, agreed to implement Center-wide, certain periodic site inspections, condition certification, and agency notification procedures designed to ensure the maintenance by Center personnel of any site-specific LUCs deemed necessary for future protection of human health and the environment. A fundamental premise underlying execution of that agreement was that through the Center's substantial good faith compliance with the procedures called for herein, reasonable assurances would be provided to EPA and FDEP as to the permanency of those remedies which included the use of specific LUCs.

Although the terms and conditions of the MOA are not specifically incorporated or made enforceable herein by reference, it is understood and agreed by NASA KSC, EPA and FDEP that the contemplated permanence of the remedy reflected herein shall be dependent upon the Center's substantial good faith compliance with the specific LUC maintenance commitments reflected herein. Should such compliance not occur or should the MOA be terminated, it is understood that the protectiveness of the remedy concurred in may be reconsidered and that additional measures may need to be taken to adequately ensure necessary future protection of human health and the environment.

effective February 23, 2001. Property transfer (if implemented in the future) will be conducted in accordance with Section X of the MOA.

KSC's Environmental Assurance Branch will provide KSC's Master Planning Office with survey coordinates of the LUC areas. Restrictions will specify limitations on development and reuse for the area for as long as LUCs are necessary to protect human health and the environment.

MONITORING

Quarterly inspections to monitor that the LUCs specified herein are in place and operating and will be conducted by KSC's Environmental Assurance Branch. The inspections will verify that no groundwater use or residential and industrial exposure to site soil is occurring at the site.

REPORTING

KSC's Environmental Assurance Branch will submit annual reports to FDEP certifying retention of the implemented LUCs.

ENFORCEMENT

KSC's Environmental Assurance Branch will be responsible for stopping any activities at KSC that are not compliant with this Interim

LUCIP.

MAINTENANCE

The Interim LUCIP shall remain in place until a land use change is implemented or the concerns managed by the Interim LUCIP are mitigated, or until there is a discovery, based on analytical evidence, that scenarios managed by the Interim LUCIP are no longer a concern.

FIGURE 1 LOCATION OF KENNEDY SPACE CENTER AND SWMU 008
SWMU 008, KENNEDY SPACE CENTER, FLORIDA

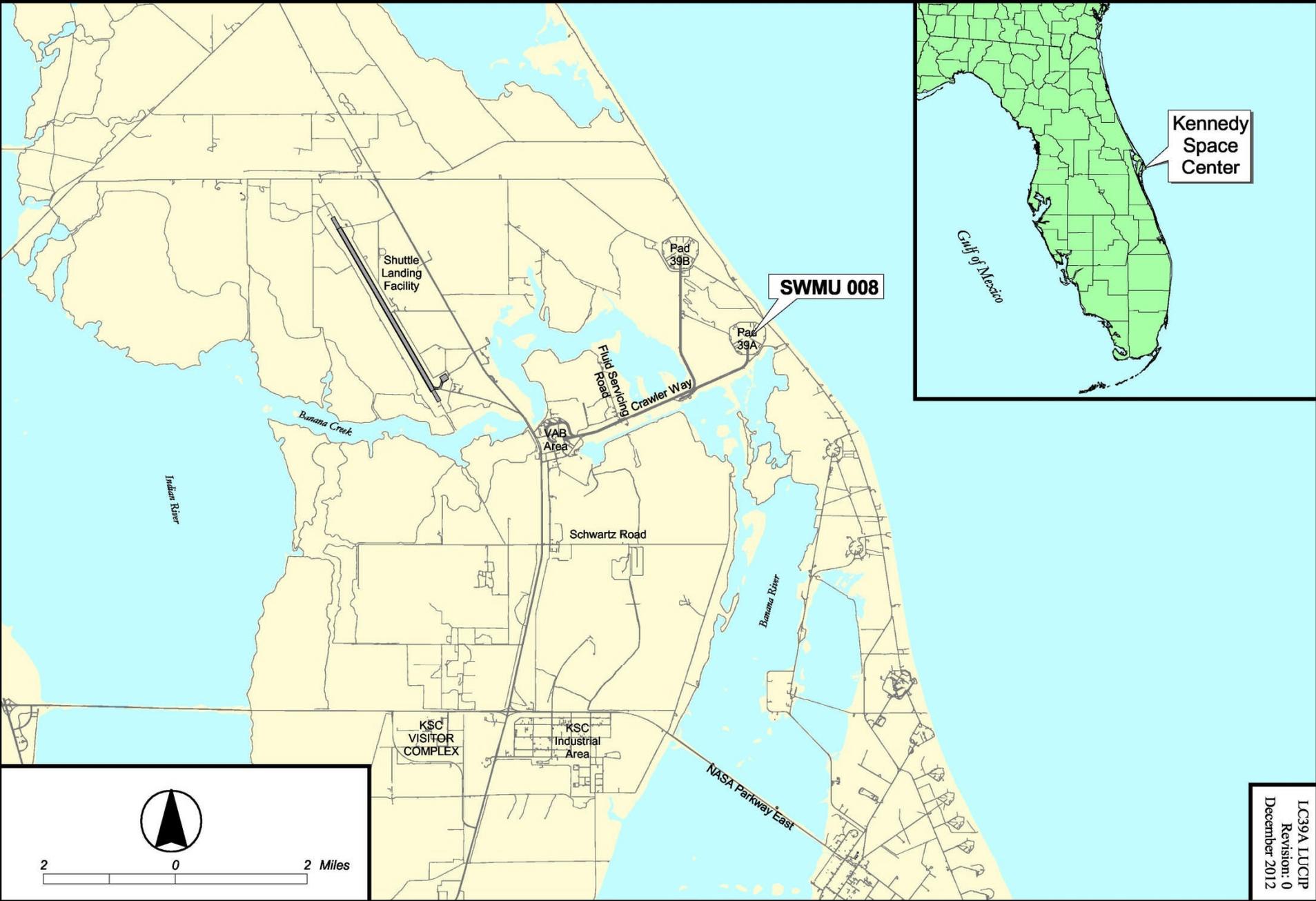
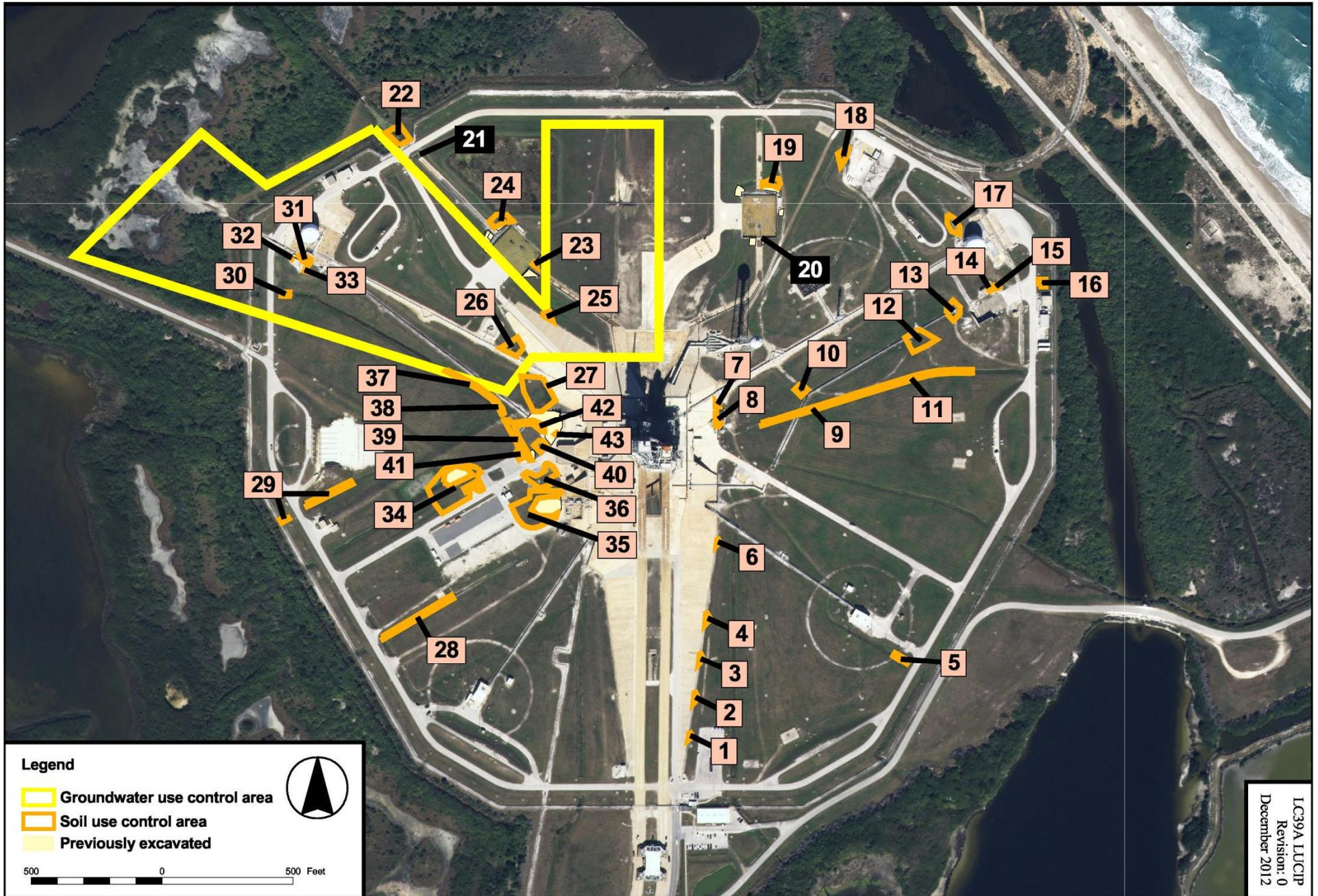


