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**DRAFT ADDITIONAL SAMPLING PLAN
ACTION AREA DELINEATION
CENTREDALE MANOR RESTORATION PROJECT
SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND**

July 11, 2002

Prepared for:

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LEA Commission Number 15RP102

**ADDITIONAL SAMPLING TO DELINEATE THE ACTION AREAS
AT THE CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
IN NORTH PROVIDENCE, RHODE ISLAND**

INTRODUCTION

On June 12, 2002, representatives of the Centredale Manor Performing Parties Group, Loureiro Engineering Associates, Inc. (LEA), AMEC, and Hart Crowser, Inc. met with the U.S. Environmental Protection Agency (EPA), U.S. Army Corps of Engineers (USACE), and the Rhode Island Department of Environmental Management (RIDEM) to discuss issues pertaining to the delineation of dioxin required for the implementation of the Non-Time-Critical Removal Action (NTCRA) at the Centredale Manor Restoration Project Superfund Site located in North Providence, Rhode Island (Site). Based on this meeting and a subsequent teleconference held on June 17, 2002 between representatives of LEA, AMEC, EPA, USACE, and RIDEM, a sampling plan has been developed to delineate the EPA-defined Action Areas along the eastern bank at the Site. As discussed during the meeting and the subsequent teleconference, EPA's primary concern is the presence of dioxin exceeding the toxic equivalents (TEQ) of 1.0 part per billion (ppb) in terrestrial soil.

Residential-use soil to be removed as part of any excavation activities will be based on the limits of dioxin exceeding the TEQ of 1.0 ppb, as indicated by the results of soil samples analyzed by USEPA Method 8290. Where no 8290 soil data exist (e.g., for the Action Areas defined by the results of sediment samples obtained by EPA below the surface of the pond(s); Action Areas 5, 6, and 11), it is planned that residential-use soil will still be excavated. The extent of any residential-use soil to be removed in these Action Areas will be based on Method 8290 results of soil samples that will be collected upslope and east of the EPA sediment sample locations. The samples that are reported to be less than the TEQ of 1.0 ppb will be used to define the eastern limit of these excavation areas. From this eastern point, an approximate five-foot wide area of soil that extends west to the floodplain sediment will be removed.

The extent of any floodplain sediment to be removed as part of any excavation activities will be limited to those sediments that lie within the shadow of the footprint of the area defined by the residential-use soil to be removed. The western limit of any excavation will be defined by institutional boundaries for Action Areas 1 and 2, the 92.8± ft elevation contour (based on an average Allendale Pond elevation of 93.8 ft) for Action Areas 3, 4, 5, 6, and 7, and the 76.0± ft elevation contour for Action Areas 9, 10, 11, and 12. For Action Area 3 / 4, the western limit of any excavation will be defined by the 93.0 ft elevation (~10 ft to the west of AP-DEL-04). As agreed upon by EPA, no post-excavation samples will be obtained.

As stated by EPA, the primary goal for the remaining part of the NTCRA is to remove terrestrial soil containing concentrations of dioxin exceeding the TEQ of 1.0 ppb. Consequently, the sampling plan described in the following sections is focused on delineating the extent of dioxin exceeding the TEQ of 1.0 ppb in terrestrial soil. As proposed, samples will be obtained from these soils based on consideration of all of the Site data, including the April 2002 sampling results as well as the previously obtained data for the site. The sampling plan incorporates a



modified grid-based sampling approach for delineating the limits of dioxin in the area of Allendale Pond that is consistent with Amendment 03 to the Implementation Work Plan.

WATER LEVEL MEASUREMENTS

At the request of EPA, one round of liquid levels will be obtained from piezometers that are located above the elevation of Allendale Pond. The liquid level data will be used to calculate the elevation of the water table at each piezometer location.

DELINEATION SAMPLING

As agreed upon by EPA at the June 12, 2002 meeting, the sampling effort is focused on the EPA sampling locations reported to contain dioxin concentrations greater than 1.0 ppb that have been used to define the Action Areas. This effort is illustrated in Figures 1-1 through 1-12 (attached). For each of these locations, a triangular-grid (5-ft grid) will be staked in the field. A composite sample will be collected from each node of the grid. Each composite sample will consist of three grab samples obtained within approximately one foot of each node. The grab samples will be obtained from the ground surface to two feet below ground surface (bgs), or from the ground surface to the water table for those areas where the water table can be clearly identified and is present above a depth of two feet bgs. These proposed sample locations are illustrated in the attached figures as "Proposed Sample Locations".

No samples will be obtained from floodplain sediments (i.e., below the elevation of the pond(s)). For the Action Areas that are defined by the results of sediment samples obtained below the elevation of the pond(s) (e.g., Action Areas 5, 6, and 11), three soil borings will be advanced to a depth two feet bgs (or to the water table), upslope and east of the EPA sediment sample locations. The soil borings will be spaced approximately five-feet apart. A composite sample comprised of the soil obtained from these three locations will be prepared. The proposed sample locations that will comprise each "three-point composite" are illustrated in Figures 1-5, 1-6, and 1-11 as "Proposed Sample Locations (To Be Composited)".

To address EPA's concerns with regard to the lateral distribution of dioxin within each Action Area and to eliminate the need for additional field mobilization efforts, a number of additional samples will be obtained from grid nodes expanded beyond the initial grid sample locations. The additional samples that are collected will be frozen and held at the laboratory for possible future analysis. The samples will be analyzed only if the laboratory data are needed to delineate the extent of dioxin. These proposed sample locations are illustrated in the attached figures as "Proposed Sample Locations (To Be Held)".

Additional sampling will also include the collection of composite samples from the immunoassay sample locations for which "high" screening results were reported. These locations will include the locations characterized by immunoassay screening results greater than 2,000 parts per trillion (ppt) (greater than 5,000 ppt for Action Areas 1, 2, and 12) that are closest to the residential properties. For each of these locations, a three-point composite sample will be obtained by advancing three soil borings to a depth two feet bgs (or to the water table where it can be clearly identified), and preparing a composite sample comprised of the soil obtained from

these three locations. Similar to the approach to be taken to characterize the soil in the area characterized by EPA (8290 soil data), the soil borings will be located on a triangular-grid. Thus, each composite sample will consist of three grab samples obtained from the area characterized by the immunoassay sample location.

All samples will be obtained using stainless steel bucket-augers, macro-cores, trowels, or similar manual sampling techniques. In general, each sample will be logged to document a general description of the soil in accordance with LEA's standard operating procedure for soil sampling. During the logging process, each soil sample will be examined so that any relevant characteristics may be identified and used to assist delineation efforts.

