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T SB16-94-11	Temporary groundwater sampling point
MW76-93-7	Groundwater monitoring well
SB76-94-01	Soil boring
SB76-94-04	Angled soil boring
SS51-97-1	Shallow soil sample location
SG-76W-7	Soil-gas probe
	Shallow soil-gas sampling location
7-95-1	Soil-gas monitoring well
VZM-OT-1	Vadose zone monitoring well
L-3	Vacuum lysimeter
P PZ 51-92-3	Piezometer
SSW-C.63	Slope stability well
SI-8.107	Slope indicator well
EW 7B-96-1	Extraction well
T SB16-94-11	Properly destroyed groundwater monitoring well or temporary groundwater sampling point
MW76-93-7	
	Soil sampling location (in soil borings)
	Sample location was excavated

LT	Less than reporting limit
ND (or <)	Not detected
NS	Not sampled
NA	Not analyzed
17	Surface structure (e.g., buildings, etc.)
A — A'	Cross section
	Sanitary sewer line
	Abandoned sanitary sewer
	Storm drain line
	LBNL site boundary
750	Water level elevation contour line (feet)
900	Topographic contour line (feet)
51-01-09	Hydrauger
	Solid Waste Management Unit
	Area of Concern

NOTE: Other symbols used are explained on the figures.

Figure C-1. Key to Symbols Used on Figures.

C-1 Symbols.ai
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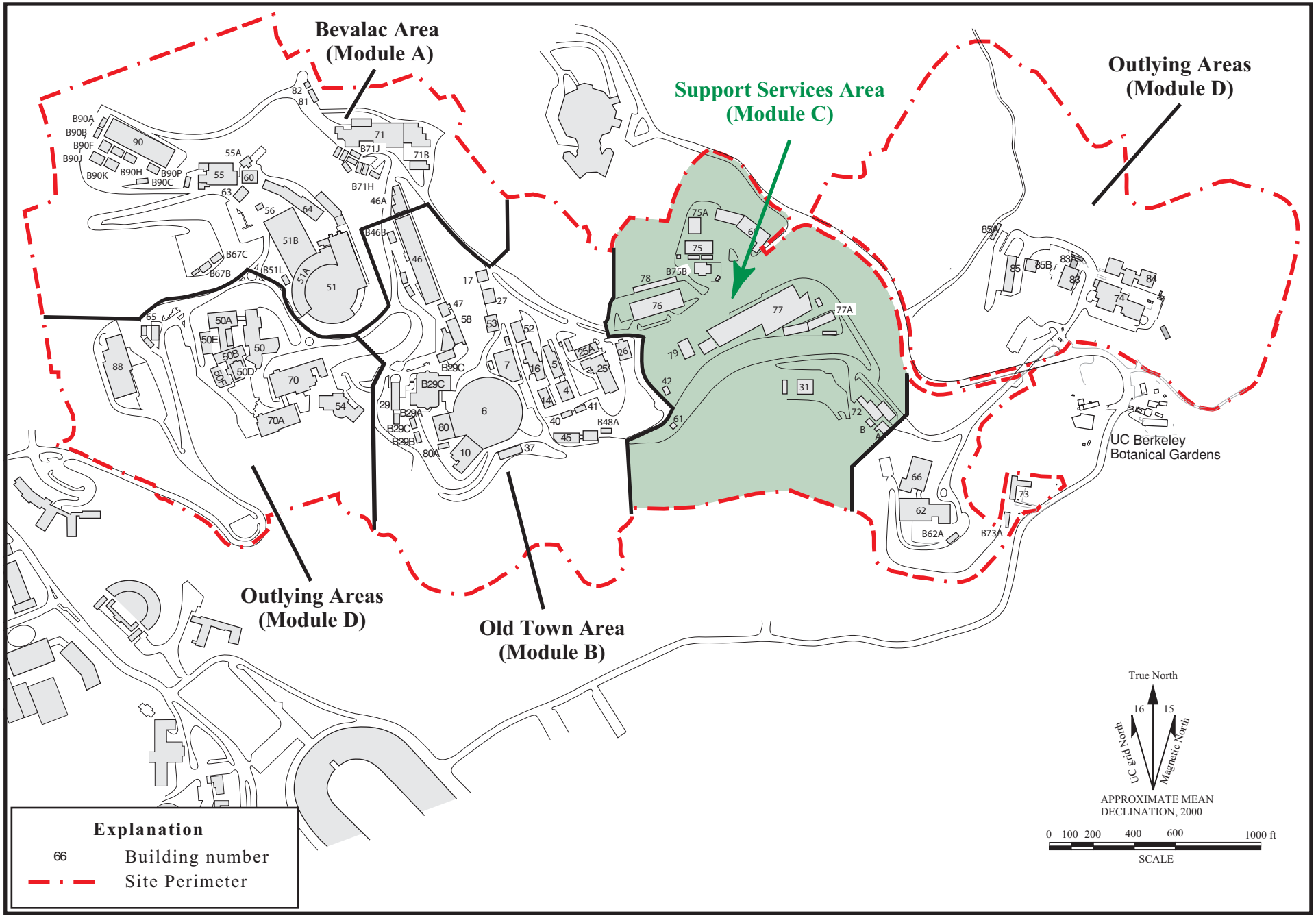
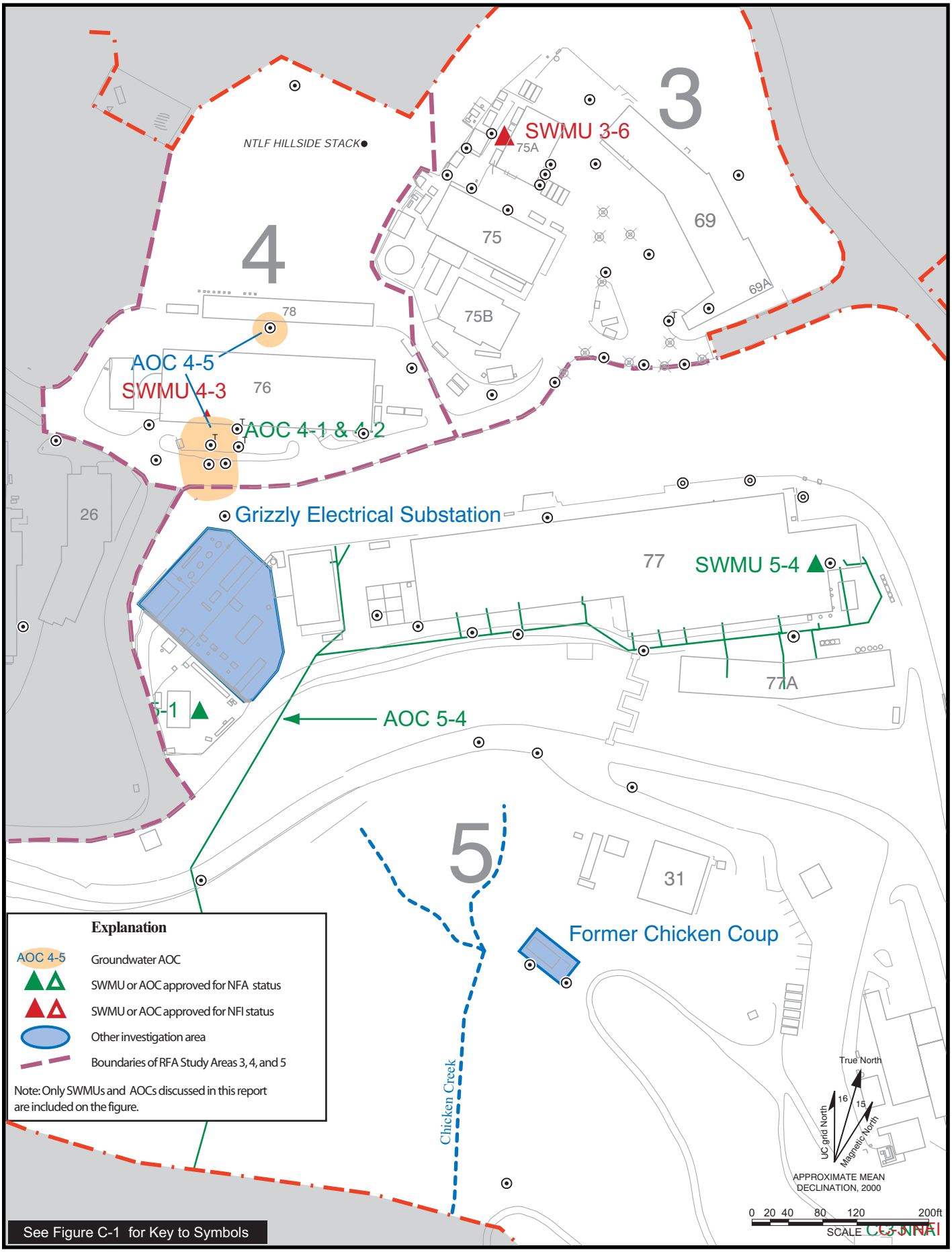


Figure C-2. Location of the Support Services Area, Lawrence Berkeley National Laboratory.

C-2.ai
09/00



SupportServicesArea.ai
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Figure C-3. Locations of SWMUs, AOCs, and Other Investigation Areas in the Support Services Area Discussed in Module C.

Age	Formation	Description
Quaternary	Artificial fill	Generally engineered fill consisting of fine-grained material. Older fills include vegetative and other debris.
	Colluvium	Predominantly clayey silt.
	Debris flows	Boulders and gravels of basalt, chert, and porcelenite in a silty clay matrix.
	Landslides	Translational/rotational slide masses incorporating bedrock. Occur at the Moraga/Orinda Formation contact.

	WEST OF HAYWARD FAULT	EAST OF HAYWARD FAULT					
		West of Life Sciences Area Main Canyon Landslide Deposit			*East of Life Sciences Area Main Canyon Landslide Deposit*		
Age		**Group**	**Formation**	**Description**	**Group**	**Formation**	**Description**
Tertiary		Contra Costa	Moraga	Andesitic flows, breccias, and agglomerates with minor amounts of basaltic flows and interbedded volcaniclastic sandstone and conglomerate.	San Pablo (?)	Neroly	Fossiliferous, shallow marine, fine grained sandstones with minor amounts of siltstone.
			Orinda	Alluvial sedimentary deposits consisting primarily of claystone and siltstone with lenticular to linear beds of sandstone and conglomerate.		Briones	Fossiliferous, shallow marine, fine grained sandstones with minor amounts of siltstone.
					Monterey	Claremont	Chert and shale with minor amounts of sandstone.
Cretaceous		Great Valley		Marine mudstones, shales, and sandstones.			
Jurassic	Franciscan Complex						

Figure C2.1-1. Stratigraphic Correlation Chart, Lawrence Berkeley National Laboratory.

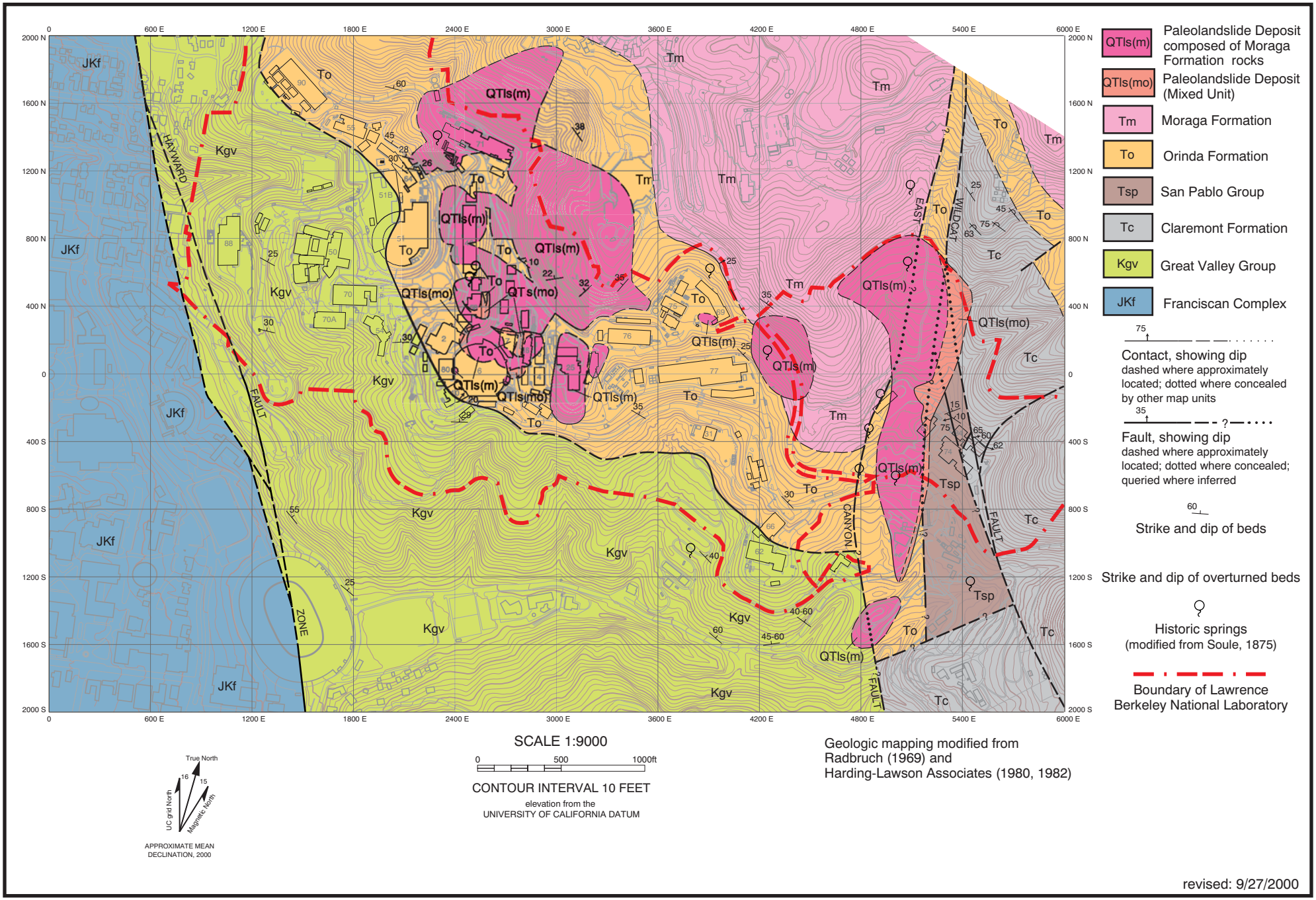

Figure C2.1-2. Bedrock Geologic Map, Lawrence Berkeley National Laboratory.

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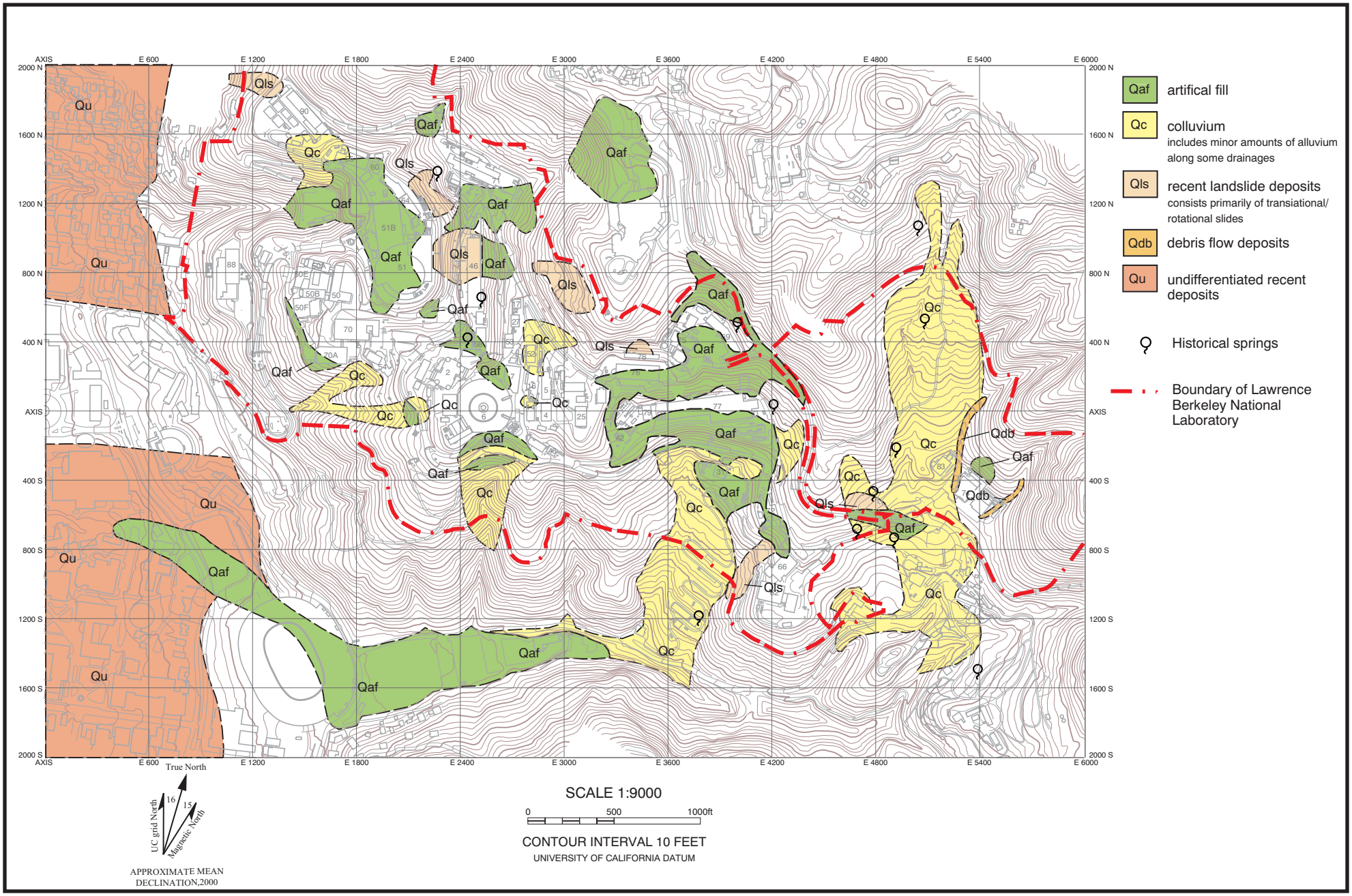

Figure C2.1-3 Surficial Geologic Map (modified from Harding-Lawson Associates, 1982).

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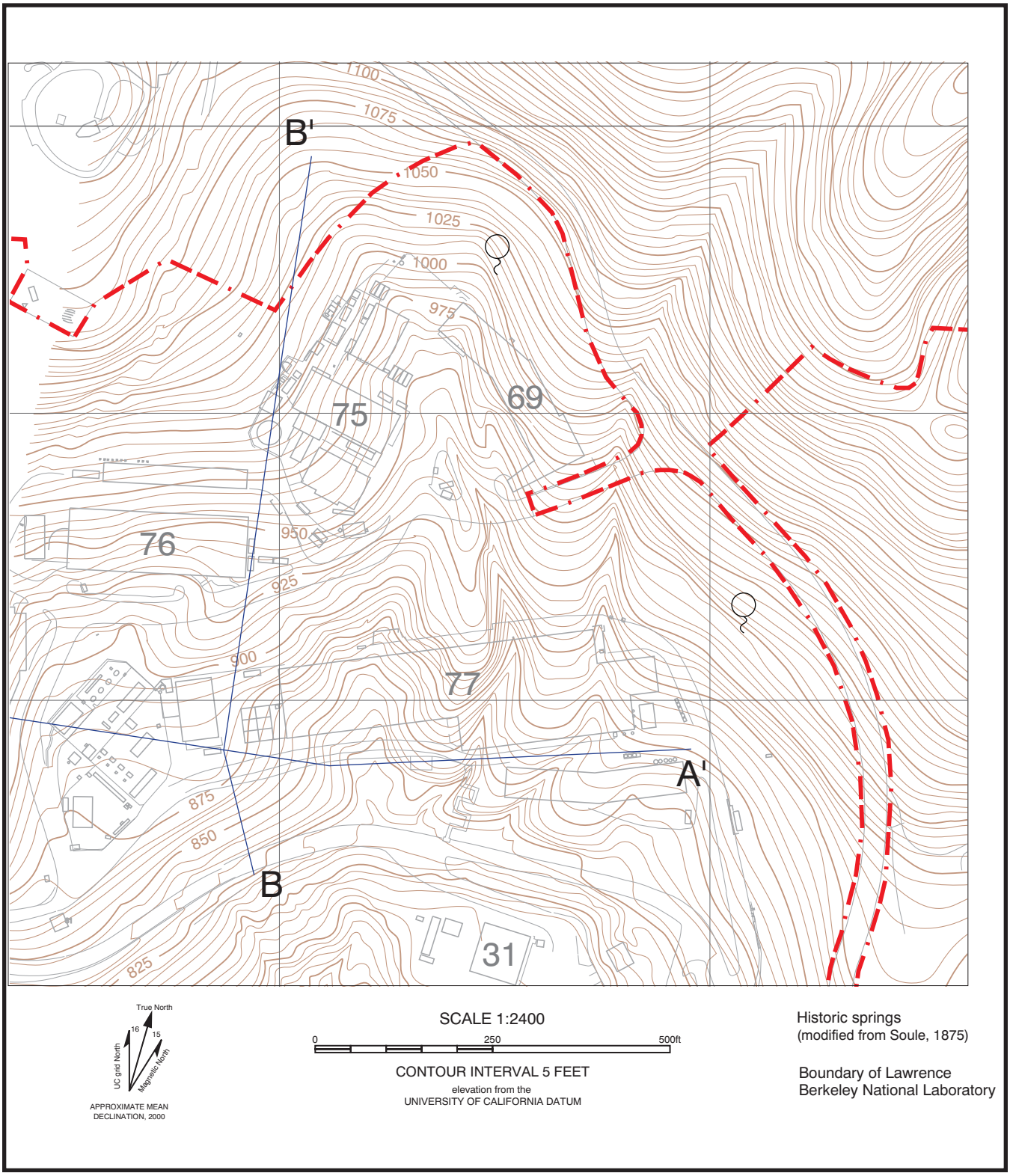
09/00



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C2.2-1.ai
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Figure C2.2-1. Pre-Development (1956) Topography of Support Services Area (modified from Hammon, Jensen, and Wallen, 1956).

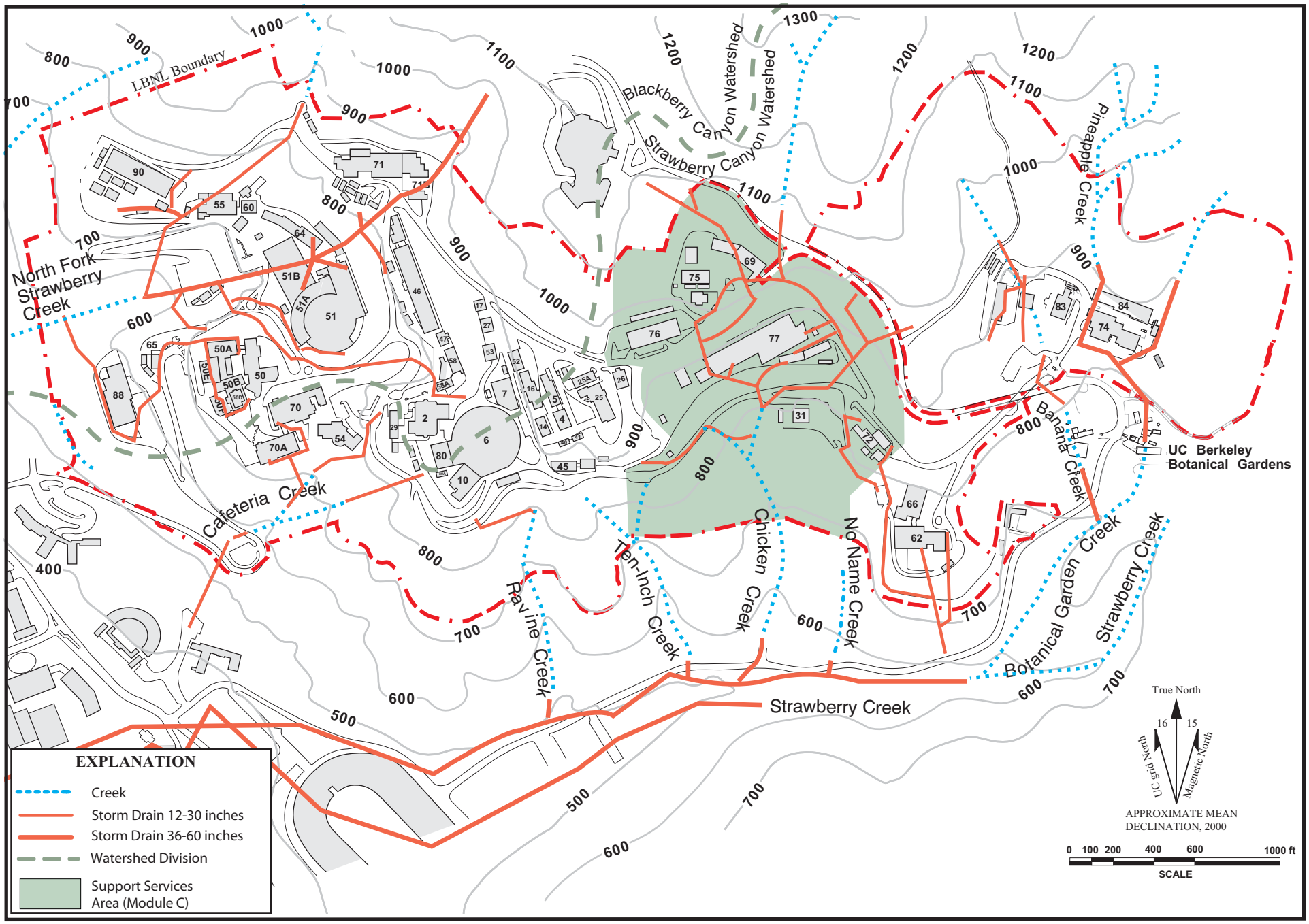

Figure C2.2-2. LBNL Surface Hydrology and Stormwater Drainage System.

C2.2-2.ai
09/00

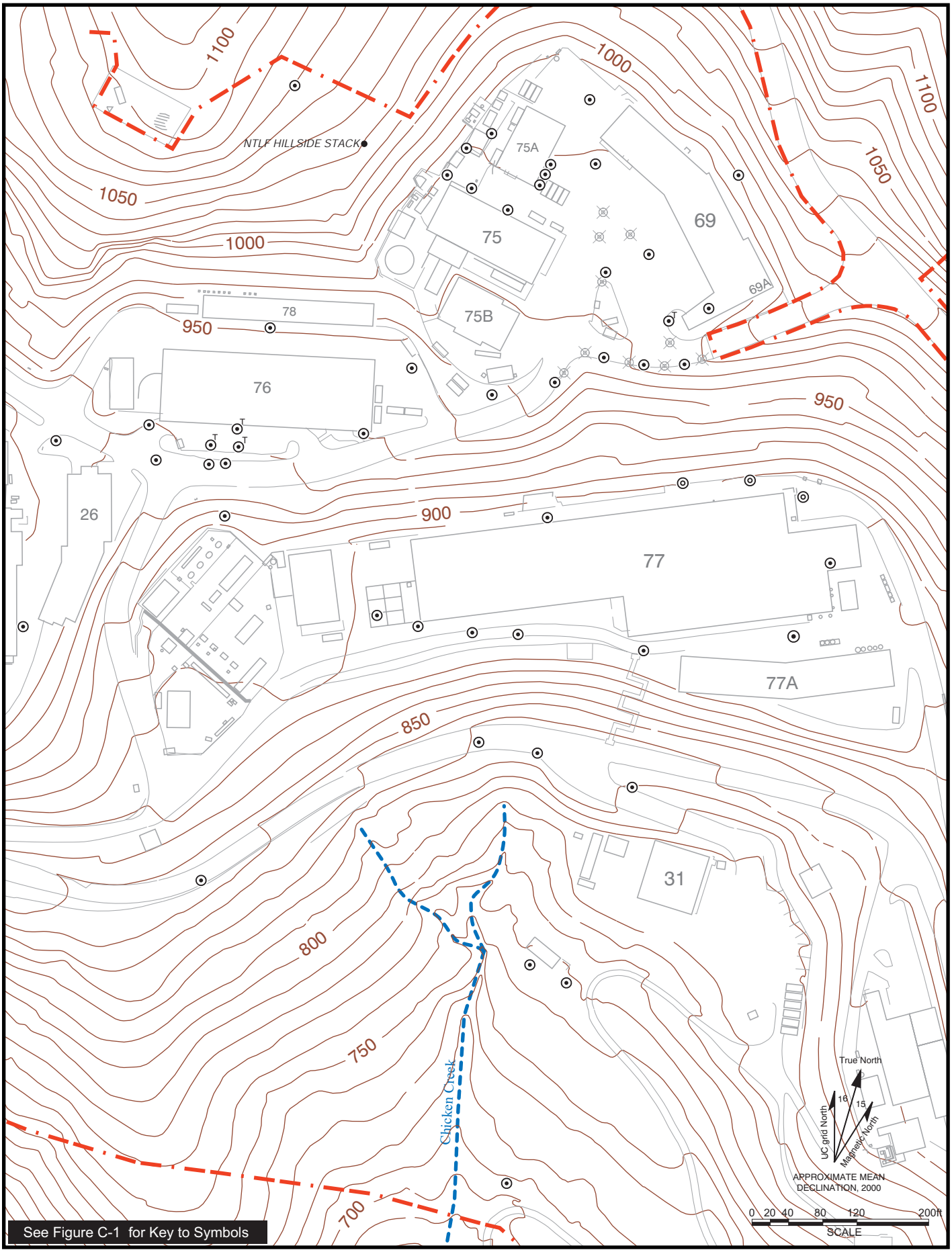

Figure C2.2-3. Topography of Support Services Area.

SupportServicesArea.ai
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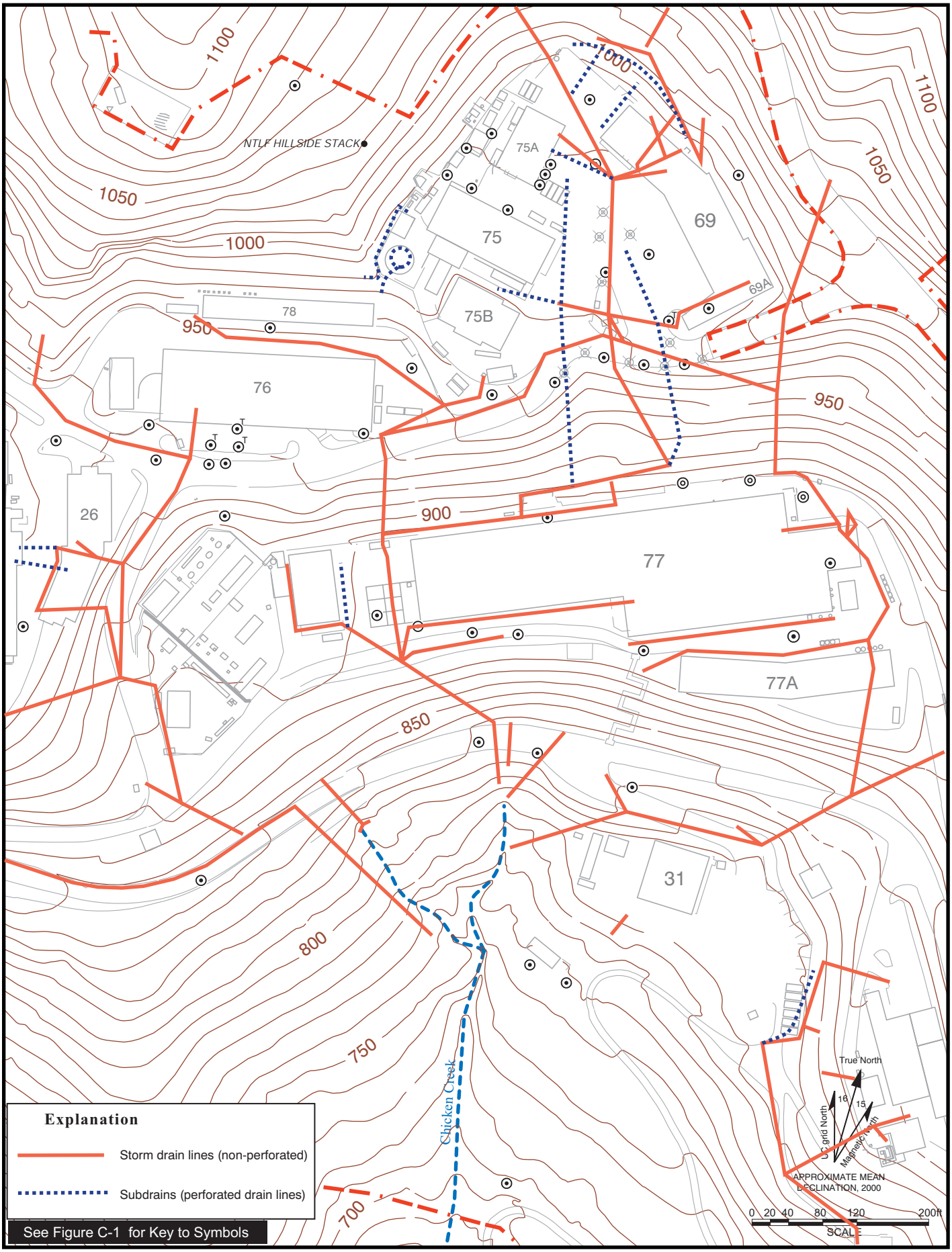

SupportServicesArea.ai
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Figure C2.2-4. Support Services Area Storm Drainage System.

