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GEOMATRIX

9 November 1993
Project 1886.03

Mr. Hugh Murphy
City of Hayward Fire Department
Hazardous Materials Office
22300 Foothill Boulevard
Hayward, California 94541

Subject: Soil Sampling Work Plan
Sunnyside Nursery
Hayward, California

Dear Mr. Murphy:

Geomatrix Consultants, Inc. (Geomatrix), has developed a soil sampling work plan to supplement soil sampling programs previously performed at the remaining undeveloped portion of the Sunnyside Nursery site in Hayward, California. This letter presents a summary of previous soil investigations performed at the Sunnyside Nursery site and a soil sampling work plan developed to facilitate regulatory approval for development of lots at the site. This soil sampling work plan will be used to develop a remedial action work plan for the subject site. The remedial action work plan will address health risk considerations raised by the City of Hayward Fire Department (HFD) and the Alameda County Health Care Services Agency (ACHCSA), and will describe remedial measures for both the HFD's and the ACHCSA's approval that are consistent with residential development of the site.

Geomatrix met with Dr. Ravi Arulanantham of the ACHCSA on 6 and 29 October 1993 to discuss health-based cleanup concentrations for pesticides that have been detected in surface soil within the Sunnyside Nursery site. During these meetings, Dr. Arulanantham also discussed his opinions regarding surface sampling coverage and analytical methods. Cleanup concentrations for site soil containing pesticides are discussed below.

TPG Development Group (TPG) of Mountain View, California, is planning to prepare approximately 15 acres of the Sunnyside Nursery parcel for residential development. The Plymouth Group (Plymouth) previously received approval for developing residential housing on approximately 3.3 acres of the site (Tracts 6078, 6260, and part of Tract 6391).

BACKGROUND

The Sunnyside Nursery site is located at 29434 Mohr Drive in Hayward, California (Figure 1) and covers approximately 18.3 acres. The former plant nursery ceased operations in the fall of 1990.

Initial Investigations

Terratech Phase I

In January 1989, Terratech, Inc. (Terratech), of San Jose, California collected surface (4 to 10 inches below ground surface [bgs]) soil samples at 24 locations (soil samples HS-1 through HS-24) within the Sunnyside Nursery parcel as part of a preliminary soil characterization study. The soil sample locations as well as the concentration of pesticides detected are denoted on Sheet 1. The soil samples were analyzed for metals according to Environmental Protection Agency (EPA) Method 6010; volatile organic compounds (EPA Method 8240); oil and grease (Standard Method 413.1); benzene, toluene, ethylbenzene, and xylenes (EPA Method 8020); carbamates (EPA Method 632); and organochlorine pesticides and polychlorinated biphenyls (PCBs) according to EPA Method 8080. Analytical results from this soil sampling event indicated that organochlorine pesticides, including endosulfan-family compounds (endosulfan), DDT-family compounds (DDX), dieldrin, and endrin, were present in shallow soil throughout the site. No other pesticides were detected above laboratory detection limits. Concentrations of organochlorine pesticides are shown at each sample location on Sheet 1.

Relatively low concentrations of oil and grease constituents were detected in 3 near-surface soil samples (HS-18 through HS-20) collected from the former shop and boiler room area located in the northeast corner of the site. Analytical results and discussions of these sampling activities are included in Terratech's February 1989 report entitled "Phase I, Environmental/Toxics Investigation, Sunnyside Nursery, Hayward California" prepared for Plymouth.

The Terratech Phase I investigation indicated that the subsurface stratigraphy was generally consistent across the site. According to Terratech, the upper 4 feet of soil consists of sandy clay, which is underlain by interbedded layers of clay, sandy clay, and clayey sand to a depth of 32.5 feet bgs. Poorly graded sand with clay and gravel was encountered in only one Terratech boring (DH-5), from 26.5 feet to the bottom of the boring (31 feet bgs). Groundwater was encountered in all seven of Terratech's deep borings, with static water levels ranging from 11 to 12.5 feet bgs.

Health-based cleanup concentrations were developed for site soil containing pesticides by Environmental Risk Sciences, Inc. (ERS), of San Francisco, California. These cleanup concentrations were as follows: combined DDT-family compounds (referred to as DDX) - 1.0 milligram/kilogram (mg/kg); combined endosulfan-family compounds - 3.5 mg/kg; endrin - 0.2 mg/kg; dieldrin - 8.0 mg/kg. This work is discussed in the 22 June 1989 report entitled, "Health Risk Assessment, Sunnyside Commons Project, Hayward,

California," prepared by ERS for Plymouth. These cleanup concentrations were subsequently revised, as discussed later in this letter report.

In the following discussion, pesticide concentrations in soil that exceed the 1989 cleanup concentrations are referred to as "elevated concentrations." Elevated concentrations of endosulfan, DDX, and endrin were detected in soil samples collected during Terratech's January 1989 sampling event.