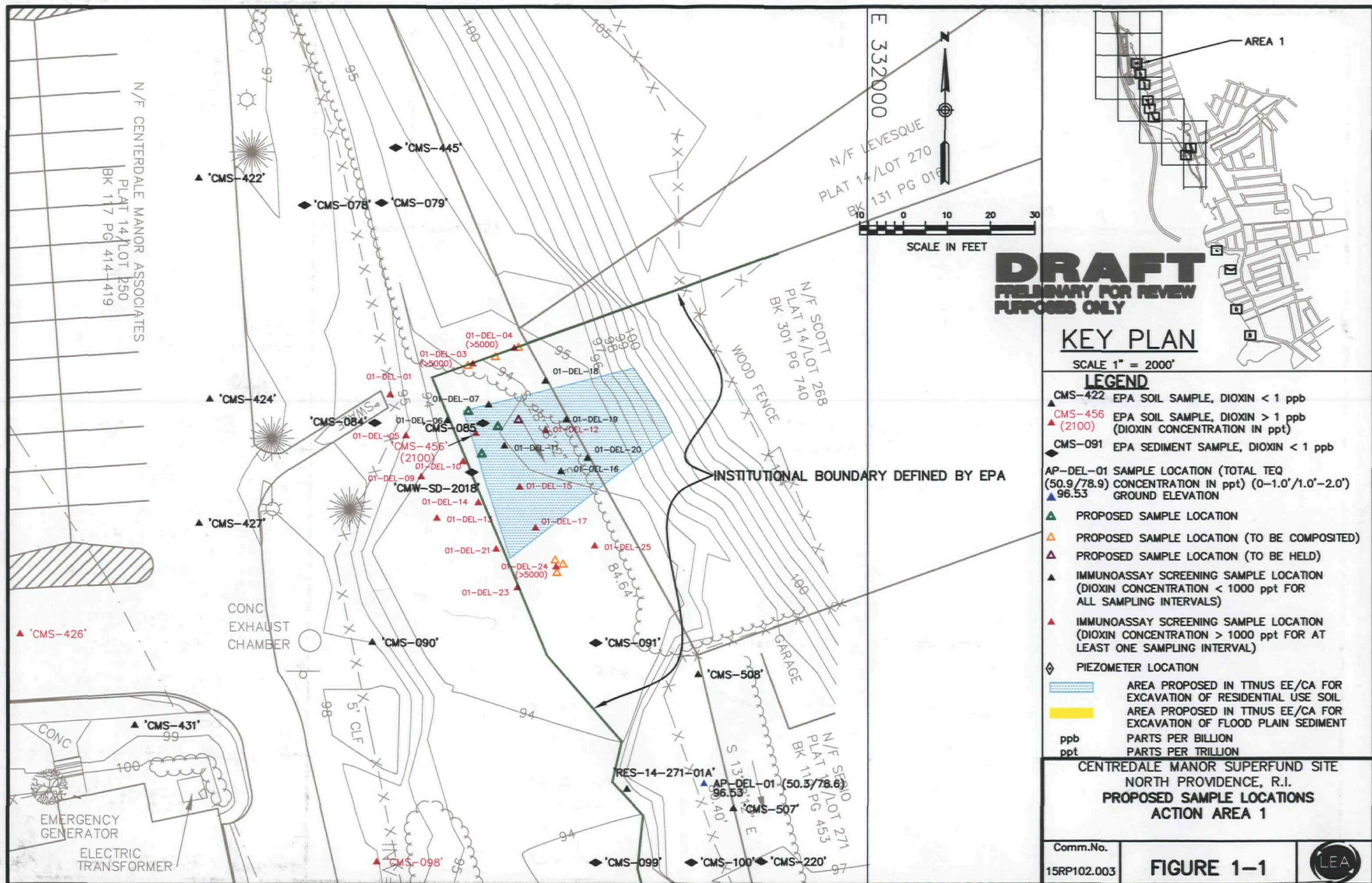
Each sample that is collected will be assigned an independent seven digit tracking number. In addition, each sample will be assigned a unique sample location identification number. The sample location identifiers will consist of an alphanumeric code that identifies that the samples were obtained within a specific "Action Area" (01), the type of sample (delineation), and the sequential sample number. According to this sampling nomenclature, the delineation samples to be obtained to assess the extent of dioxin within the "Action Areas" will be identified, for example, as "01-DEL-01". The tracking numbers and location identification numbers will be logged along with the corresponding analysis being requested. The results of the analysis will be logged into the electronic database for the site, such that the data fields will clearly identify the difference between the USEPA Method 8290 laboratory results and the immunoassay screening results.