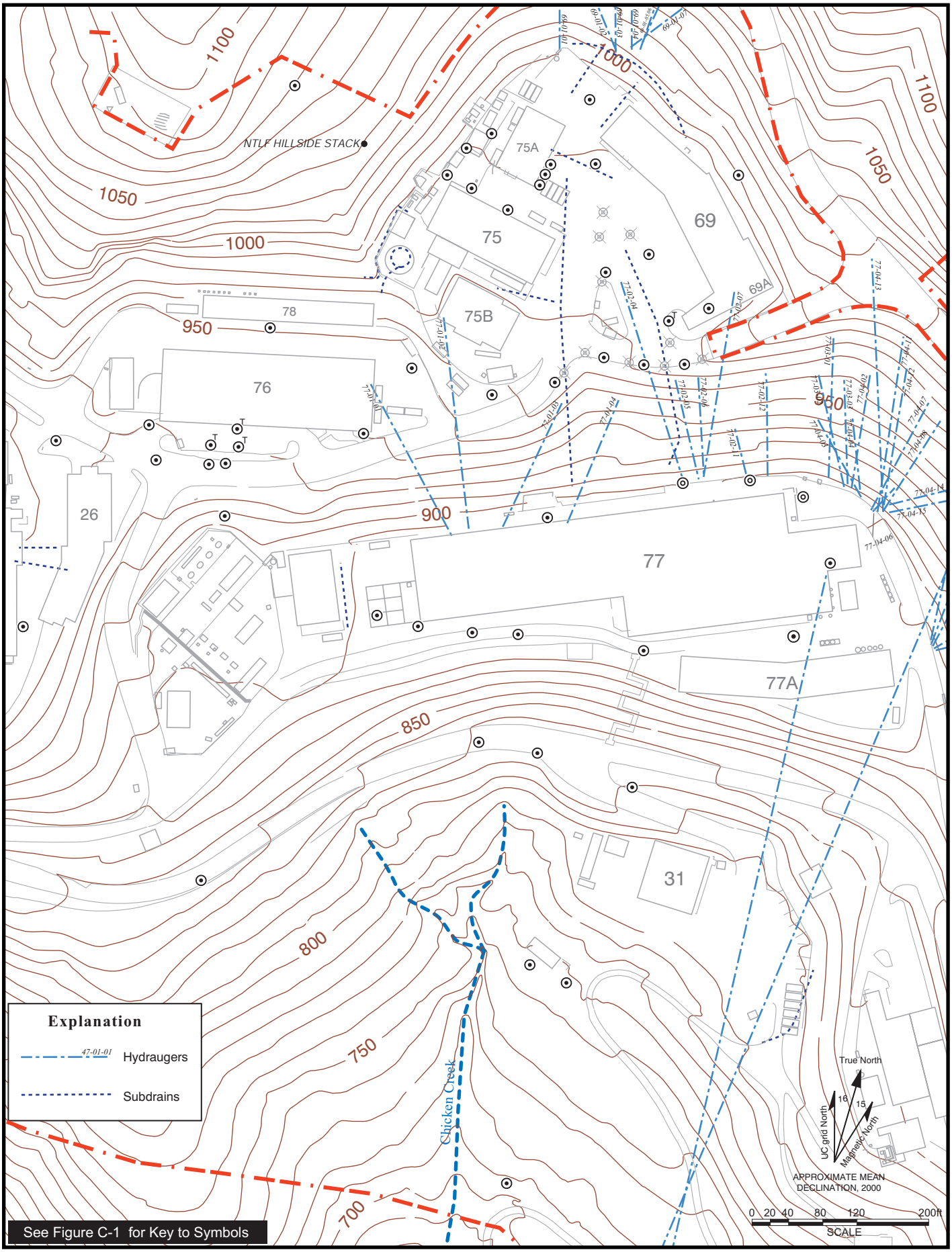

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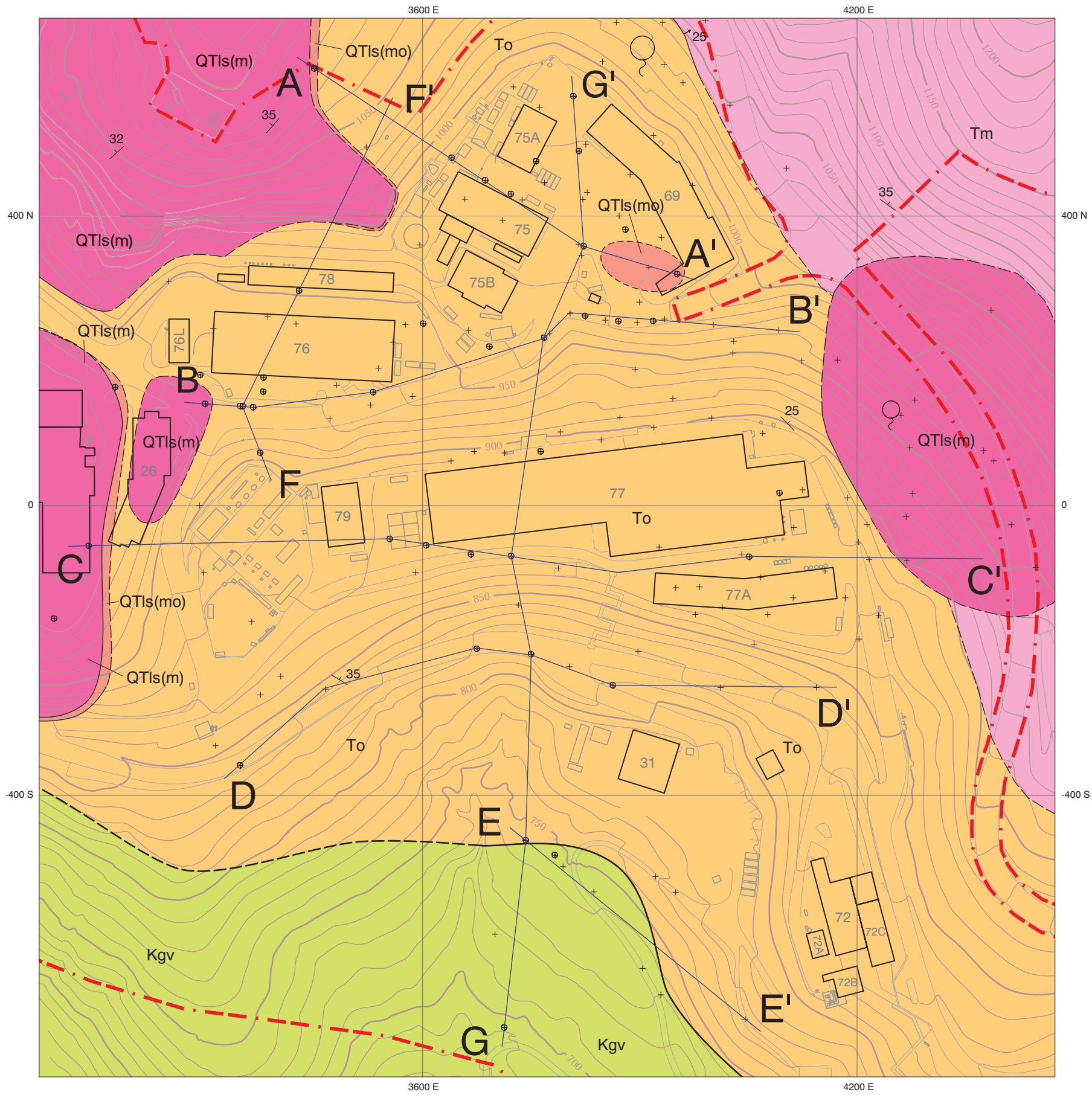
Figure C2.2-5. Hydraugers and Subdrains in the Support Services Area.



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0 160 320ft

CONTOUR INTERVAL 10 FEET
UNIVERSITY OF CALIFORNIA DATUM

True North
16
15
UC grid North
Magnetic North

APPROXIMATE MEAN DECLINATION, 2000

QTls(m)	Paleolandslide Deposit Composed of Moraga Formation Rocks
QTls(mo)	Paleolandslide Deposit (Mixed Unit)
Tm	Moraga Formation
To	Orinda Formation
Tsp	San Pablo Group
Tc	Claremont Formation
Kgv	Great Valley Group
JKf	Franciscan Complex

tinted box indicates unit appears in figure

Support Services area cross section

Boundary of Lawrence Berkeley National Laboratory

Environmental monitoring wells includes groundwater and soil gas wells and lysimeters

Soil borings includes slope indicators and slope stability wells

Historic springs (modified from Soule, 1875)

75
Contact, showing dip dashed where approximately located; dotted where concealed by other map units

35
Fault, showing dip dashed where approximately located; dotted where concealed; queried where inferred

60
Strike and dip of beds

revision: 9/26/2000

Figure C2.3-1. Support Services Area Bedrock Geologic Map.

C2.3-1 br map.ai
09/00

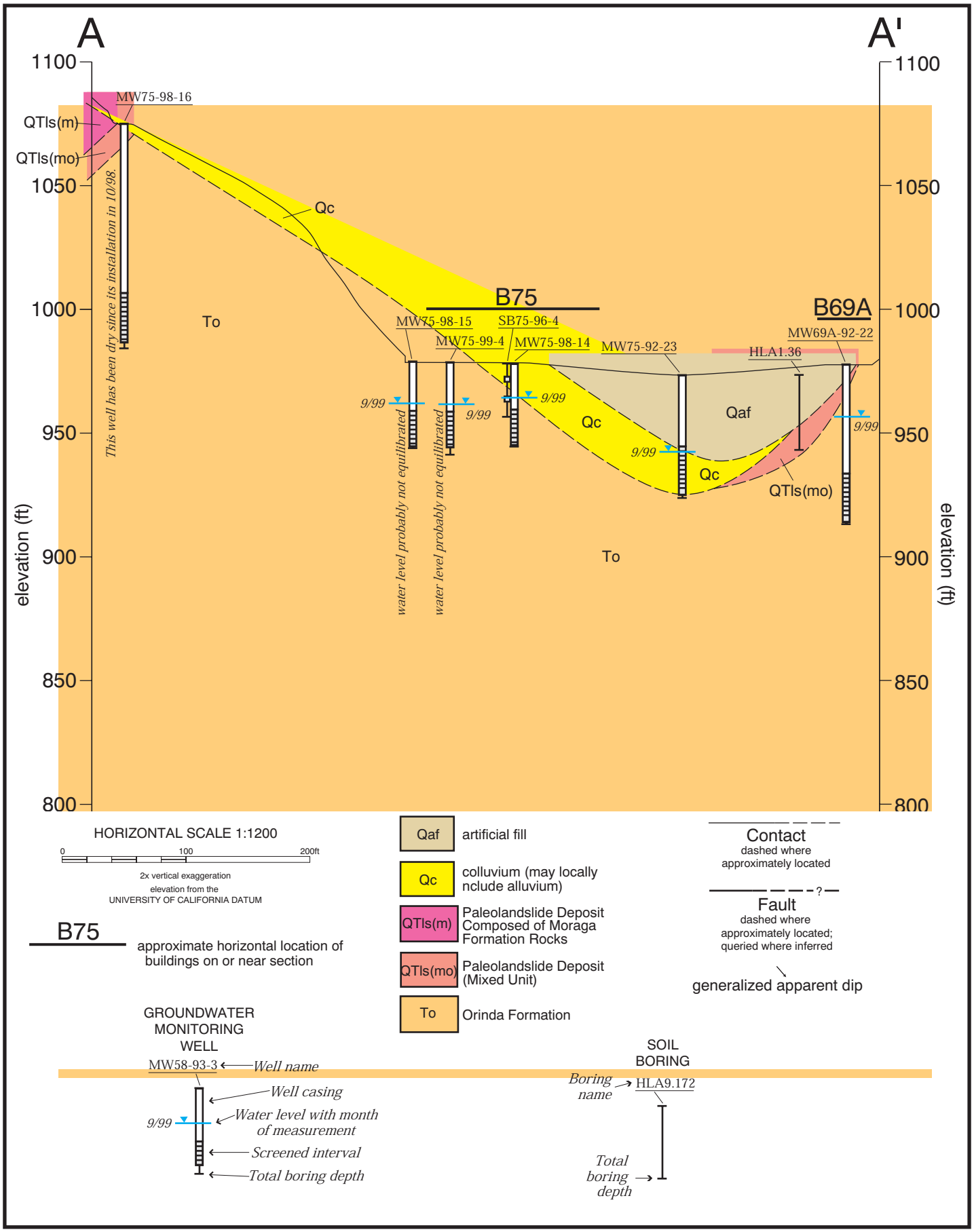
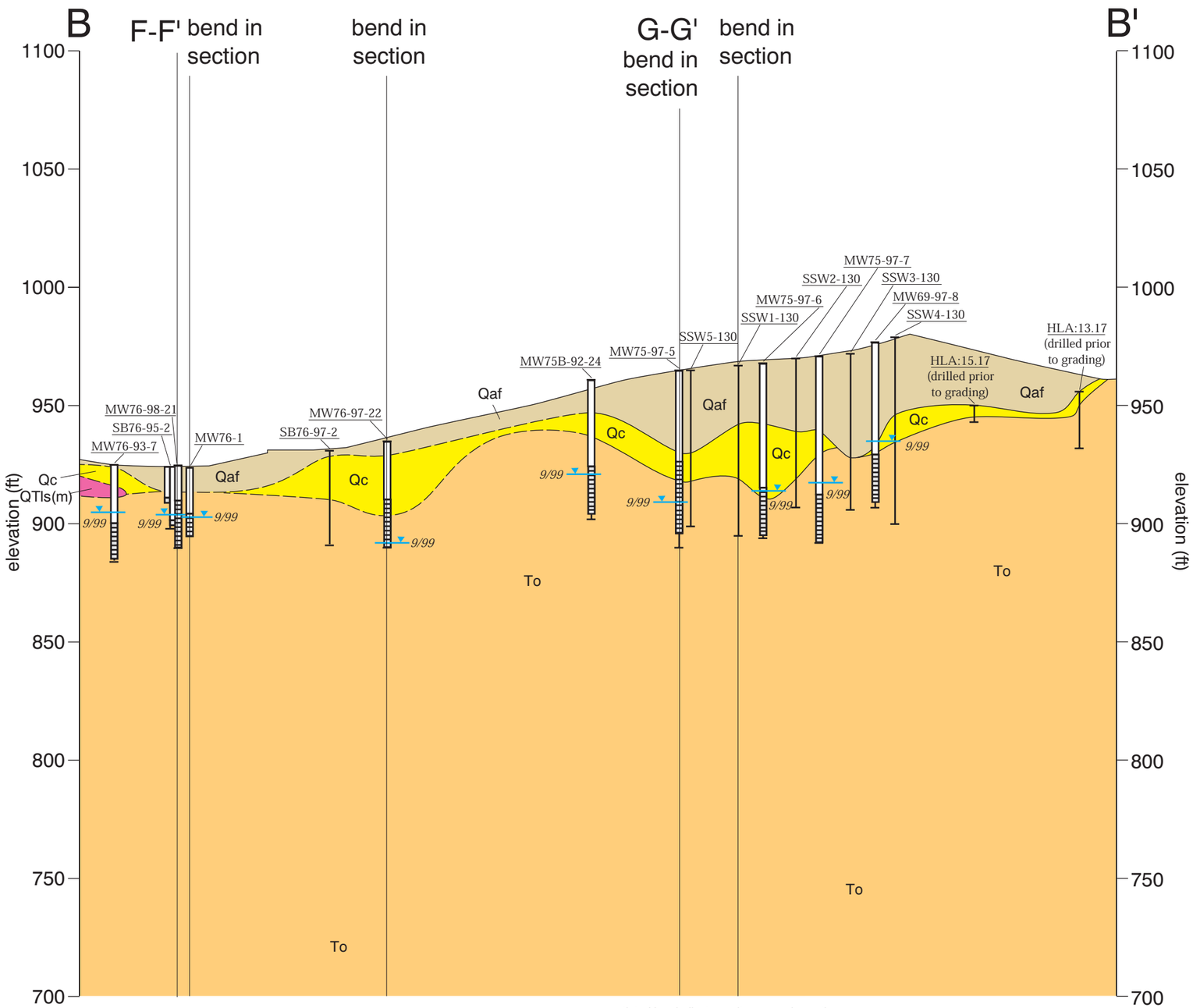


Figure C2.3-2 . Support Services Area Cross Section A-A'.



HORIZONTAL SCALE 1:1200

0 100 200ft

2x vertical exaggeration

elevation from the UNIVERSITY OF CALIFORNIA DATUM

B58 — approximate horizontal location of buildings on or near section

tinted box indicates unit appears in section

Qaf	artificial fill	QTls(m)	Paleolandslide Deposit Composed of Moraga Formation Rocks	Tsp	San Pablo Group
Qc	colluvium (may locally include alluvium)	QTls(mo)	Paleolandslide Deposit (Mixed Unit)	Tc	Claremont Formation
Qdb	debris flow deposits	Tm	Moraga Formation	Kgv	Great Valley Group
		To	Orinda Formation		

Contact — dashed where approximately located

Fault — dashed where approximately located; queried where inferred

generalized apparent dip

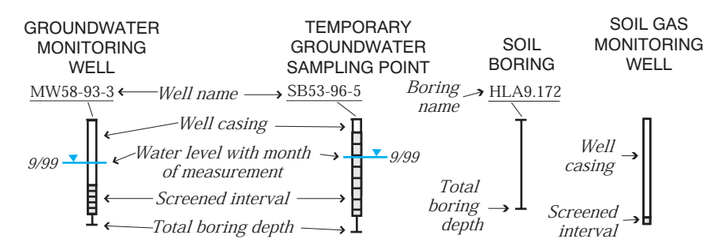
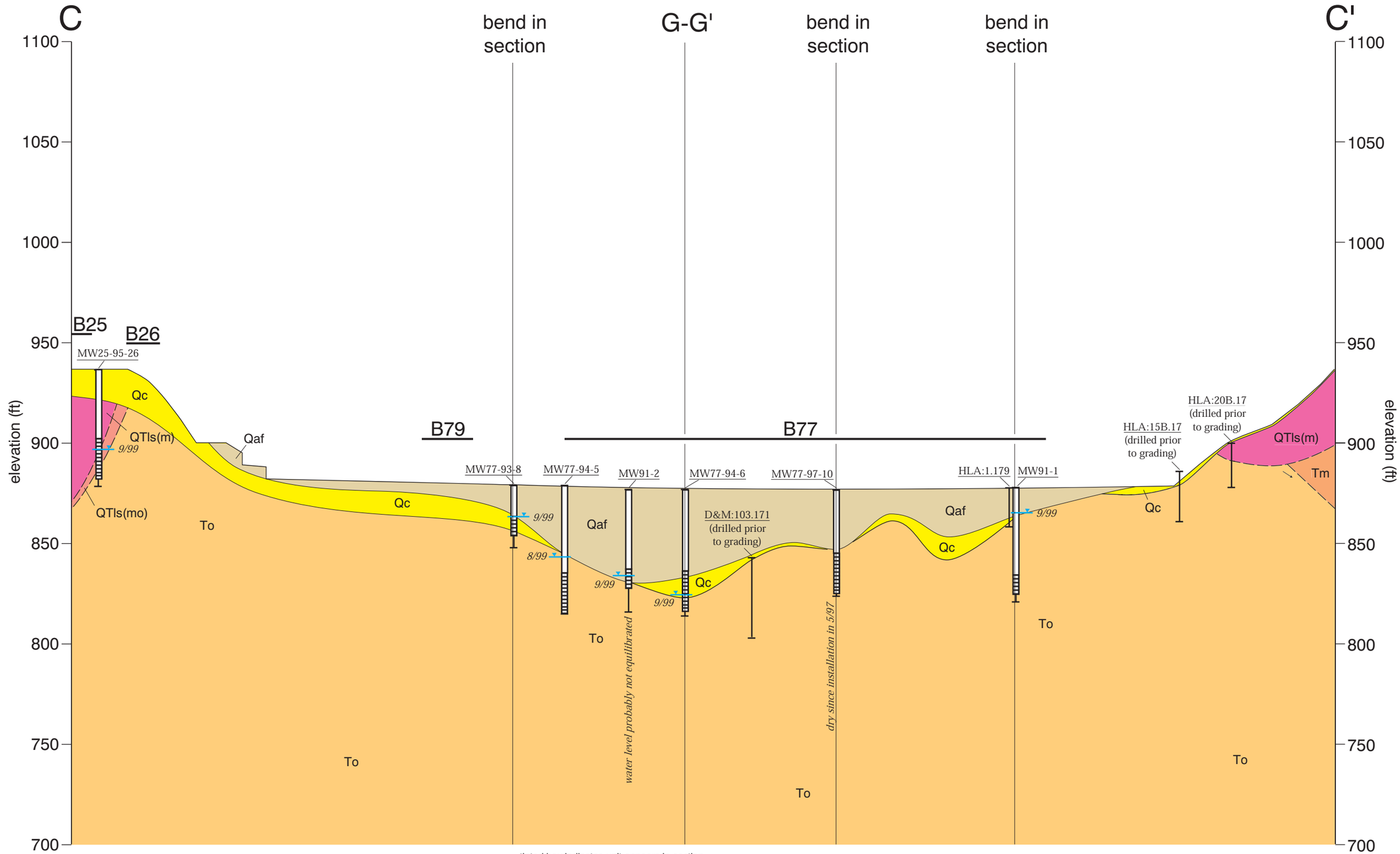


Figure C2.3-3. Support Services Area Cross Section B-B'.

C2.3-3 sec b.ai
09/00

revision: 9/29/2000



HORIZONTAL SCALE 1:1200

0 100 200ft

2x vertical exaggeration

elevation from the UNIVERSITY OF CALIFORNIA DATUM

B58 — approximate horizontal location of buildings on or near section

1956 ground surface (modified from Hammon, Jensen, and Wallen, 1956)

tinted box indicates unit appears in section

Qaf	artificial fill	QTls(m)	Paleolandslide Deposit Composed of Moraga Formation Rocks	Tsp	San Pablo Group
Qc	colluvium (may locally include alluvium)	QTls(mo)	Paleolandslide Deposit (Mixed Unit)	Tc	Claremont Formation
Qdb	debris flow deposits	Tm	Moraga Formation	Kgv	Great Valley Group
		To	Orinda Formation		

Contact — dashed where approximately located

Fault — dashed where approximately located; queried where inferred

generalized apparent dip

GROUNDWATER MONITORING WELL — MW58-93-3

TEMPORARY GROUNDWATER SAMPLING POINT — SB53-96-5

SOIL BORING — HLA9.172

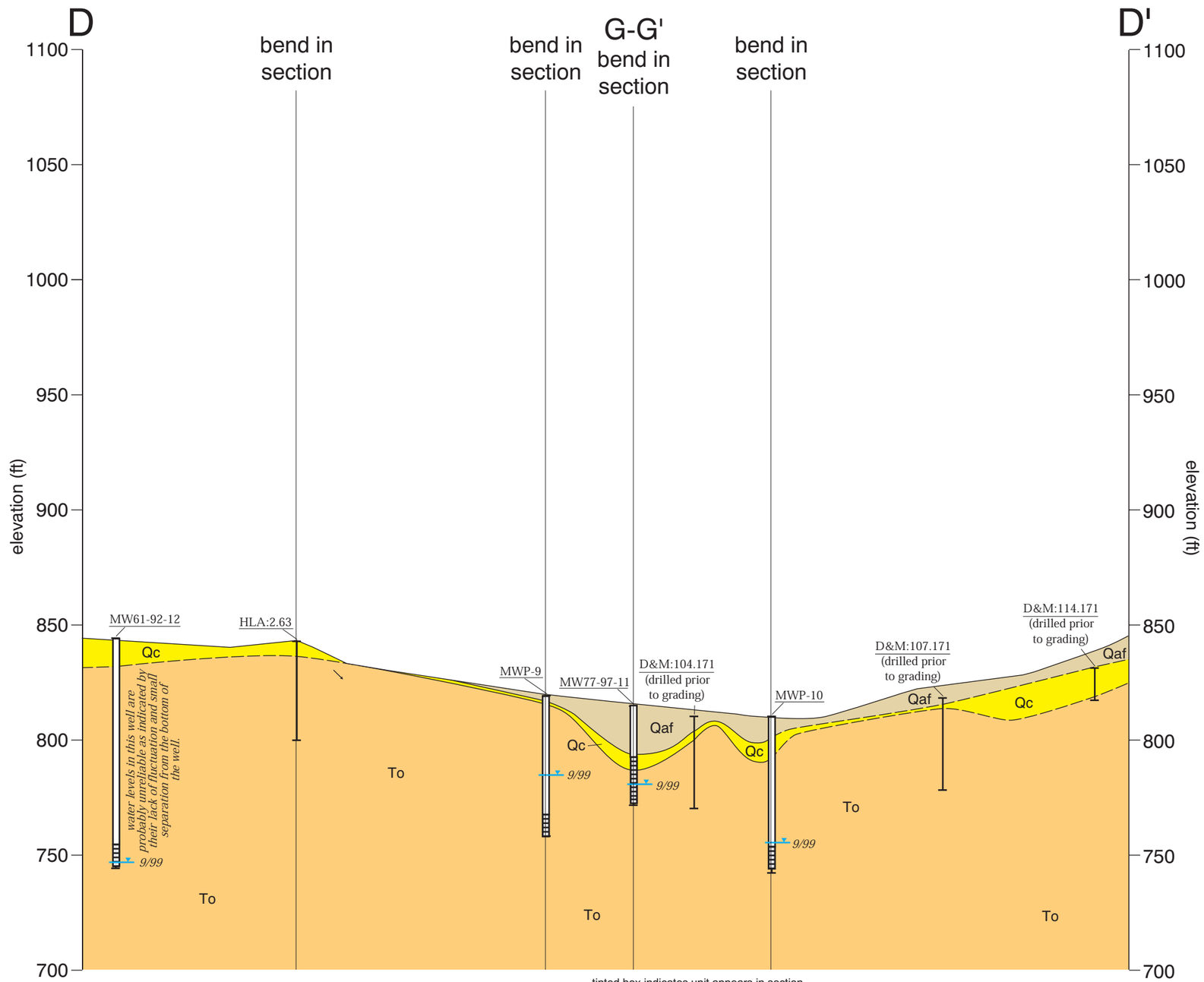
SOIL GAS MONITORING WELL

Well name; Well casing; Water level with month of measurement; Screened interval; Total boring depth; Boring name; Total boring depth; Well casing; Screened interval

revision: 9/29/2000

Figure C2.3-4. Support Services Area Cross Section C-C'.

C2.3-4 sec c.ai
09/00



HORIZONTAL SCALE 1:1200

0 100 200ft

2x vertical exaggeration

elevation from the UNIVERSITY OF CALIFORNIA DATUM

B58 approximate horizontal location of buildings on or near section

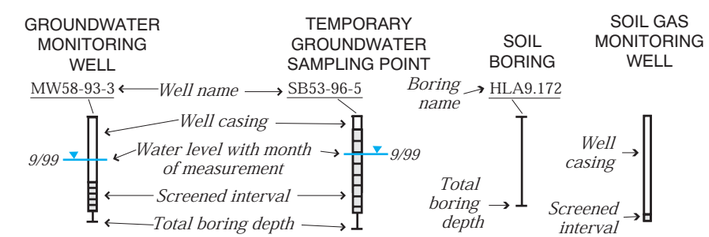
tinted box indicates unit appears in section

Qaf	artificial fill	QTls(m)	Paleolandslide Deposit Composed of Moraga Formation Rocks	Tsp	San Pablo Group
Qc	colluvium (may locally include alluvium)	QTls(mo)	Paleolandslide Deposit (Mixed Unit)	Tc	Claremont Formation
Qdb	debris flow deposits	Tm	Moraga Formation	Kgv	Great Valley Group
		To	Orinda Formation		

Contact
dashed where approximately located

Fault
dashed where approximately located; queried where inferred

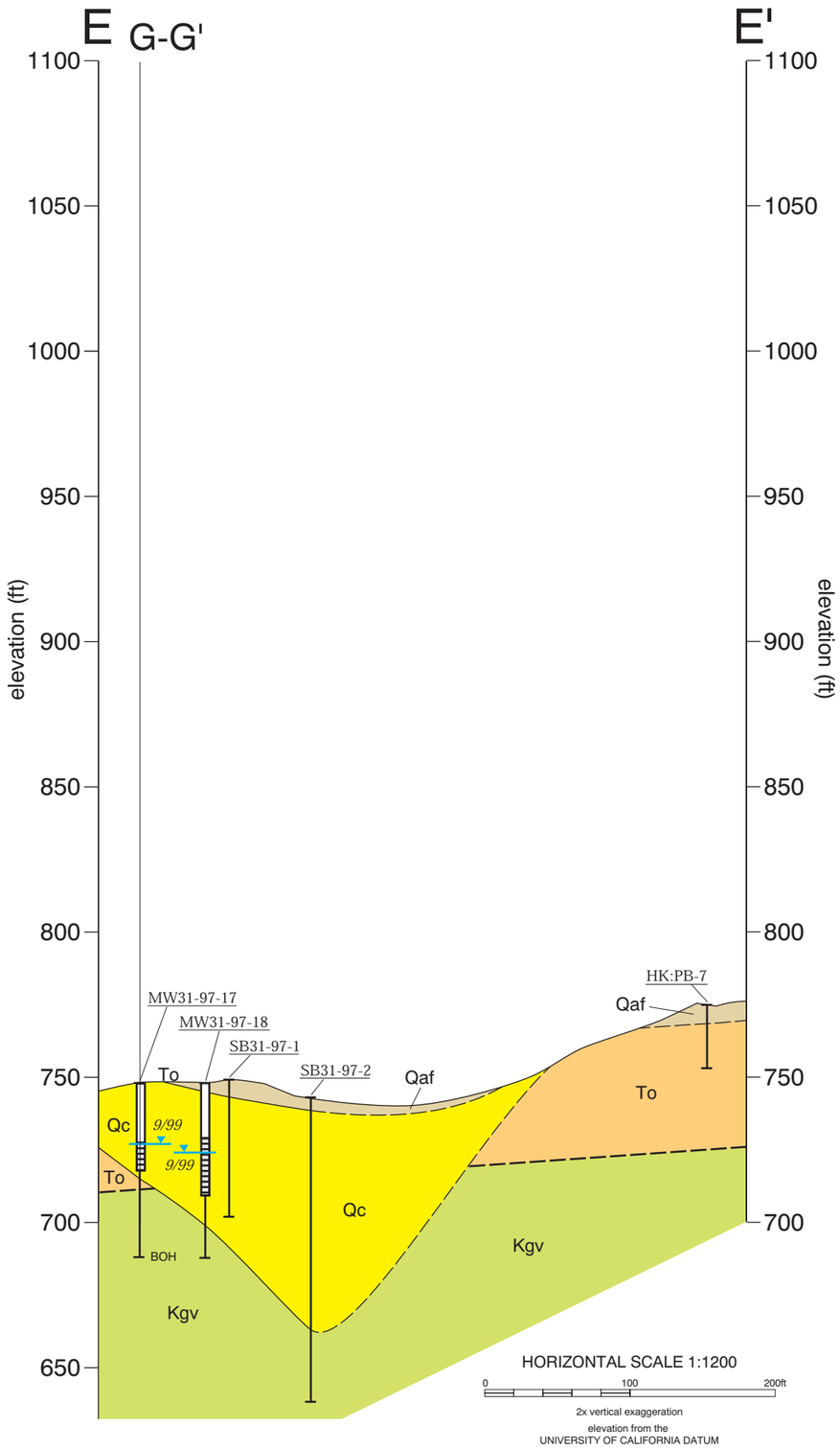
generalized apparent dip



revision: 9/29/2000

Figure C2.3-5. Support Services Area Cross Section D-D'.

C2.3-5 sec d.ai
09/00



tinted box indicates unit appears in section

Qaf	artificial fill	To	Orinda Formation
Qc	colluvium (may locally include alluvium)	Kgv	Great Valley Group

Contact
dashed where approximately located

Fault
dashed where approximately located; queried where inferred

generalized apparent dip

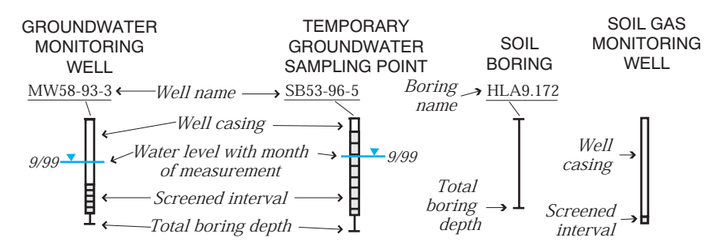


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Figure C2.3-6. Support Services Area Cross Section E-E'.

C2.3-6 sec e.ai
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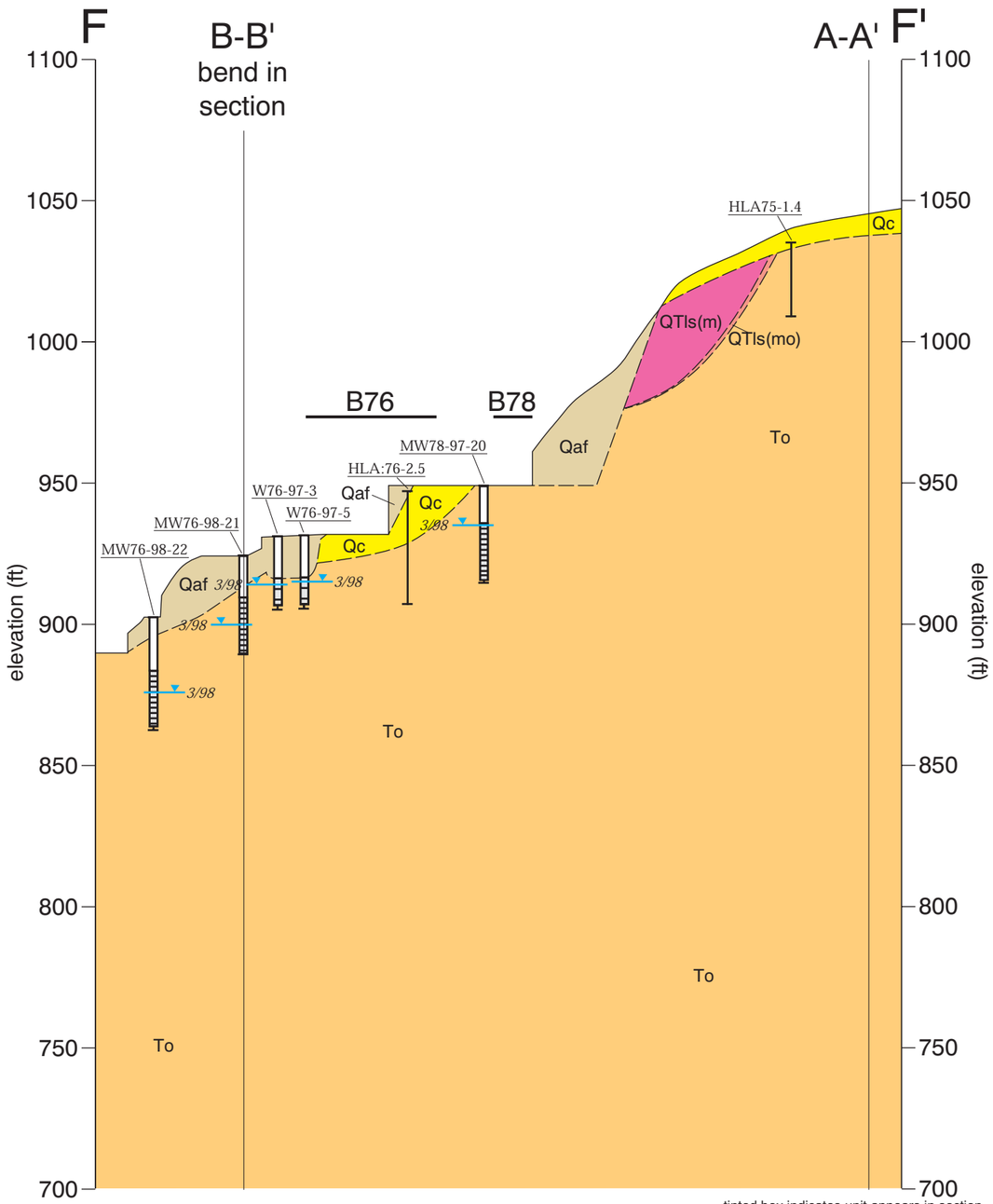

HORIZONTAL SCALE 1:1200

0 100 200ft

2x vertical exaggeration

elevation from the UNIVERSITY OF CALIFORNIA DATUM

B58 — approximate horizontal location of buildings on or near section

Qaf	artificial fill	QTls(m)	Paleolandslide Deposit Composed of Moraga Formation Rocks	Tsp	San Pablo Group
Qc	colluvium (may locally include alluvium)	QTls(mo)	Paleolandslide Deposit (Mixed Unit)	Tc	Claremont Formation
Qdb	debris flow deposits	Tm	Moraga Formation	Kgv	Great Valley Group
		To	Orinda Formation		

Contact — dashed where approximately located

Fault — dashed where approximately located; queried where inferred

generalized apparent dip

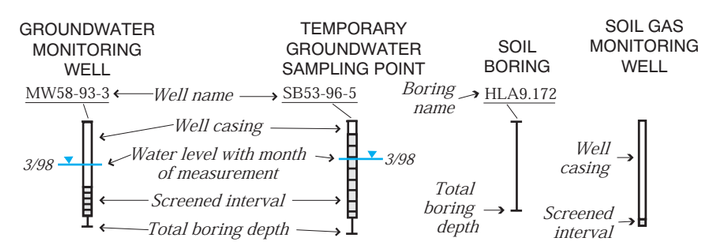

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Figure C2.3-7. Support Services Area Cross Section F-F'.