FIGURE 2 LAND USE CONTROL AREAS
 SWMU 008, KENNEDY SPACE CENTER, FLORIDA



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FIGURE 3 GROUNDWATER LAND USE CONTROL AREAS
SWMU 008, KENNEDY SPACE CENTER, FLORIDA

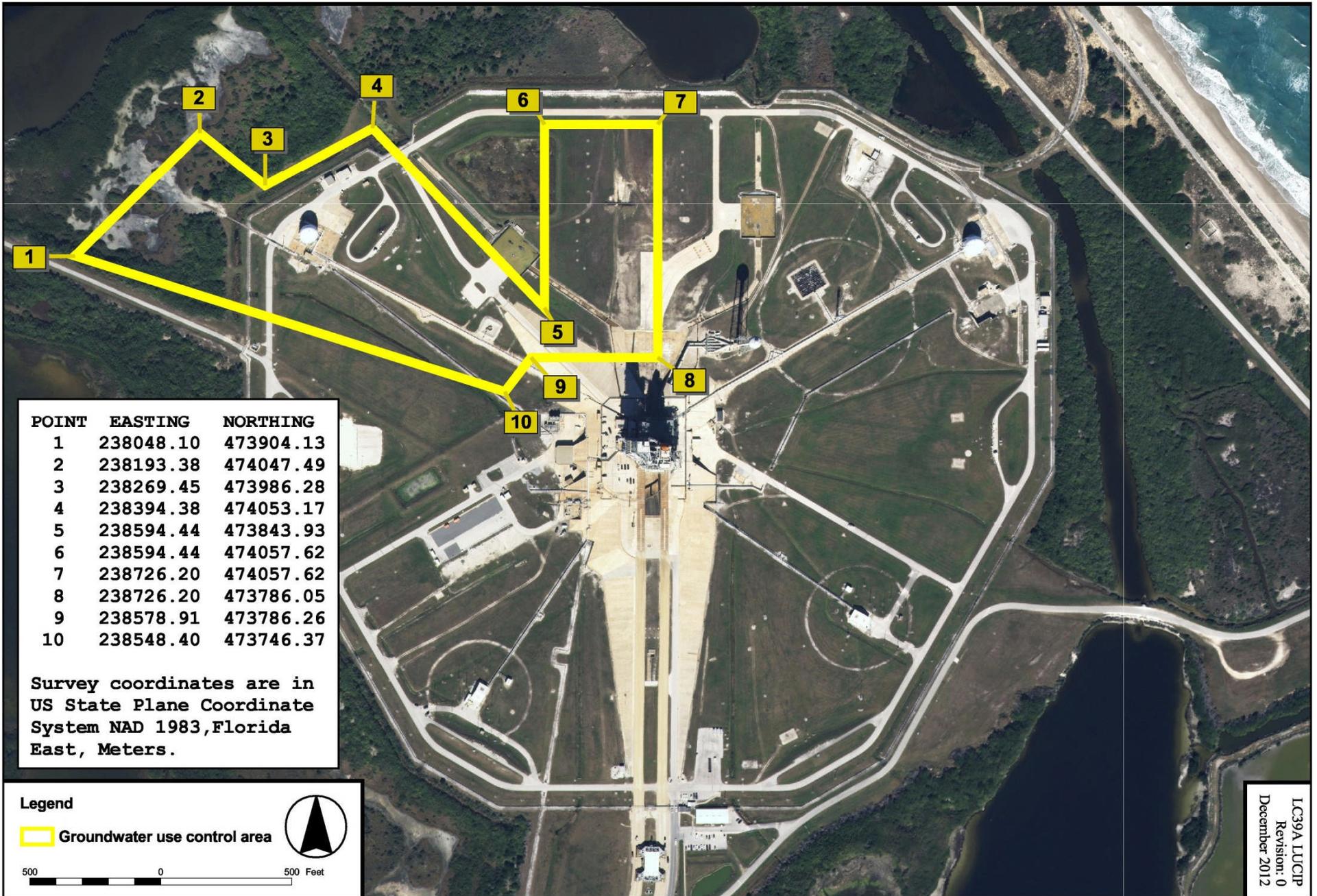
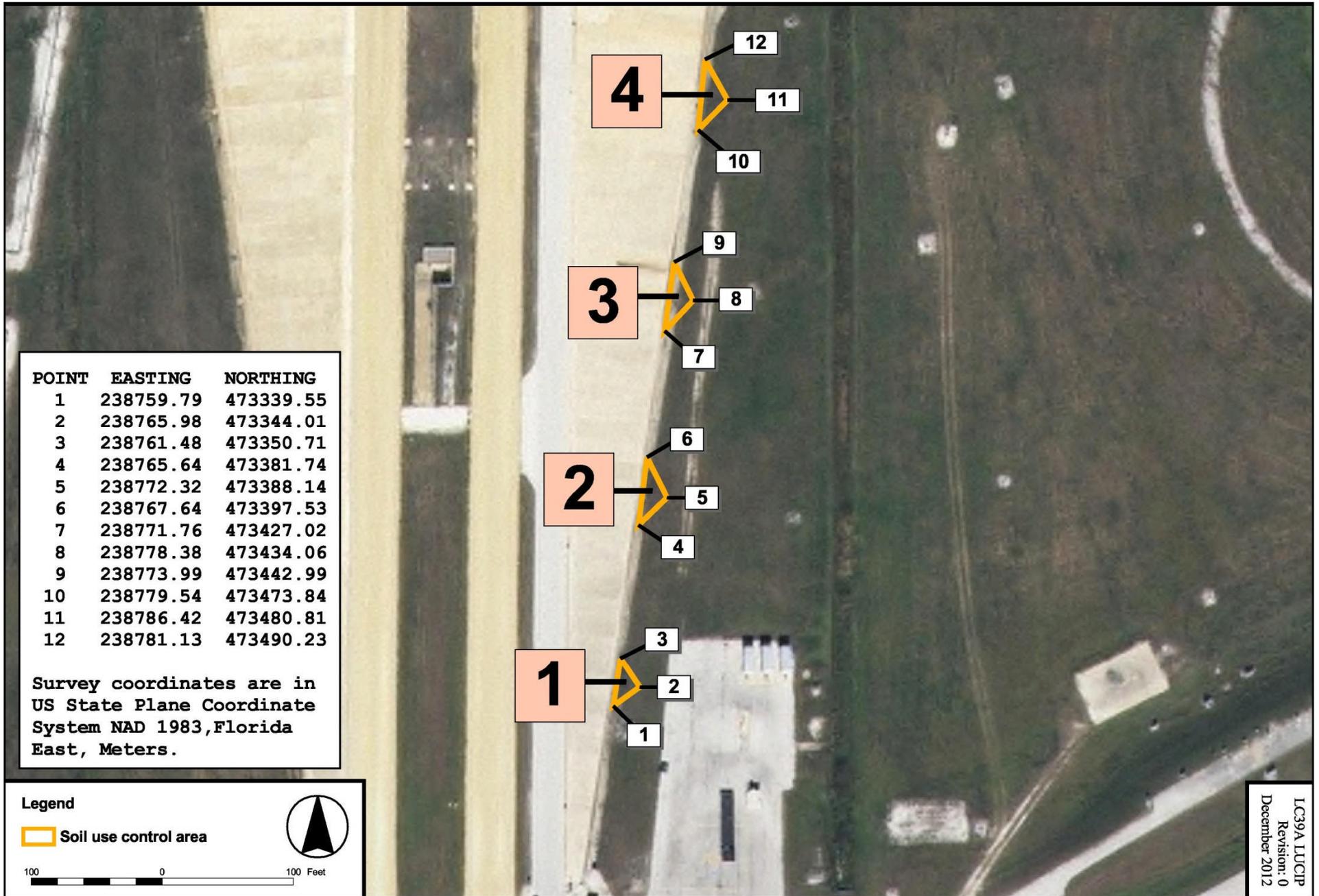


FIGURE 4 LAND USE CONTROL AREAS 1, 2, 3, AND 4
SWMU 008, KENNEDY SPACE CENTER, FLORIDA



POINT	EASTING	NORTHING
1	238759.79	473339.55
2	238765.98	473344.01
3	238761.48	473350.71
4	238765.64	473381.74
5	238772.32	473388.14
6	238767.64	473397.53
7	238771.76	473427.02
8	238778.38	473434.06
9	238773.99	473442.99
10	238779.54	473473.84
11	238786.42	473480.81
12	238781.13	473490.23

Survey coordinates are in
US State Plane Coordinate
System NAD 1983, Florida
East, Meters.