Terratech Phase II

In December 1990 and February 1991, shortly after the nursery stopped operating, Terratech collected near-surface (12 to 18 inches bgs) samples at 58 additional locations (RS-1 through RS-58) from the Sunnyside Nursery parcel (Sheet 1). These soil samples were analyzed for organochlorine pesticides and PCBs according to EPA Method 8080. DDX, endrin, and endosulfan were detected at elevated concentrations. Analytical results are shown at each sample location on Sheet 1 and discussions of these sampling activities and results are included in Terratech's 27 February letter report, "Status Report, Statistical Characterization of Pesticide Concentrations, Sunnyside Nursery" and their 25 March 1991 letter report "Table Summary of Pesticide Results, Sunnyside Nursery," prepared for Plymouth.

Geomatrix

In October 1991, Geomatrix collected near-surface (6 to 12 inches bgs) soil samples at 13 locations (GS-1 through GS-13) within the northern 6.5 acres of the site (Sheet 1); Plymouth originally intended to develop this portion of the Sunnyside Nursery site first. These samples were analyzed for organochlorine pesticides according to EPA Method 8080, carbamates (EPA Method 632), and organophosphate pesticides (EPA Method 8140), and arsenic and lead (EPA Methods 7061 and 7420, respectively). In addition, five near-surface soil samples (GS-HC-1 through GS-HC-5) were collected between 6 and 12 inches bgs from the former shop and boiler room area located in the northeast corner of the site (Sheet 1); these samples were analyzed for extractable hydrocarbons as diesel and oil according to EPA Method 3550/GCFID.

Analytical results from this sampling event indicated that DDT-family pesticides were present in surface soil at the site; endrin and endosulfan were not detected. The concentrations of arsenic and lead detected in the two soil samples are considered to be within background concentrations. Relatively low concentrations of extractable hydrocarbons as diesel were detected in three of the five soil samples; these concentrations were 2 mg/kg, 15 mg/kg, and 400 mg/kg.

The analytical results from the October 1991 soil sampling event are included in the 6 November 1991 report entitled "Soil Investigation Report, Sunnyside Nursery - Phase I Development, Sunnyside Nursery, Hayward, California" prepared for Plymouth. Pesticide analytical results are shown at each sample location on Sheet 1.

Areas Approved for Residential Development

Plymouth has gained approval for residential development of portions of three tracts within the Sunnyside Nursery parcel. These three tracts, as well as soil investigations conducted within them, are described below.

Tract 6078

This tract consists of 12 lots within a former residential area that borders Mohr Avenue and the western side of the Sunnyside Nursery facility and covers approximately 1.8 acres (Sheet 1). In December 1990, Terratech collected three near-surface soil samples (RS-13, RS-17, and RS-31) from within the Tract 6078 area; no pesticides were detected in these soil samples. In August 1992, Geomatrix collected a total of ten soil samples from within the Tract 6078 area; four soil samples (A-1 through A-4) were collected from 3 to 6 inches below ground surface, and six samples (B-1 through B-3 and B-5 through B-7) were collected from 12 to 18 inches below the ground surface. All ten soil samples were analyzed for organochlorine pesticides and PCBs (EPA Method 8080), organophosphate pesticides (EPA Method 8140), carbamates and urea-based pesticides and herbicides (EPA Method 632). In addition, two soil samples (A-3 and A-4) were analyzed for California Code of Regulations Title 22 Metals (EPA Methods 6010 and 7000 series). The locations of these soil samples as well as concentration of pesticides detected are shown on Sheet 1.

No EPA Method 8080 compounds were detected in nine of the samples; relatively low concentrations of DDT-family compounds were detected in sample A-2. No organophosphate pesticides (EPA Method 8140) were detected in any of the samples. No EPA Method 632 compounds were detected in nine of the samples; a relatively low concentration of diuron (0.03 mg/kg) was detected in sample A-3. The concentrations of metals detected in the soil samples are considered to be within background concentrations.

The analytical results from the sampling event cited above are included in the 3 September 1992 letter report to Dr. Ravi Arulanantham of ACHCSA entitled "Results of Supplemental Sampling/Approval of Proposed Site Use, Sunnyside Nursery, Hayward, California." This tract was cleared by the ACHCSA for development.

Tract 6260

This tract consists of nine lots covering an approximately 1.0-acre area within the former Sunnyside Commons II area that borders Mohr Drive (Sheet 1). In February 1990, Terratech collected four (HS-1 through HS-4) near-surface soil samples from between 12 and 18 inches bgs in this area. An elevated concentration of aroclor 1254 (1.4 mg/kg), a PCB, was detected in sample HS-3. Plymouth reportedly removed soil in the vicinity of this sample location and conducted confirmation sampling.

Plymouth used a PCB cleanup concentration for site soil of 1 mg/kg. The PCB Spill Cleanup Policy (1987, 40 CFR Part 761.120) establishes different PCB cleanup levels for "unrestricted access areas" and "restricted access areas." In restricted access areas, the Spill Cleanup Policy requires cleanup of affected soil to 10 mg/kg PCBs, as well as excavation of the top 10 inches of soil to 1 mg/kg and replacement with clean backfill. In restricted access areas (areas that are at least 0.1 kilometer from a residential/commercial area and limited by man-made or natural barriers), the policy requires soil cleanup to 25 mg/kg PCBs by weight. Under certain conditions, the Spill Cleanup Policy may allow less stringent cleanup levels.