C2.3-7 sec f.ai
09/00

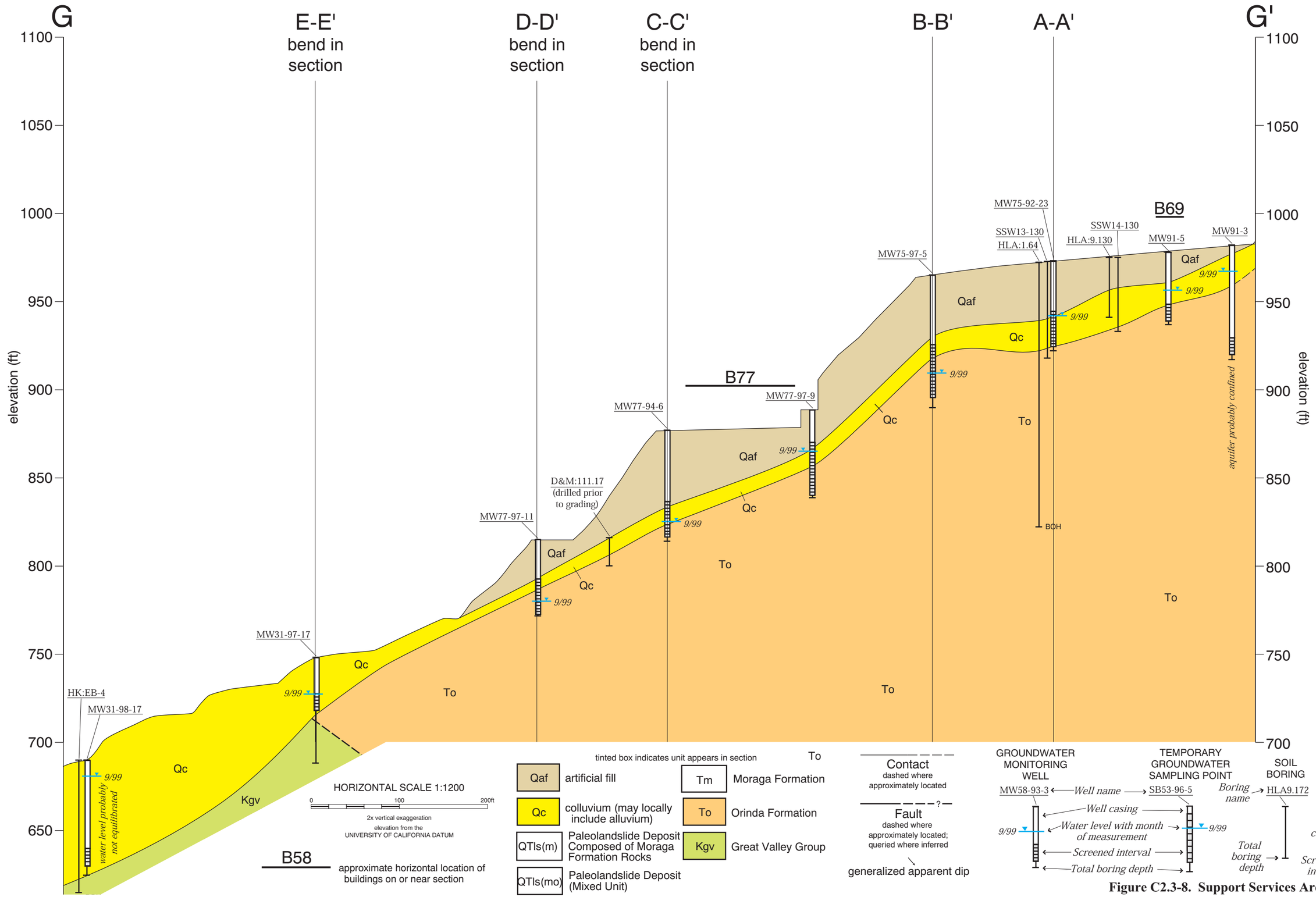


Figure C2.3-8. Support Services Area Cross Section G-G'.

C2.3-8 sec g.ai
09/00

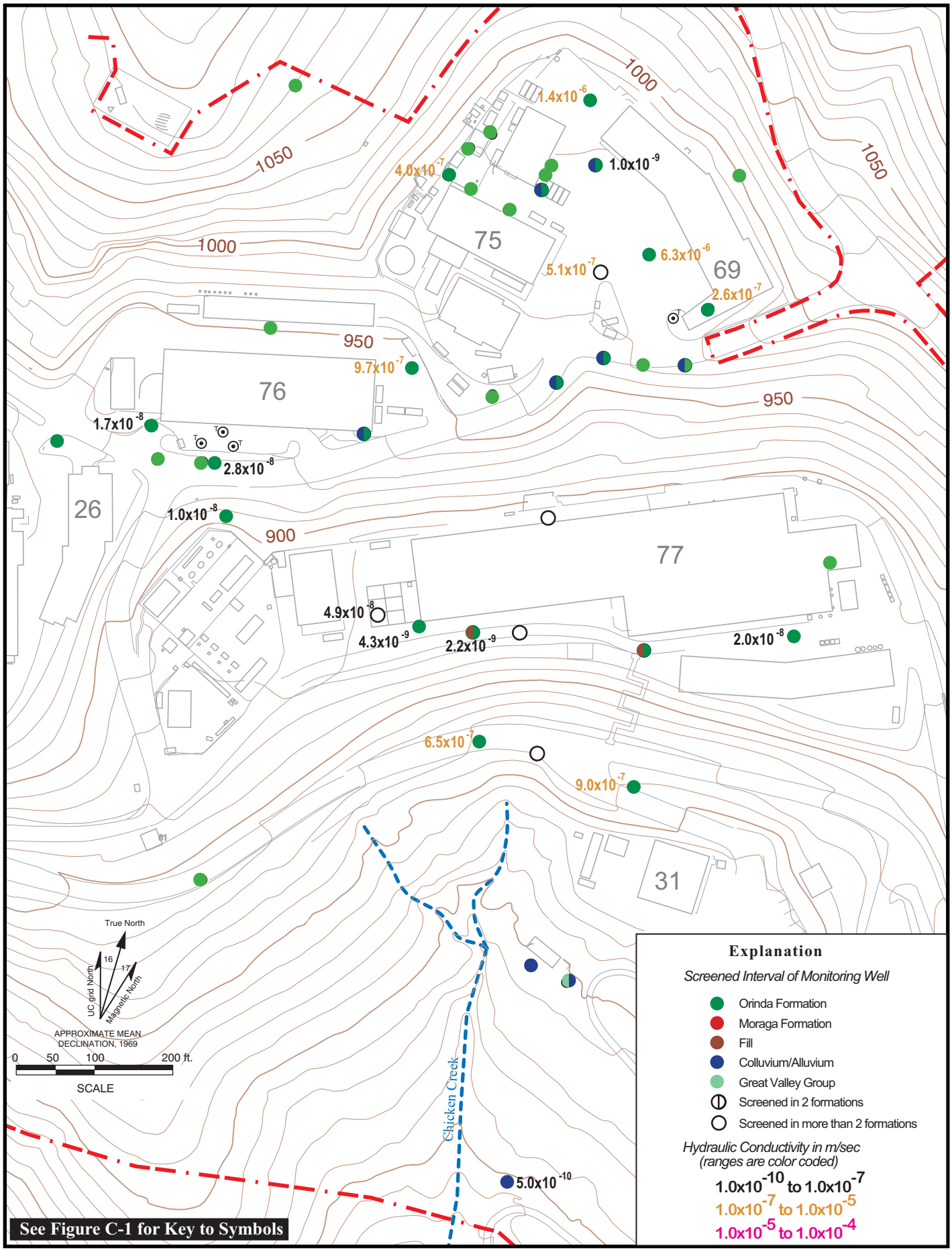
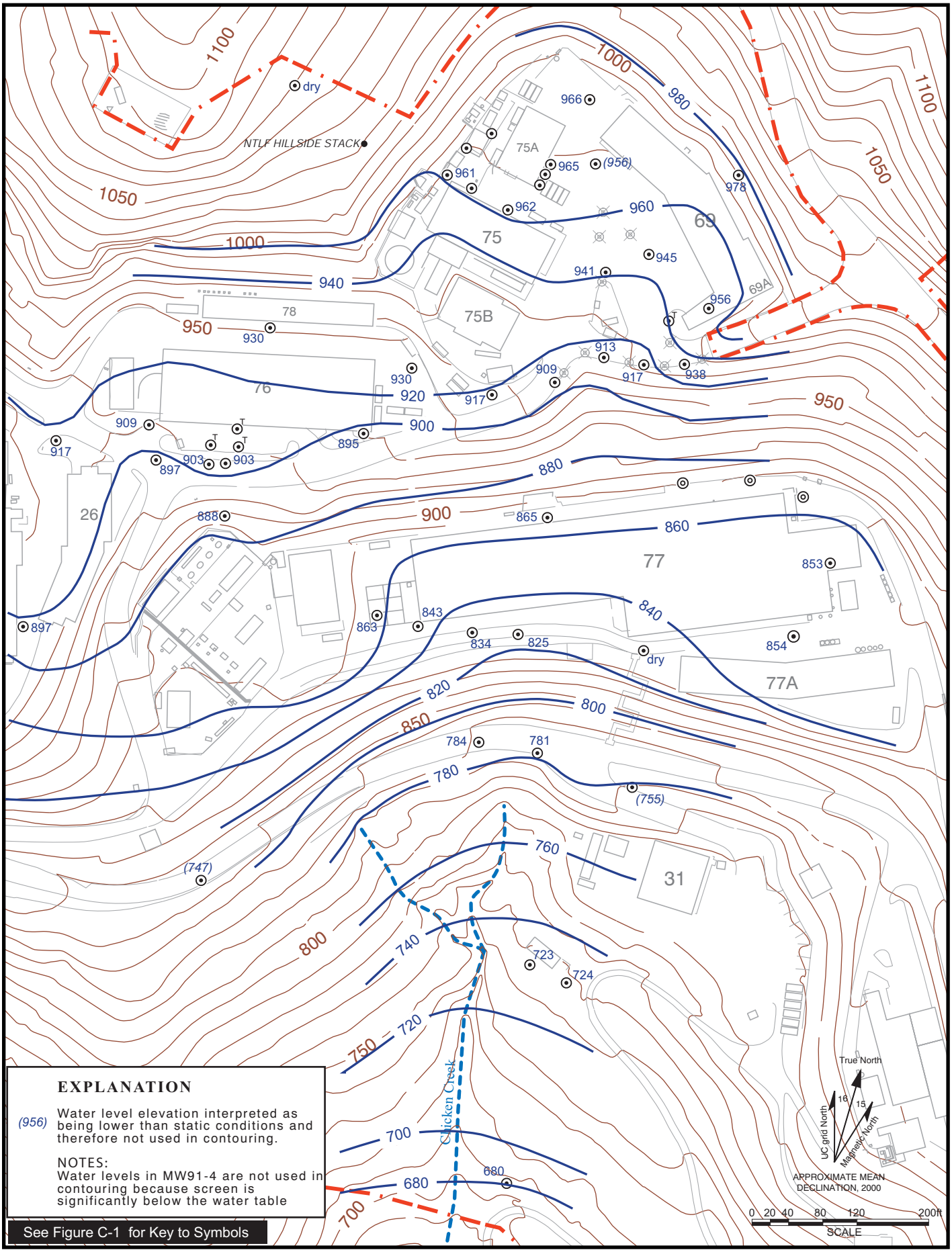


Figure C2.4-1. Support Services Area Well Locations Showing Hydraulic Conductivity Estimates Calculated from Slug Tests and Pumping Tests.

C2.4-1SupportServK.ai
09/00



SupportServicesArea.ai
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Figure C2.4-2. Water Level Elevation Contour Map, Support Services Area, Fourth Quarter Fiscal Year 1999.

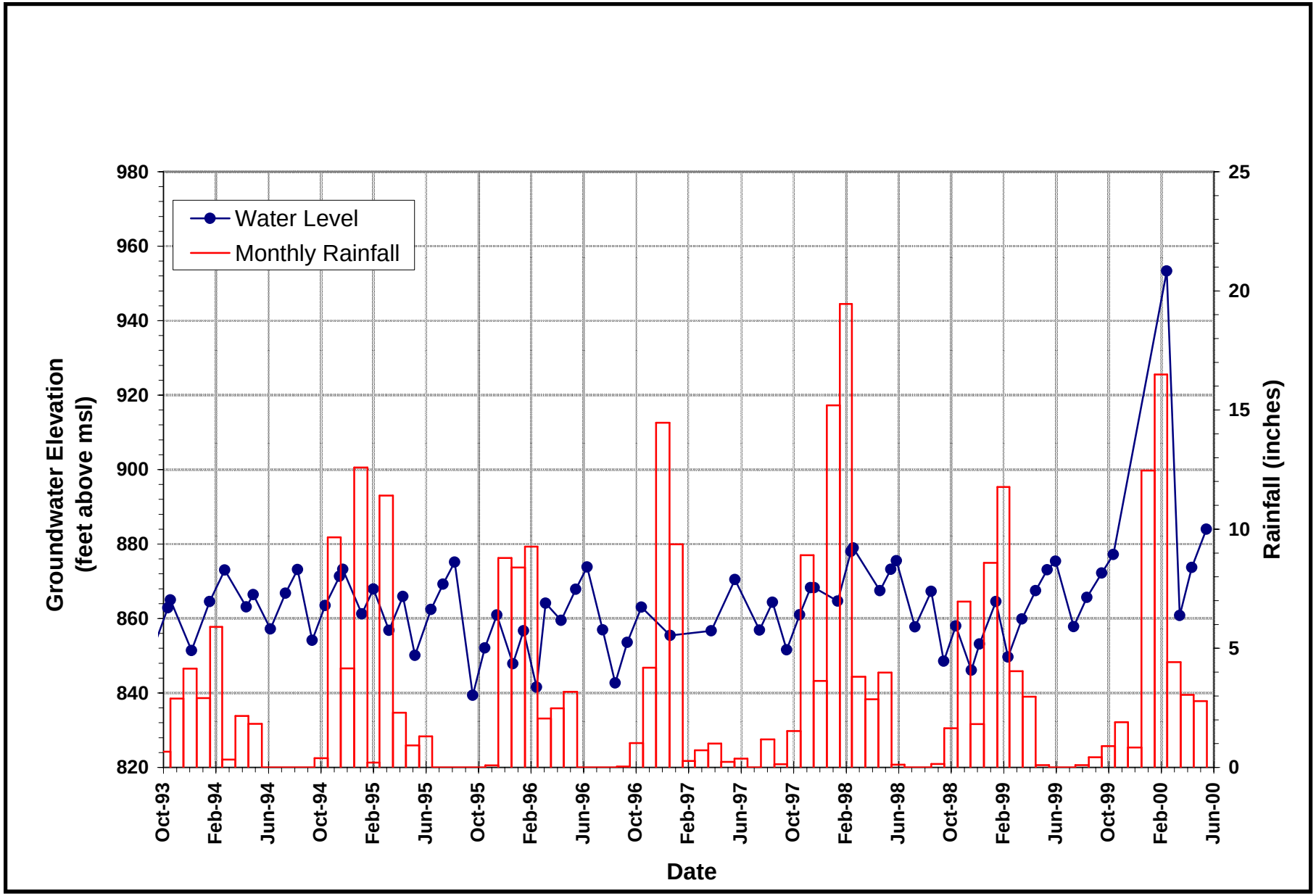


Figure C2.4-3. Hydrograph of Well MW91-4.

C2.4-3.xls
09/00

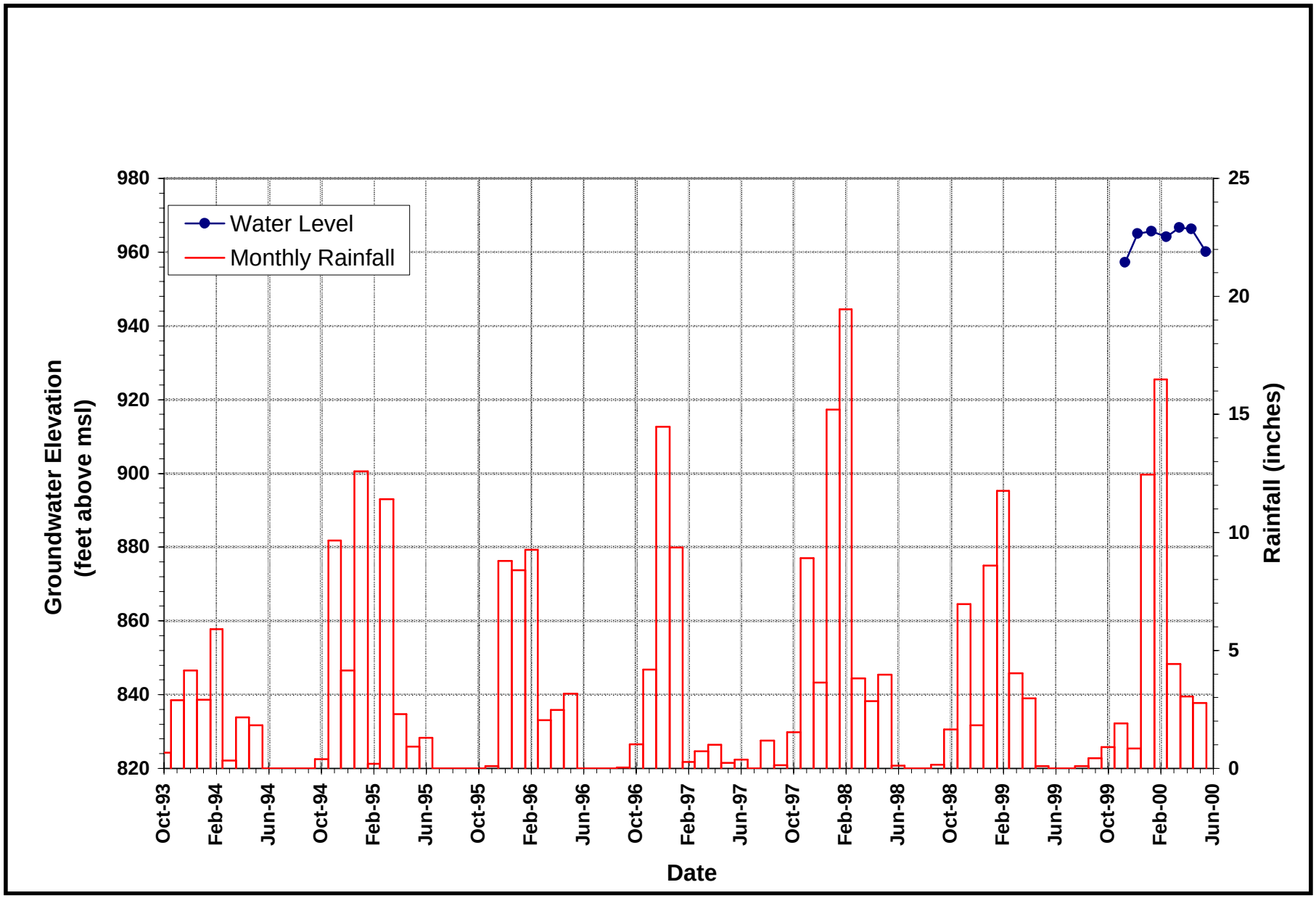


Figure C2.4-4. Hydrograph of Well MW75-99-7.

C2.4-4.xls
09/00

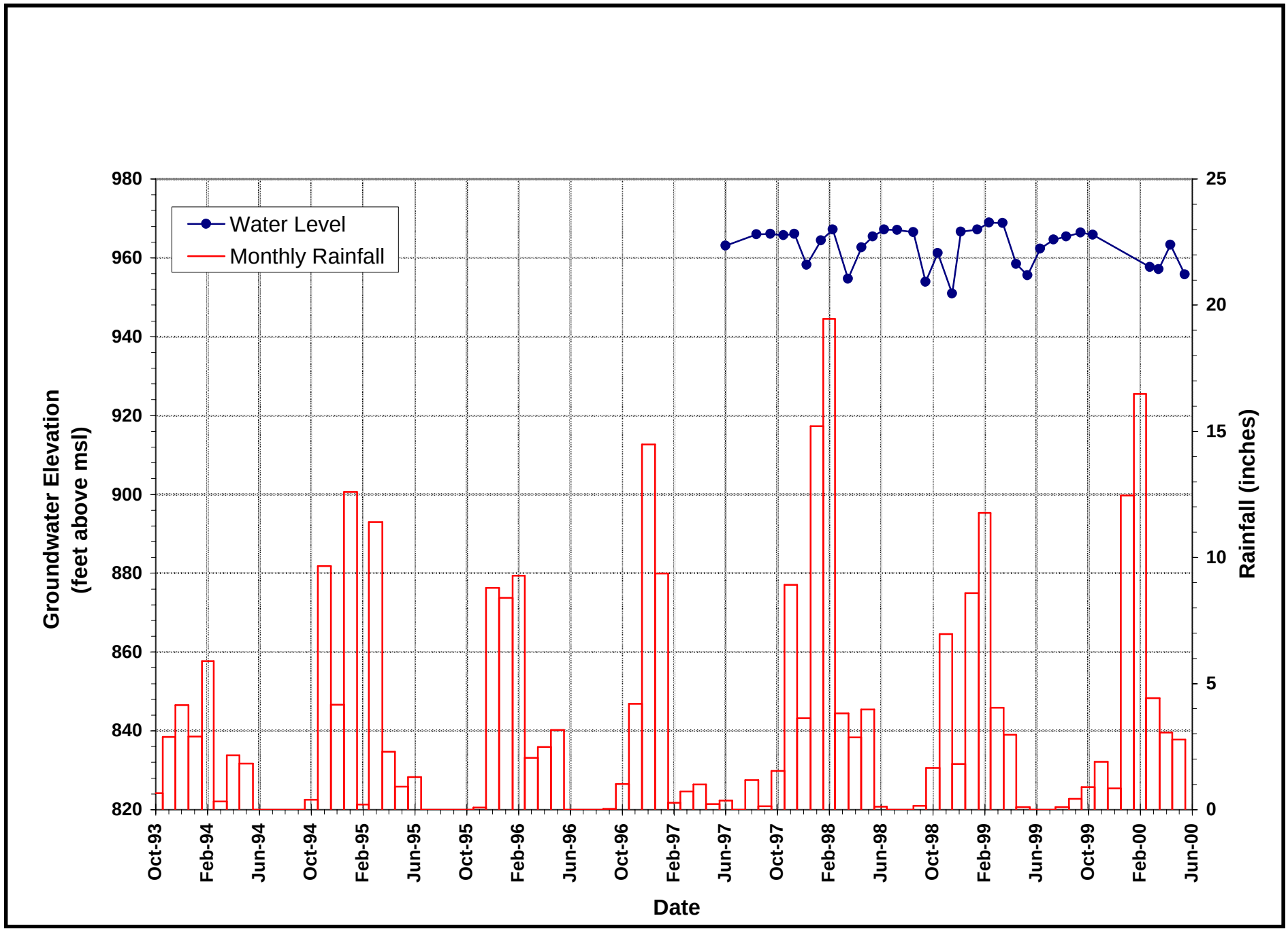
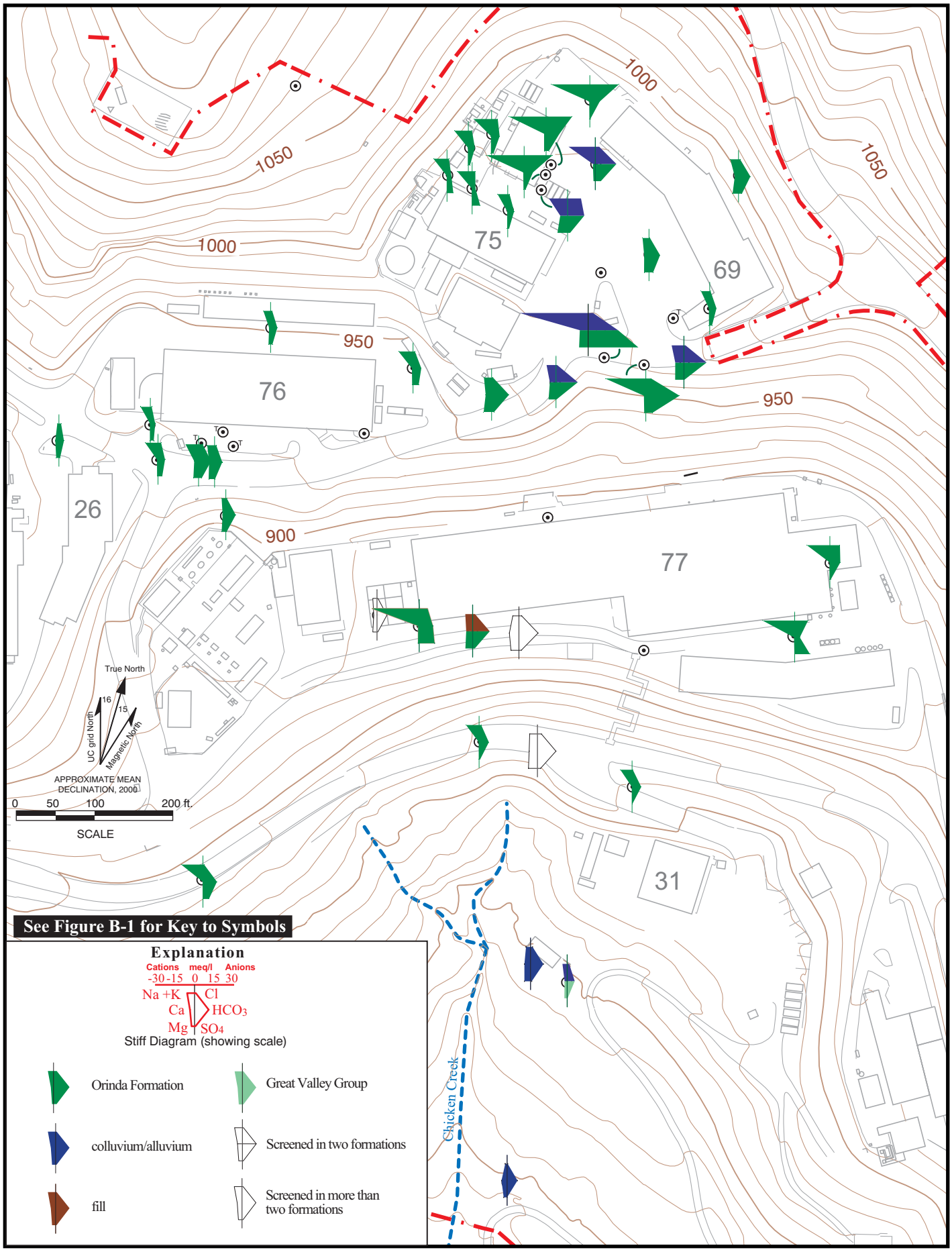


Figure C2.4-5. Hydrograph of Well MW75-96-20.

C2.4-5.xls
09/00



C2.4-6Stiff.ai
9/00

Figure C2.4-6. Stiff Diagrams of Groundwater Geochemical Parameters in Support Services Area.

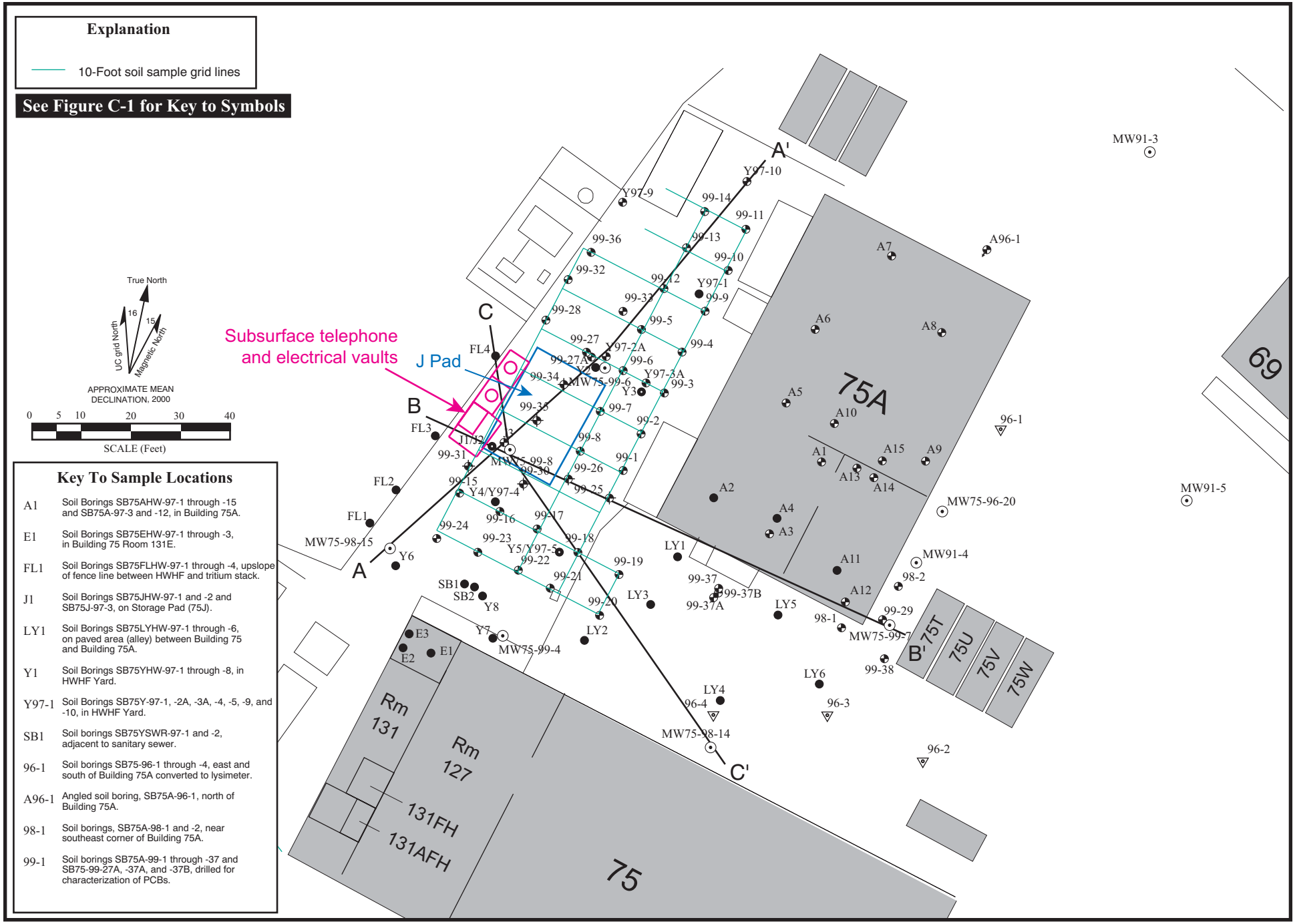
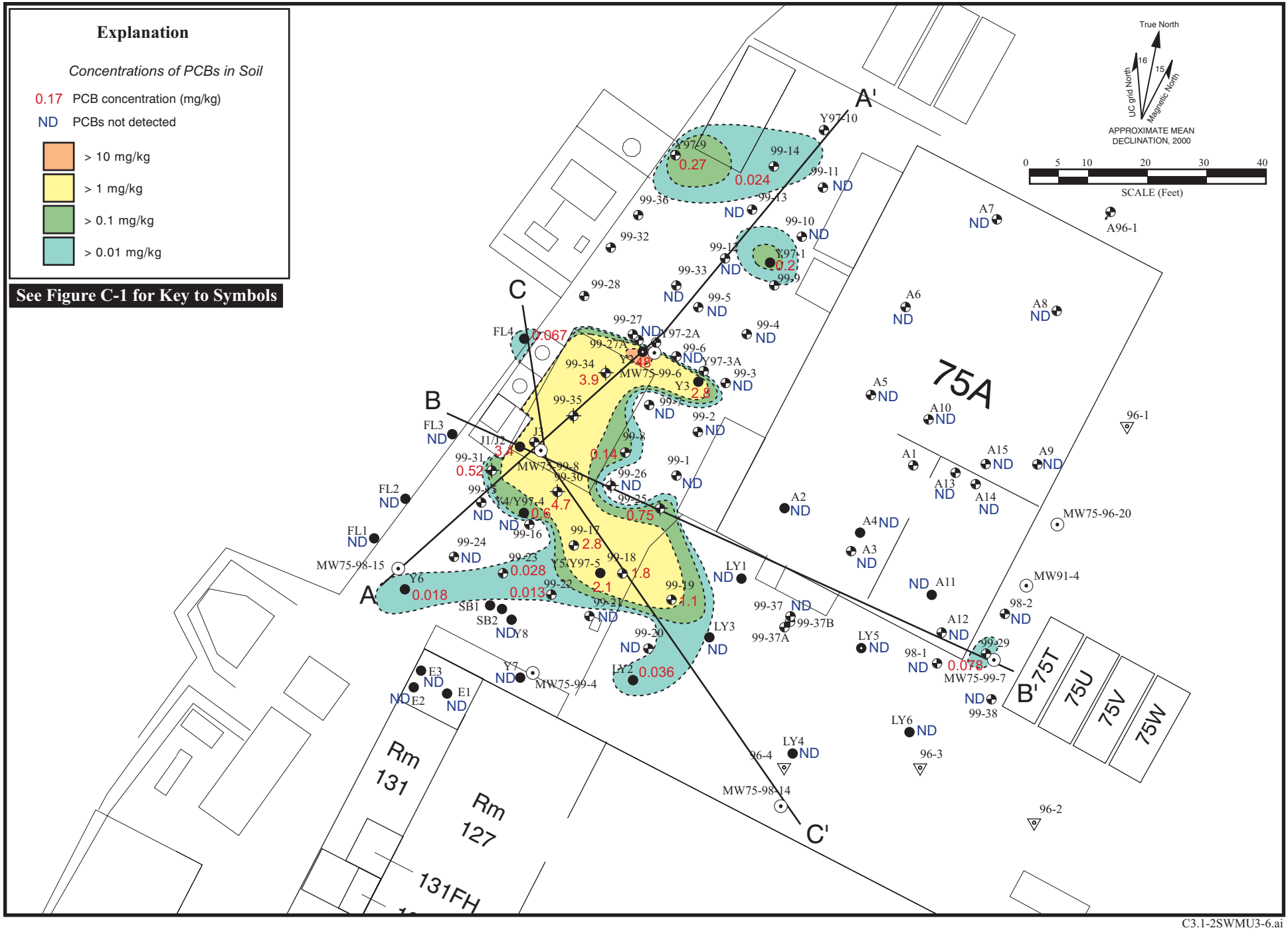