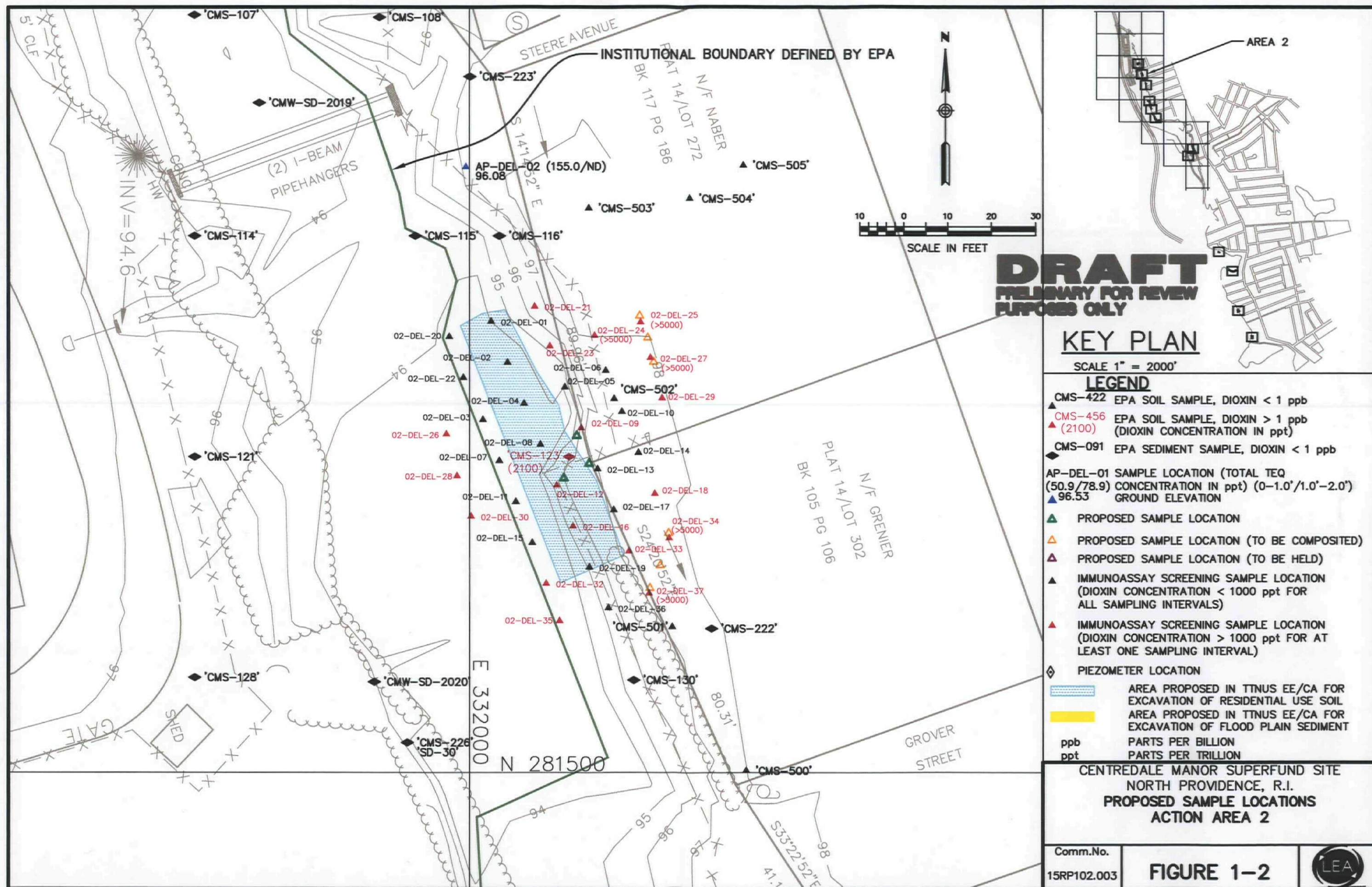
SAMPLE ANALYSIS AND EVALUATION

All samples that are collected, except those that are frozen and held for possible future analysis, will be screened using competitive enzyme immunoassay screening techniques using Cape Technologies test kits (USEPA Method 4025). In addition, the samples (except those that are held) will be analyzed for dioxin and furan and congeners using USEPA Method 8290, and converted into 2,3,7,8-TCDD TEQ following accepted EPA protocol. The laboratory analytical results will be validated in accordance with the Region I Data Validation Functional Guidelines for Evaluating Environmental Analyses. The validated results will be evaluated relative to the TEQ of 1.0 ppb. The results will also be compared to the immunoassay screening results to provide a better understanding of the extent of dioxin in those areas of the site previously characterized by immunoassay screening results. The extent of dioxin will be based on the results of the 8290 analyses.

It is expected that the limits of dioxin will be defined by the results of the samples that are collected along the primary grid. However, if samples are reported to contain concentrations of dioxin that exceed the TEQ of 1.0 ppb, then the appropriate additional samples that were collected along the expanded grid, frozen and held at the laboratory will be analyzed. The likely outcome and expectation of the laboratory analyses is that the samples will contain

concentrations of dioxin less than the TEQ of 1.0 ppb. However, if the additional samples are reported to contain concentrations of dioxin that exceed the TEQ of 1.0 ppb, then additional sampling and analyses will likely be required. The results may be evaluated in light of other existing 8290 and immunoassay results to finalize any additional delineation and to determine the scope of any excavation program.







KEY PLAN

SCALE 1" = 2000'

LEGEND

- CMS-422 EPA SOIL SAMPLE, DIOXIN < 1 ppb
 ▲ CMS-456 EPA SOIL SAMPLE, DIOXIN > 1 ppb
 ▲ (2100) (DIOXIN CONCENTRATION IN ppt)
 CMS-091 EPA SEDIMENT SAMPLE, DIOXIN < 1 ppb
 ◆ AP-DEL-01 SAMPLE LOCATION (TOTAL TEQ
 (50.9/78.9) CONCENTRATION IN ppt) (0-1.0'/1.0'-2.0')
 ▲ 96.53 GROUND ELEVATION
 ▲ PROPOSED SAMPLE LOCATION
 ▲ PROPOSED SAMPLE LOCATION (TO BE COMPOSITED)
 ▲ PROPOSED SAMPLE LOCATION (TO BE HELD)
 ▲ IMMUNOASSAY SCREENING SAMPLE LOCATION
 (DIOXIN CONCENTRATION < 1000 ppt FOR
 ALL SAMPLING INTERVALS)
 ▲ IMMUNOASSAY SCREENING SAMPLE LOCATION
 (DIOXIN CONCENTRATION > 1000 ppt FOR AT
 LEAST ONE SAMPLING INTERVAL)
 ◆ PIEZOMETER LOCATION
 AREA PROPOSED IN TTNUS EE/CA FOR
 EXCAVATION OF RESIDENTIAL USE SOIL
 AREA PROPOSED IN TTNUS EE/CA FOR
 EXCAVATION OF FLOOD PLAIN SEDIMENT
 ppb PARTS PER BILLION
 ppt PARTS PER TRILLION

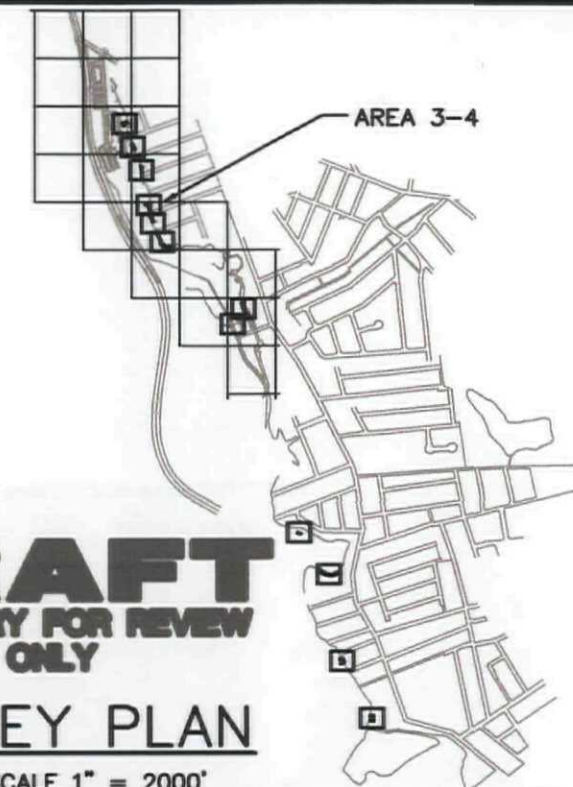
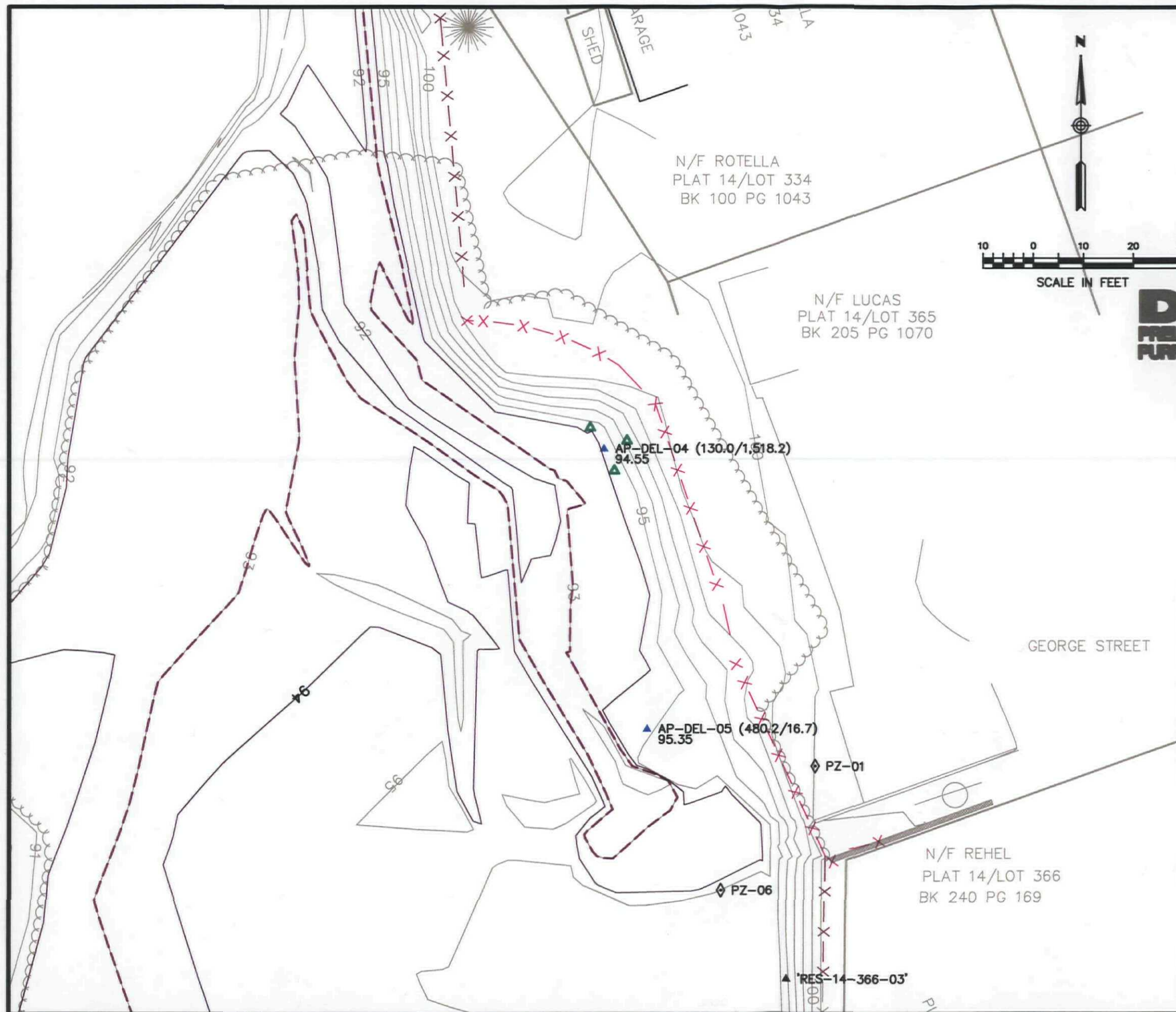
**CENTREDALE MANOR SUPERFUND SITE
NORTH PROVIDENCE, R.I.
PROPOSED SAMPLE LOCATIONS
ACTION AREA 3**