Legend

 Soil use control area



100 0 100 Feet

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FIGURE 5 LAND USE CONTROL AREA 5
 SWMU 008, KENNEDY SPACE CENTER, FLORIDA



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FIGURE 6 LAND USE CONTROL AREA 6
SWMU 008, KENNEDY SPACE CENTER, FLORIDA



FIGURE 7 LAND USE CONTROL AREAS 7 AND 8
 SWMU 008, KENNEDY SPACE CENTER, FLORIDA

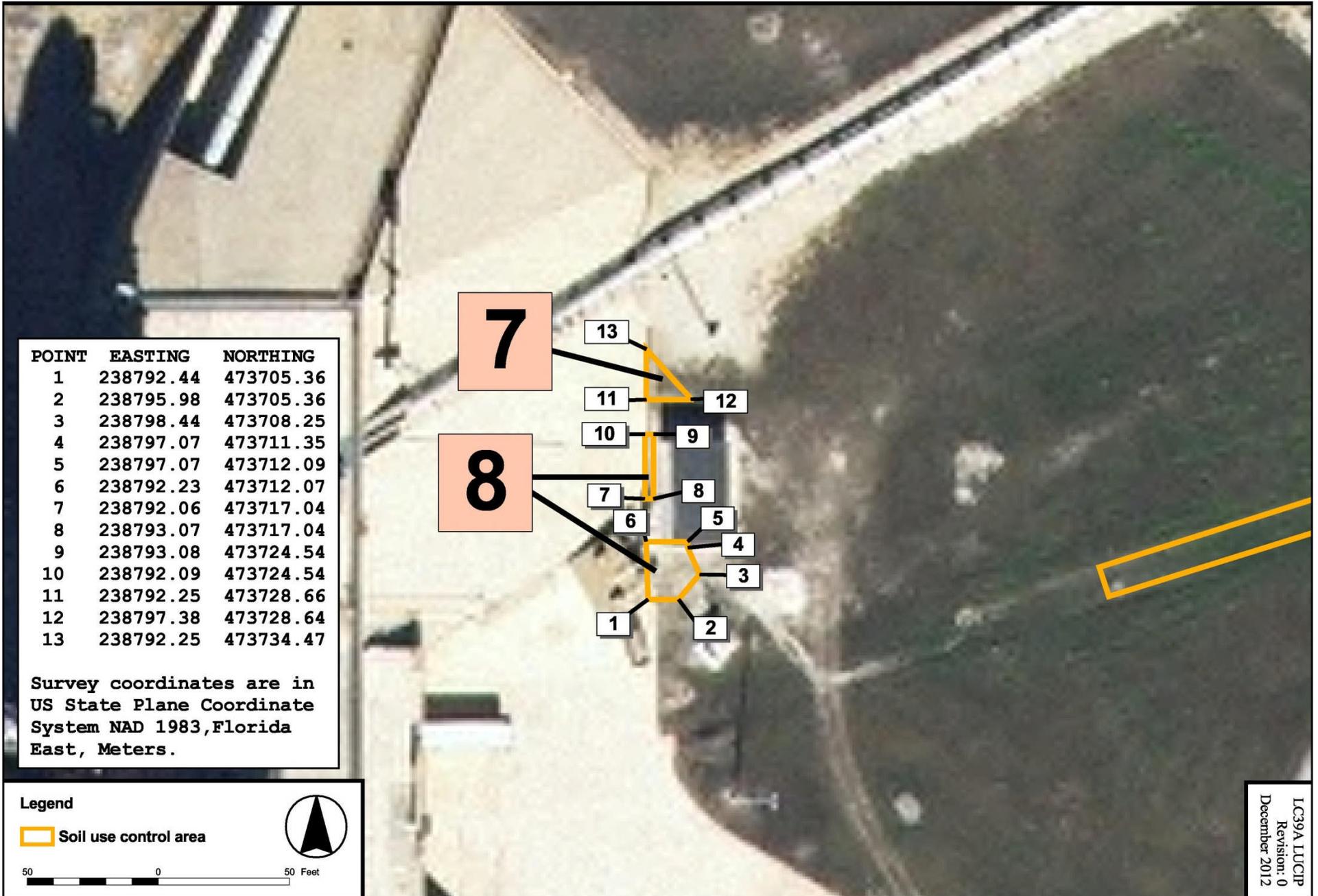
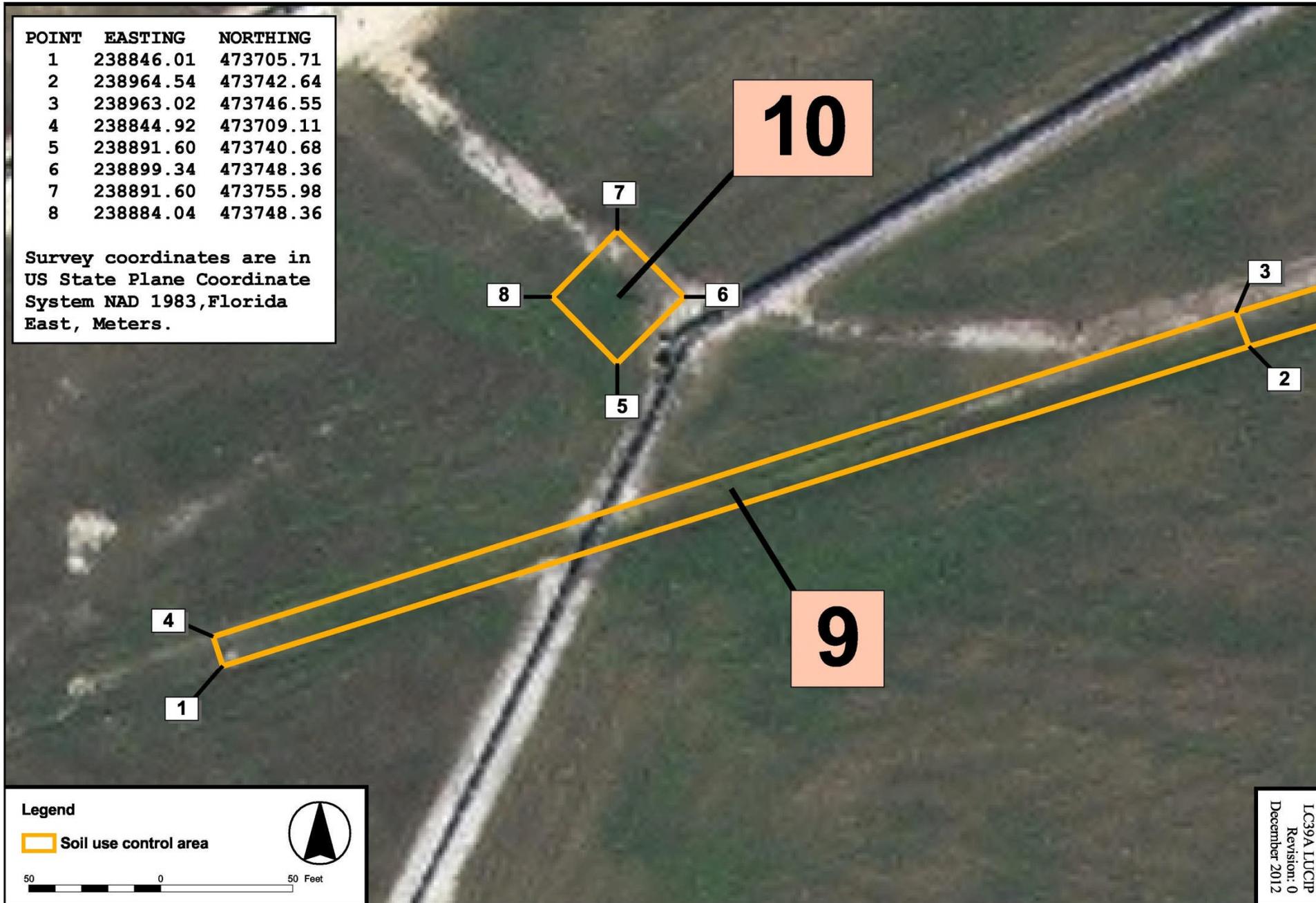


FIGURE 8 LAND USE CONTROL AREAS 9 AND 10
 SWMU 008, KENNEDY SPACE CENTER, FLORIDA

POINT	EASTING	NORTHING
1	238846.01	473705.71
2	238964.54	473742.64
3	238963.02	473746.55
4	238844.92	473709.11
5	238891.60	473740.68
6	238899.34	473748.36
7	238891.60	473755.98
8	238884.04	473748.36

Survey coordinates are in US State Plane Coordinate System NAD 1983, Florida East, Meters.