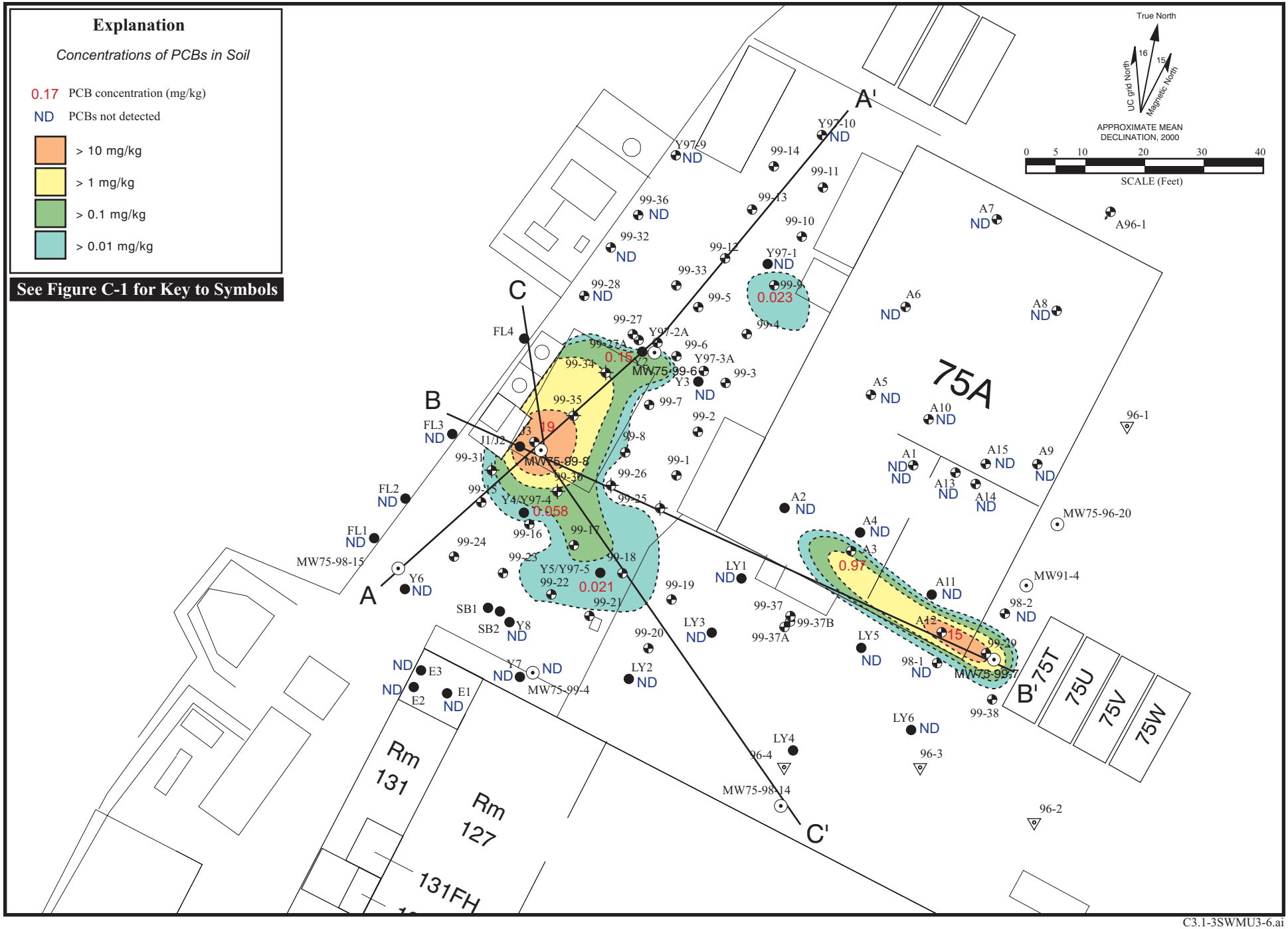
Figure C3.1-1. Building 75 Former HWHF (SWMU 3-6), Soil Boring and Cross Section Locations.

C3.1-1SWMU3-6.ai
09/00



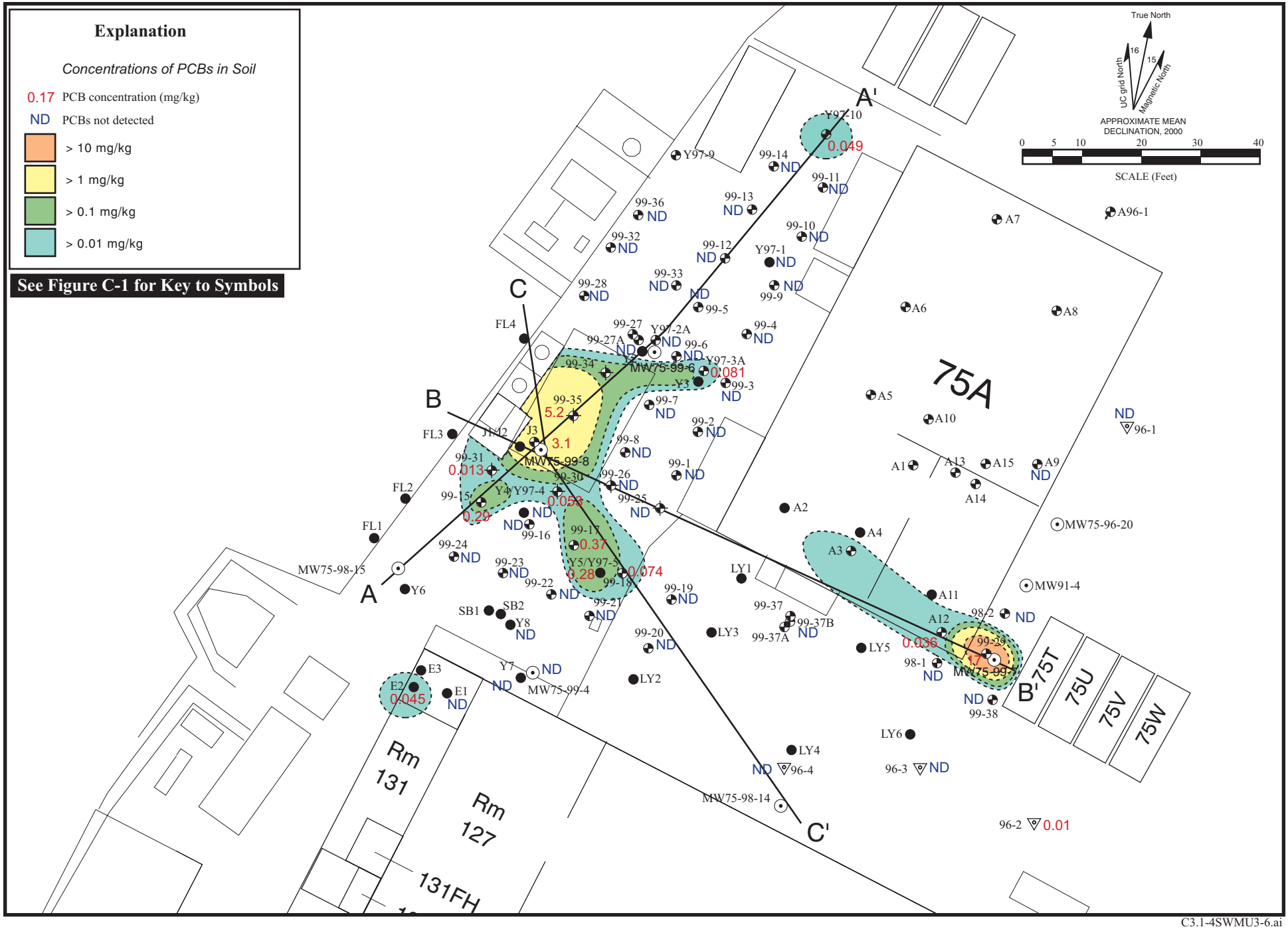
C3.1-2SWMU3-6.ai
09/00

Figure C3.1-2. Concentrations of PCBs Detected in Soil Samples (mg/kg) from 0 to 2.0 feet bgs, Building 75 Former HWHF (SWMU 3-6).



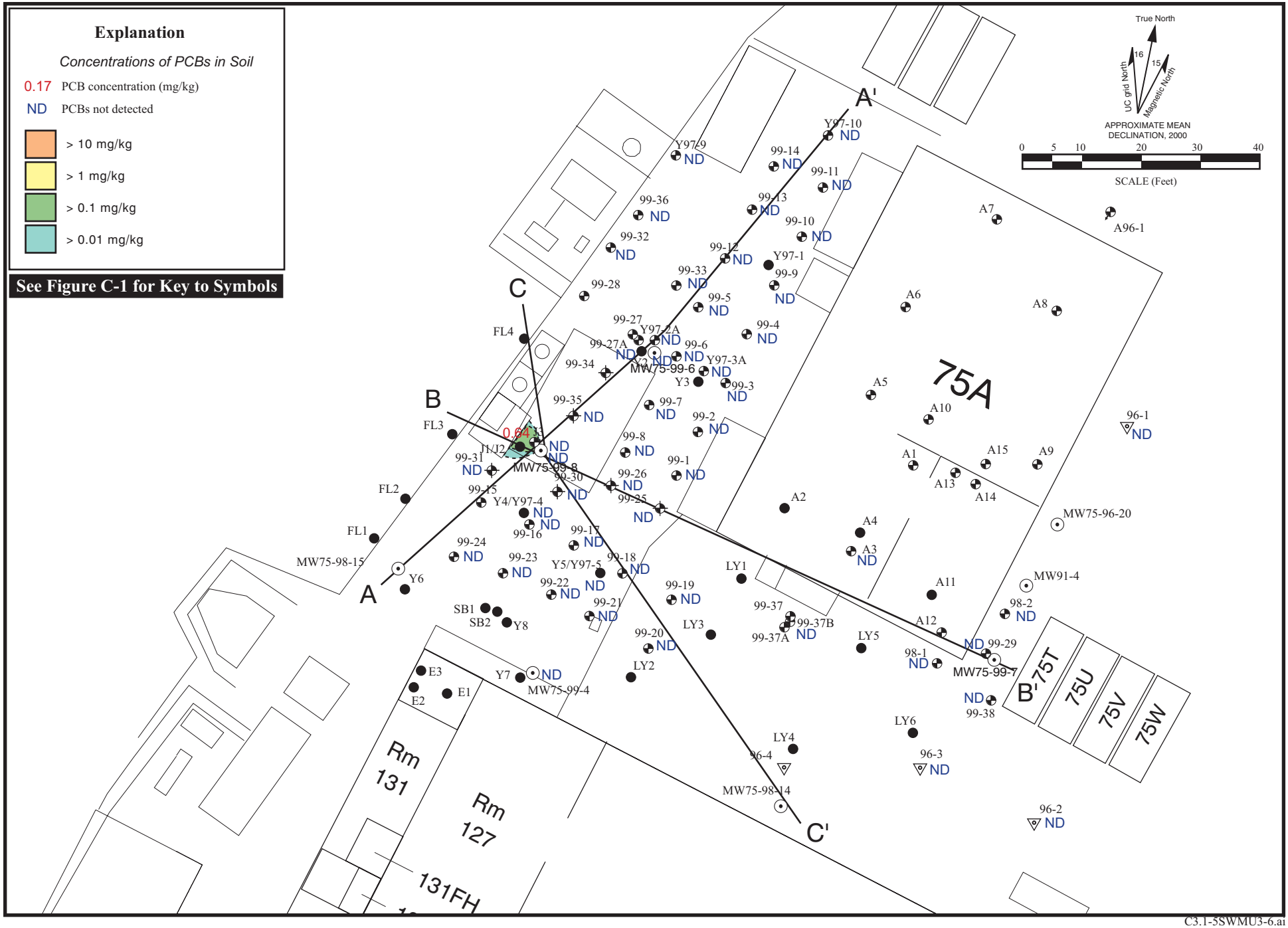
C3.1-3SWMU3-6.ai
09/00

Figure C3.1-3. Concentrations of PCBs Detected in Soil Samples (mg/kg) from 2.2 to 3.8 feet bgs, Building 75 Former HWHF (SWMU 3-6).



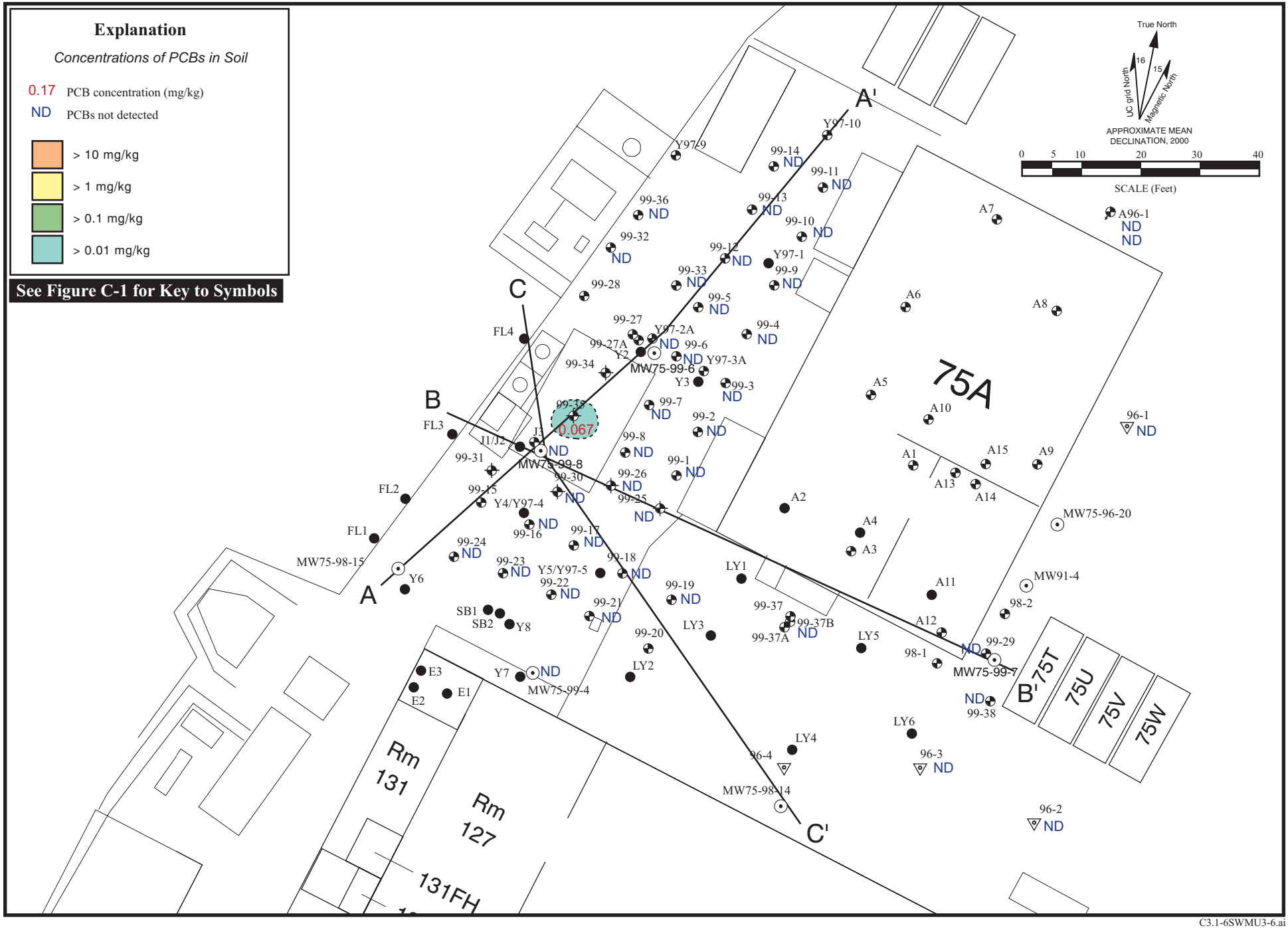
C3.1-4SWMU3-6.ai
09/00

Figure C3.1-4. Concentrations of PCBs Detected in Soil Samples (mg/kg) from 4.0 to 6.8 feet bgs, Building 75 Former HWHF (SWMU 3-6).



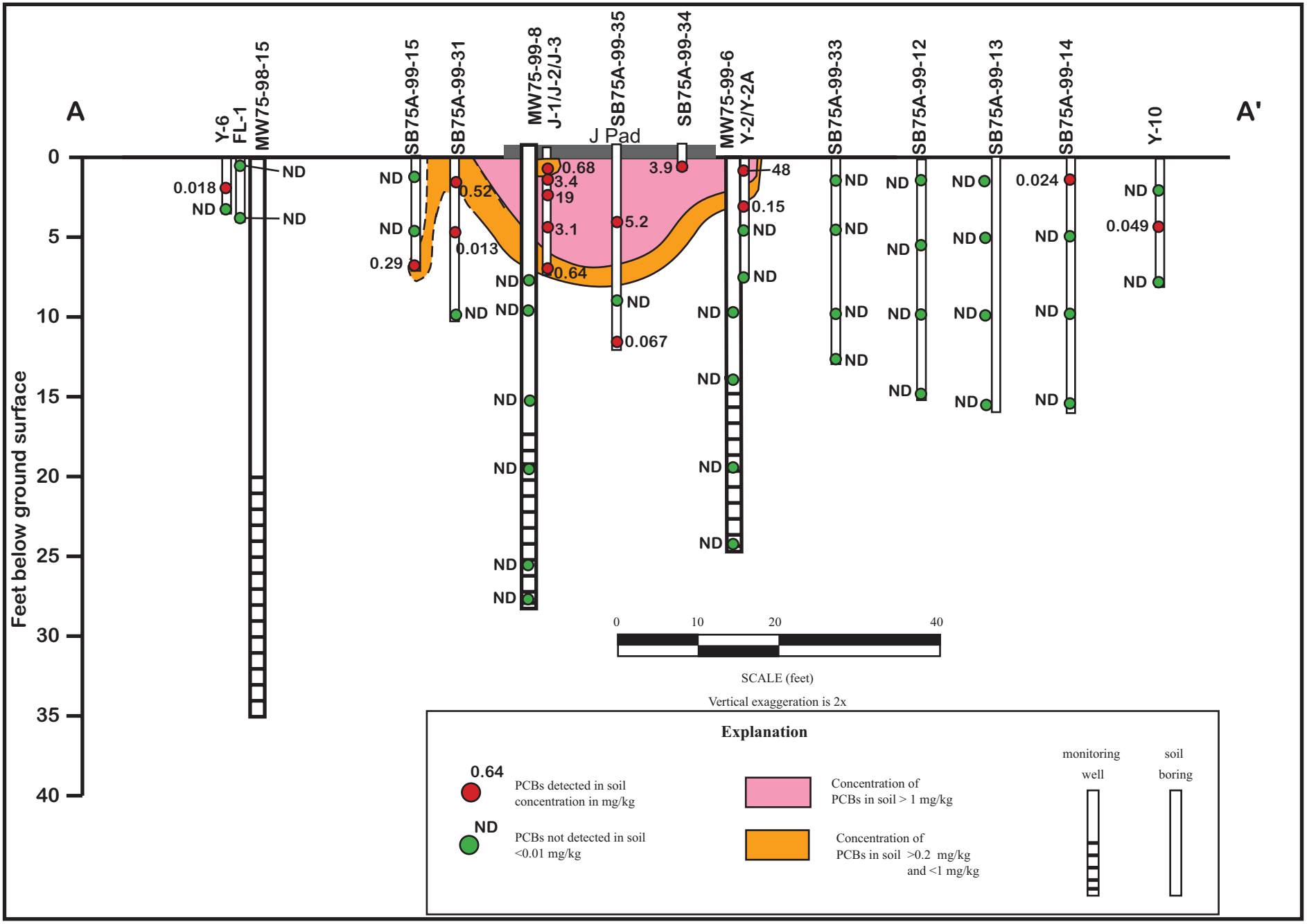
C3.1-5SWMU3-6.ai
09/00

Figure C3.1-5. Concentrations of PCBs Detected in Soil Samples (mg/kg) from 7.3 to 11.0 feet bgs, Building 75 Former HWHF (SWMU 3-6).



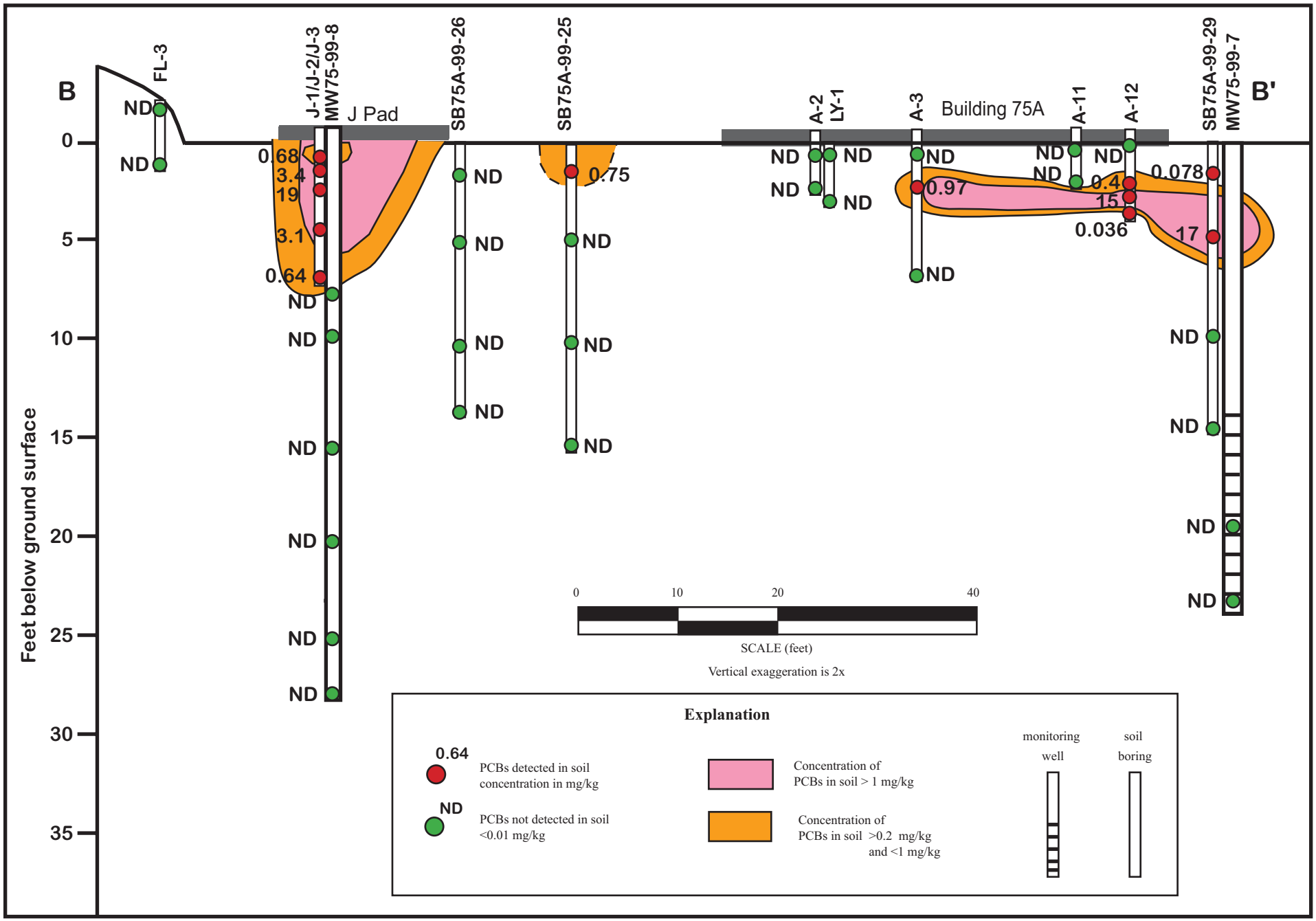
C3.1-6SWMU3-6.ai
09/00

Figure C3.1-6. Concentrations of PCBs Detected in Soil Samples (mg/kg) from 12.1 to 17.8 feet bgs, Building 75 Former HWHF (SWMU 3-6).



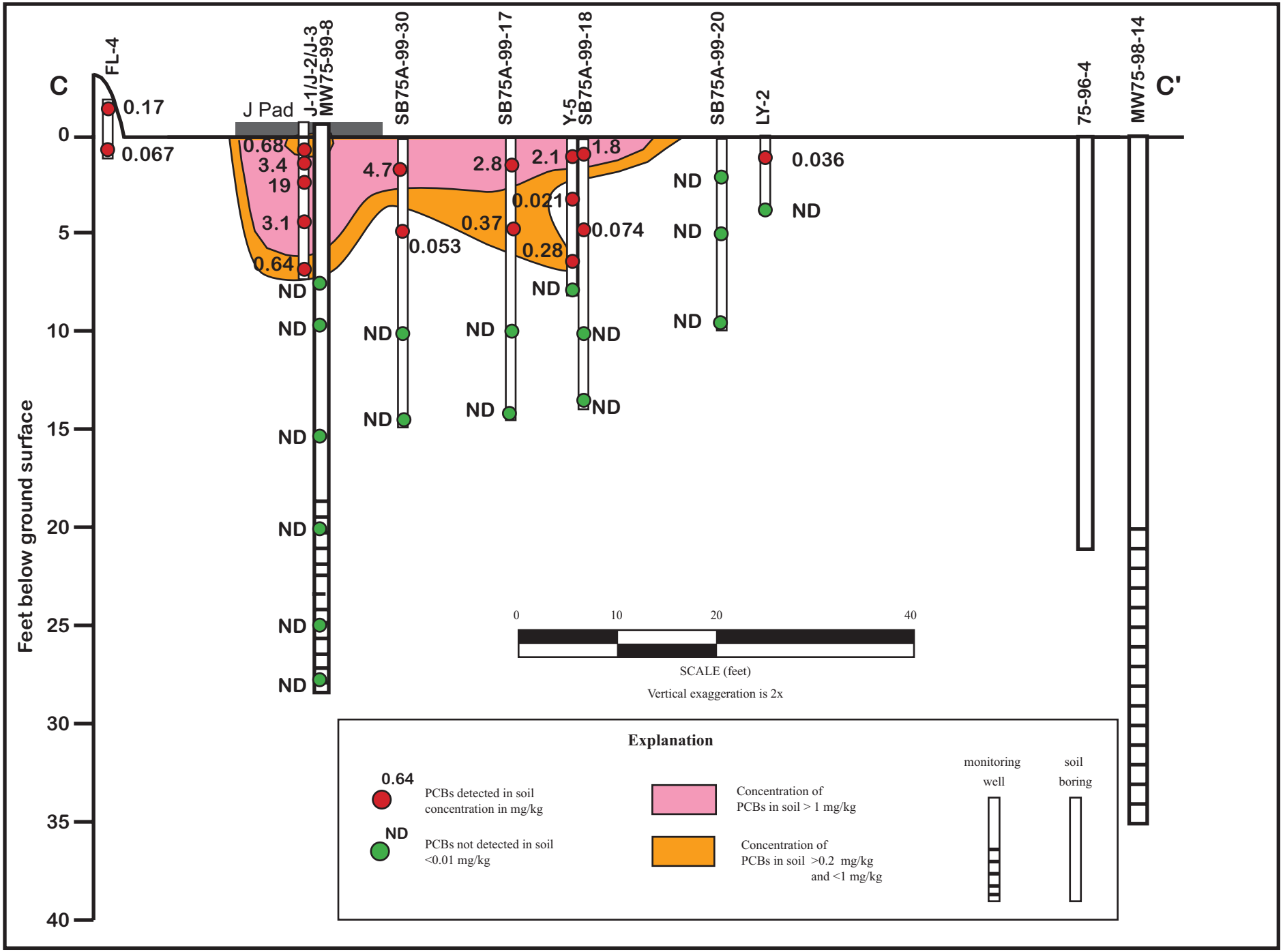
C3.1-7SWMU3-6.ai
09/00

Figure C3.1-7. Cross Section A-A' Showing Concentrations of PCBs Detected (mg/kg), Building 75 Former HWHF (SWMU 3-6).



C3.1-8SWMU3-6.ai
09/00

Figure C3.1-8. Cross Section B-B' Showing Concentrations of PCBs Detected (mg/kg), Building 75 Former HWHF (SWMU 3-6).



C3.1-9SWMU3-6.ai
09/00

Figure C3.1-9. Cross Section C-C' Showing Concentrations of PCBs Detected (mg/kg), Building 75 Former HWHF (SWMU 3-6).