In January 1993, Geomatrix collected 4 statistically authoritative soil samples (NS-1 through NS-4) from approximately 6 to 12 inches below ground surface in the tract 6260 area. These samples were analyzed for organochlorine pesticides and PCBs according to EPA Method 8140 and organophosphate pesticides according to EPA Method 8140. No organophosphate pesticides were detected in the soil samples. Relatively low concentrations of organochlorine compounds were detected in the soil samples, including 4,4'-DDT at 0.017 and 0.062 mg/kg; 4,4'-DDE at 0.086 mg/kg; and, endrin at 0.110 mg/kg. Aroclor 1254 was detected at a concentration of 1.6 mg/kg in one of the soil samples; the source of the elevated concentration of aroclor is not known. Sampling locations and analytical results are shown on Sheet 1.

In April 1993, approximately 17 cubic yards of soil was removed in the area where the soil sample that contained Aroclor 1254 was collected; PCBs were not detected in the confirmation soil samples collected from within the excavation. The soil was transported under Non-Hazardous Waste Manifest to Forward, Inc., a state-licensed Class III disposal facility in Stockton, California.

Details about the 1993 sampling, analytical results, and removal in this area are presented in the 12 May 1993 letter report to ACHCSA entitled "Results of Supplemental Soil Sampling and Removal of Soil Containing PCBs, Phase II Development Area, Sunnyside Nursery, Hayward, California." This tract was cleared by the ACHCSA for development.

Tract 6391

The first five lots to be developed within this tract border Mohr Drive in the southwest corner of the Sunnyside Nursery site and cover approximately 0.5 acre (Sheet 1). Terratech's sampling in 1989-1991 included 5 near-surface soil samples within this area (HS-15, RS-21, RS-41, RS-49, and RS-58; Sheet 1). Elevated concentrations of endosulfan were detected in samples RS-41 and HS-15 at 26.7 and 11.4 mg/kg, respectively. In February 1993, Geomatrix collected both surface (0 to 6 inches below ground surface) and near-surface (6 to 12 inches below ground surface) soil samples at eight locations within this area (B-1 through B-8; Sheet 1); two samples were collected in the vicinity of the Terratech samples that contained elevated concentrations of endosulfan. These samples were analyzed for organochlorine pesticides and PCBs according to EPA Method 8080. Relatively low concentrations of dieldrin, endrin, and endosulfan were detected in three samples; no EPA Method 8080 compounds were detected in the other samples. Organophosphate pesticides (EPA Method 8140) were not detected in the three previous sampling events conducted by Geomatrix; therefore, this analysis was not conducted, as discussed in our 28 January 1993 letter to Dr. Ravi Arulanantham of the ACHCSA. Analytical results for samples collected at locations B-1 through B-8 are presented on Sheet 1.

In March 1993, Geomatrix researched the environmental fate of endosulfan in surface soil. The results from this research indicated that endosulfan compounds break down in natural settings either biotically or abiotically, and have half-lives in soil of several days to a few months.

In April 1993, Geomatrix collected five additional soil samples (designated B-9 through B-13) near the two locations where Terratech had collected soil samples that contained elevated concentrations of endosulfan. Surface samples (3 to 6 inches bgs) were collected from boring locations B-9, B-11, and B-13, and near-surface samples were collected at boring locations B-10 and B-12 (Sheet 1). No endosulfan-family compounds were detected in these samples, which confirmed that the endosulfans detected in the earlier samples had degraded. Geomatrix discussed these findings with Dr. Arulanantham of ACHCSA, and Dr. Arulanantham cleared this area for residential development.

Both the memorandum summarizing Geomatrix's research on endosulfan-family compounds and the analytical results from the Tract 6391 sampling events also are included in the 12 May 1993 letter report to ACHCSA entitled "Results of Supplemental Soil Sampling and Removal of Soil Containing PCBs, Phase II Development Area, Sunnyside Nursery, Hayward, California."

PROPOSED SOIL CLEANUP CONCENTRATIONS

Final pesticide cleanup concentrations for site soil were agreed upon during a meeting between Geomatrix and representatives of the ACHCSA and HFD on 29 October 1993. These compound-specific soil cleanup concentrations are based upon EPA, California State Department of Toxic Substances Control, and ACHCSA guidelines for residential development and are as follows:

- 0.9 mg/kg-DDX, where DDX equals the sum of DDD, DDE, and DDT
- 0.2 mg/kg-endrin
- 3.5 mg/kg-endosulfan
- 0.9 mg/kg-chlordane
- 0.075 mg/kg-dieldrin
- 1.0 mg/kg-PCBs

PROPOSED DEVELOPMENT AREA

The proposed development area consists of approximately 15 acres of the former Sunnyside Nursery parcel located east and north of the areas currently approved for development (Sheet 1). Elevated concentrations of endrin, endosulfans, chlordane, and DDX were previously detected in surface soil in this portion of the site (Terratech, 1989, 1990, and 1991; Geomatrix, 1991, 1992, and 1993). The distribution of these compounds is discussed below in the Proposed Soil Sampling Work Plan. In addition, total petroleum hydrocarbons as oil and grease were detected in surface soil in the northeast corner of the parcel in the vicinity of a former boiler and above ground fuel tanks.