Legend

 Soil use control area



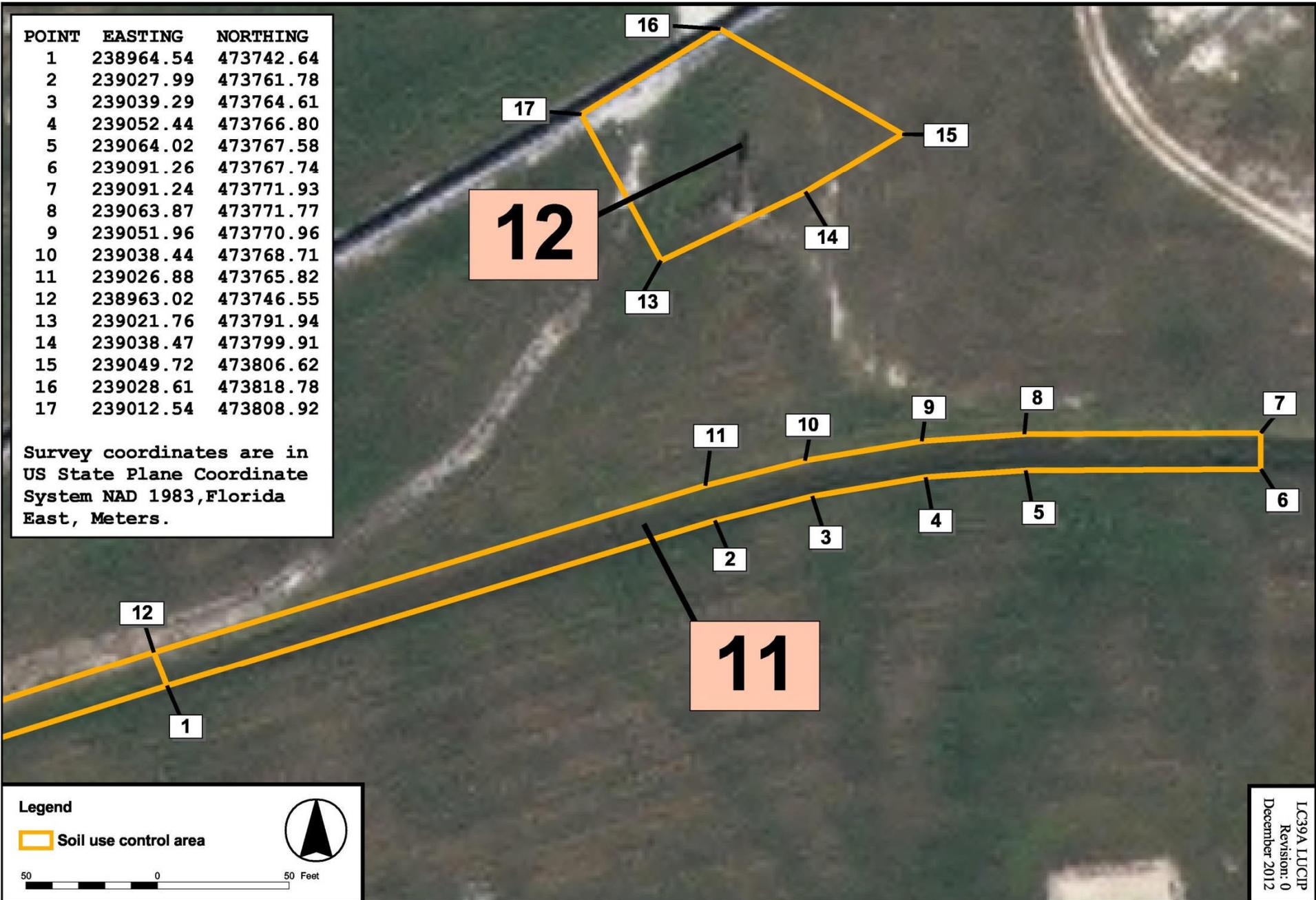
50 0 50 Feet

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FIGURE 9 LAND USE CONTROL AREAS 11 AND 12
 SWMU 008, KENNEDY SPACE CENTER, FLORIDA

POINT	EASTING	NORTHING
1	238964.54	473742.64
2	239027.99	473761.78
3	239039.29	473764.61
4	239052.44	473766.80
5	239064.02	473767.58
6	239091.26	473767.74
7	239091.24	473771.93
8	239063.87	473771.77
9	239051.96	473770.96
10	239038.44	473768.71
11	239026.88	473765.82
12	238963.02	473746.55
13	239021.76	473791.94
14	239038.47	473799.91
15	239049.72	473806.62
16	239028.61	473818.78
17	239012.54	473808.92

Survey coordinates are in US State Plane Coordinate System NAD 1983, Florida East, Meters.



Legend

 Soil use control area



50 0 50 Feet

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FIGURE 10 LAND USE CONTROL AREAS 13, 14, 15, AND 16
SWMU 008, KENNEDY SPACE CENTER, FLORIDA

POINT	EASTING	NORTHING
1	239068.74	473828.78
2	239076.18	473836.57
3	239076.58	473844.26
4	239068.69	473851.85
5	239060.95	473843.96
6	239061.00	473836.67
7	239111.01	473862.88
8	239113.50	473864.31
9	239110.46	473869.33
10	239108.09	473867.95
11	239115.76	473864.86
12	239120.78	473865.97
13	239123.32	473867.46
14	239122.38	473869.17
15	239118.08	473871.93
16	239114.27	473866.63

Survey coordinates are in US State Plane Coordinate System NAD 1983, Florida East, Meters.

POINT	EASTING	NORTHING
17	239168.07	473868.53
18	239176.50	473868.53
19	239176.50	473876.96
20	239168.07	473876.96

Survey coordinates are in US State Plane Coordinate System NAD 1983, Florida East, Meters.

Legend

 Soil use control area

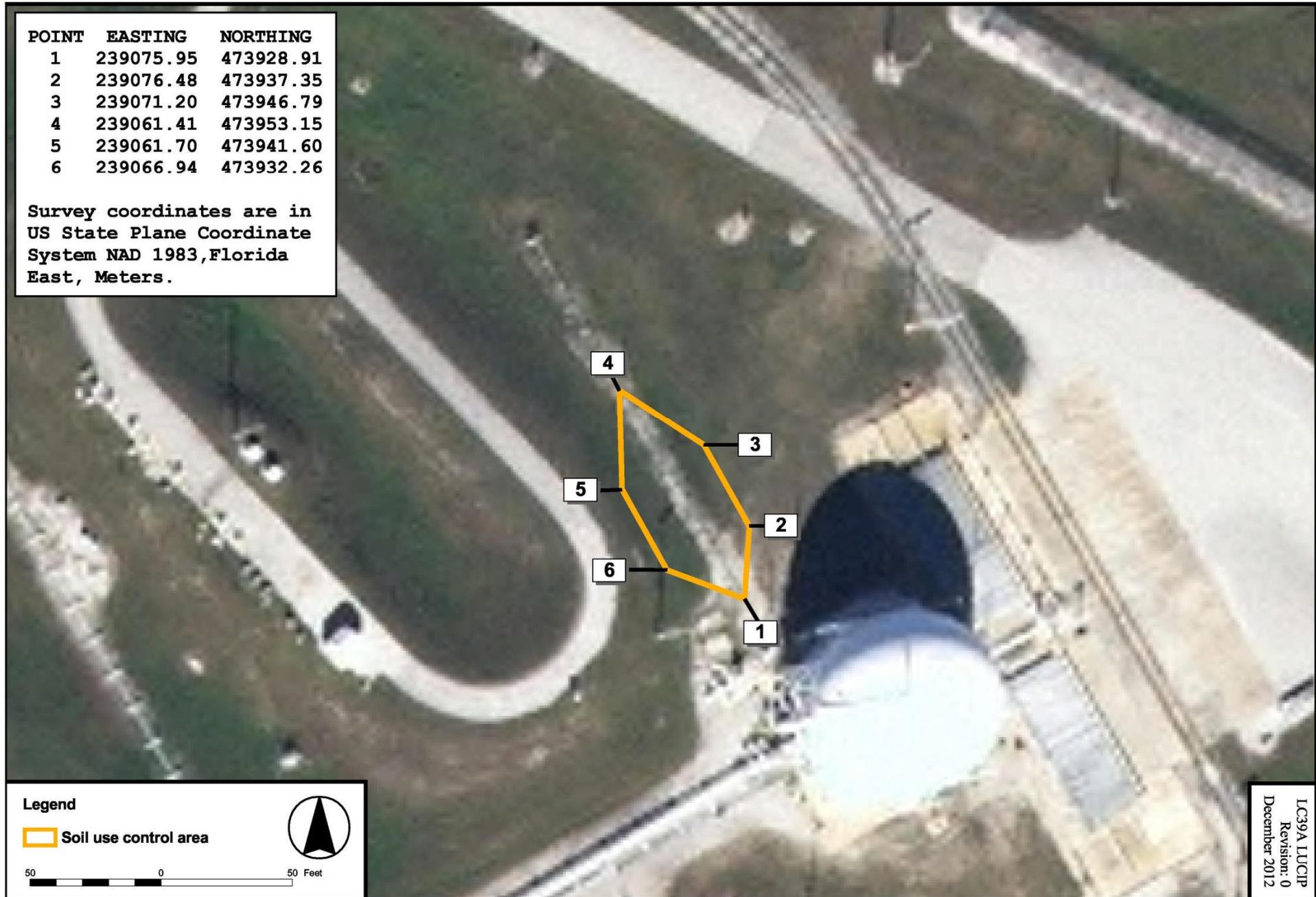



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FIGURE 11 LAND USE CONTROL AREA 17
SWMU 008, KENNEDY SPACE CENTER, FLORIDA

POINT	EASTING	NORTHING
1	239075.95	473928.91
2	239076.48	473937.35
3	239071.20	473946.79
4	239061.41	473953.15
5	239061.70	473941.60
6	239066.94	473932.26

Survey coordinates are in
US State Plane Coordinate
System NAD 1983, Florida
East, Meters.



Legend

 Soil use control area



50 0 50 Feet

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FIGURE 12 LAND USE CONTROL AREA 18
SWMU 008, KENNEDY SPACE CENTER, FLORIDA

POINT	EASTING	NORTHING
1	238937.69	474008.52
2	238944.43	474019.49
3	238948.09	474032.88
4	238934.13	474023.62

Survey coordinates are in
US State Plane Coordinate
System NAD 1983, Florida
East, Meters.