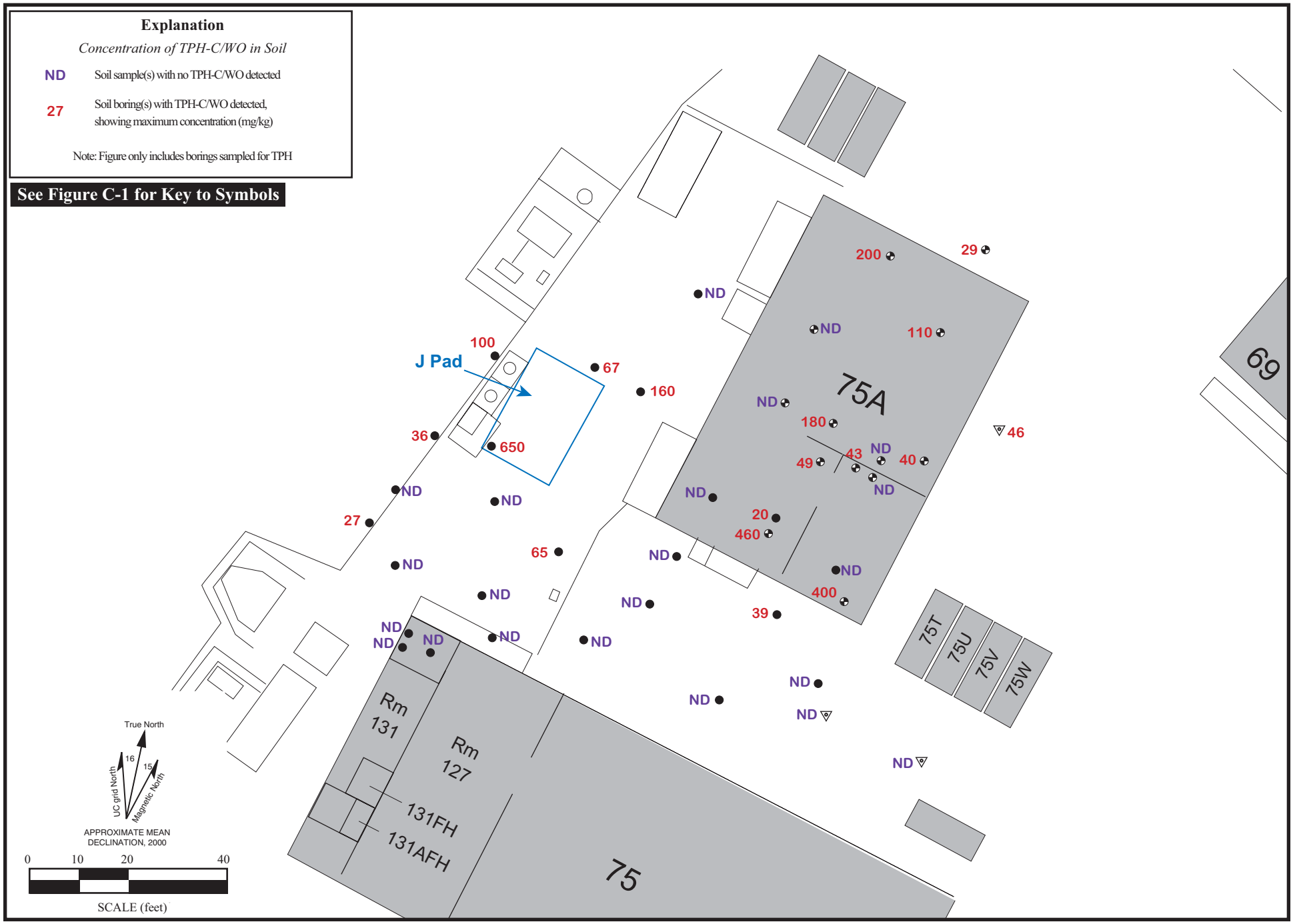
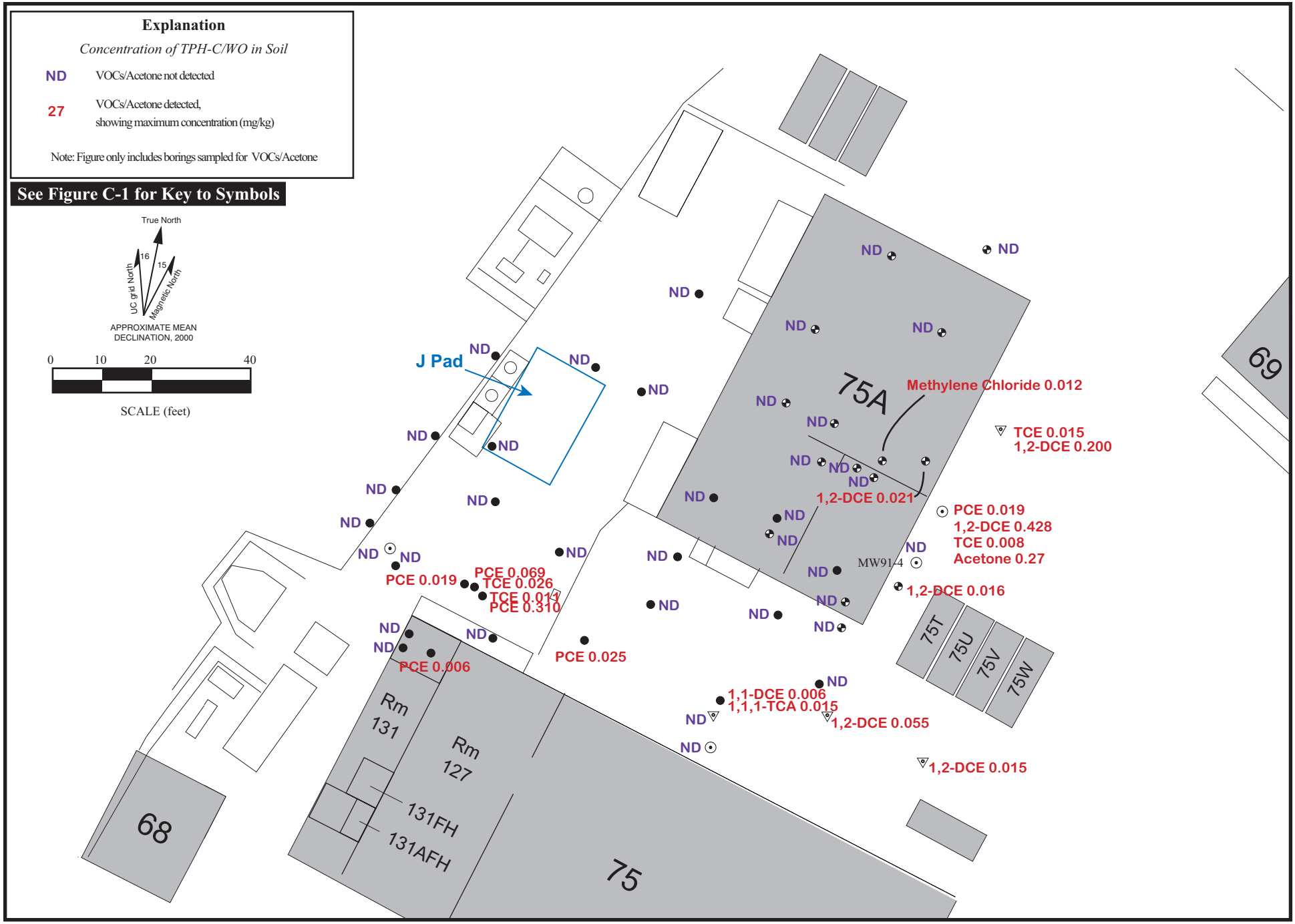


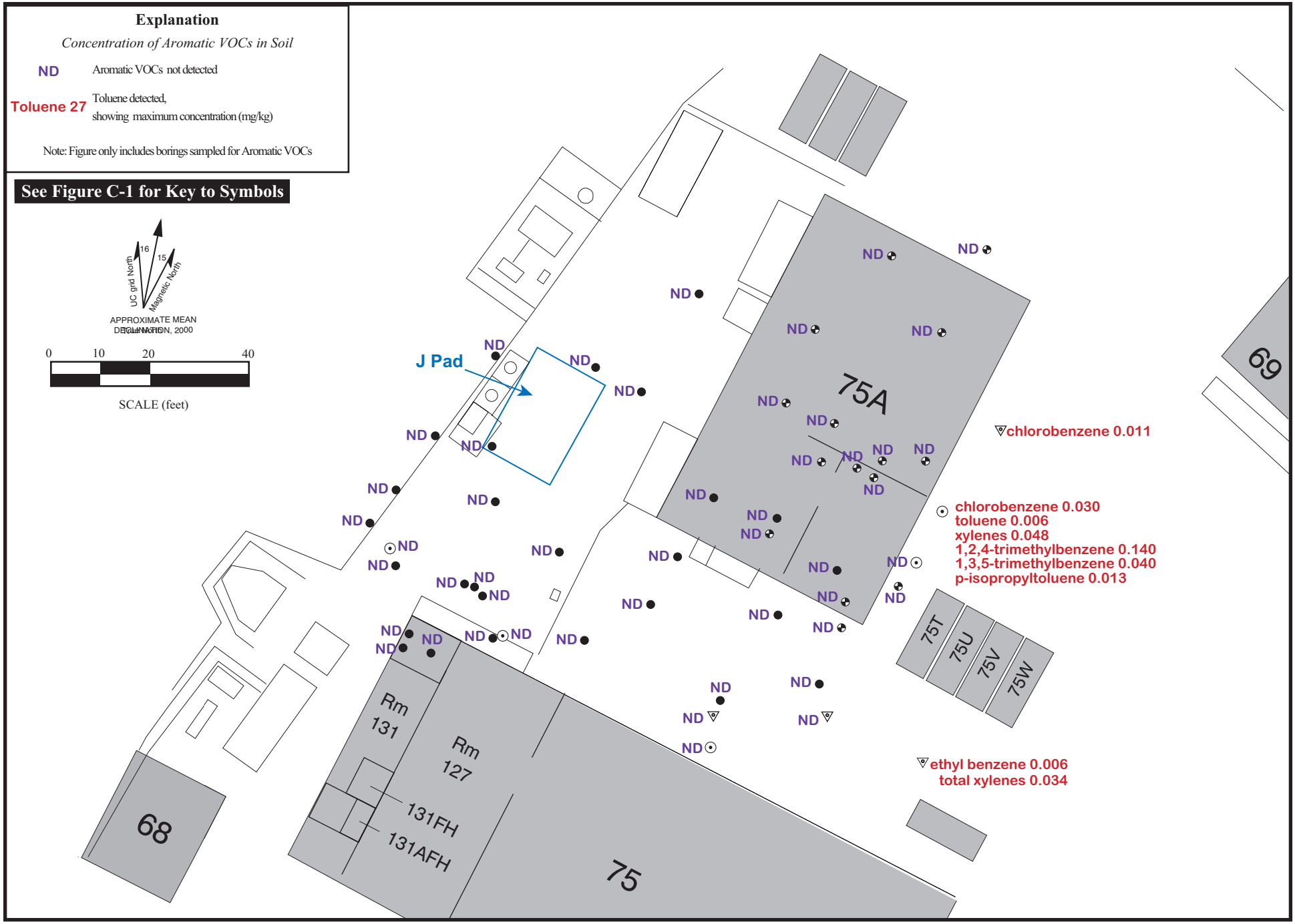
Figure C3.1-10. Hydrocarbons (TPH) in the Range of Crude/Waste Oil Detected in Soil, Building 75 Former Hazardous Waste Handling Facility (SWMU 3-6).

C3.1-10B75.ai
09/00



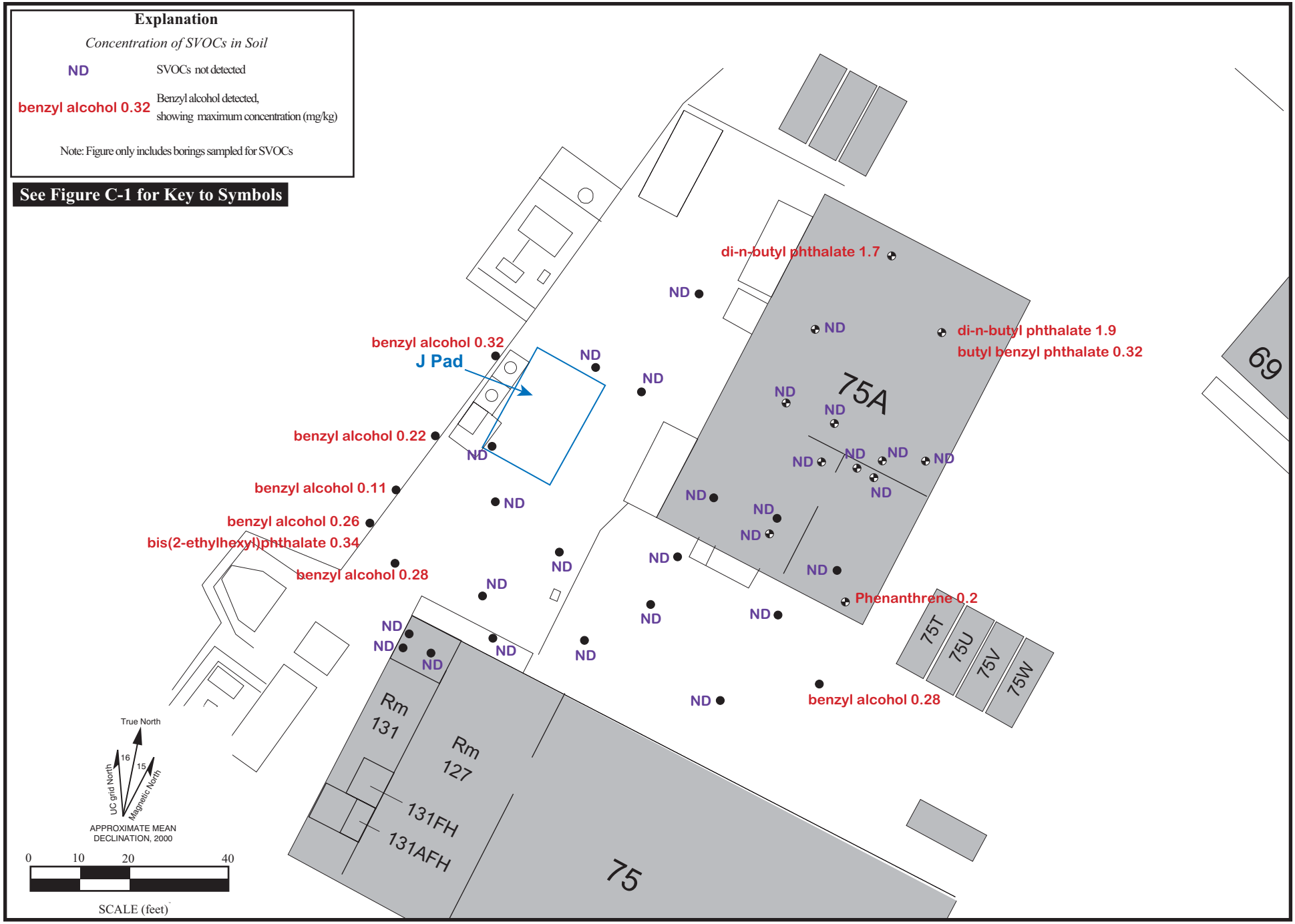
C3.1-11B75.ai

Figure C3.1-11. Non-Aromatic Halogenated VOCs and Acetone Detected in Soil, Building 75 Former Hazardous Waste Handling Facility. 09/00



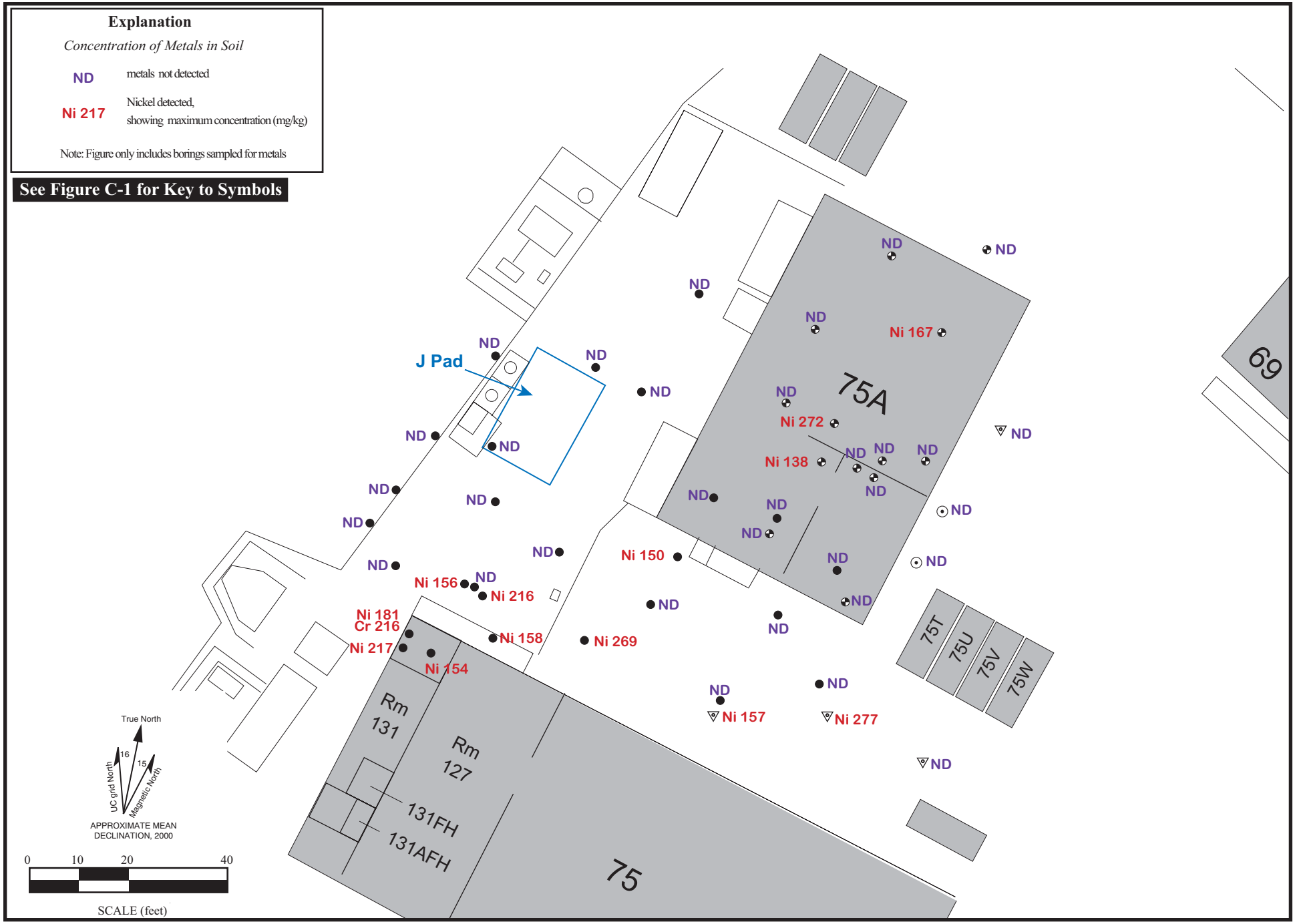
C3.1-12B75.ai
09/00

Figure C3.1-12. Aromatic VOCs in Soil, Building 75 Former Hazardous Waste Handling Facility.



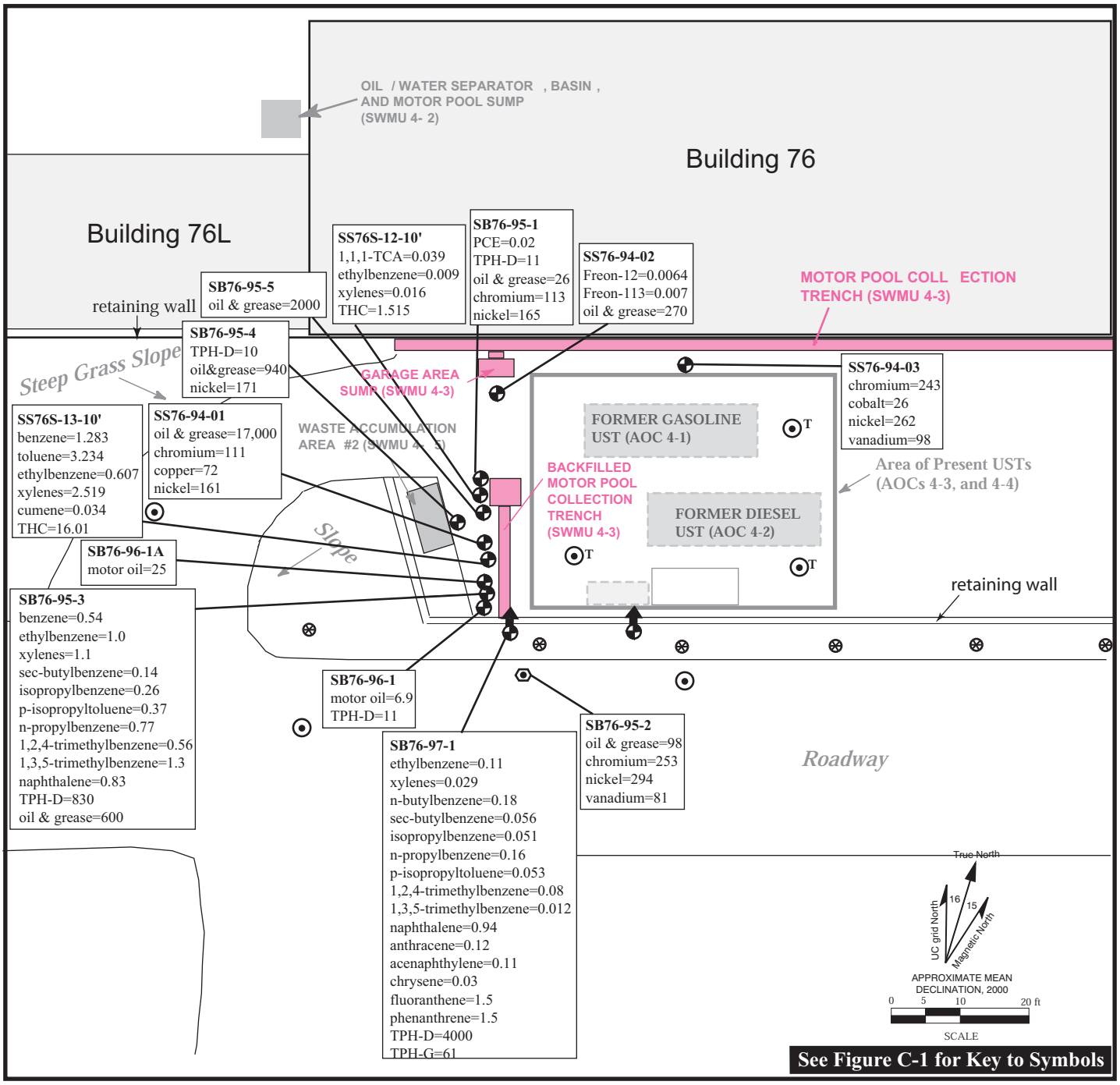
C3.1-13B75.ai
09/00

Figure C3.1-13. SVOCs in Soil, Building 75 Former Hazardous Waste Handling Facility (SWMU 3-6).



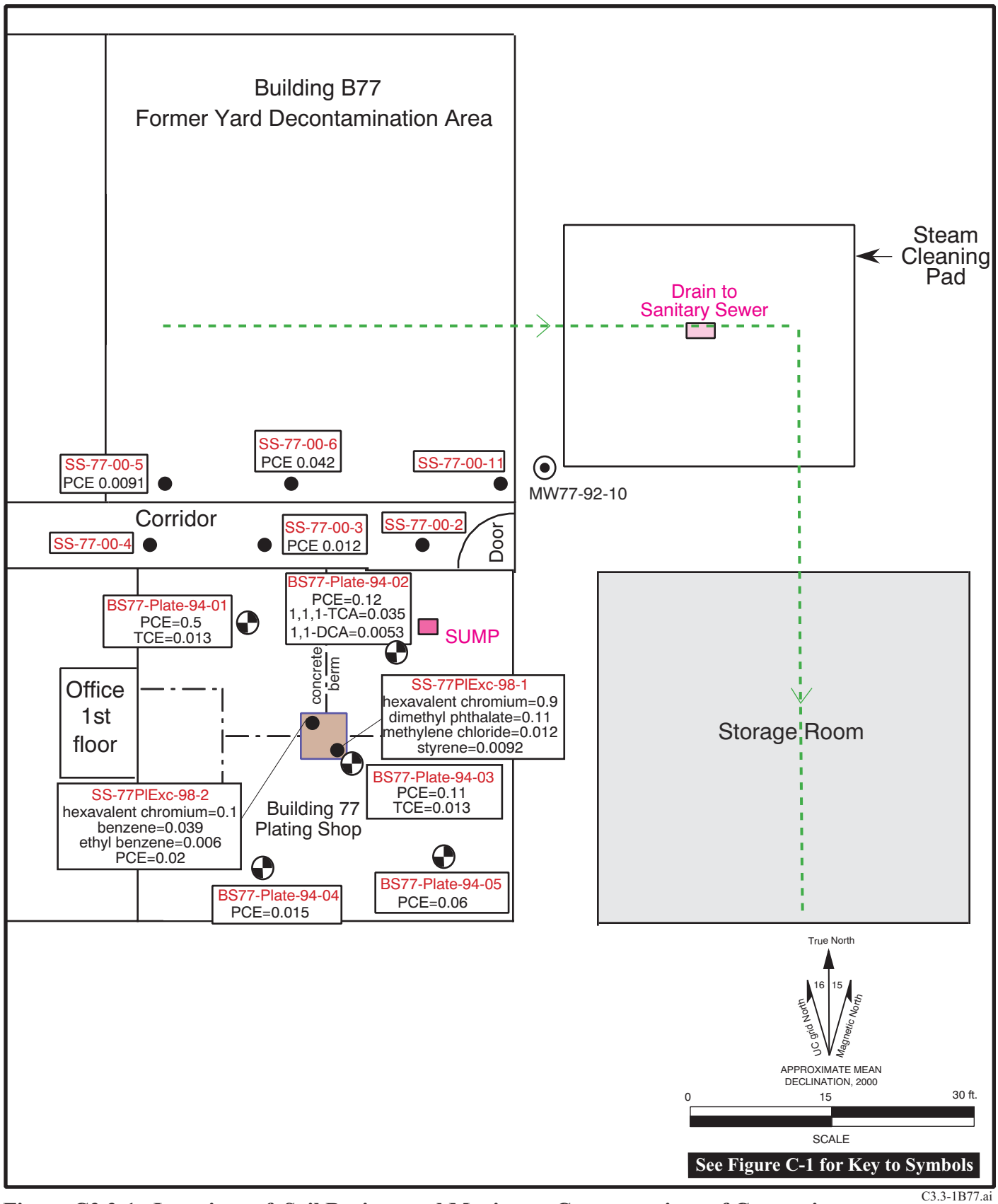
C3.1-14B75.ai
09/00

Figure C3.1-14. Metals Exceeding Background and PRGs in Soil, Building 75 Former Hazardous Waste Handling Facility (SWMU 3-6).



C3.2-1SWMU4-3.ai
09/00

Figure C3.2-1. Locations of Soil Borings and Maximum Concentrations of Analytes Detected Above Background Levels (mg/kg), Building 76 Motor Pool Collection Trenches (SWMU 4-3).



C3.3-1B77.ai
09/00

Figure C3.3-1. Locations of Soil Borings and Maximum Concentrations of Contaminants Detected (mg/kg), Building 77 Plating Shop (SWMU 5-4).

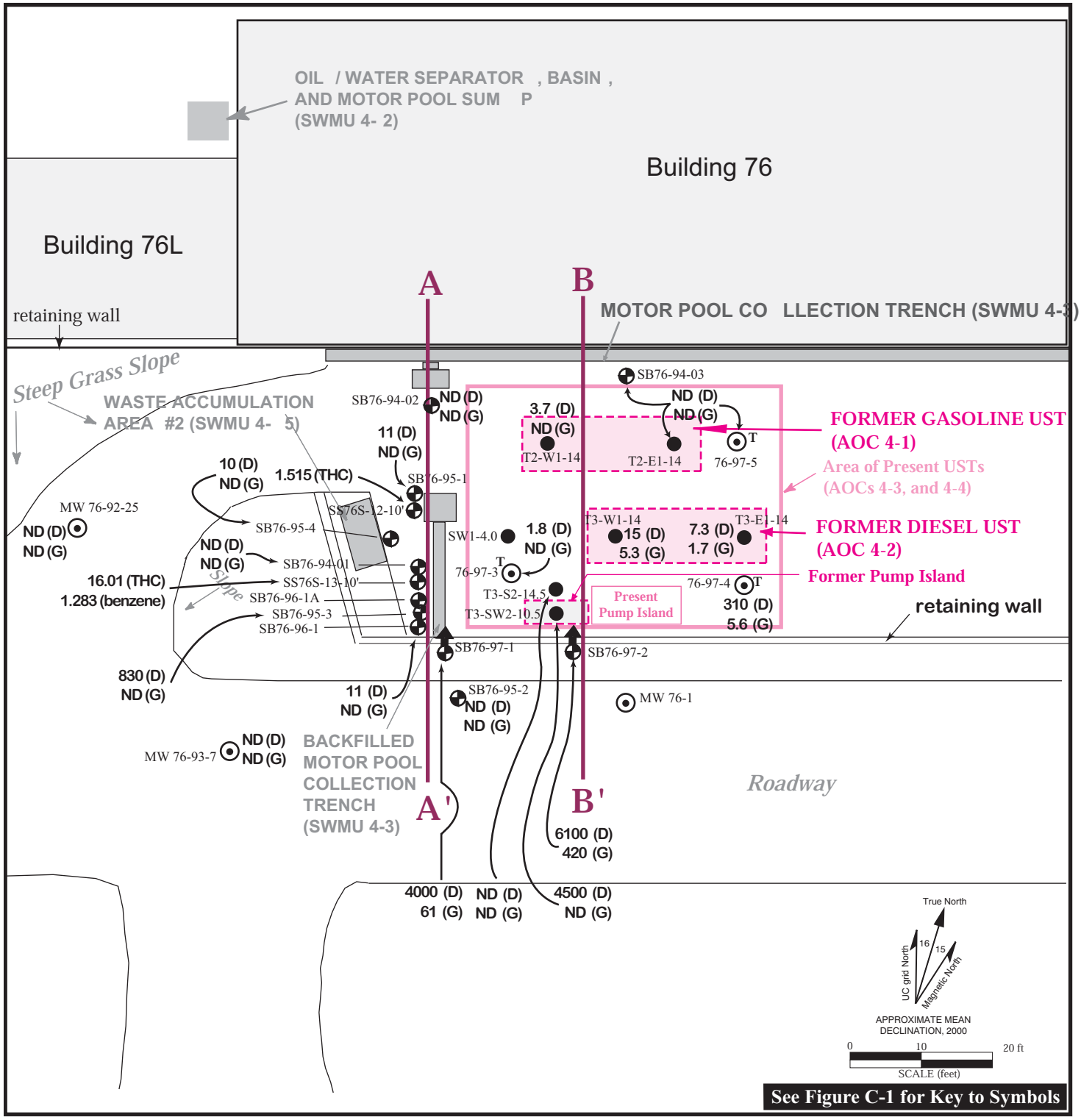


Figure C3.4-1. Soil Sample Locations Showing Detected Total Petroleum Hydrocarbons and Fuel Related Aromatic VOCs (mg/kg) Exceeding PRGs, Building 76 Motor Pool Area and the Former Gasoline and Diesel USTs (AOCs 4-1 and 4-2).

C3.4-1B76.ai
09/00

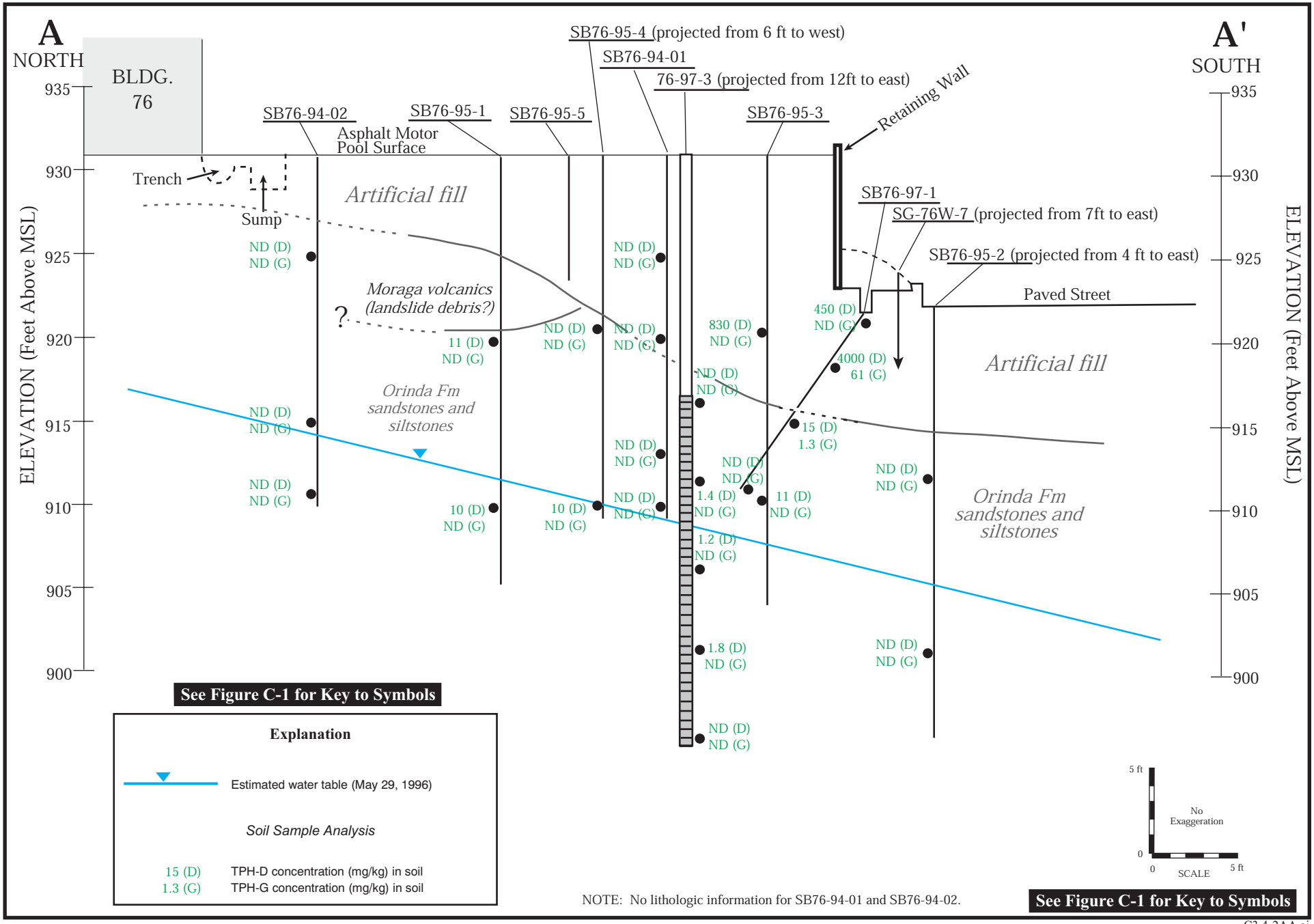


Figure C3.4-2. Geologic Cross-Section A-A' Showing Total Petroleum Hydrocarbon Concentrations (mg/kg), Building 76 Motor Pool Area (AOCs 4-1 and 4.2).