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FIGURE 1-3



Original includes color coding.



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PURPOSES ONLY

KEY PLAN

SCALE 1" = 2000'

LEGEND

- ▲ CMS-422 EPA SOIL SAMPLE, DIOXIN < 1 ppb
- ▲ CMS-456 EPA SOIL SAMPLE, DIOXIN > 1 ppb (DIOXIN CONCENTRATION IN ppt) (2100)
- ◆ CMS-091 EPA SEDIMENT SAMPLE, DIOXIN < 1 ppb
- ▲ AP-DEL-01 SAMPLE LOCATION (TOTAL TEQ (50.9/78.9) CONCENTRATION IN ppt) (0-1.0'/1.0'-2.0') GROUND ELEVATION 96.53
- ▲ PROPOSED SAMPLE LOCATION
- ▲ PROPOSED SAMPLE LOCATION (TO BE COMPOSITED)
- ▲ PROPOSED SAMPLE LOCATION (TO BE HELD)
- ▲ IMMUNOASSAY SCREENING SAMPLE LOCATION (DIOXIN CONCENTRATION < 1000 ppt FOR ALL SAMPLING INTERVALS)
- ▲ IMMUNOASSAY SCREENING SAMPLE LOCATION (DIOXIN CONCENTRATION > 1000 ppt FOR AT LEAST ONE SAMPLING INTERVAL)
- ◆ PIEZOMETER LOCATION
- AREA PROPOSED IN TTNUS EE/CA FOR EXCAVATION OF RESIDENTIAL USE SOIL
- AREA PROPOSED IN TTNUS EE/CA FOR EXCAVATION OF FLOOD PLAIN SEDIMENT
- ppb PARTS PER BILLION
- ppt PARTS PER TRILLION

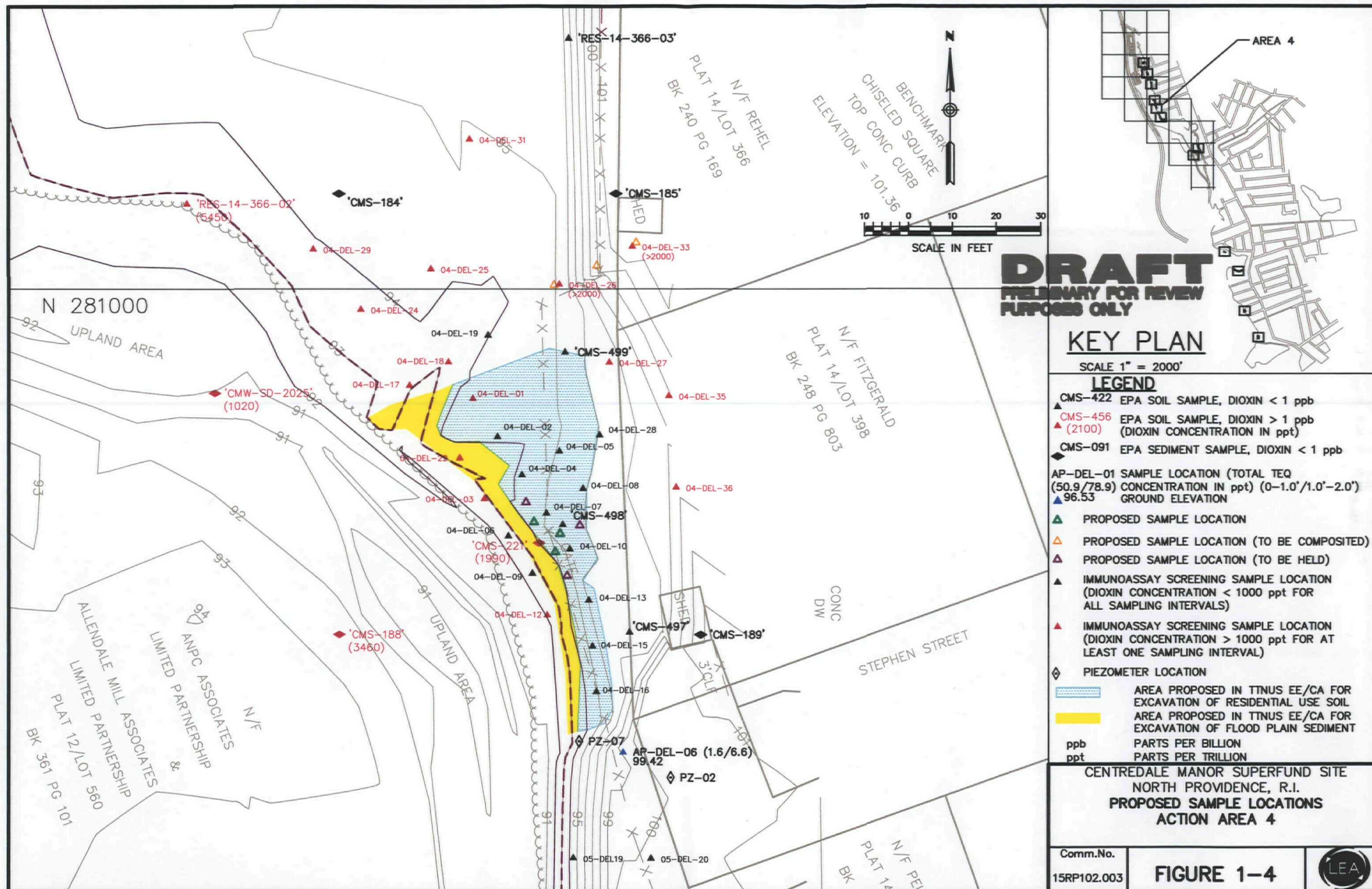
CENTREDALE MANOR SUPERFUND SITE
NORTH PROVIDENCE, R.I.
**PROPOSED SAMPLE LOCATIONS
ACTION AREA 3-4**