PROPOSED SOIL SAMPLING WORK PLAN

Geomatrix proposes to collect a set of surface and near-surface soil samples at 51 locations (total of 102 samples) within the proposed development area (Sheet 2). Surface soil samples will be collected from 3 to 6 inches bgs and near-surface soil samples will be collected from 6 to 12 inches bgs. Soil samples will be collected to:

- confirm the absence of elevated concentrations of endosulfan (confirmation sampling)

- characterize the distribution of endrin, chlordane, and DDT in surface soil for remediation planning (characterization sampling)

- provide additional site coverage for identifying the presence of endrin, endosulfan, chlordane, dieldrin, and DDT (supplemental sampling)

- further characterize the distribution of diesel in surface soil near the former shop and boiler room area (diesel characterization).

The soil samples will be collected in accordance with local regulating agency requirements and Geomatrix protocols. Soil sampling activities are described in greater detail below.

Confirmation Sampling

Four soil samples collected by Terratech within the proposed development area contained elevated concentrations of endosulfan only (Sheet 1). Based on our research concerning the breakdown of endosulfan, Geomatrix believes that the absence of elevated concentrations of endosulfan in the proposed confirmation samples will indicate that the endosulfan detected in soil samples collected by Terratech has degraded and is no longer present at significant concentrations at these locations. Geomatrix proposes to collect a set of soil samples to confirm the absence of elevated concentrations of endosulfan in surface soil at these four locations (Sheet 2). In response to your request that the former drainage ditch along Mohr Drive be sampled, one of the confirmation samples (CNS-4) will be obtained from within the former drainage ditch.

Characterization Sampling

Elevated concentrations of endrin and/or DDT were detected in surface soil samples collected by Geomatrix and Terratech at 18 former sampling locations within the proposed development area. Geomatrix proposes to collect soil samples near these 18 locations (Sheet 2) for organochlorine pesticide analysis to characterize the extent of elevated concentrations of endrin and/or DDT in these areas.

Supplemental Sampling

Soil samples will be collected from 24 locations within the proposed development area (Sheet 2) to further characterize the distribution of endrin and DDT in surface soil. The locations will be in areas where soil samples were not previously collected and will be intended to supplement the previous sampling events. This additional soil sampling for

pesticide analysis will increase the sampling coverage to approximately 8 pesticide sample locations per acre.

Diesel Characterization

Soil samples will be collected from 5 locations within the area of the former shop and boiler room (Sheet 2). These sample locations will be selected to evaluate concentrations of diesel in surface soils and to supplement previous sampling events.

Laboratory Analysis

Geomatrix will deliver the 102 samples, under Geomatrix chain-of-custody procedures to a state-certified analytical laboratory for chemical analysis. Confirmation, characterization, and supplemental soil samples will be analyzed for chlorinated pesticides and PCBs according to EPA Method 8080. In addition, Geomatrix will select a few of the characterization soil samples to be analyzed for carbamates according to EPA Method 632. These samples will be selected from areas that previously had the highest concentrations of pesticides detected in surface soils. The diesel characterization soil samples will be analyzed for total petroleum hydrocarbons as diesel according to EPA Method 3550/GCFID.

Initially, soil samples collected from 3 to 6 inches below ground surface will be analyzed. If pesticides or hydrocarbons are detected at significant concentrations in the shallower sample, the deeper soil sample collected at this location will then be analyzed.

Organophosphate pesticides, volatile organic compounds, and elevated concentrations of metals have not been detected in surface soil within the site during previous soil sampling events; for this reason, we propose that the soil samples collected during this sampling plan not be analyzed for these constituents.

DEVELOPMENT OF REMEDIAL ACTION WORK PLAN

Based on the findings of the soil sampling work plan outline above, and work previously completed in the proposed development, Geomatrix will assess the extent of soil within the site that contains elevated concentrations of pesticides, and design a remedial action work plan. During preparation of the preliminary remedial action work plan, Geomatrix will meet with the HFD and the ACHCSA to discuss the analytical results and to refine remedial approaches. Based on discussions with the HFD and the ACHCSA, Geomatrix will prepare a remedial action work plan for review by the ACHCSA and the HFD. The

work plan will be a technical report that describes the findings of the soil sampling work plan, remedial activities to be performed, and the proposed time schedule. The plan will include a confirmation sampling program, per HFD request.

SCHEDULE

Due to the potential onset of winter rains, we would appreciate receiving your and Dr. Ravi Arulanantham's approval for this soil sampling work plan as soon as possible. Activities proposed in this work plan can be initiated immediately upon authorization. The soil sampling can be completed within one to two weeks, depending on availability of a sample rig/backhoe. Standard laboratory turnaround time for chemical analyses is two weeks. The Remedial Action Work Plan can be submitted for your review within 2 weeks of receipt of analytical results. The Work Plan will be finalized upon receipt of your comments.

Please contact either of the undersigned if you have any questions.

Sincerely,

GEOMATRIX CONSULTANTS, INC.