C3.4-2AA.ai
09/00

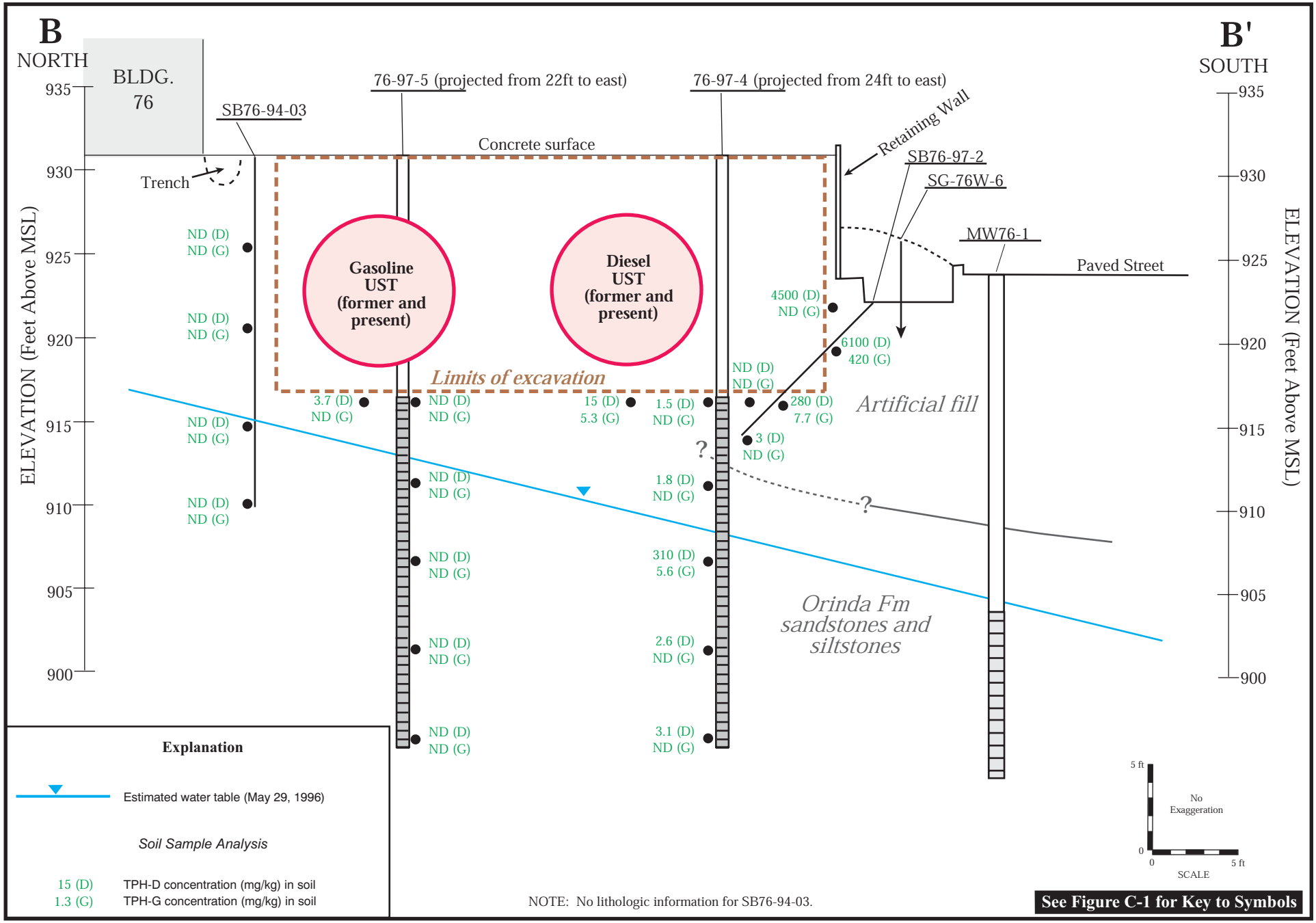
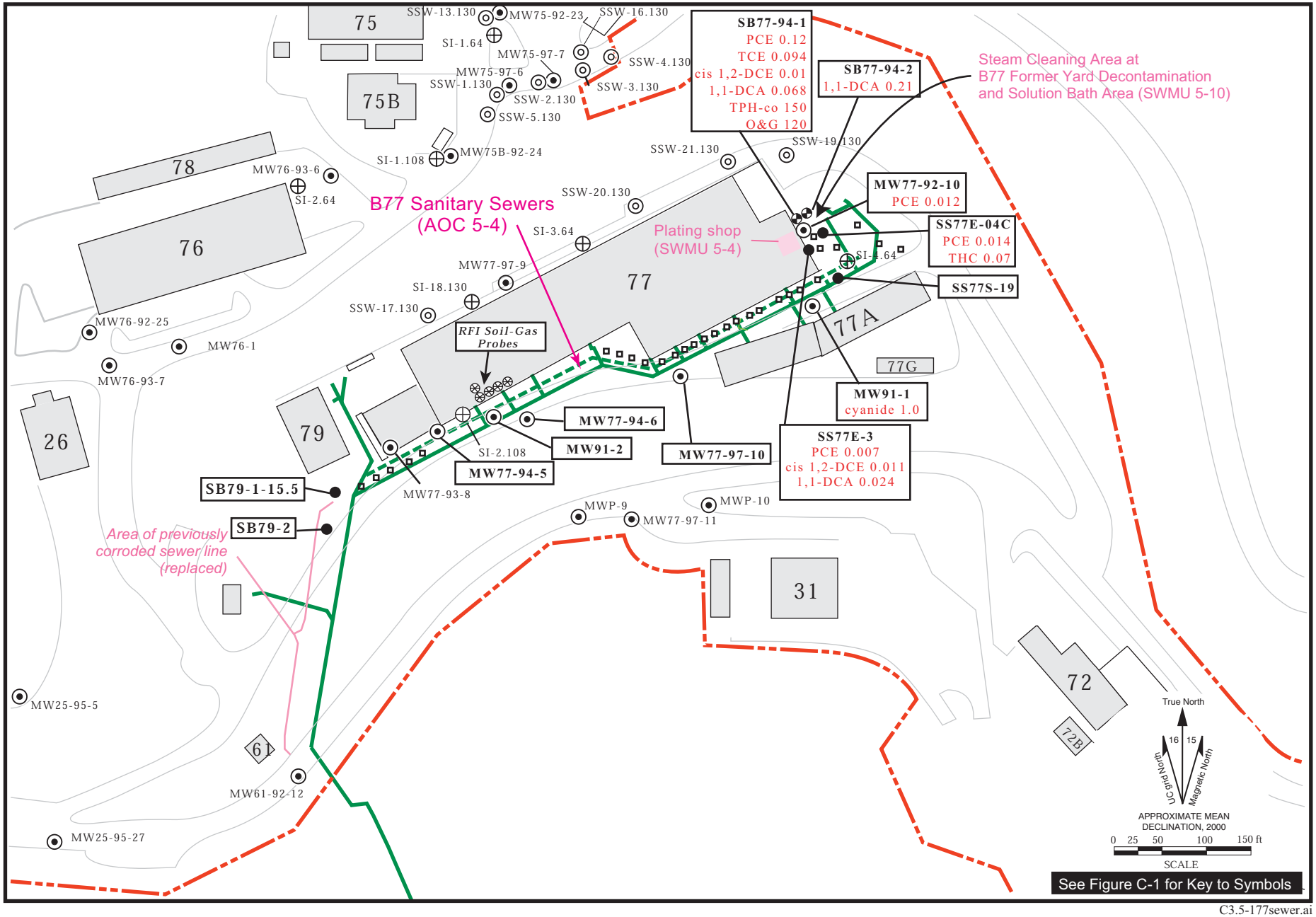


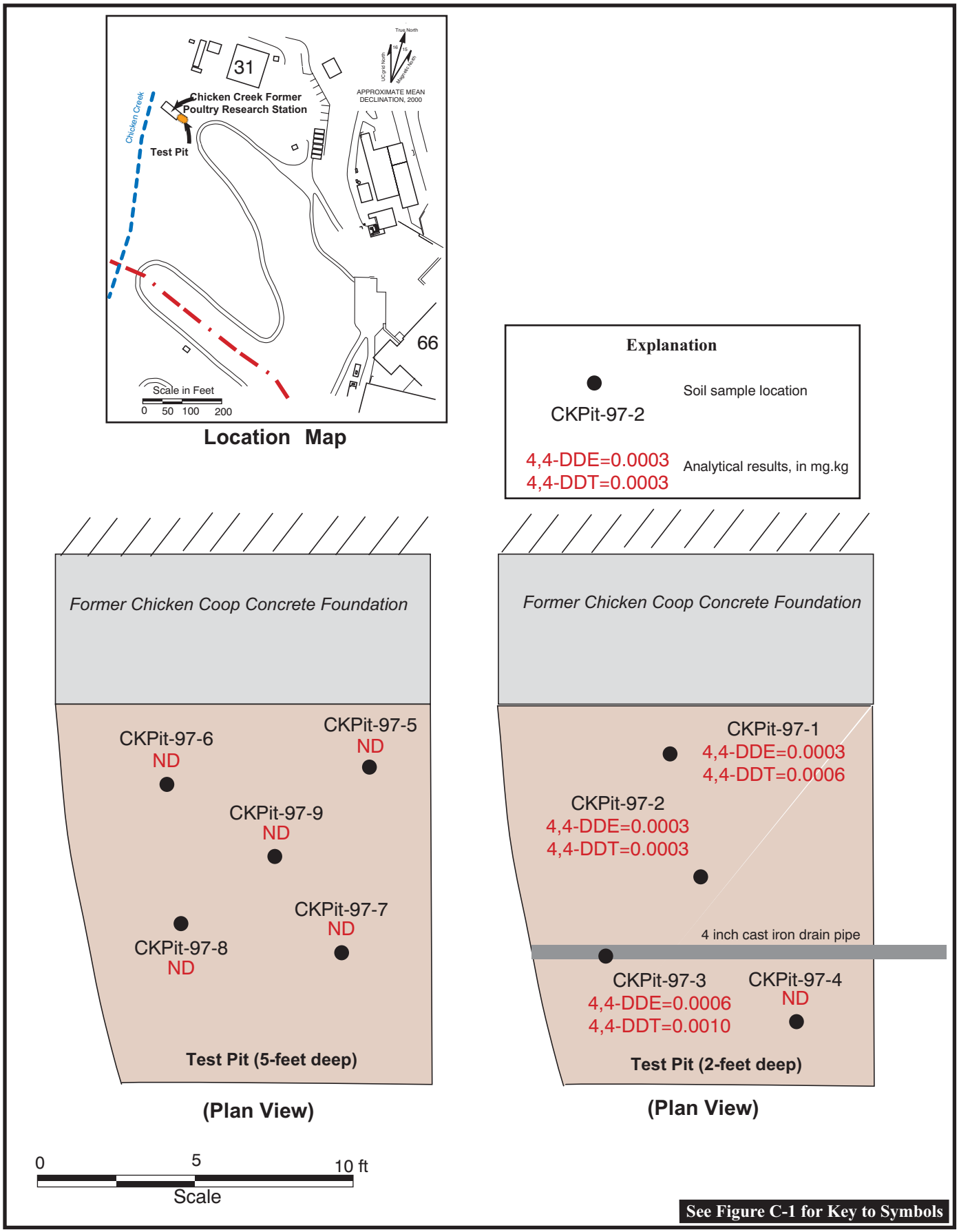
Figure C3.4-3. Geologic Cross-Section B-B' Showing Total Petroleum Hydrocarbon Concentrations, Building 76 Motor Pool Area (AOCs 4-1 and 4-2).

C3.4-3BB.ai
09/00



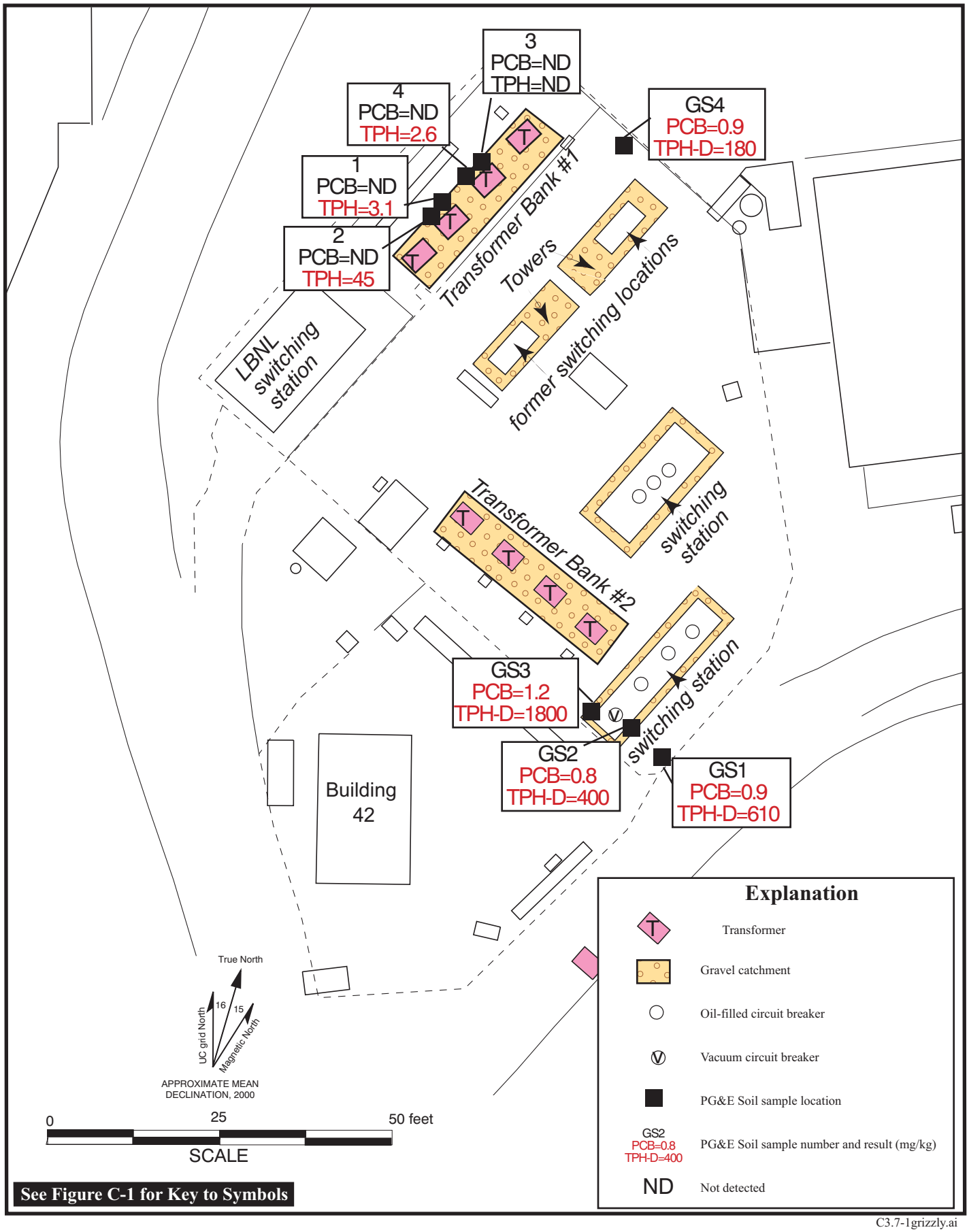
C3.5-177sewer.ai
09/00

Figure C3.5-1. Site Map, Building 77 Sanitary Sewer System (AOC 5-4) and Related Sampling Locations Showing Detected Contaminant Concentrations (mg/kg).



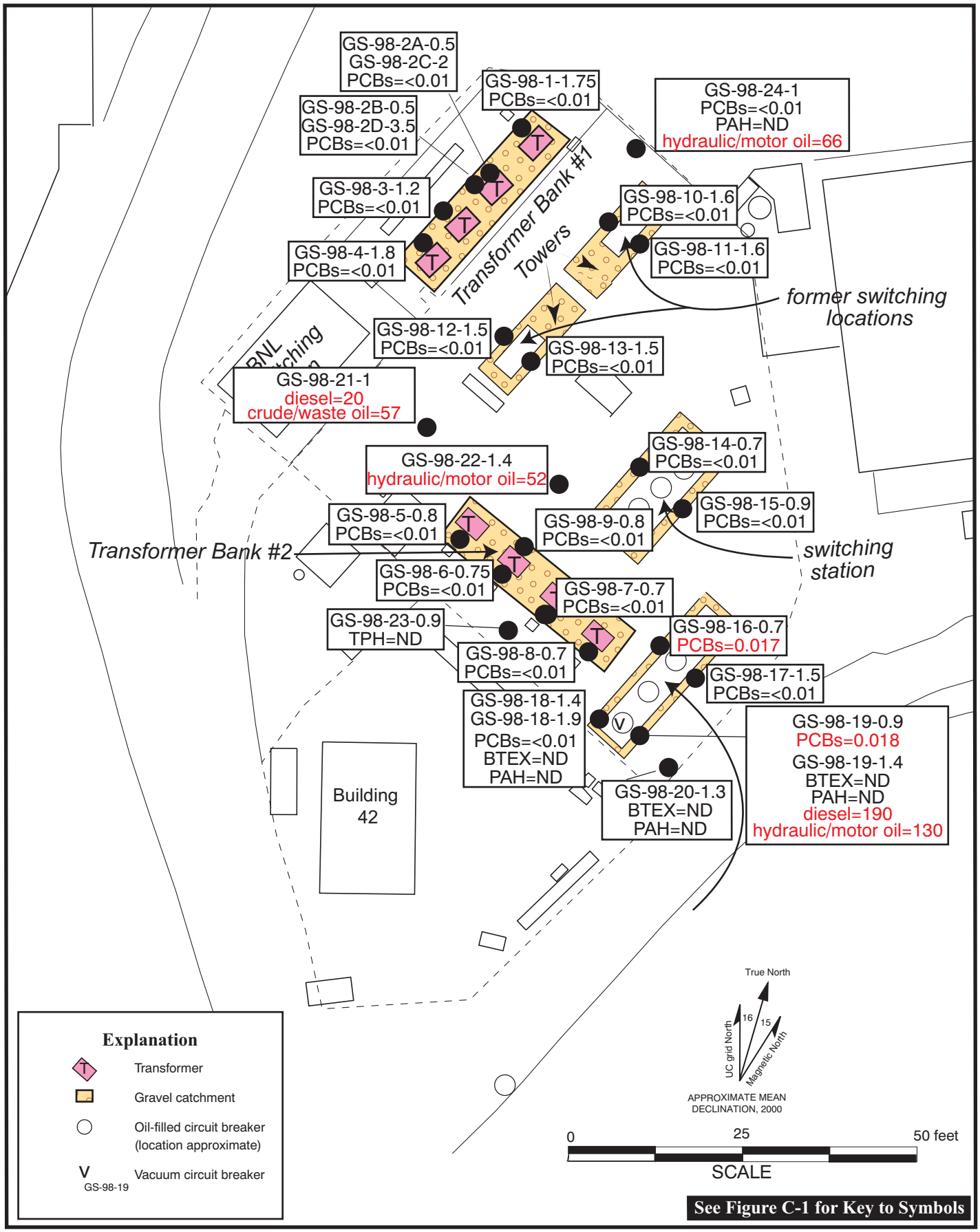
C3.6-1coop
09/00

Figure C3.6-1. Locations of Soil Samples and Concentrations of Contaminants Detected (mg/kg), Chicken Creek Poultry Research Station.



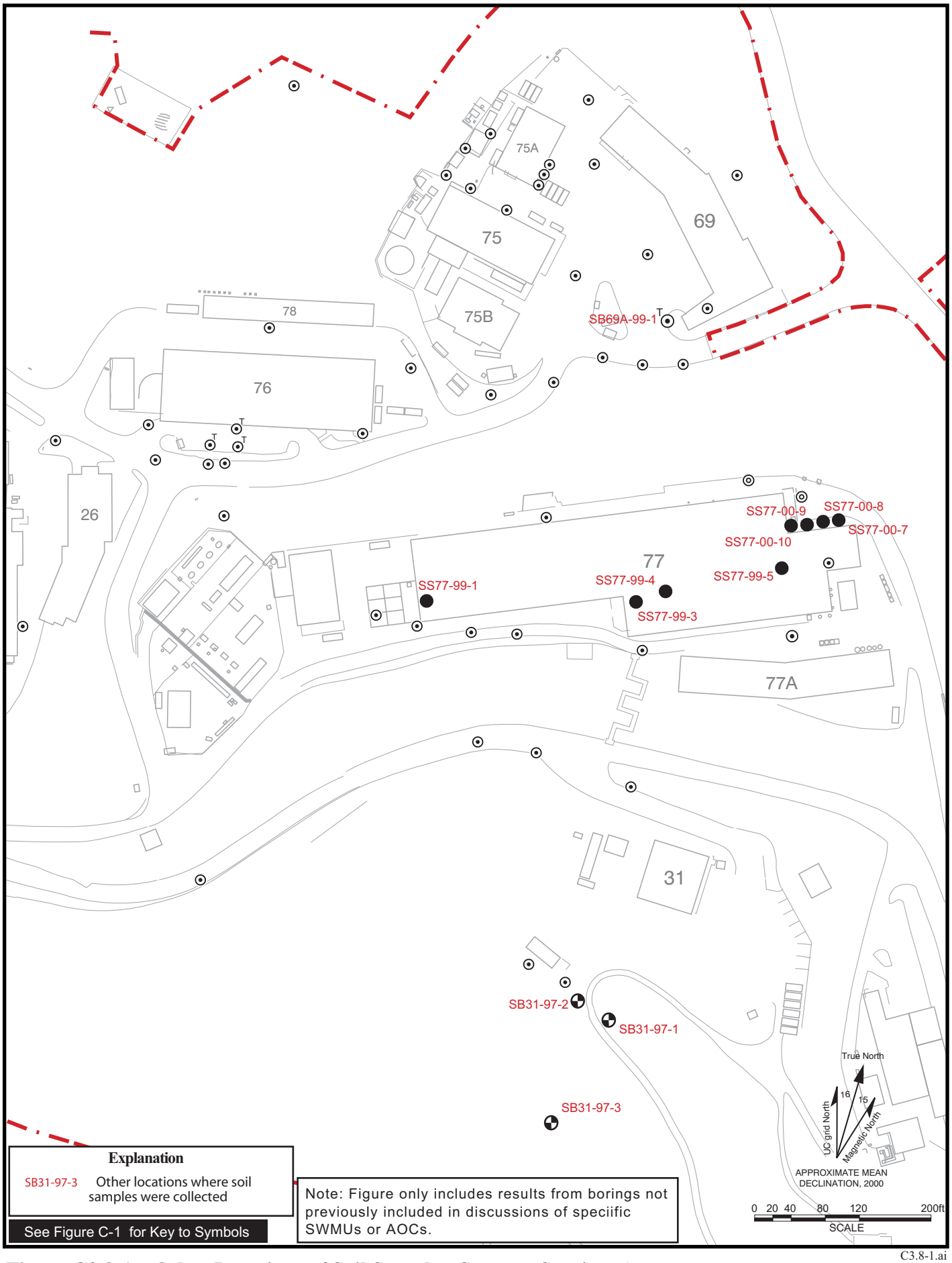
C3.7-1grizzly.ai
09/00

Figure C3.7-1. Locations of Soil Samples and Concentrations of Contaminants Detected (mg/kg), Reported by Pacific Gas and Electric (PG&E) 1994, Grizzly Substation.



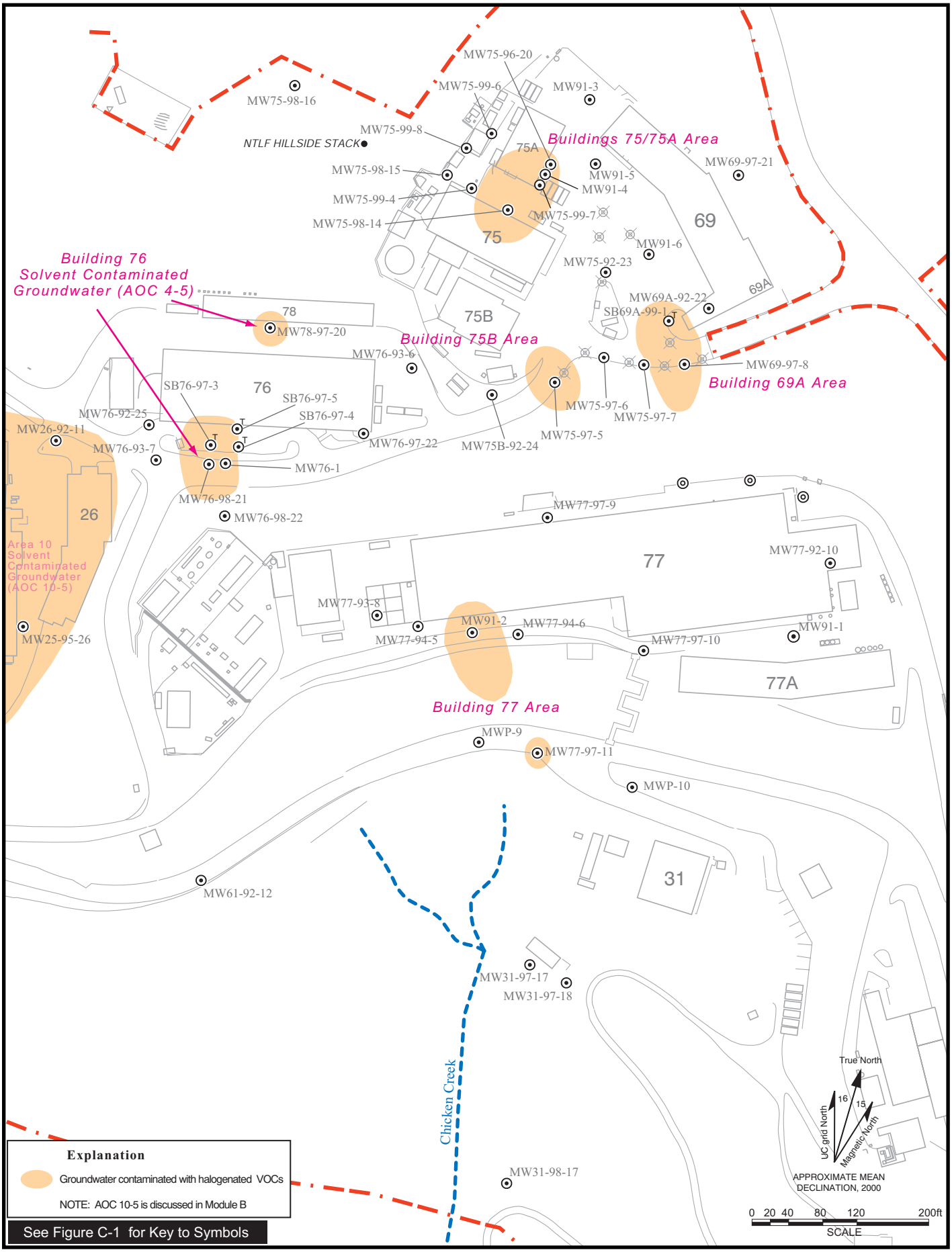
C3.7-2grizzly.ai
09/00

Figure C3.7-2. Locations of Soil Samples Collected in 1998 and Concentrations of Contaminants Detected (mg/kg), Grizzly Substation.



C3.8-1.ai
09/00

Figure C3.8-1. Other Locations of Soil Samples, Support Services Area.



SupportServicesArea.ai
09/00

Figure C4.1-1. Areas of Groundwater Contamination (Halogenated VOCs) in the Support Services Area (Fiscal Year 1999) with Groundwater AOCs Shown.

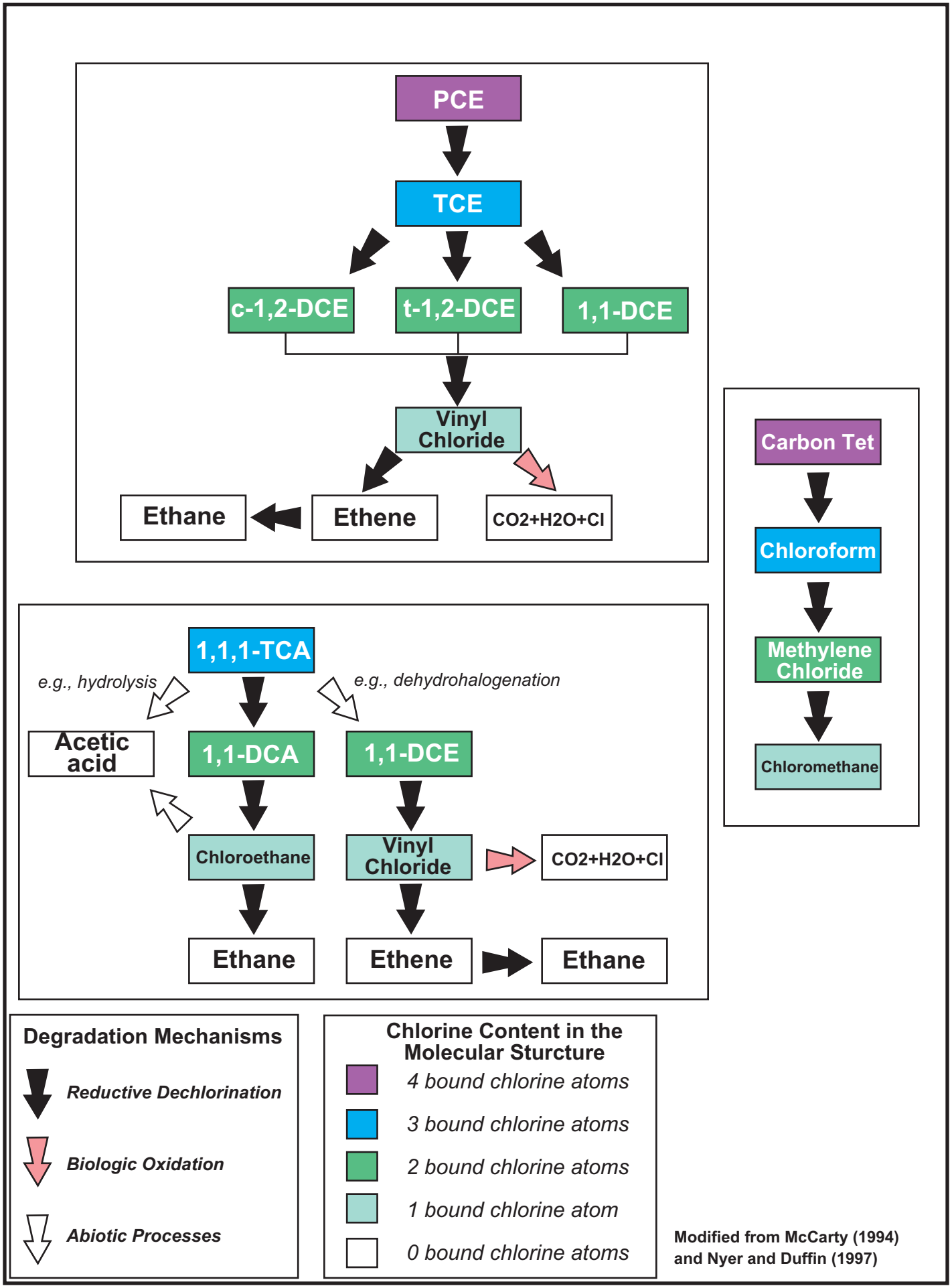
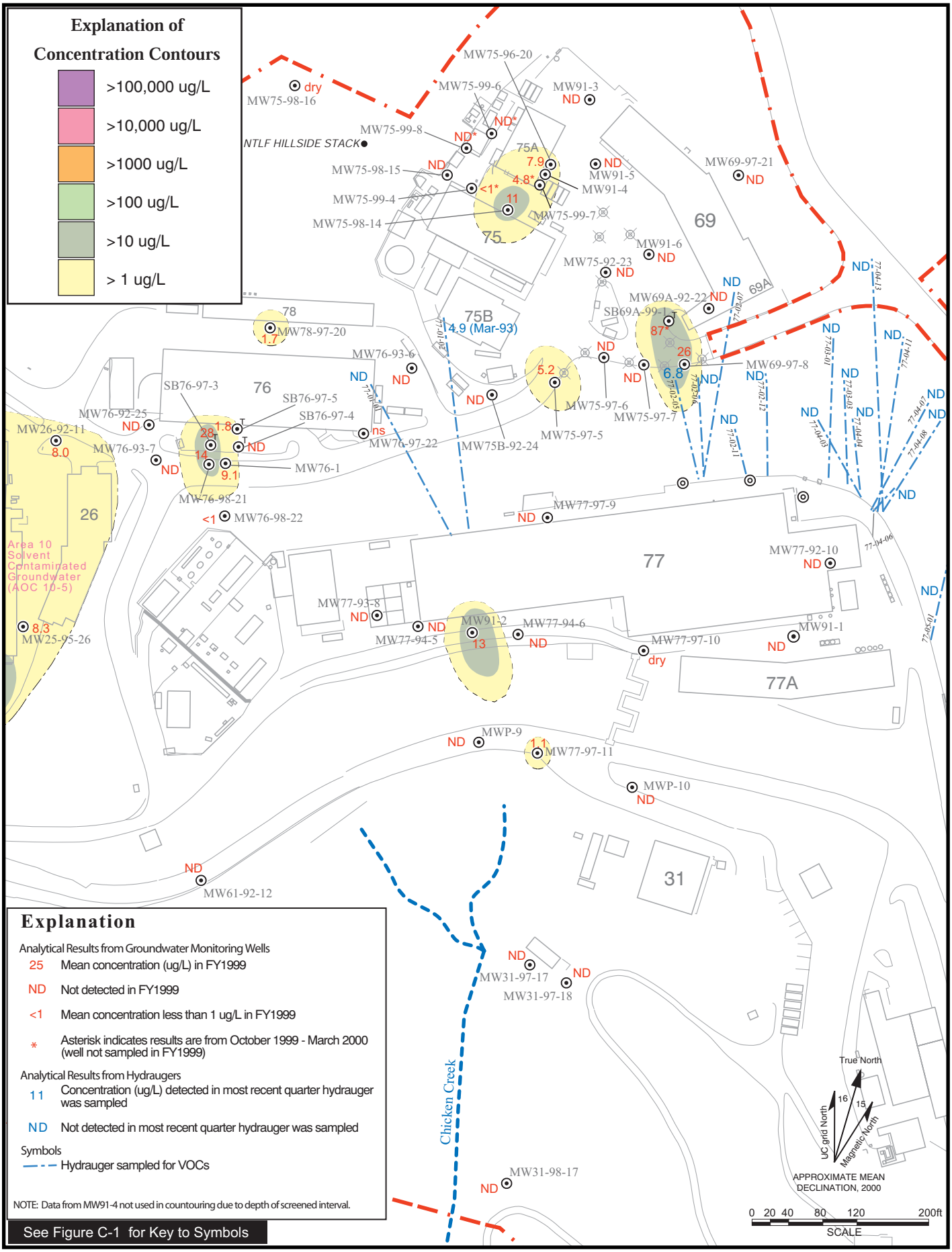


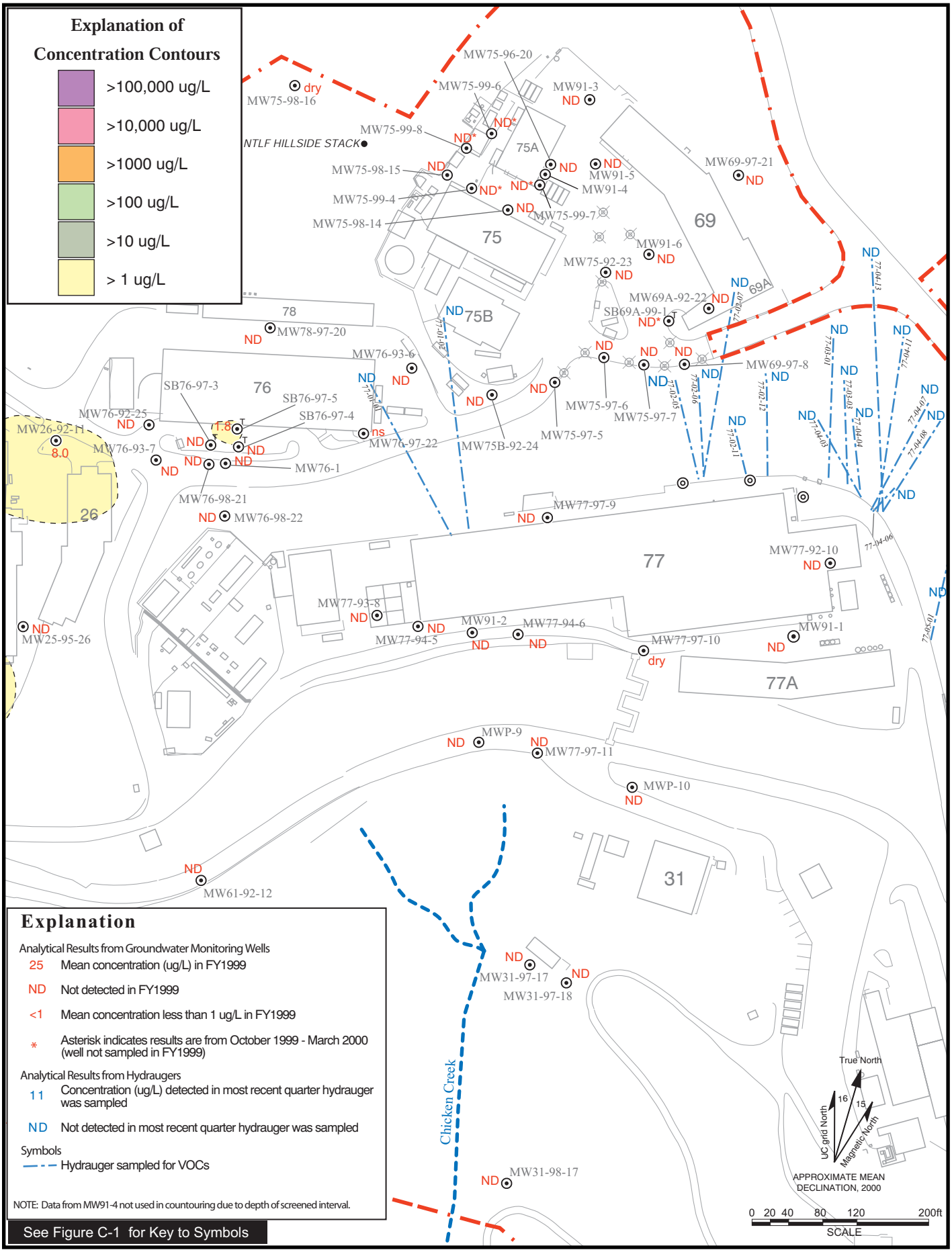
Figure C4.2-1. Generalized Degradation Pathways of Chlorinated Hydrocarbons.