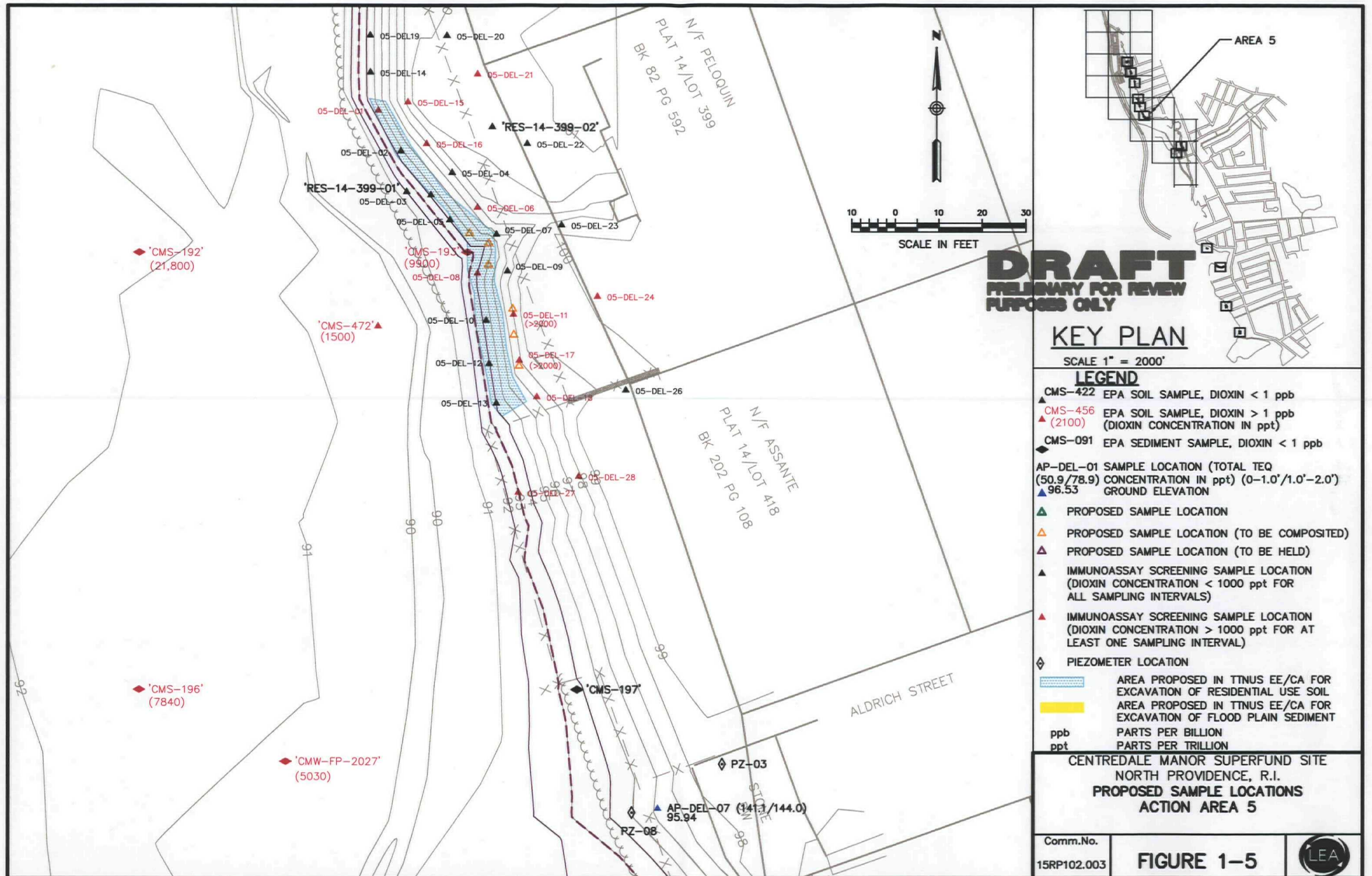
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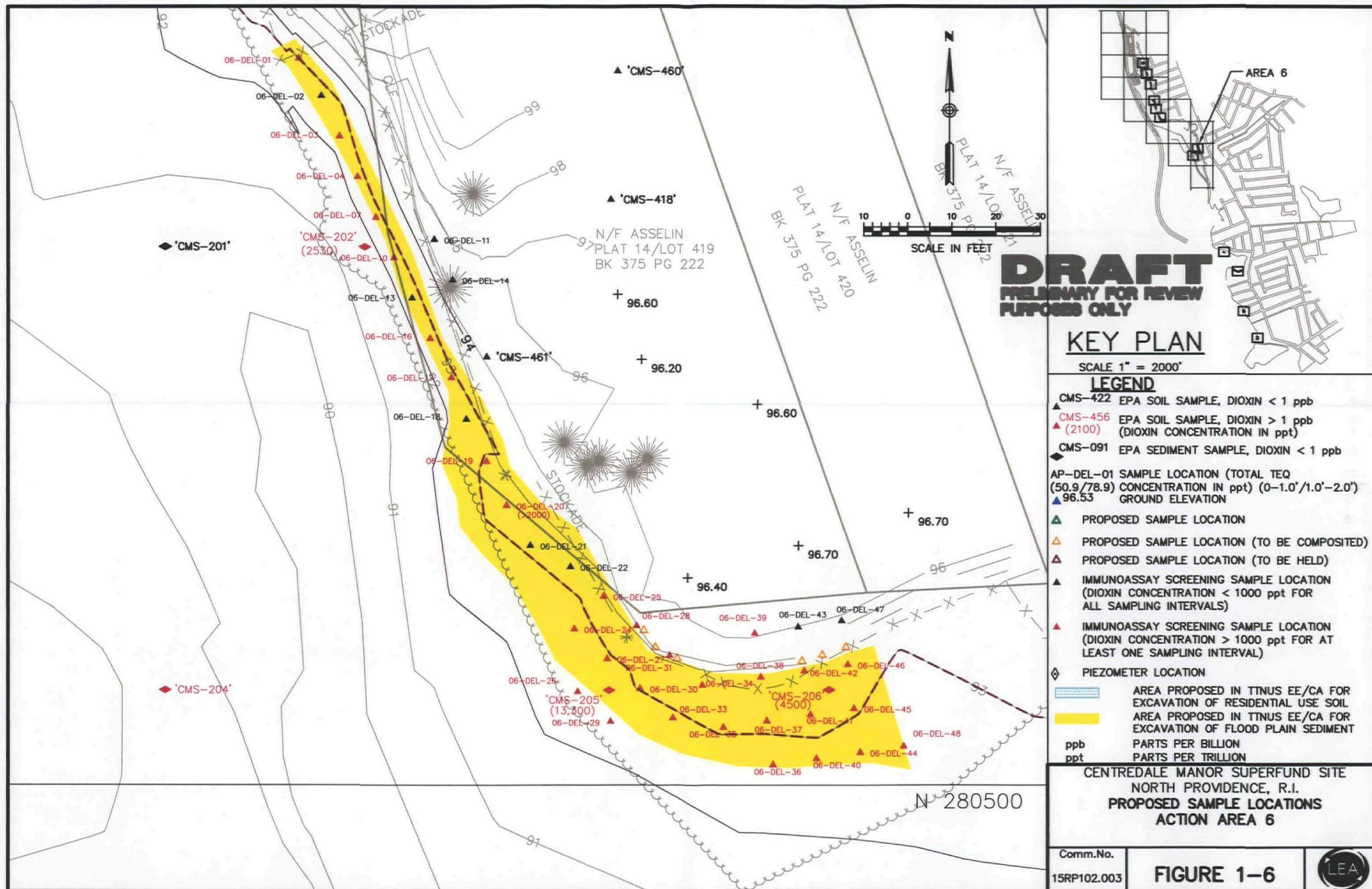
FIGURE 1-3/4