Legend

 Soil use control area



50 0 50 Feet

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FIGURE 13 LAND USE CONTROL AREAS 19 AND 20
SWMU 008, KENNEDY SPACE CENTER, FLORIDA

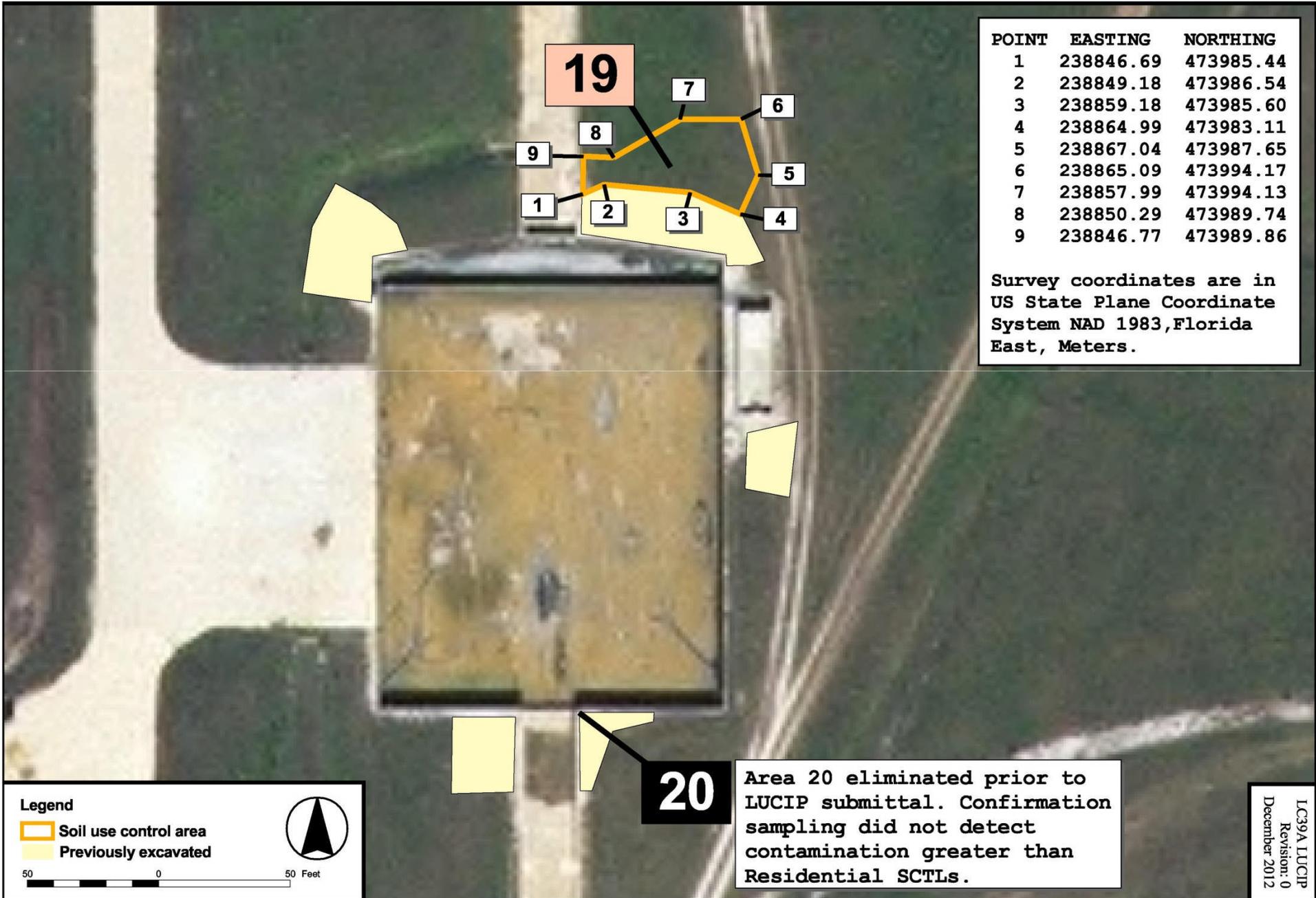


FIGURE 14 LAND USE CONTROL AREAS 21 AND 22
SWMU 008, KENNEDY SPACE CENTER, FLORIDA

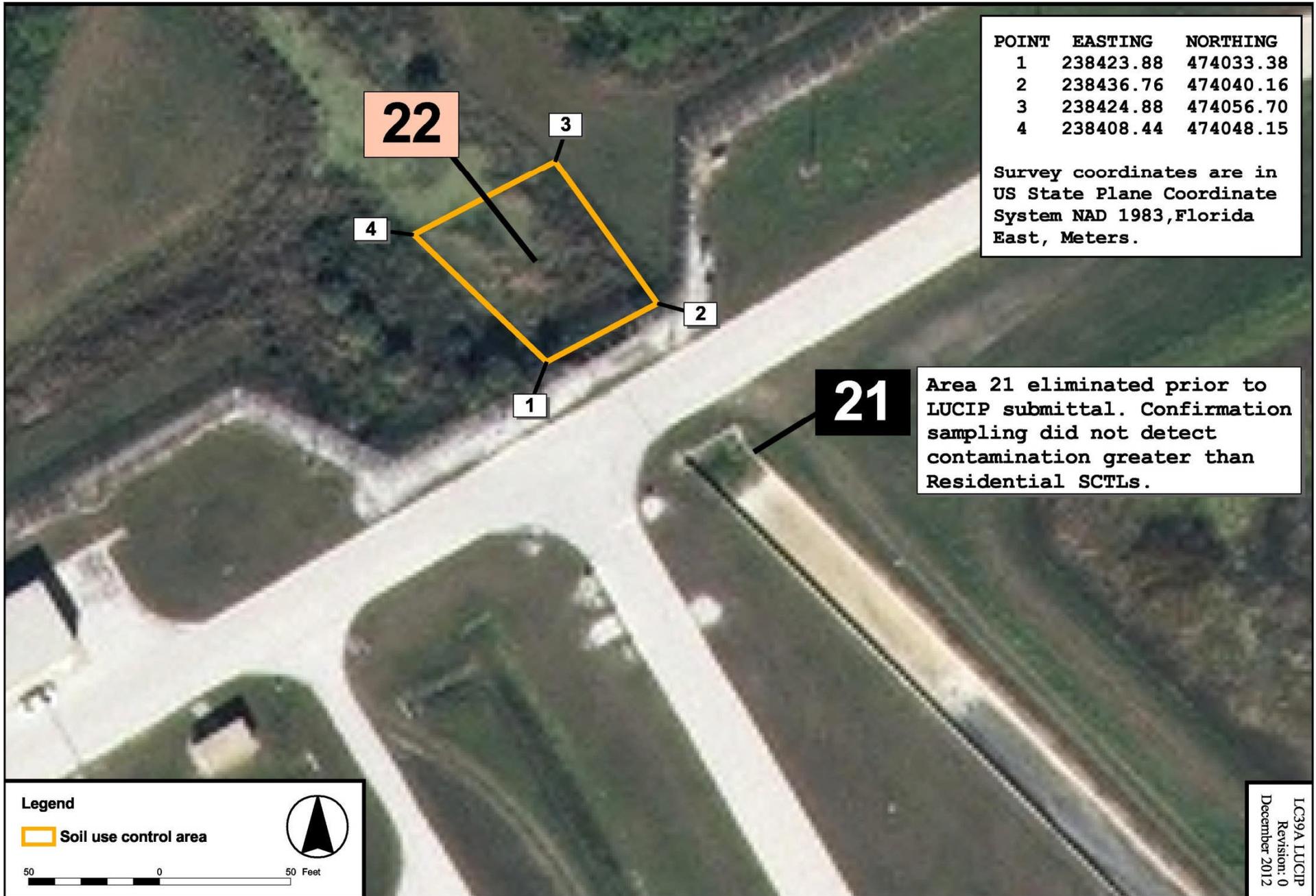
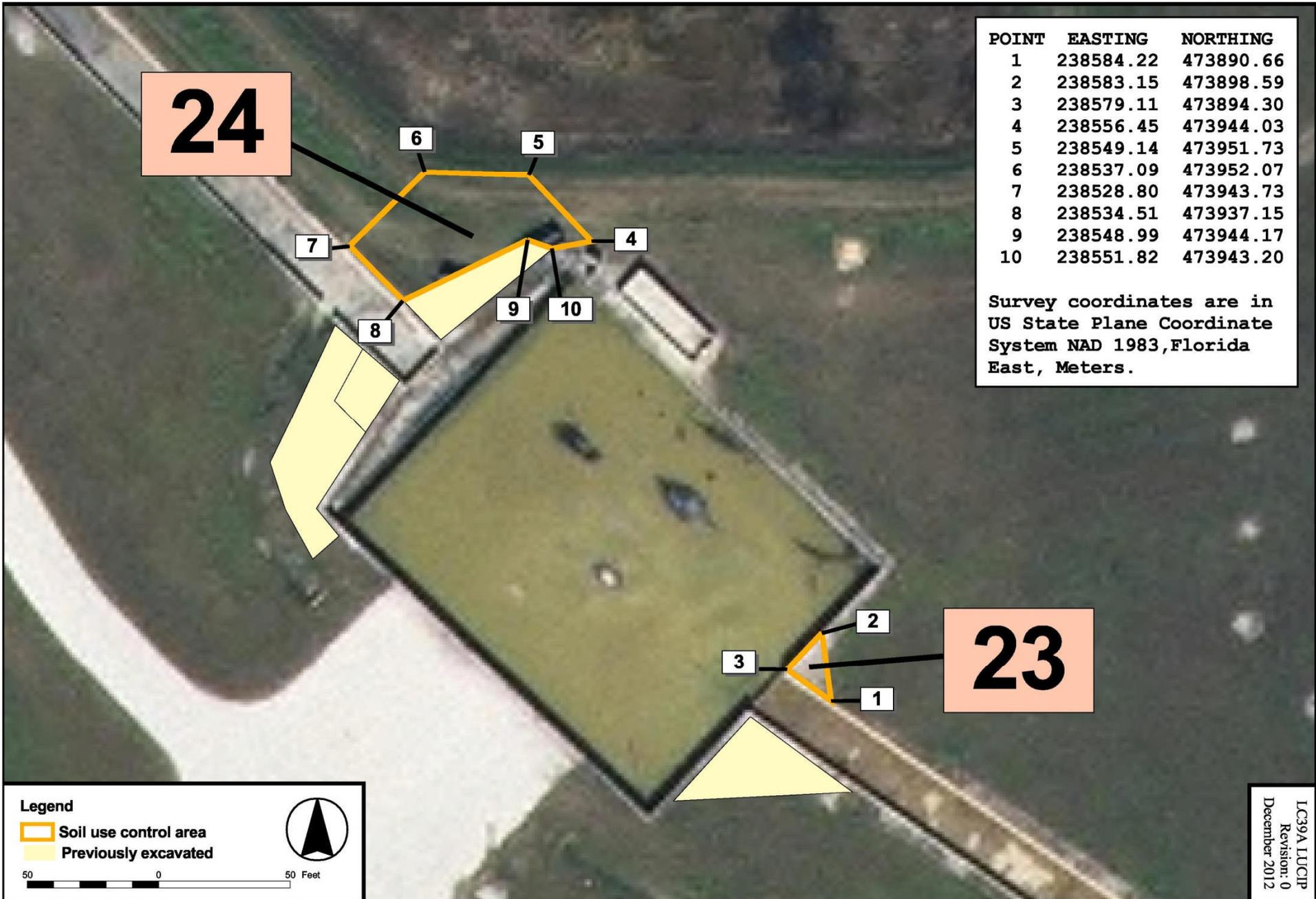