C4.2-1 BioDegChart.ai
09/00



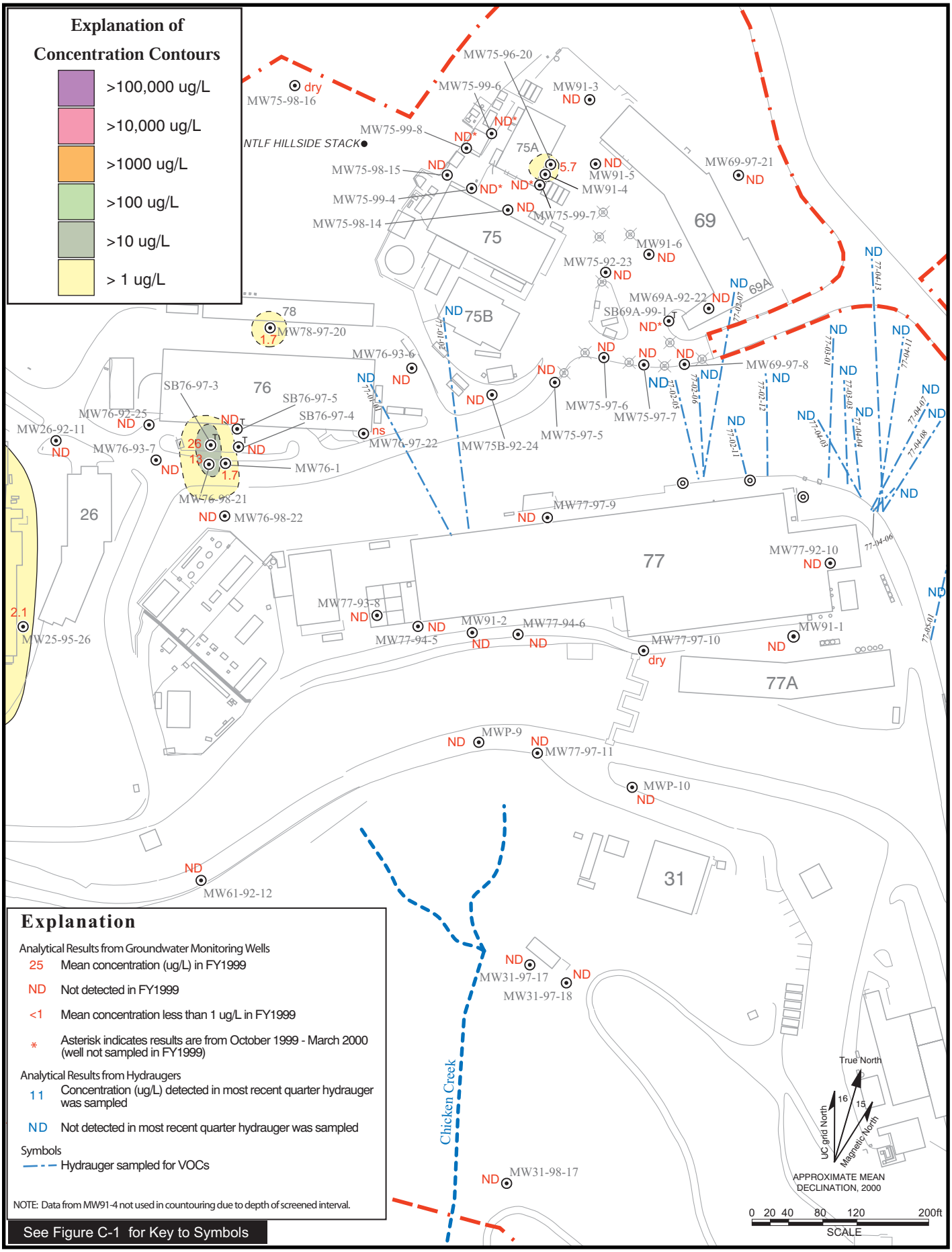
SupportServicesArea.ai
09/00

Figure C4.3-1. Isoconcentration Contour Map: Mean Concentrations of Total Halogenated Non-Aromatic VOCs Near Water Table, Support Services Area, Fiscal Year 1999.



SupportServicesArea.ai
09/00

Figure C4.3-2. Isoconcentration Contour Map: Mean Concentrations of PCE Near Water Table, Support Services Area, Fiscal Year 1999.



SupportServicesArea.ai
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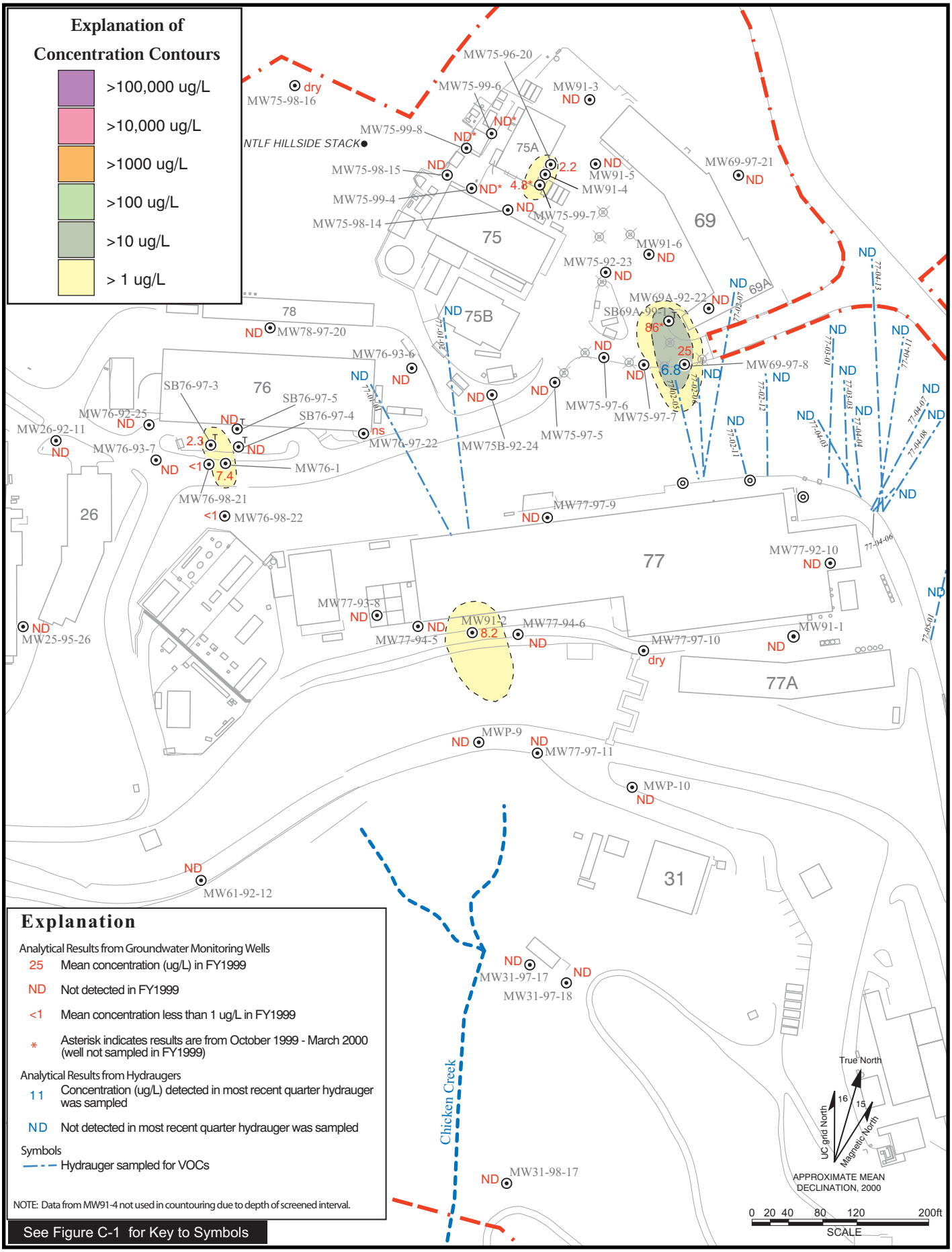
Figure C4.3-3. Isoconcentration Contour Map: Mean Concentrations of TCE Near Water Table, Support Services Area, Fiscal Year 1999.



SupportServicesArea.ai
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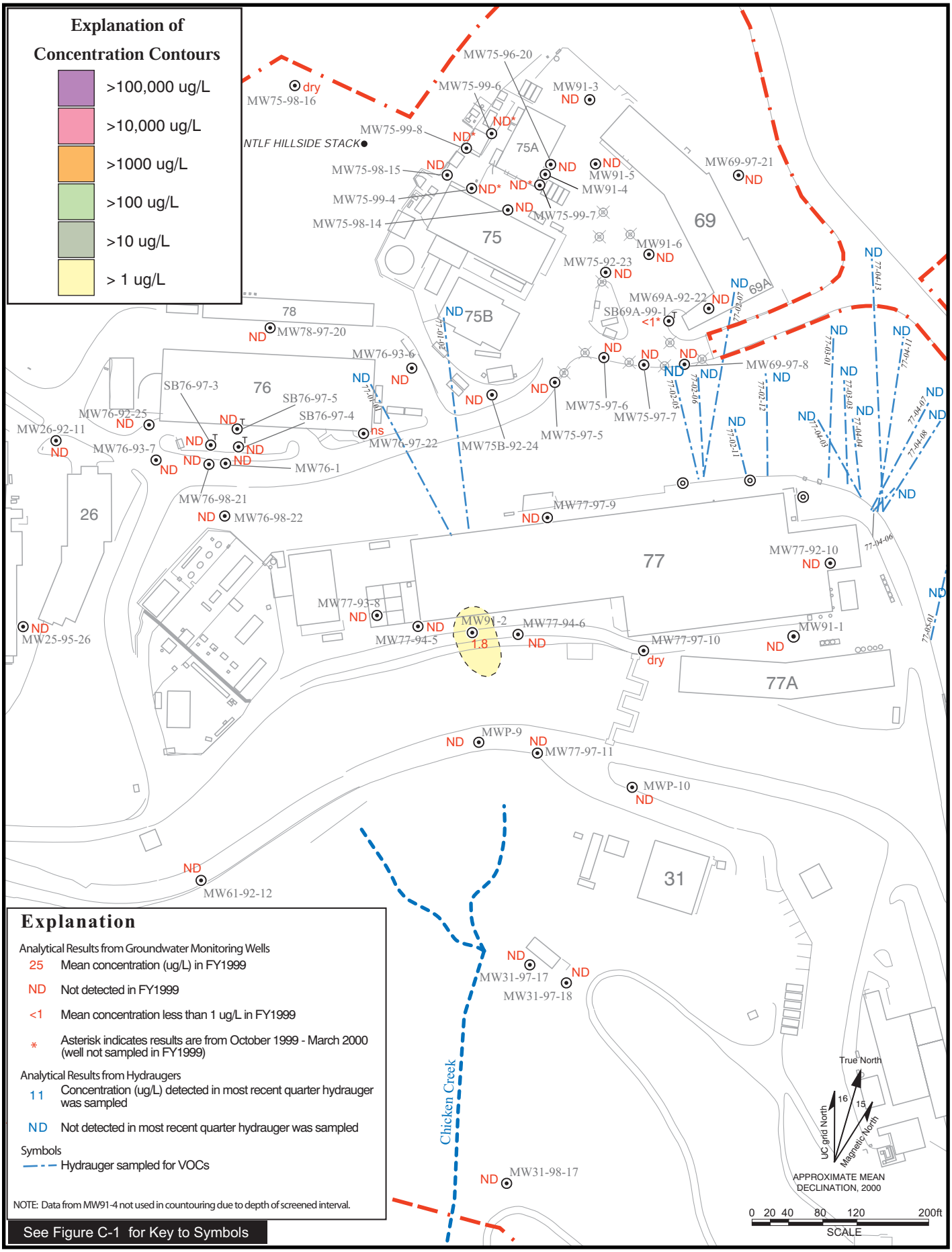
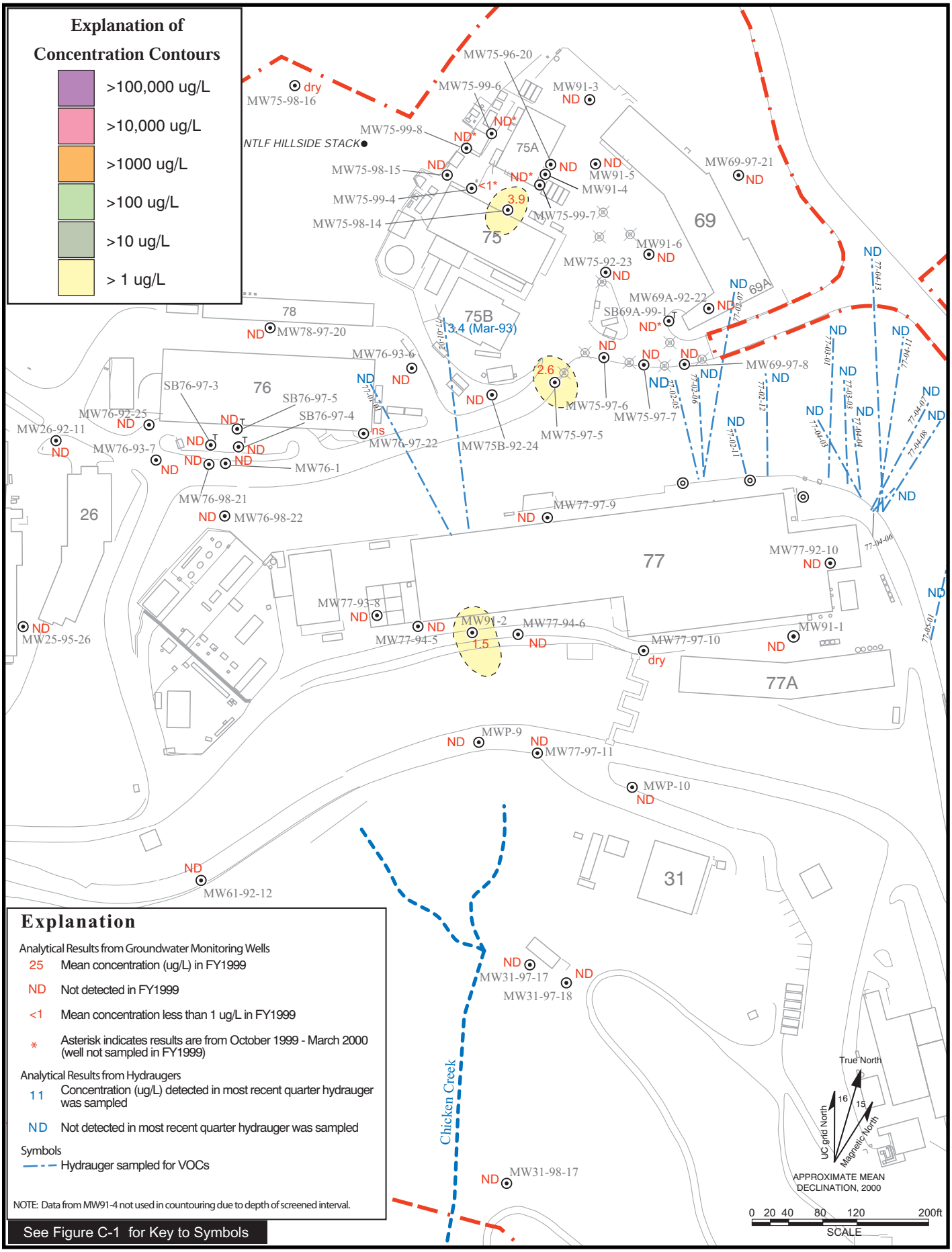
Figure C4.3-4. Isoconcentration Contour Map: Mean Concentrations of cis-1,2-DCE Near Water Table, Support Services Area, Fiscal Year 1999.



SupportServicesArea.ai
09/00

Figure C4.3-5. Isoconcentration Contour Map: Mean Concentrations of trans-1,2-DCE Near Water Table, Support Services Area, Fiscal Year 1999.



SupportServicesArea.ai
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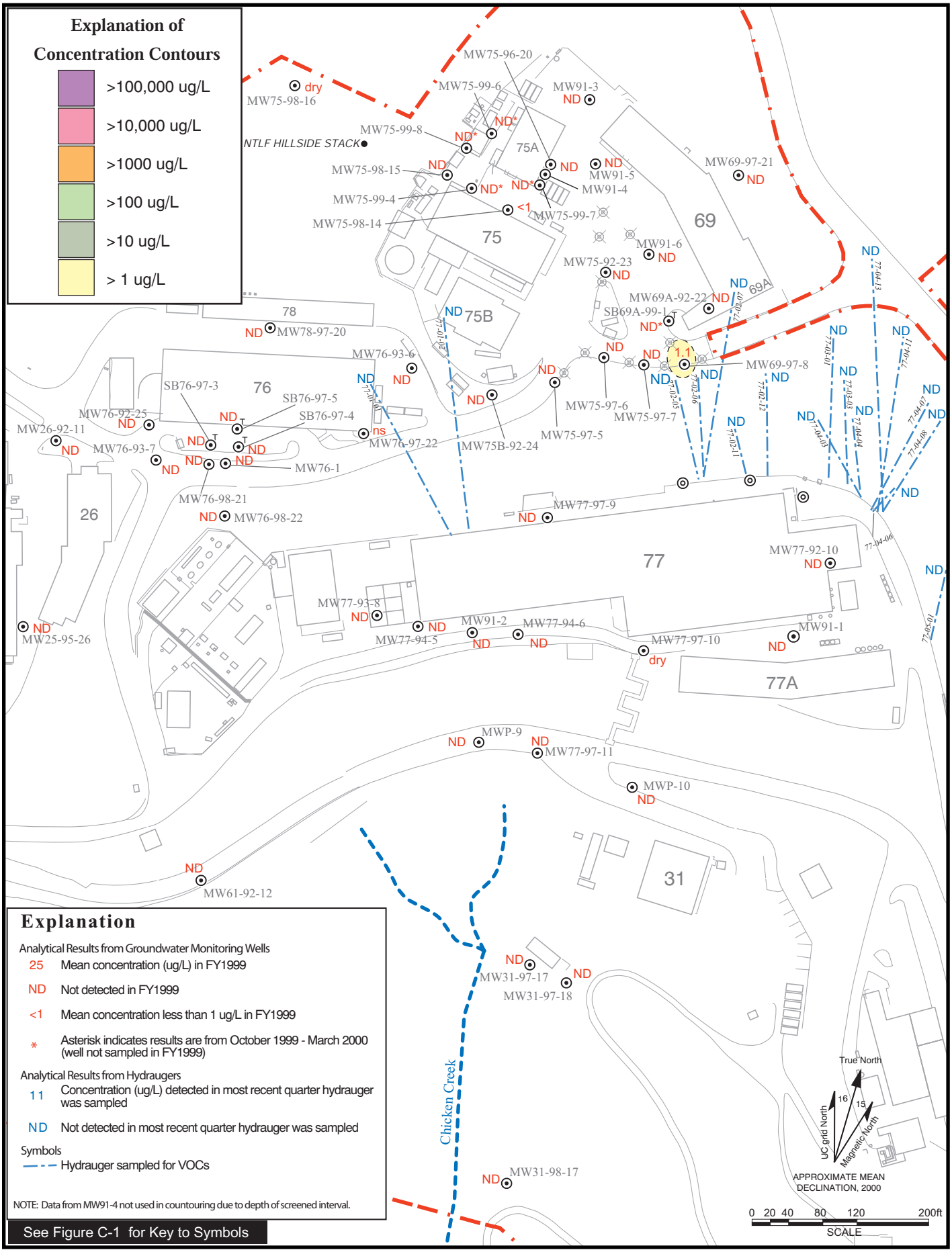
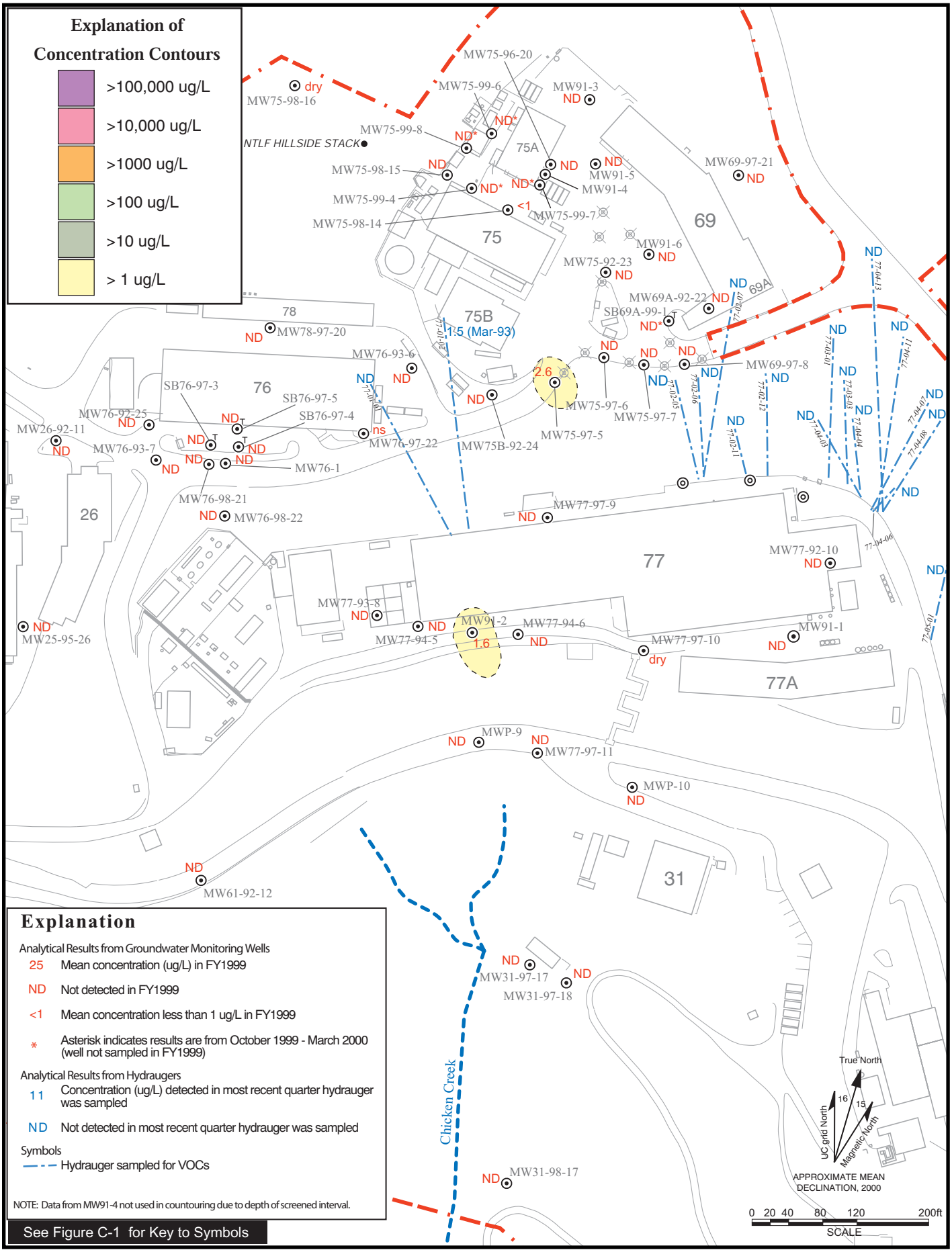
Figure C4.3-6. Isoconcentration Contour Map: Mean Concentrations of 1,1-DCE Near Water Table, Support Services Area, Fiscal Year 1999.



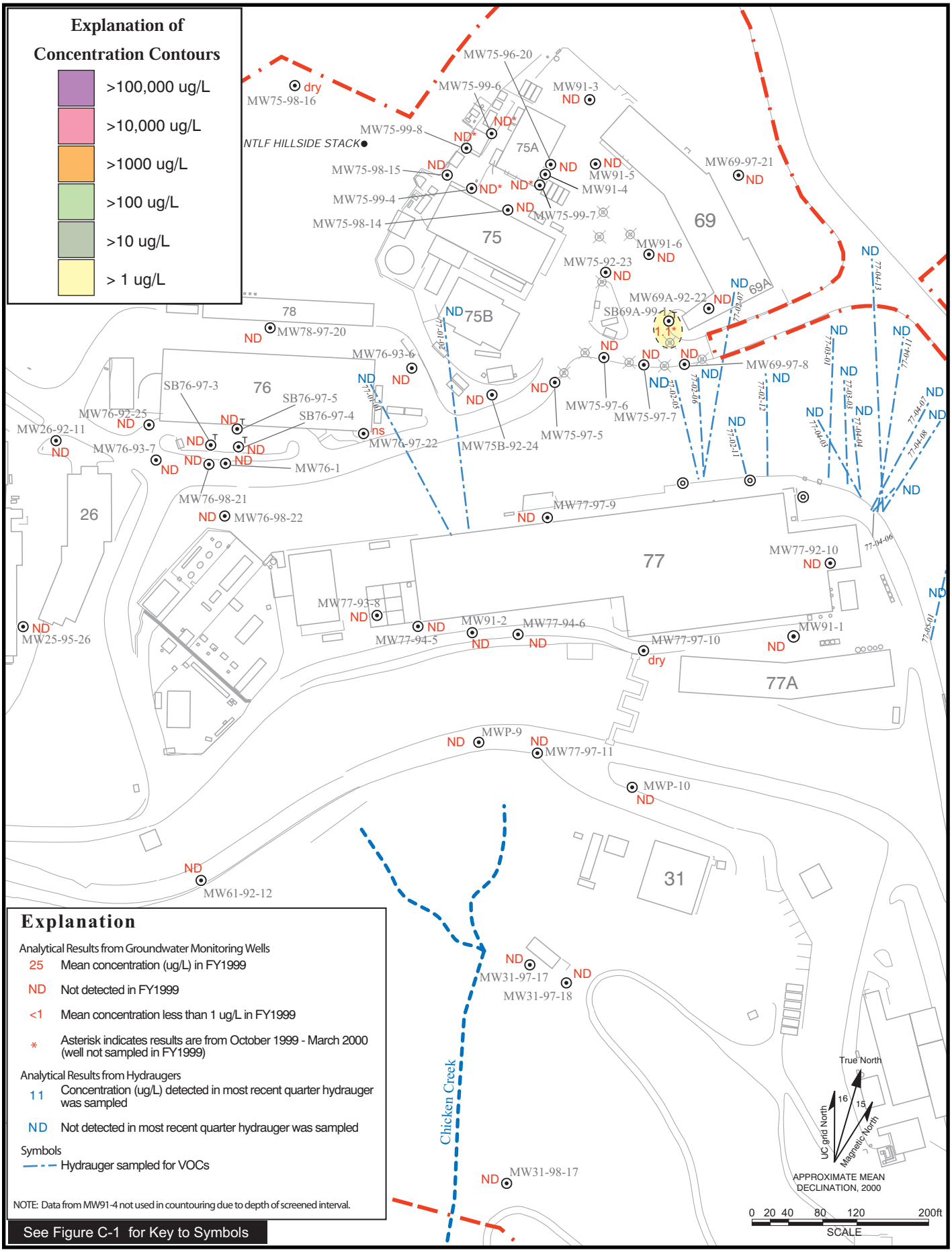
SupportServicesArea.ai
09/00

Figure C4.3-7. Isoconcentration Contour Map: Mean Concentrations of 1,1,1-TCA Near Water Table, Support Services Area, Fiscal Year 1999.



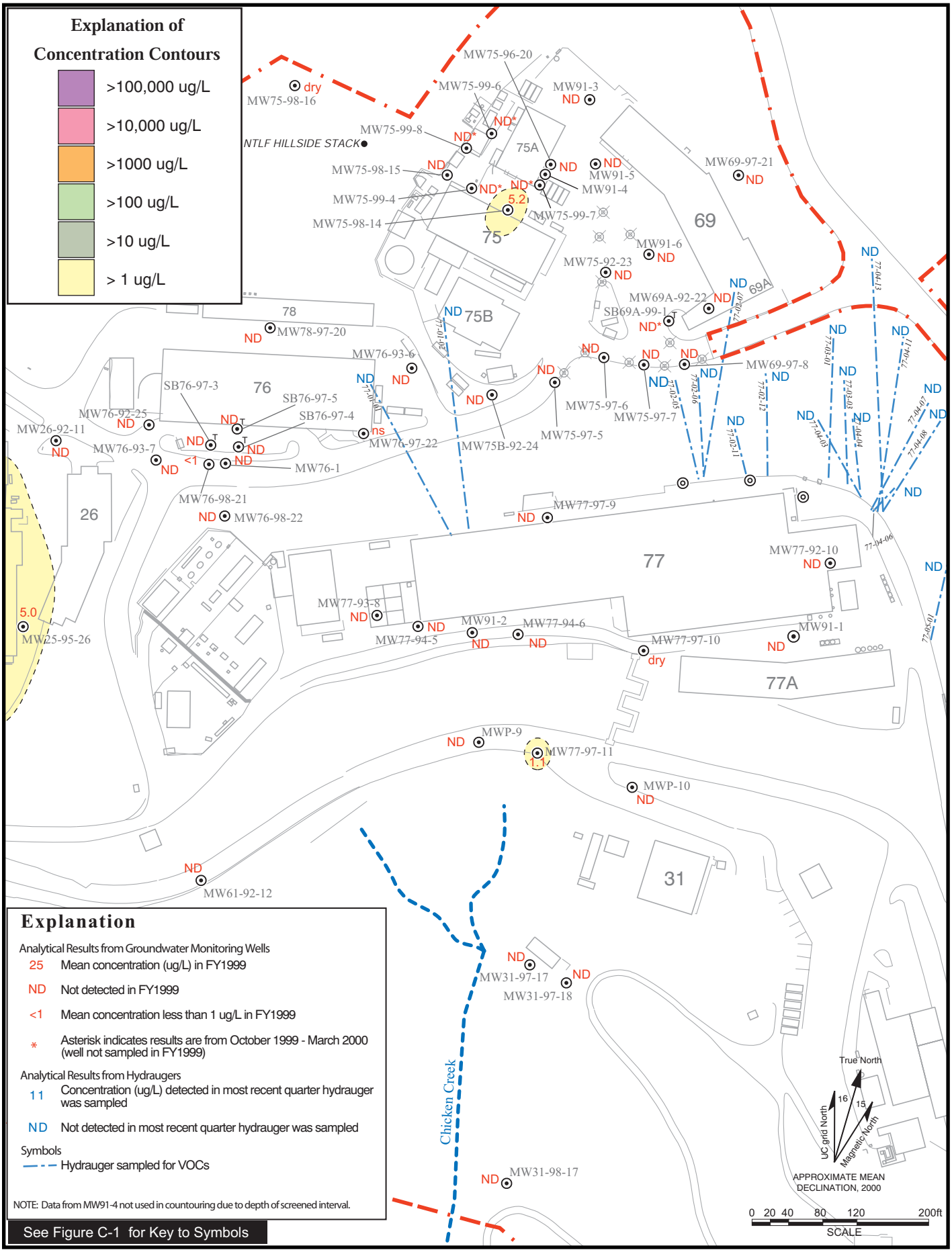
SupportServicesArea.ai
09/00

Figure C4.3-8. Isoconcentration Contour Map: Mean Concentrations of 1,1-DCA Near Water Table, Support Services Area, Fiscal Year 1999.



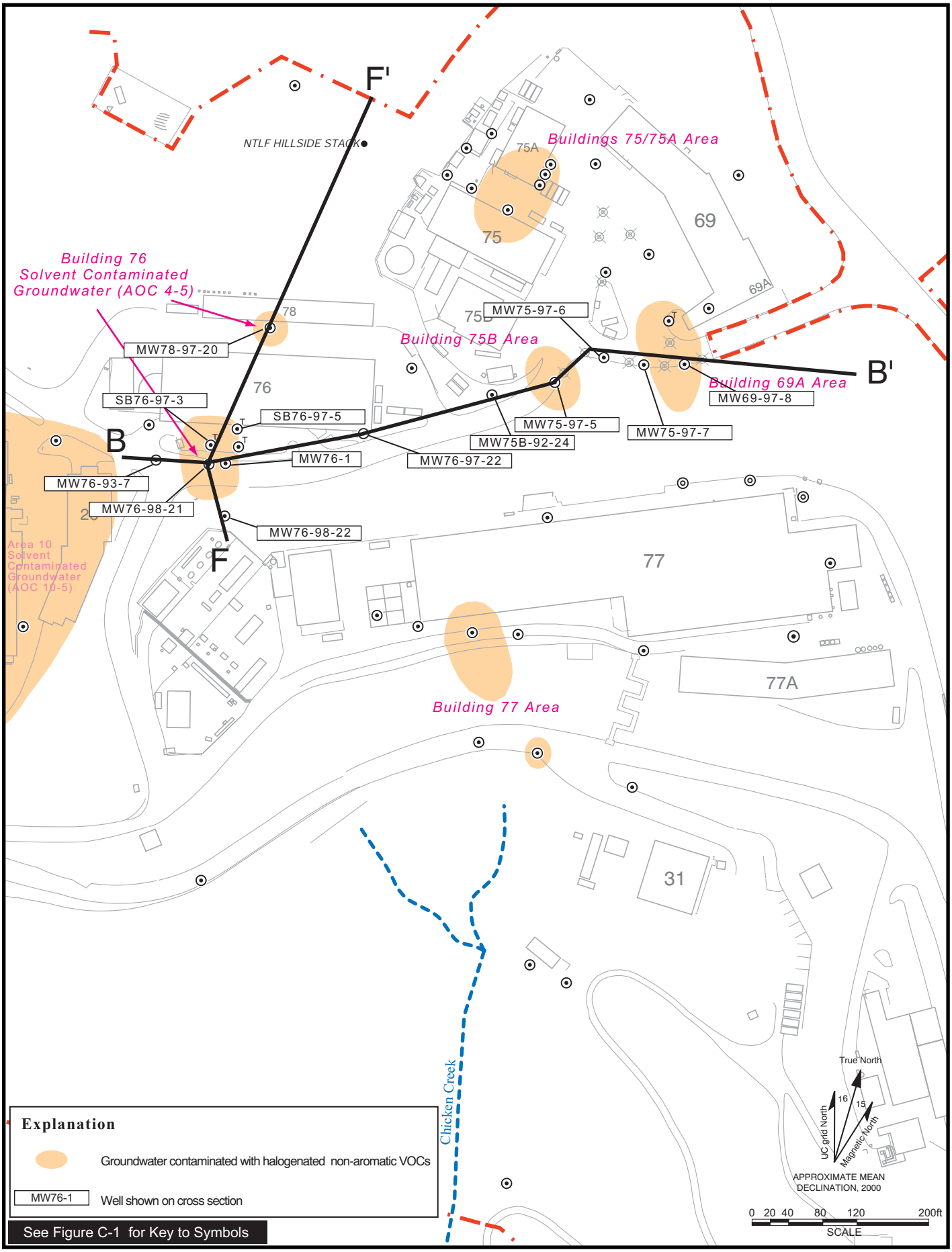
SupportServicesArea.ai
09/00

Figure C4.3-9. Isoconcentration Contour Map: Mean Concentrations of Vinyl Chloride Near Water Table, Support Services Area, Fiscal Year 1999.