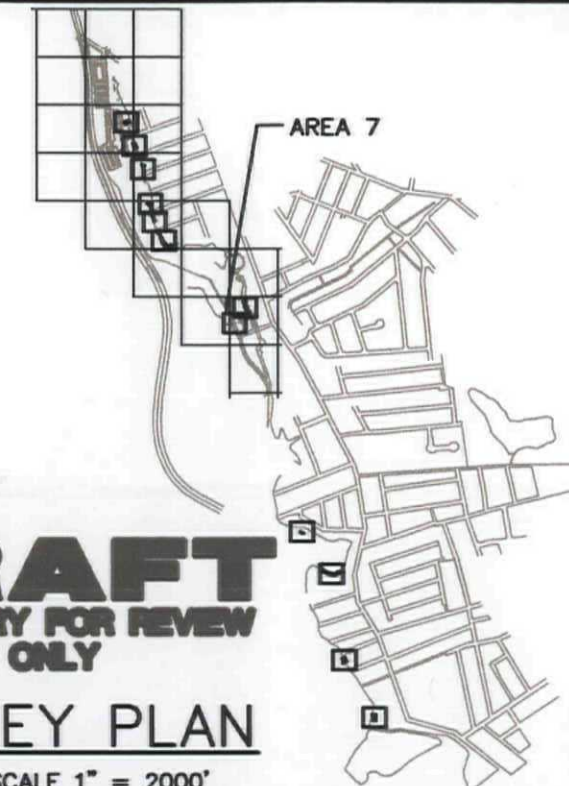
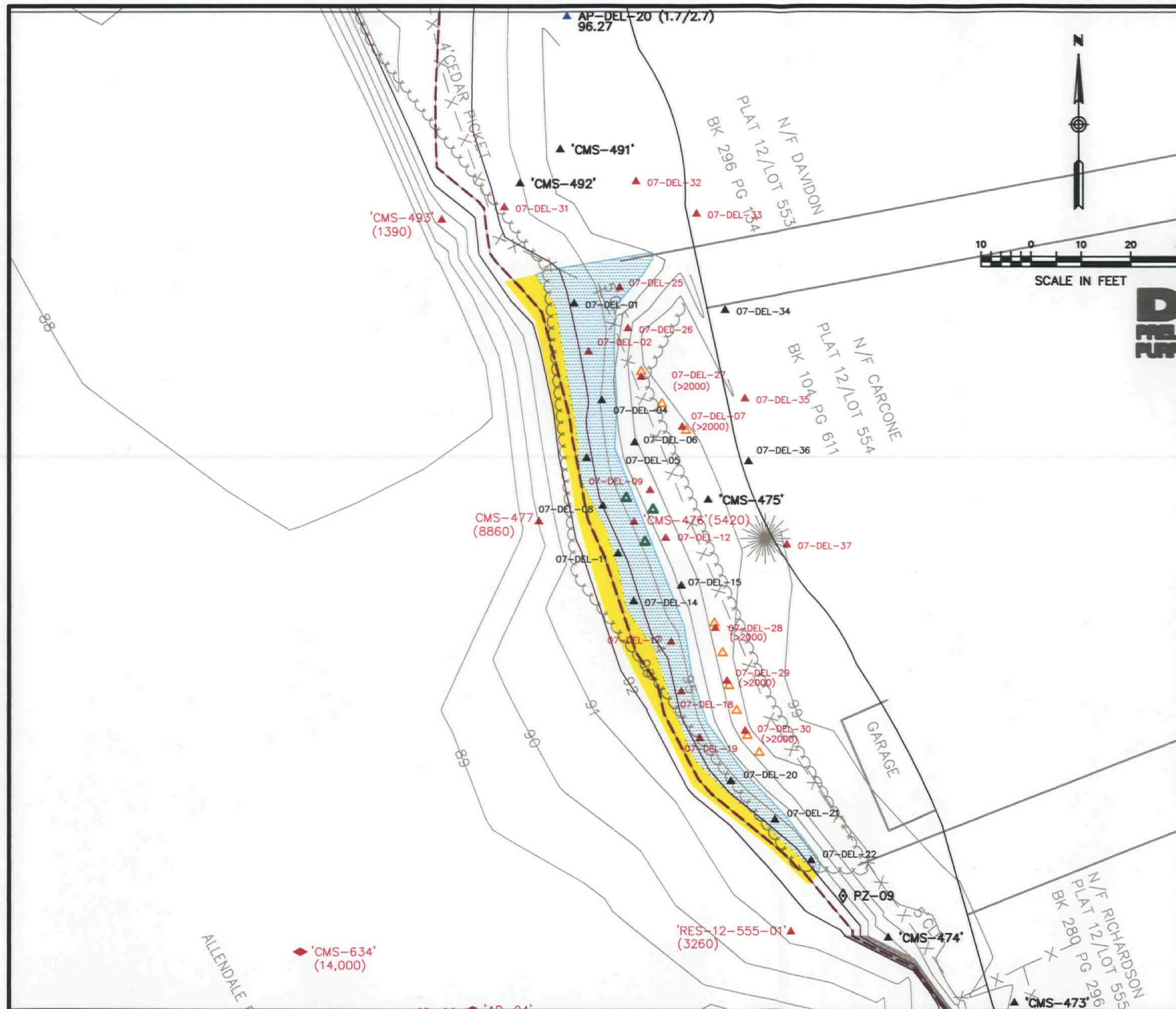


Original includes color coding.