FIGURE 15 LAND USE CONTROL AREAS 23 AND 24
 SWMU 008, KENNEDY SPACE CENTER, FLORIDA



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FIGURE 16 LAND USE CONTROL AREAS 25, 26, AND 27
 SWMU 008, KENNEDY SPACE CENTER, FLORIDA

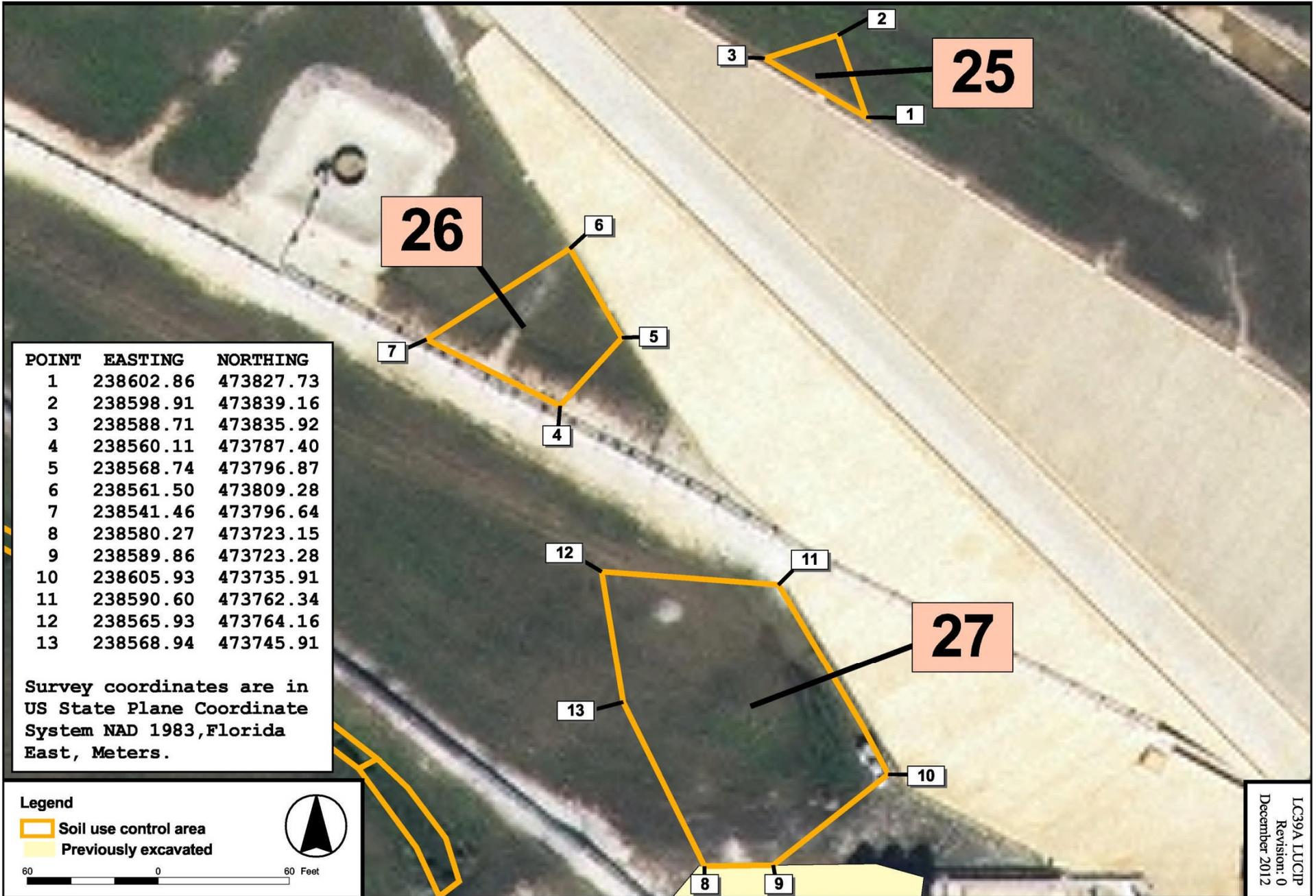
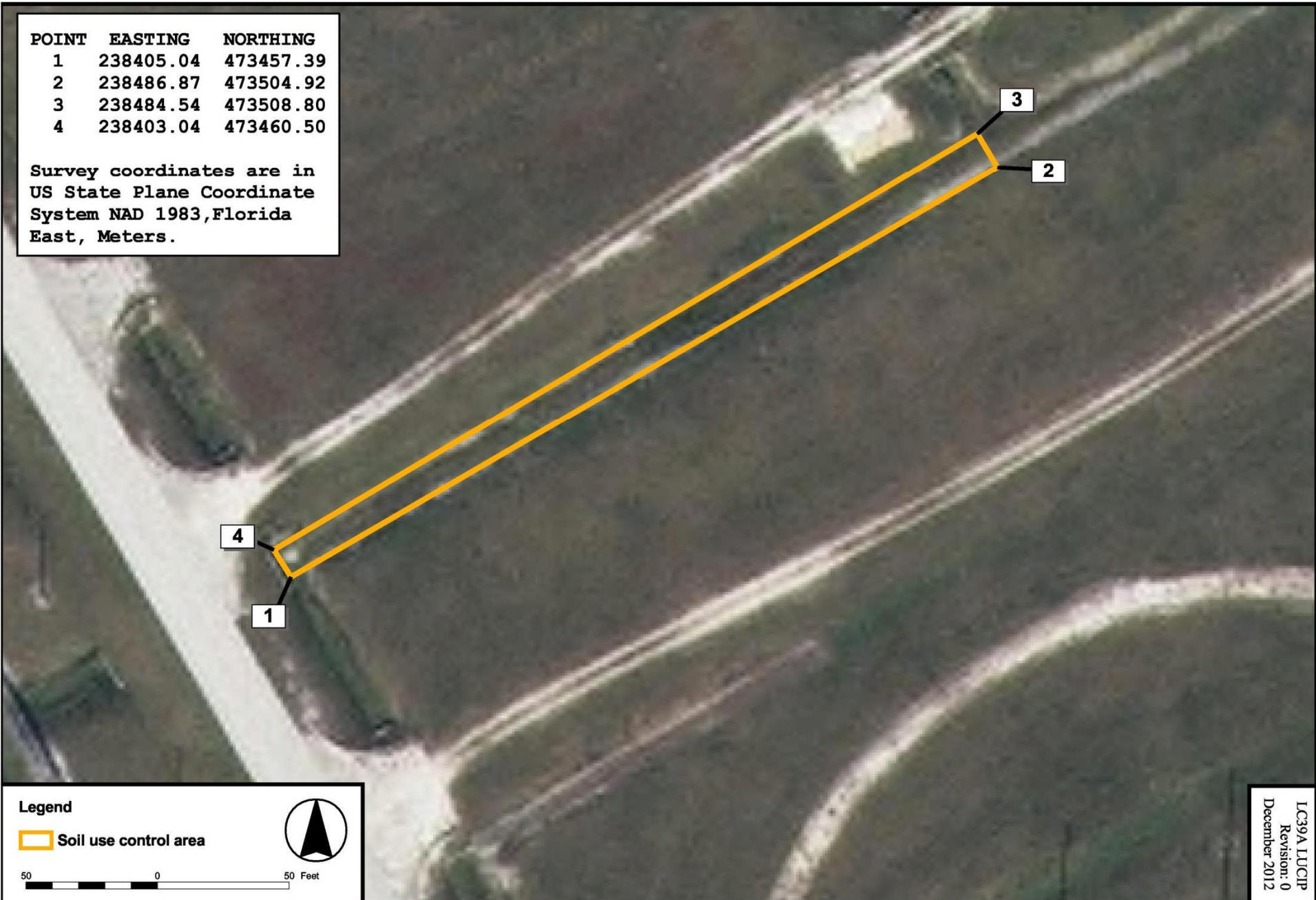


FIGURE 17 LAND USE CONTROL AREA 28
SWMU 008, KENNEDY SPACE CENTER, FLORIDA

POINT	EASTING	NORTHING
1	238405.04	473457.39
2	238486.87	473504.92
3	238484.54	473508.80
4	238403.04	473460.50

Survey coordinates are in
US State Plane Coordinate
System NAD 1983, Florida
East, Meters.