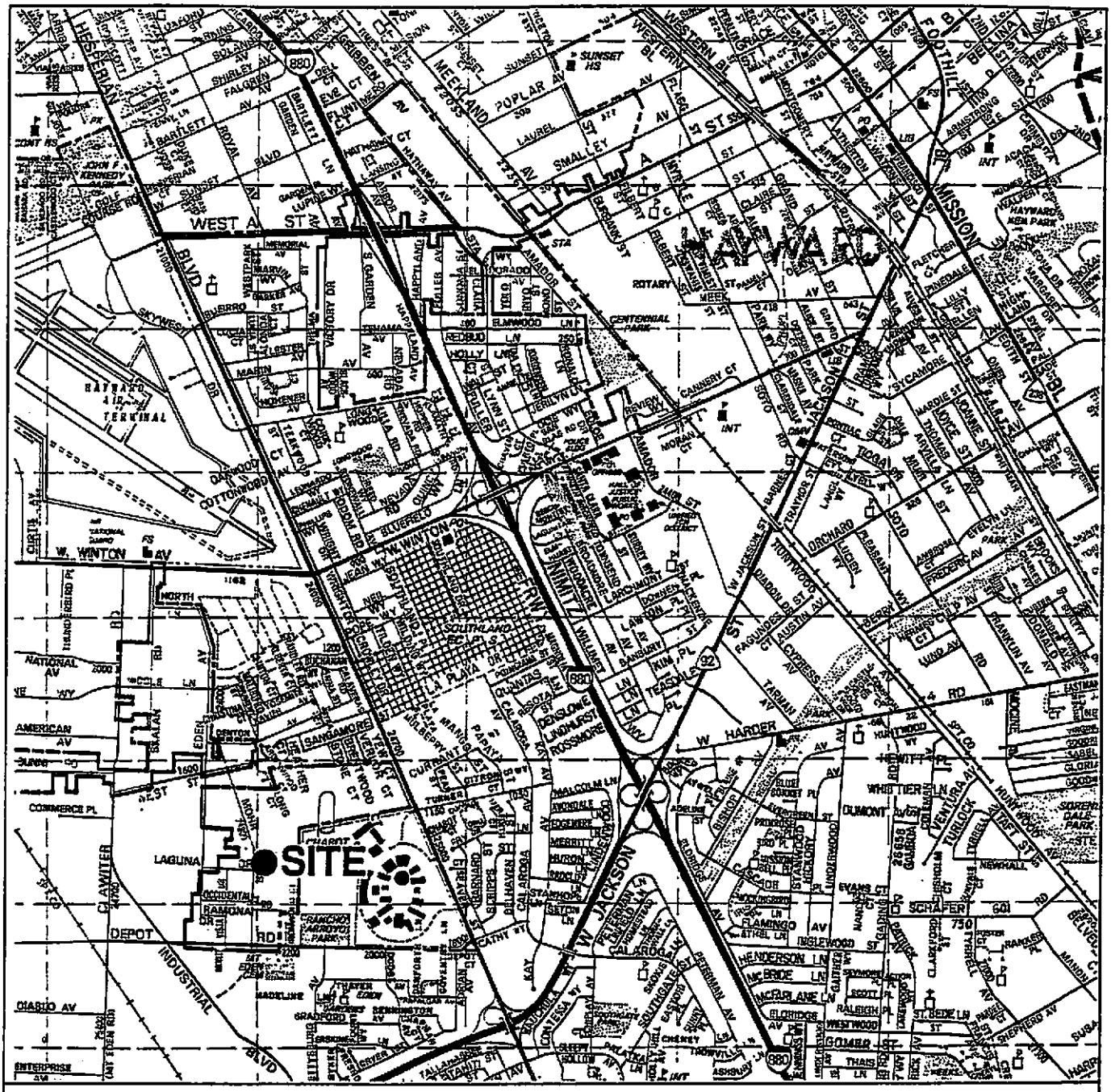
Jeffrey C. Nelson, P.E.
Project Engineer