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PRELIMINARY FOR REVIEW
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KEY PLAN

SCALE 1" = 2000'

LEGEND

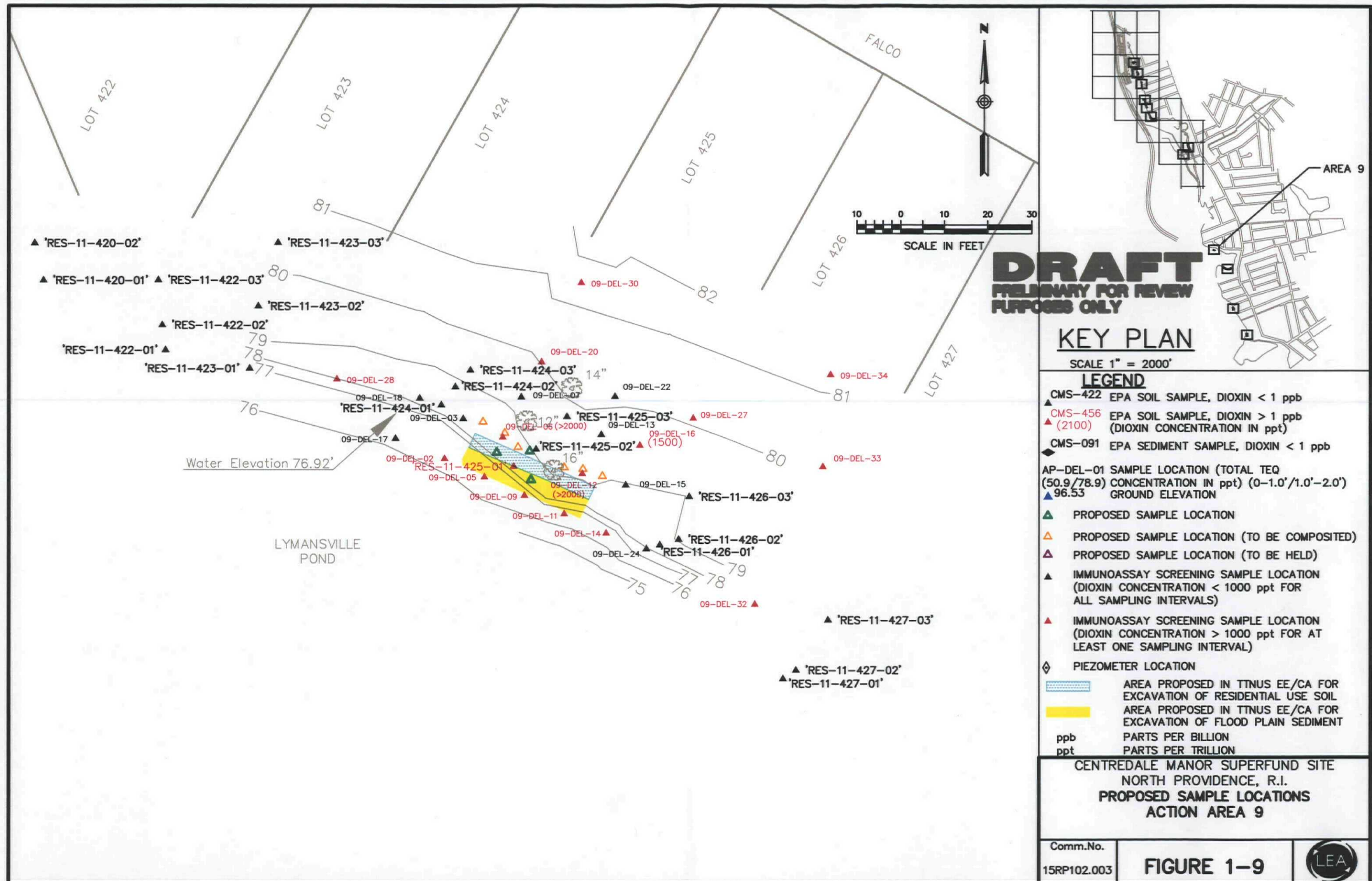
- ▲ CMS-422 EPA SOIL SAMPLE, DIOXIN < 1 ppb
- ▲ CMS-456 (2100) EPA SOIL SAMPLE, DIOXIN > 1 ppb (DIOXIN CONCENTRATION IN ppt)
- ◆ CMS-091 EPA SEDIMENT SAMPLE, DIOXIN < 1 ppb
- ▲ AP-DEL-01 SAMPLE LOCATION (TOTAL TEQ (50.9/78.9) CONCENTRATION IN ppt) (0-1.0'/1.0'-2.0')
- ▲ 96.53 GROUND ELEVATION
- ▲ PROPOSED SAMPLE LOCATION
- ▲ PROPOSED SAMPLE LOCATION (TO BE COMPOSITED)
- ▲ PROPOSED SAMPLE LOCATION (TO BE HELD)
- ▲ IMMUNOASSAY SCREENING SAMPLE LOCATION (DIOXIN CONCENTRATION < 1000 ppt FOR ALL SAMPLING INTERVALS)
- ▲ IMMUNOASSAY SCREENING SAMPLE LOCATION (DIOXIN CONCENTRATION > 1000 ppt FOR AT LEAST ONE SAMPLING INTERVAL)
- ◆ PIEZOMETER LOCATION
- AREA PROPOSED IN TTUS EE/CA FOR EXCAVATION OF RESIDENTIAL USE SOIL
- AREA PROPOSED IN TTUS EE/CA FOR EXCAVATION OF FLOOD PLAIN SEDIMENT
- ppb PARTS PER BILLION
- ppt PARTS PER TRILLION

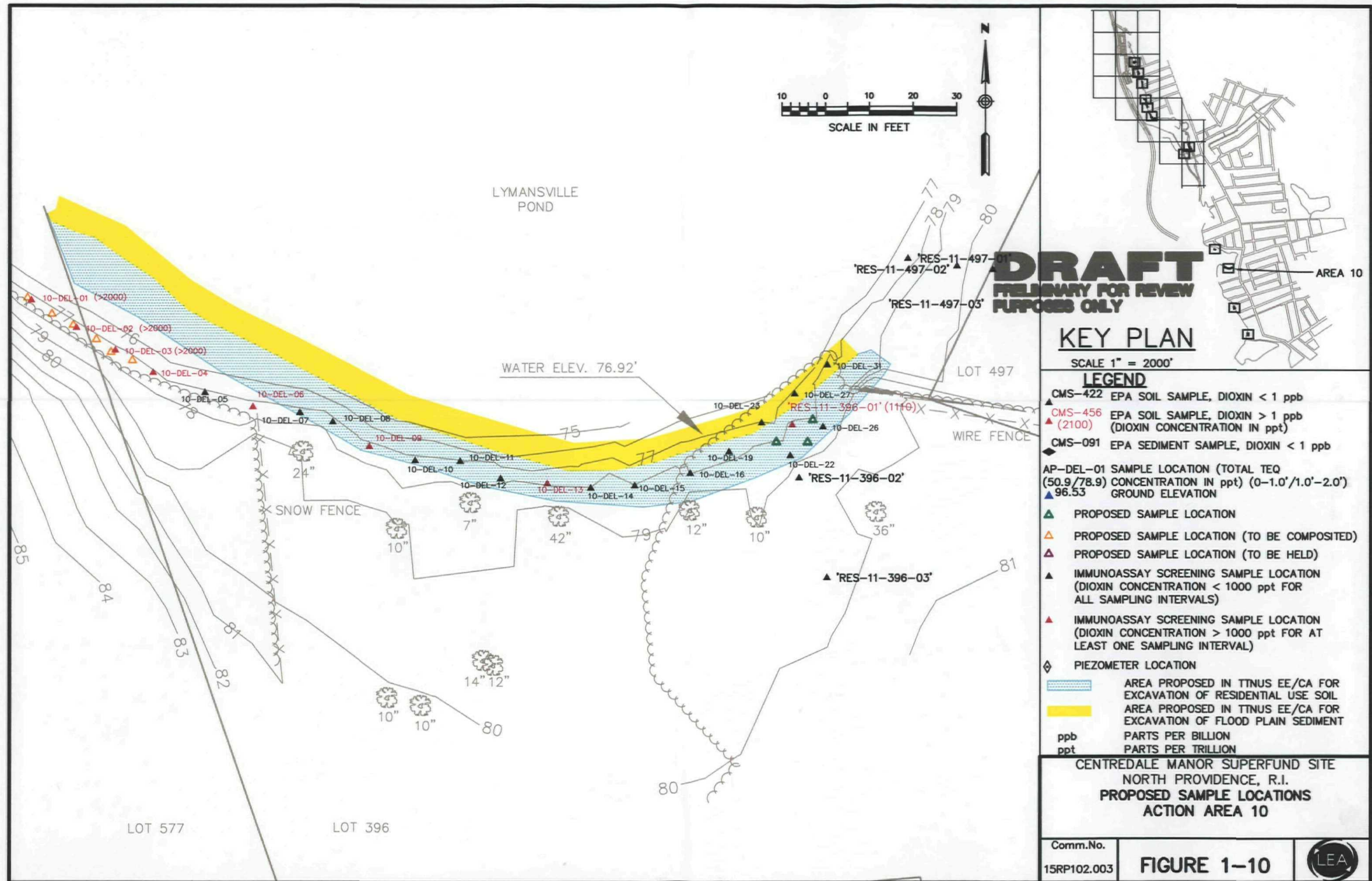
CENTREDALE MANOR SUPERFUND SITE
NORTH PROVIDENCE, R.I.
**PROPOSED SAMPLE LOCATIONS
ACTION AREA 7**