Legend

 Soil use control area



50 0 50 Feet

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FIGURE 18 LAND USE CONTROL AREA 29
 SWMU 008, KENNEDY SPACE CENTER, FLORIDA

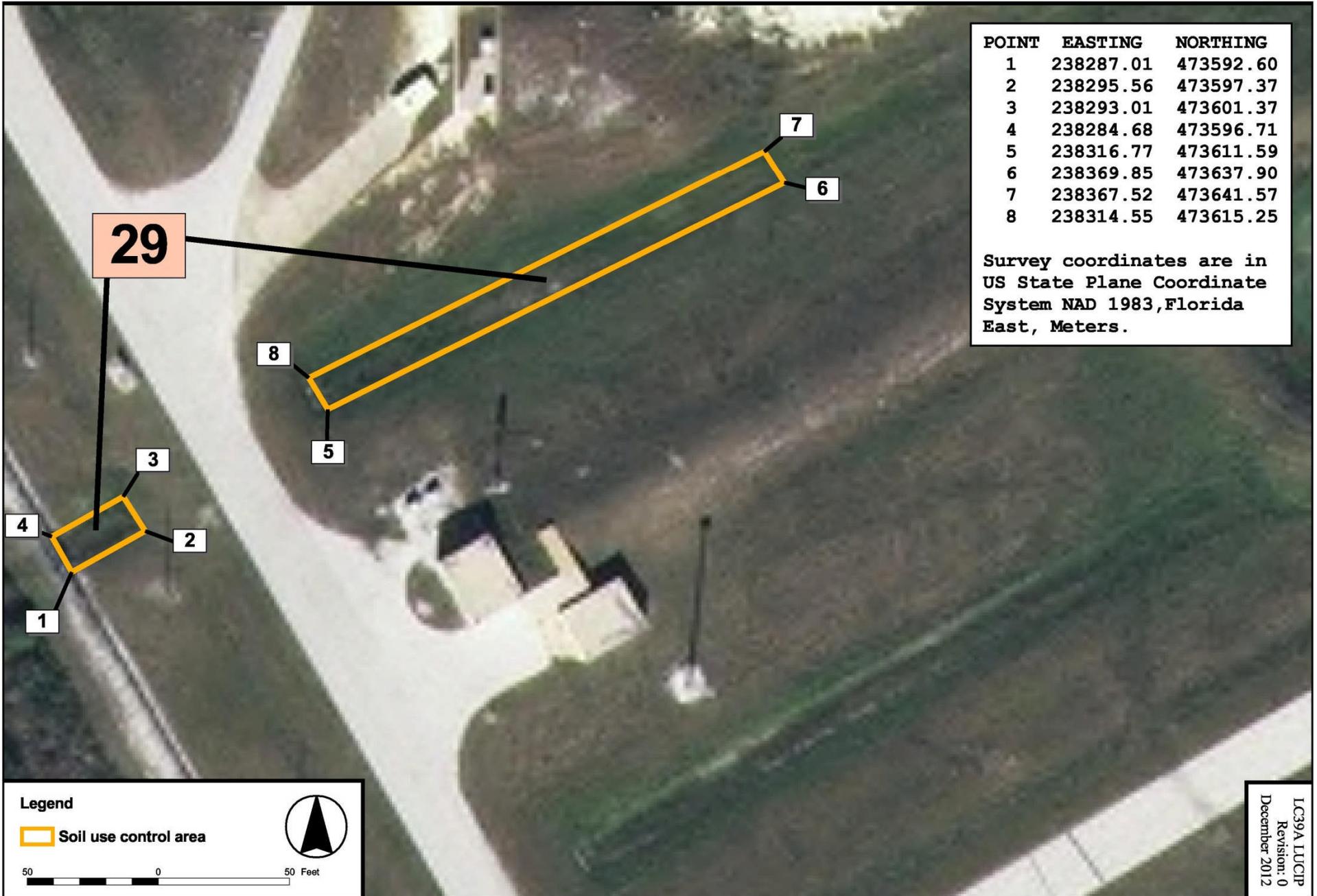


FIGURE 19 LAND USE CONTROL AREAS 30, 31, 32, AND 33
SWMU 008, KENNEDY SPACE CENTER, FLORIDA

POINT	EASTING	NORTHING
1	238286.53	473857.37
2	238296.22	473857.12
3	238296.32	473861.79
4	238286.43	473861.99
5	238319.54	473894.83
6	238321.10	473896.72
7	238321.29	473899.34
8	238313.92	473903.80
9	238308.86	473905.09
10	238307.30	473904.91
11	238306.65	473903.67
12	238308.26	473902.75
13	238309.14	473901.27
14	238310.84	473898.37
15	238315.30	473895.57
16	238317.19	473895.71
17	238298.60	473900.35
18	238300.26	473902.70
19	238296.81	473902.33
20	238312.91	473886.83
21	238315.53	473886.09
22	238315.21	473889.40
23	238312.54	473888.62

Survey coordinates are in US State Plane Coordinate System NAD 1983, Florida East, Meters.

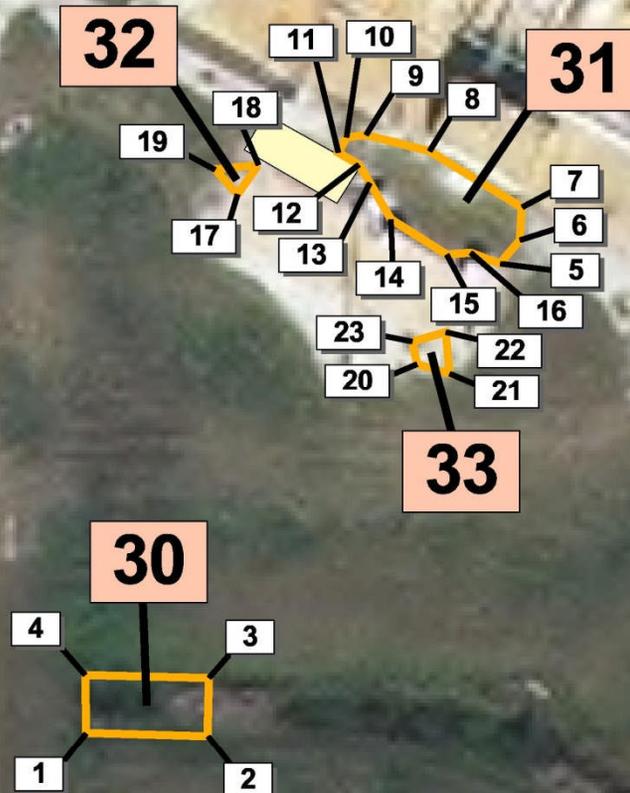
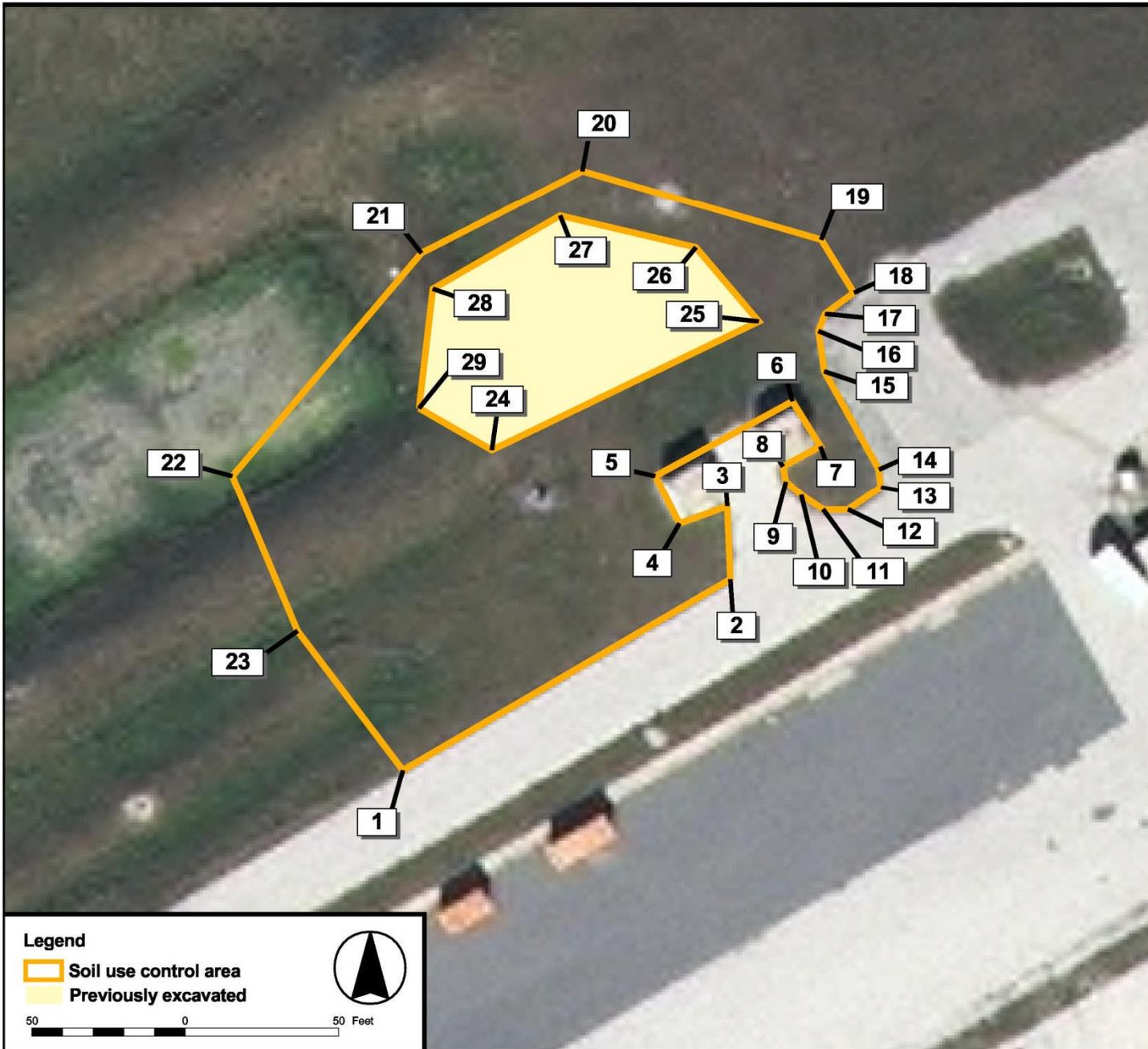