REGISTERED PROFESSIONAL ENGINEER
TOM GRAF
No. 34719
CALIFORNIA

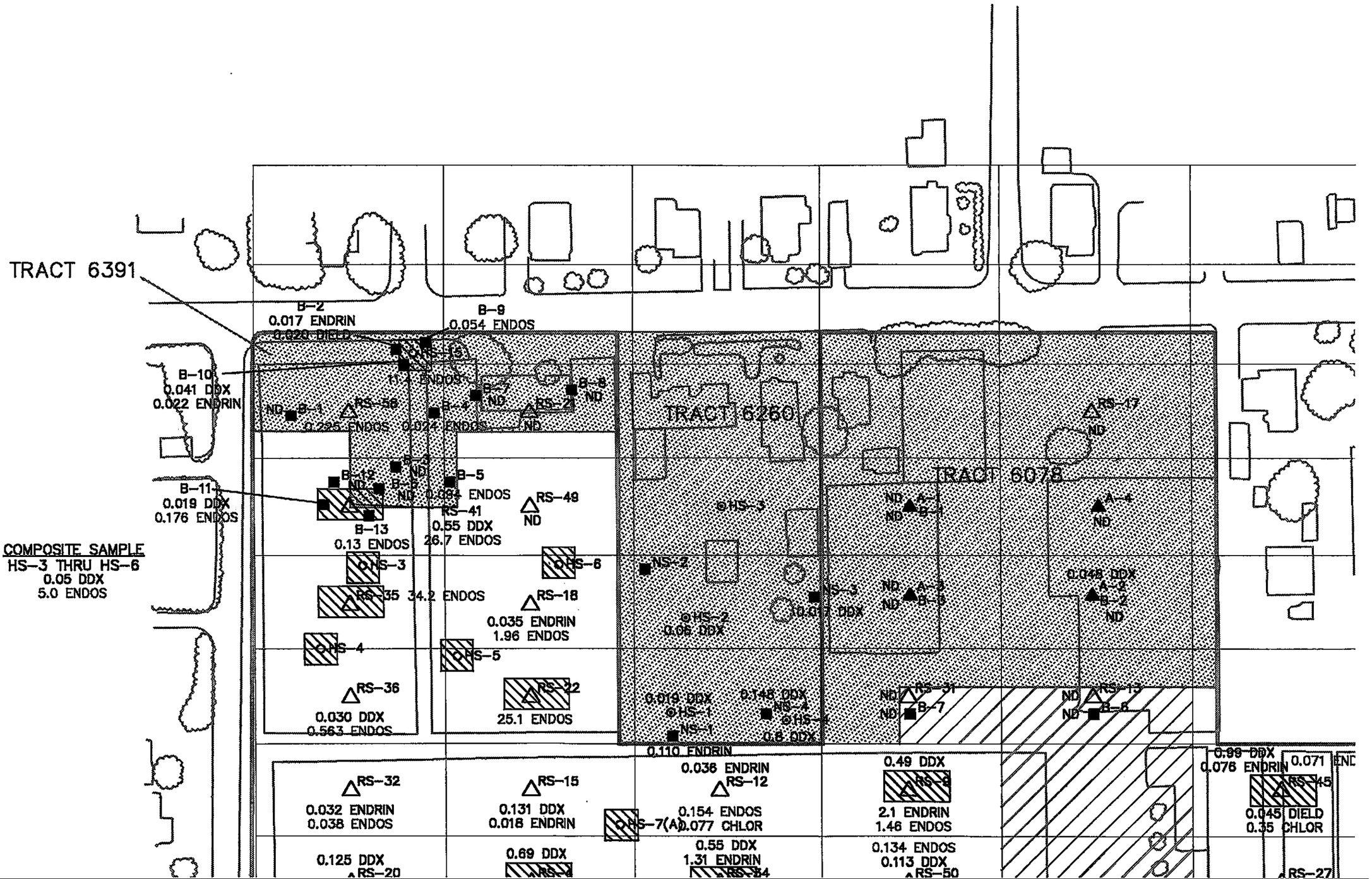
Tom Graf, P.E.
Vice President

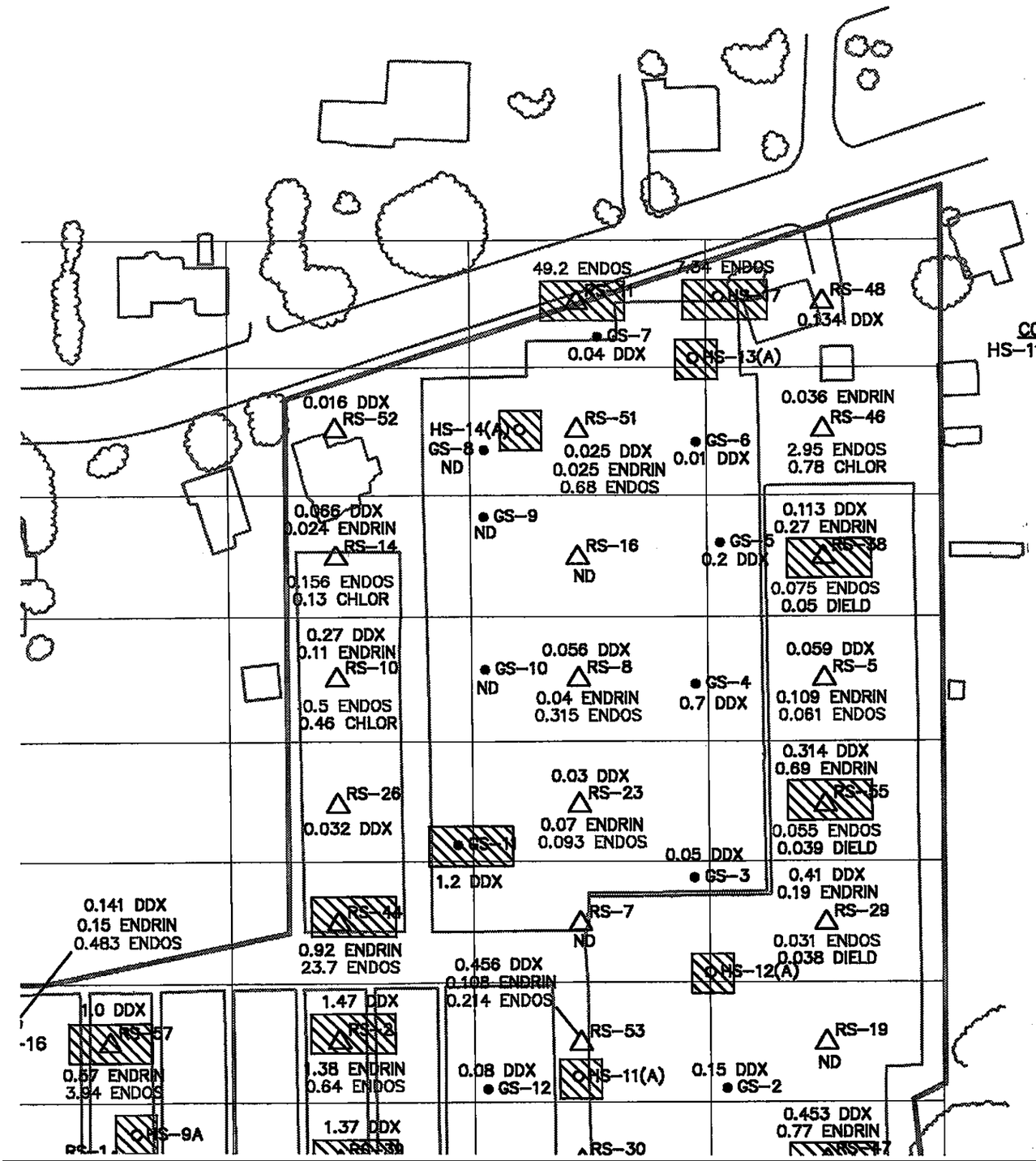
JCN/slr
CONTR\1886\3-WP.LTR

cc: Dr. Ravi Arulanantham, ACHCSA



GEOMATRIX	SITE LOCATION MAP Phase II Development Area Sunnyside Nursery Hayward, California	Figure 1 Project No. 1886.01

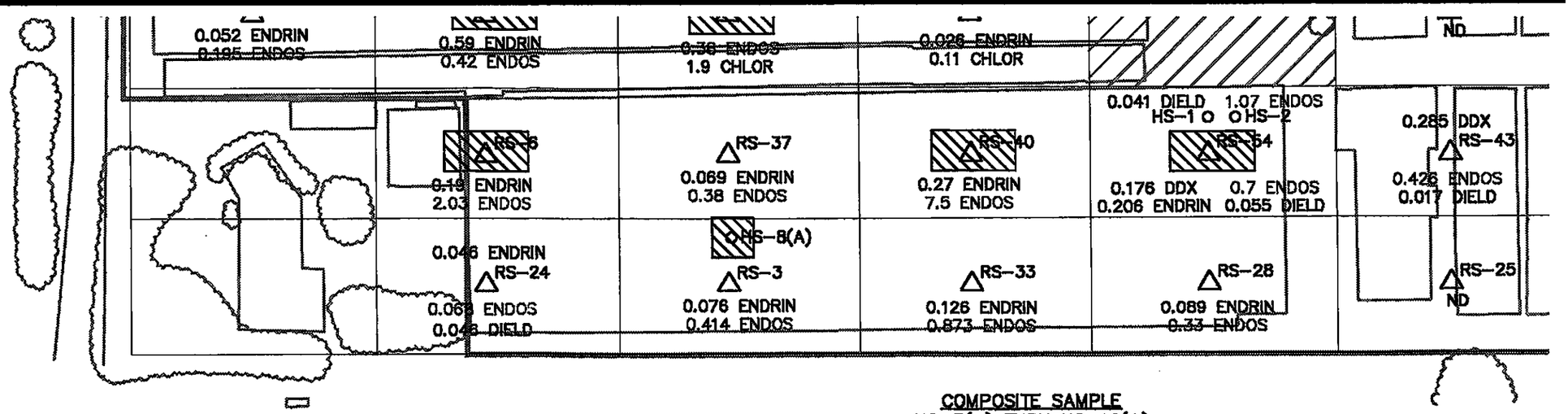

TRACT 6391
B-2
0.017 ENDRIN
0.020 DIELD
B-9
0.054 ENDOS
B-10
0.041 DDX
0.022 ENDRIN
B-11
0.019 DDX
0.176 ENDOS
COMPOSITE SAMPLE
HS-3 THRU HS-6
0.05 DDX
5.0 ENDOS
RS-58
RS-21
RS-41
0.55 DDX
26.7 ENDOS
RS-49
B-13
0.13 ENDOS
RS-35 34.2 ENDOS
RS-18
0.035 ENDRIN
1.96 ENDOS
RS-36
0.030 DDX
0.563 ENDOS
25.1 ENDOS
TRACT 6260
TRACT 6078
RS-17
RS-32
0.032 ENDRIN
0.038 ENDOS
RS-15
0.131 DDX
0.018 ENDRIN
RS-12
0.154 ENDOS
0.077 CHLOR
0.036 ENDRIN
0.110 ENDRIN
0.49 DDX
2.1 ENDRIN
1.46 ENDOS
0.99 DDX
0.076 ENDRIN
0.071
0.045 DIELD
0.35 CHLOR
0.125 DDX
RS-20
0.69 DDX
0.55 DDX
1.31 ENDRIN
0.134 ENDOS
0.113 DDX
RS-50
RS-27