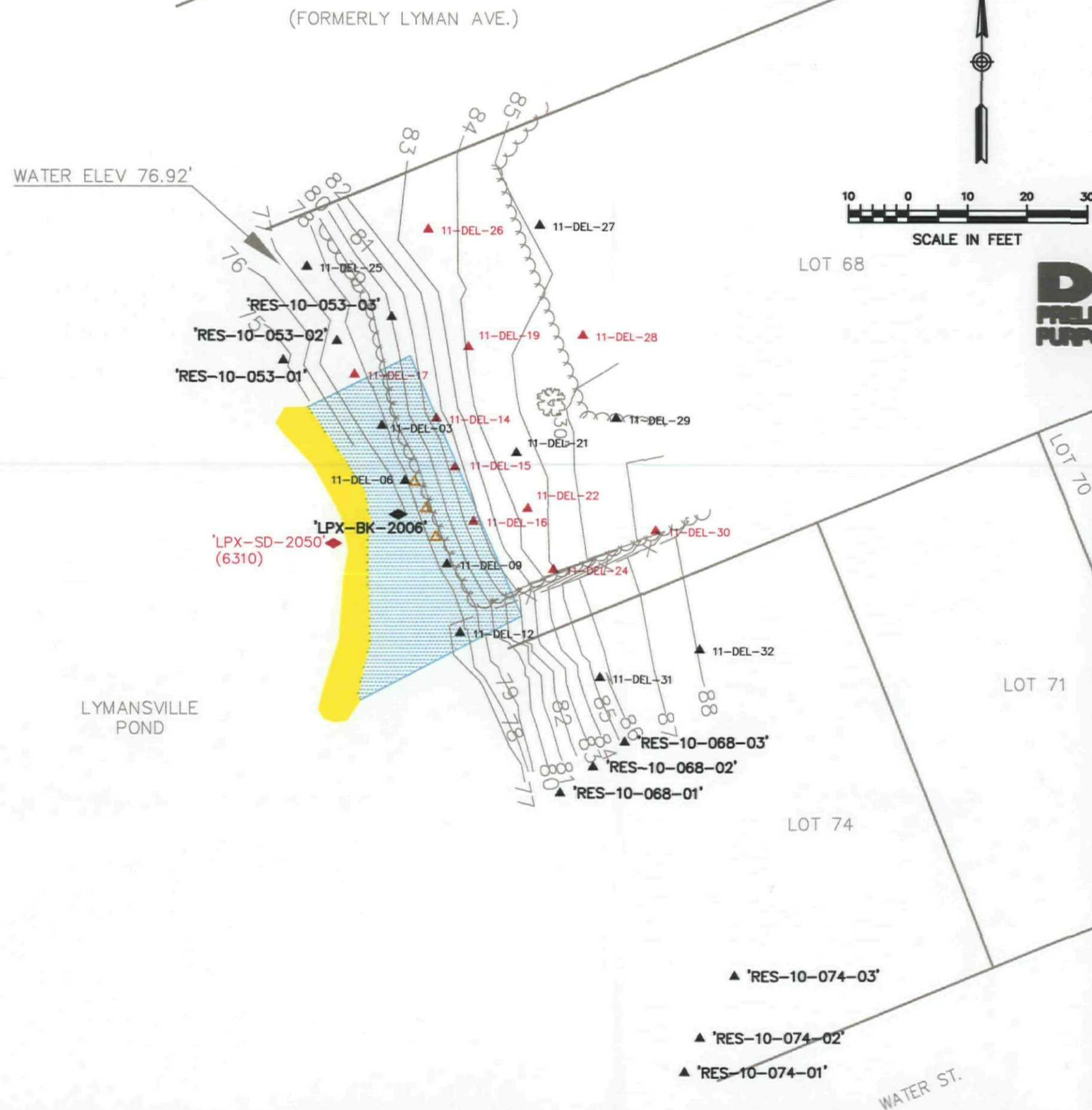
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FIGURE 1-7









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PRELIMINARY FOR REVIEW
PURPOSES ONLY

KEY PLAN

SCALE 1" = 2000'

LEGEND

- ▲ CMS-422 EPA SOIL SAMPLE, DIOXIN < 1 ppb
- ▲ CMS-456 EPA SOIL SAMPLE, DIOXIN > 1 ppb (2100) (DIOXIN CONCENTRATION IN ppt)
- ◆ CMS-091 EPA SEDIMENT SAMPLE, DIOXIN < 1 ppb
- ▲ AP-DEL-01 SAMPLE LOCATION (TOTAL TEQ (50.9/78.9) CONCENTRATION IN ppt) (0-1.0'/1.0'-2.0') GROUND ELEVATION 96.53
- ▲ PROPOSED SAMPLE LOCATION
- ▲ PROPOSED SAMPLE LOCATION (TO BE COMPOSITED)
- ▲ PROPOSED SAMPLE LOCATION (TO BE HELD)
- ▲ IMMUNOASSAY SCREENING SAMPLE LOCATION (DIOXIN CONCENTRATION < 1000 ppt FOR ALL SAMPLING INTERVALS)
- ▲ IMMUNOASSAY SCREENING SAMPLE LOCATION (DIOXIN CONCENTRATION > 1000 ppt FOR AT LEAST ONE SAMPLING INTERVAL)
- ◆ PIEZOMETER LOCATION
- ▨ AREA PROPOSED IN TTUS EE/CA FOR EXCAVATION OF RESIDENTIAL USE SOIL
- AREA PROPOSED IN TTUS EE/CA FOR EXCAVATION OF FLOOD PLAIN SEDIMENT
- ppb PARTS PER BILLION
- ppt PARTS PER TRILLION

CENTREDALE MANOR SUPERFUND SITE
NORTH PROVIDENCE, R.I.
**PROPOSED SAMPLE LOCATIONS
ACTION AREA 11**

Comm.No.
15RP102.003

FIGURE 1-11



Original includes color coding.