FIGURE 20 LAND USE CONTROL AREA 34
SWMU 008, KENNEDY SPACE CENTER, FLORIDA



POINT	EASTING	NORTHING
1	238473.97	473603.77
2	238506.49	473622.75
3	238506.20	473629.99
4	238501.43	473628.28
5	238499.05	473633.04
6	238512.68	473640.48
7	238515.45	473636.00
8	238511.73	473634.00
9	238512.02	473632.47
10	238513.54	473631.14
11	238515.73	473629.71
12	238518.21	473629.71
13	238521.46	473631.90
14	238521.27	473633.71
15	238515.83	473643.44
16	238515.26	473647.44
17	238515.93	473649.16
18	238518.79	473651.26
19	238515.54	473656.50
20	238491.80	473663.37
21	238475.78	473655.17
22	238457.00	473633.04
23	238463.48	473617.60
24	238482.79	473635.64
25	238509.32	473648.40
26	238503.09	473655.77
27	238489.58	473658.93
28	238476.95	473651.65
29	238475.55	473639.81

Survey coordinates are in US State Plane Coordinate System NAD 1983, Florida East, Meters.

Legend

- Soil use control area
- Previously excavated




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FIGURE 21 LAND USE CONTROL AREAS 35 AND 36
SWMU 008, KENNEDY SPACE CENTER, FLORIDA

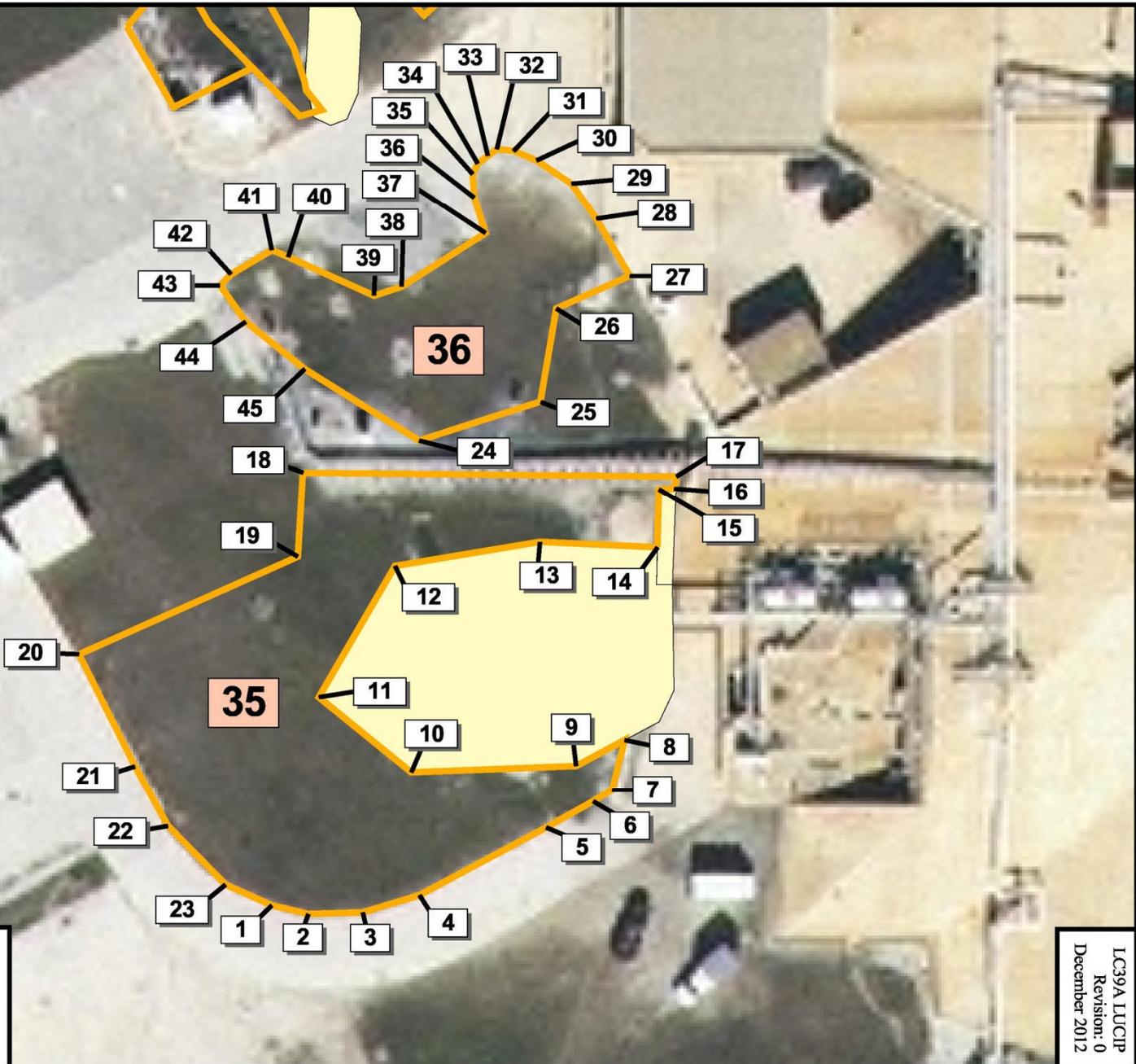
POINT	EASTING	NORTHING
1	238573.14	473587.79
2	238576.75	473586.96
3	238582.09	473587.11
4	238587.65	473588.77
5	238600.06	473595.38
6	238604.65	473597.94
7	238606.53	473599.07
8	238607.77	473603.98
9	238603.00	473601.43
10	238586.84	473600.82
11	238577.77	473608.16
12	238585.24	473621.02
13	238599.44	473623.37
14	238610.98	473622.85
15	238611.10	473628.56
16	238612.61	473628.62
17	238612.84	473629.82
18	238576.23	473630.19
19	238575.70	473621.92
20	238554.27	473612.37
21	238559.76	473601.40
22	238562.99	473595.53
23	238568.63	473589.82
24	238587.58	473633.36
25	238599.51	473637.15
26	238601.04	473646.26
27	238608.26	473649.48
28	238604.98	473655.06
29	238602.53	473658.54
30	238599.10	473660.84
31	238596.85	473661.76
32	238595.21	473661.92
33	238594.34	473661.30
34	238593.37	473660.54
35	238592.86	473659.51
36	238593.01	473657.16
37	238594.13	473653.68
38	238585.90	473648.41
39	238583.18	473647.54
40	238574.74	473651.32
41	238573.15	473651.99
42	238569.16	473649.64
43	238568.09	473648.51
44	238570.60	473644.98
45	238576.38	473640.37

Survey coordinates are in US State Plane Coordinate System NAD 1983, Florida East, Meters.

Legend

-  Soil use control area
-  Previously excavated

50 0 50 Feet



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FIGURE 22 LAND USE CONTROL AREAS 37, 38, 39, 40, 41, 42, AND 43
SWMU 008, KENNEDY SPACE CENTER, FLORIDA