COMPOSITE SAMPLE
HS-11(A) THRU HS-14(A)
1.3 ENDRIN
16.3 ENDOS

LEGEND

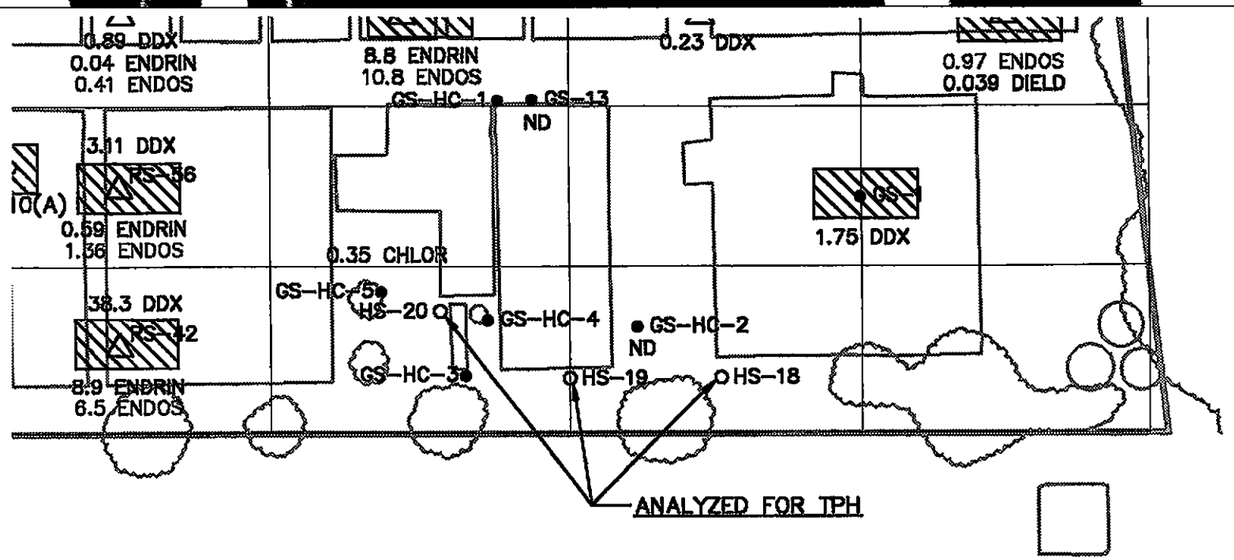
○ HS-13(A)	SURFACE (4" TO 10") TERRATECH SOIL SAMPLE – JANUARY 1989
⊙ HS-3	NEAR SURFACE (12" TO 18") TERRATECH SOIL SAMPLE – FEBUARY 1990
△ RS-58	SURFACE (6" TO 12") TERRATECH SOIL SAMPLE – DECEMBER 1990 AND FEBUARY 1991
● GS-7	SURFACE (6" TO 12") GEOMATRIX SOIL SAMPLE – OCTOBER 1991
▲ A-1 / B-1	SURFACE (A-1, 0" TO 6") AND NEAR SURFACE (B-1, 18") GEOMATRIX SOIL SAMPLE – AUGUST 1992
■ B-1 / NS-1	SURFACE (B-1, 0" TO 6") AND NEAR SURFACE (NS-1, 6" TO 12") GEOMATRIX SOIL SAMPLE – JANUARY/FEBUARY 1993
0.20 DDX	CONCENTRATION IN mg/kg OF DDD + DDE + DDT
0.15 ENDRIN	CONCENTRATION IN mg/kg OF ENDRIN
0.15 ENDOS	CONCENTRATION IN mg/kg OF ENDOSULFANS
0.045 DIELD	CONCENTRATION IN mg/kg OF DIELDRIN
0.35 CHLOR	CONCENTRATION IN mg/kg OF CHLORDANE



NO.	DATE	REVISION	BY	NO.	DATE	REVISION	BY

Approval: JC Nelson

Date: 11/91



GS-1 — SOIL SAMPLE CONCENTRATION ≥ 0.9 mg/kg DDX

HS-17 — SOIL SAMPLE CONCENTRATION ≥ 0.2 mg/kg ENDRIN

HS-11 — SOIL SAMPLE CONCENTRATION ≥ 3.5 mg/kg ENDOSULFAN

HS-14 — SOIL SAMPLE CONCENTRATION ≥ 0.9 mg/kg CHLORDANE

TRACTS ALREADY DEVELOPED

ND — NO DETECTION

PROPERTY BOUNDARY
NO DETECTION

CELLS BEING EXCLUDED DUE TO PAVEMENT/SLAB COVER AND NO PESTICIDE APPLICATION

0 80'

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GEOMATRIX

Geomatrix Consultants, Inc.
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Sunnyside Nursery
Hayward, California

SITE PLAN
HISTORIC SOIL SAMPLING LOCATIONS AND PESTICIDE ANALYTICAL RESULTS

1886.03
Project No.

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Sheet