SupportServicesArea.ai
09/00

Figure C4.3-10. Isoconcentration Contour Map: Mean Concentrations of Chloroform Near Water Table, Support Services Area, Fiscal Year 1999.



SupportServicesArea.ai
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Figure C4.3-11. Cross Section Index Map of the Support Services Area.

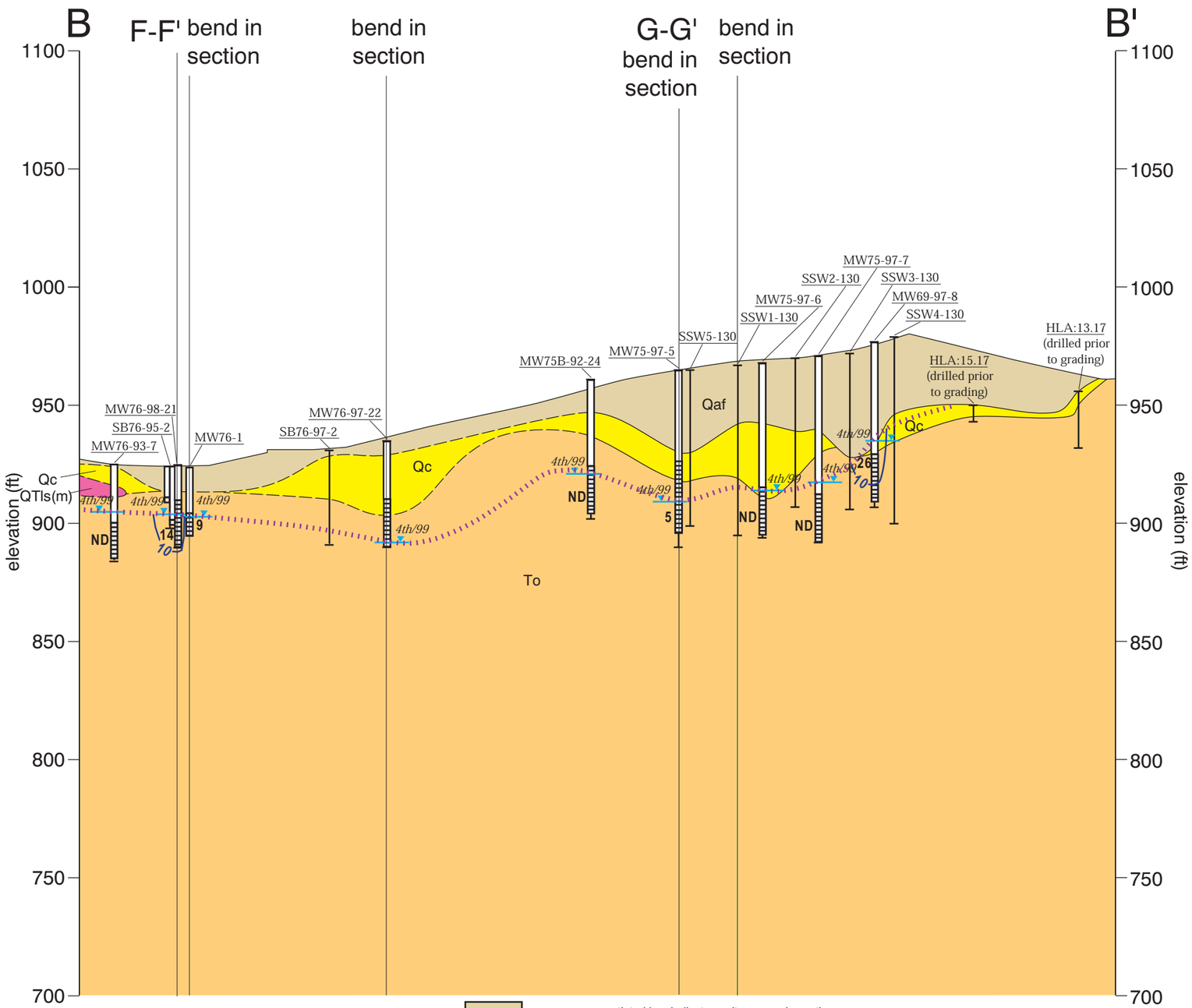
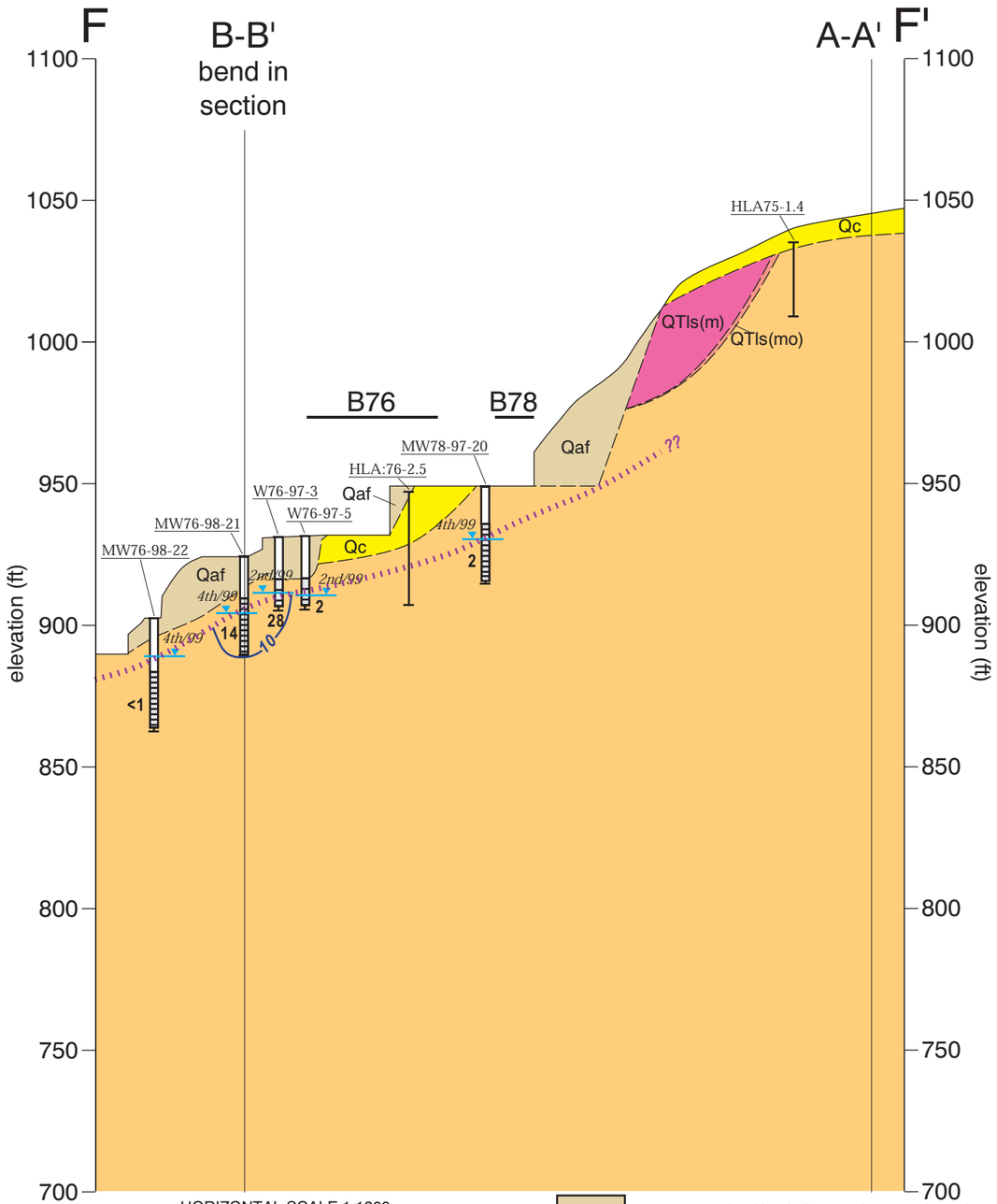


Figure C4.3-12. Support Services Area Hydrogeologic Cross Section B-B'.

C4.3-12SSAreaBB'.ai
09/00



HORIZONTAL SCALE 1:1200

0 100 200ft

2x vertical exaggeration

elevation from the UNIVERSITY OF CALIFORNIA DATUM

B58 approximate horizontal location of buildings on or near section

Qaf artificial fill

Qc colluvium (may locally include alluvium)

Qdb debris flow deposits

tinted box indicates unit appears in section

QTls(m) Paleolandslide Deposit Composed of Moraga Formation Rocks

QTls(mo) Paleolandslide Deposit (Mixed Unit)

Tm Moraga Formation

To Orinda Formation

Tsp San Pablo Group

Tc Claremont Formation

Kgv Great Valley Group

Contact
dashed where approximately located

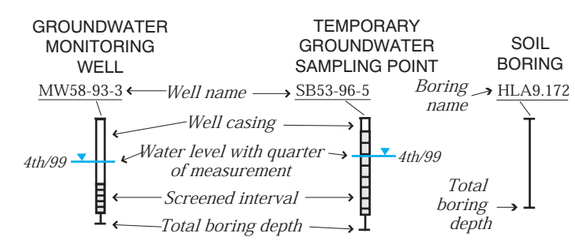
Fault
dashed where approximately located; queried where inferred

generalized apparent dip

14 Mean Concentration (ug/L) of Total Halogenated VOCs (FY1999)

Water Table

100 Isoconcentration contour line (ug/L) (Total Halogenated VOCs)



revision: 9/29/2000

Figure C4.3-13. Support Services Area Hydrogeologic Cross Section F-F'.

C4.3-13SSAreaFF'.ai
09/00

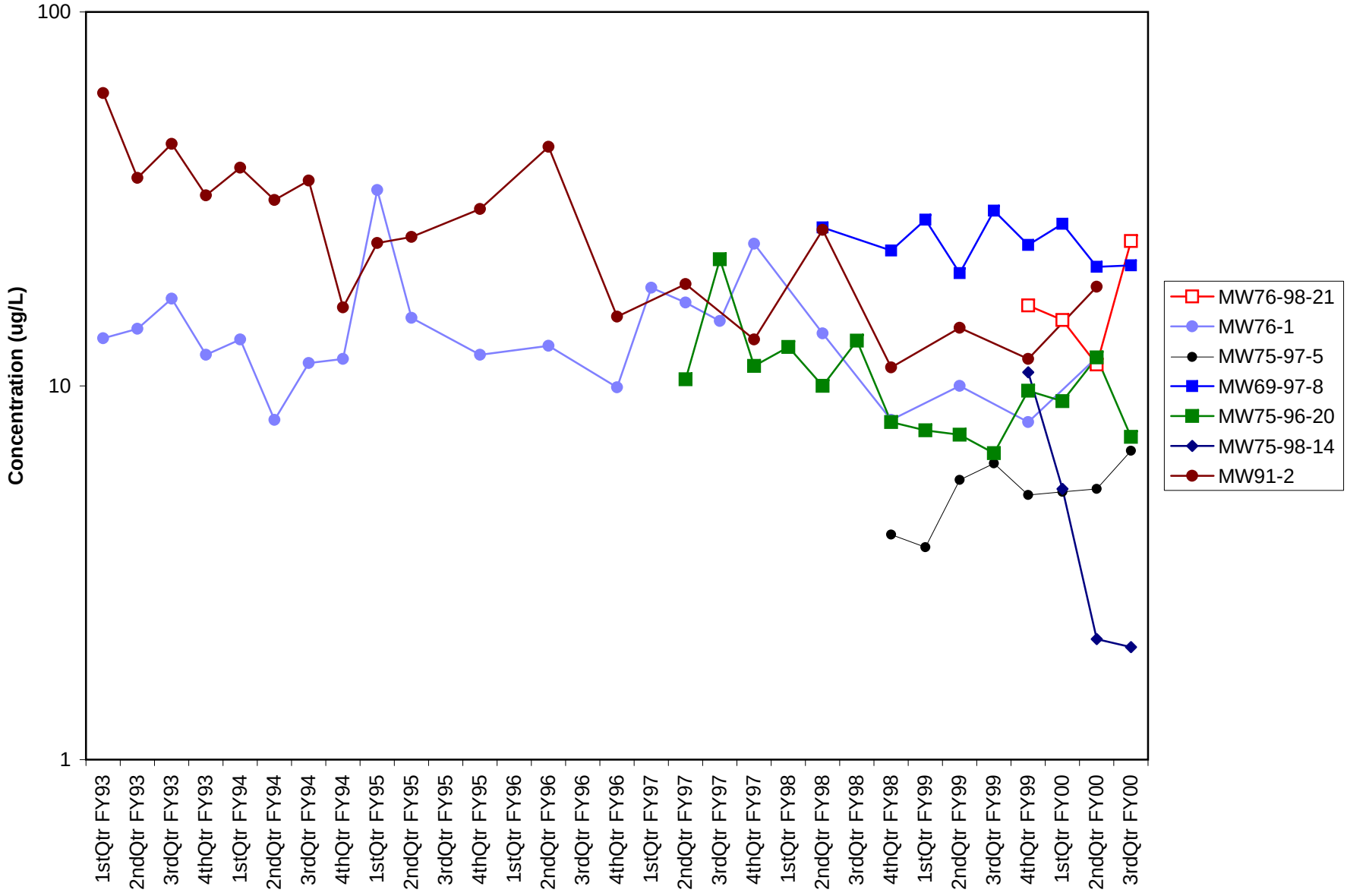
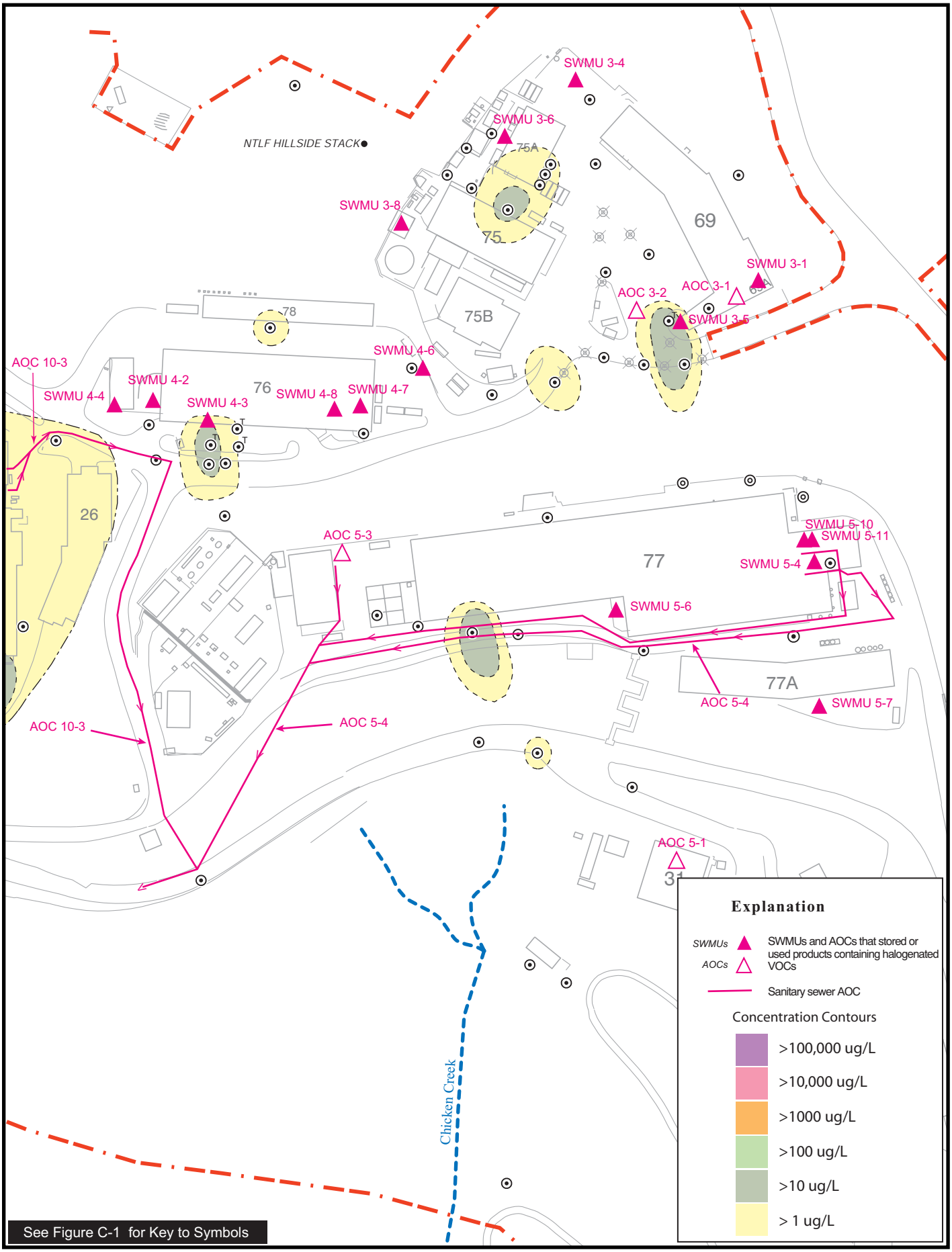


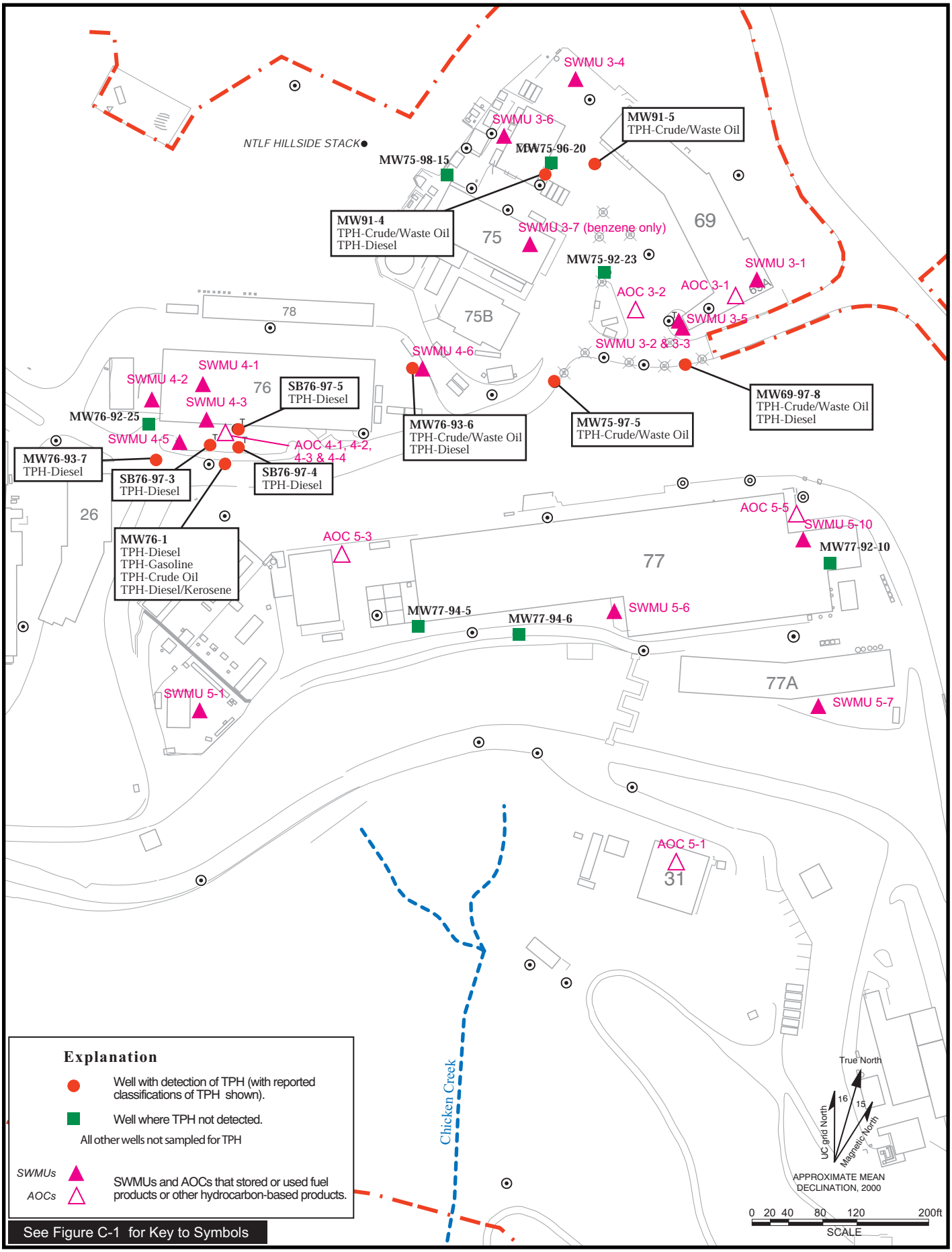
Figure C4.3-14. Concentrations of Total Halogenated VOCs in Wells Located in the Support Services Area.

SSAreaConcGraphs.xls
09/00



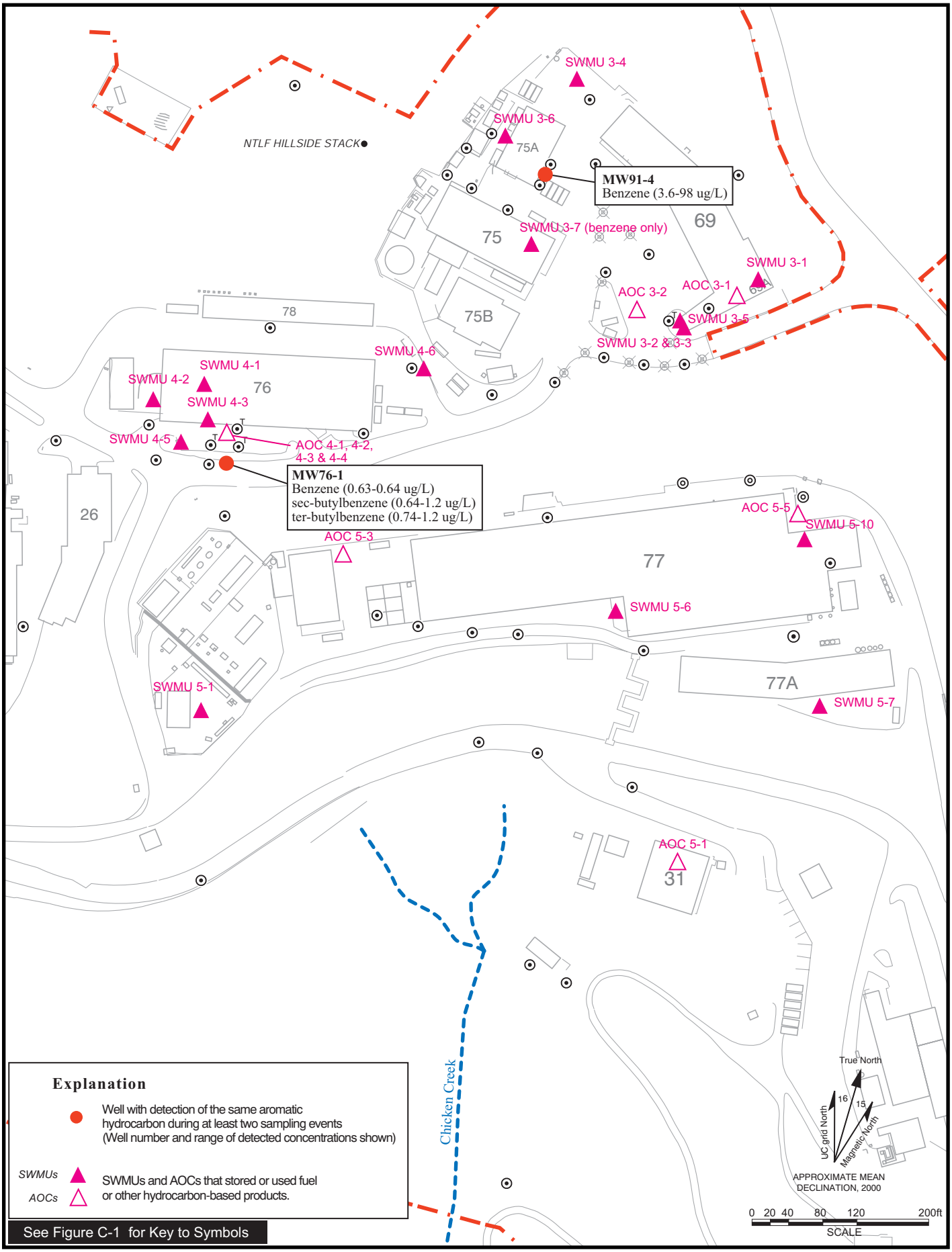
SupportServicesArea.ai
09/00

Figure C4.3-15. Isoconcentration Contour Map: Mean Concentrations of Total Halogenated Non-Aromatic VOCs (FY1999) in Support Services Area, With Potential Source Areas (SWMUs and AOCs) for the Groundwater Contamination.



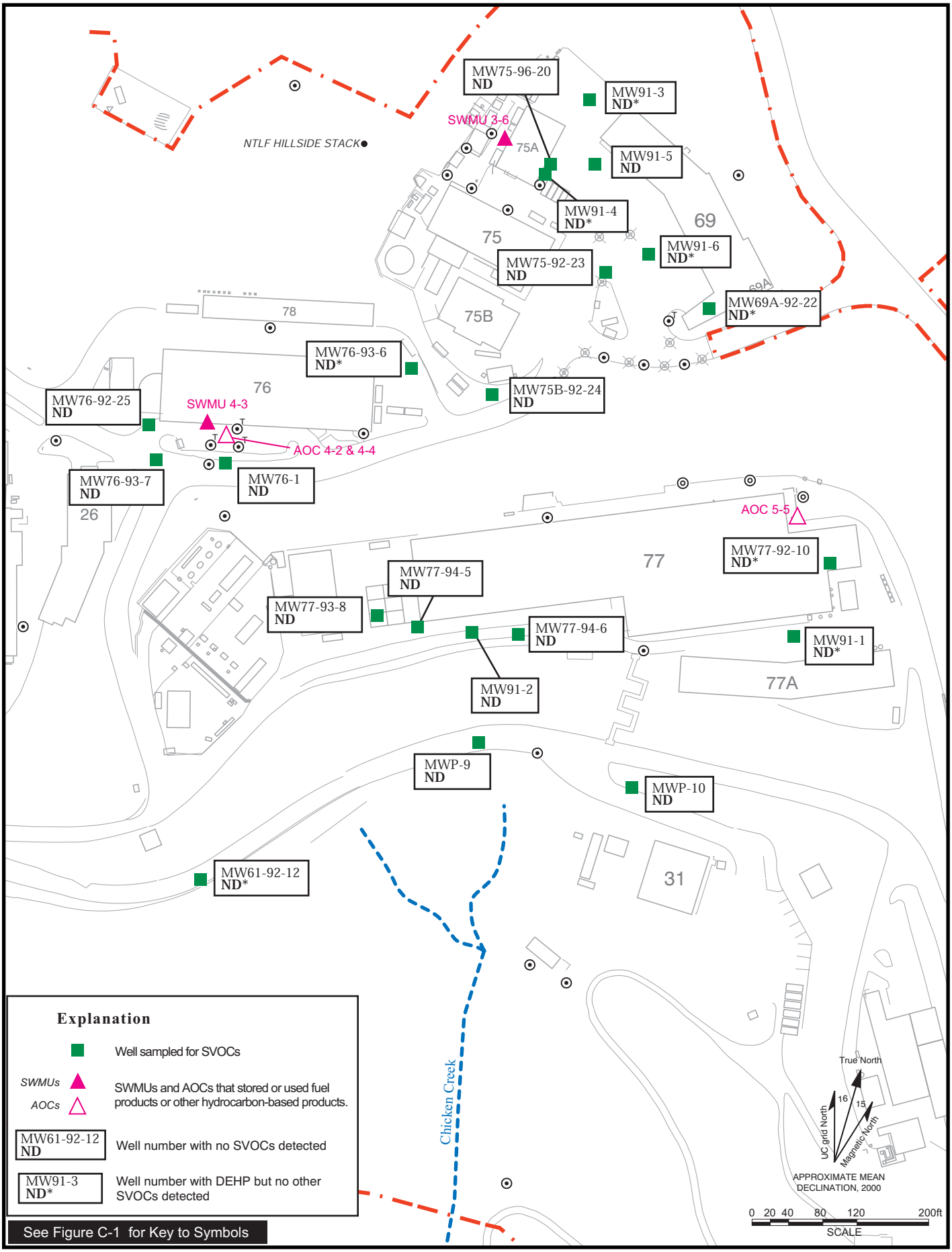
SupportServicesArea.ai
09/00

Figure C4.4-1. Wells Where TPH Has Been Detected in Groundwater in the Support Services Area, With Locations of SWMUs and AOCs That Stored or Used Fuel Products or Other Hydrocarbon-Based Products.



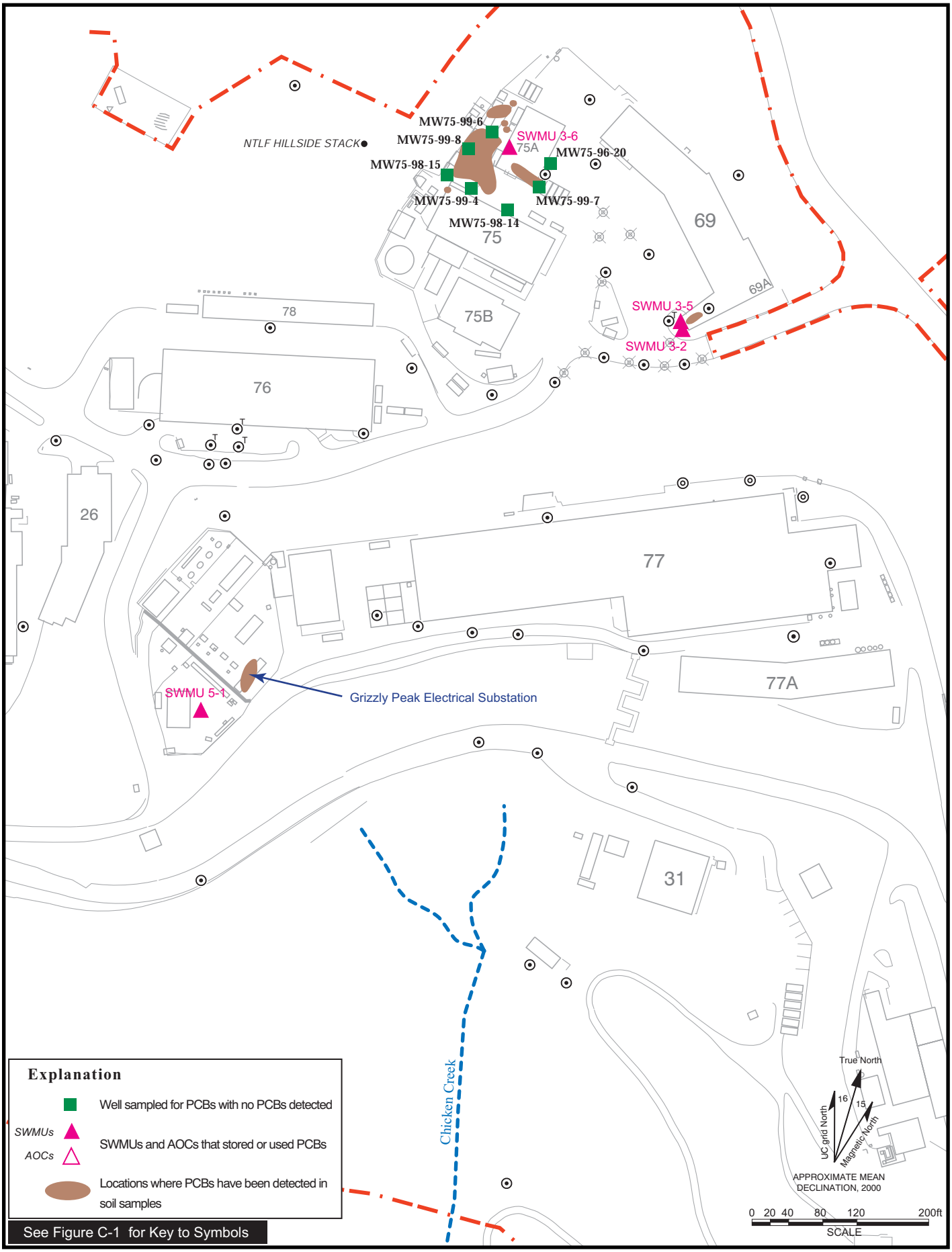
SupportServicesArea.ai
09/00

Figure C4.4-2. Wells Where the Same Aromatic Hydrocarbon Has Been Detected in Groundwater More Than One Sampling Event in the Support Services Area, With Locations of SWMUs and AOCs That Stored or Used Fuel Products or Other Hydrocarbon-Based Products.



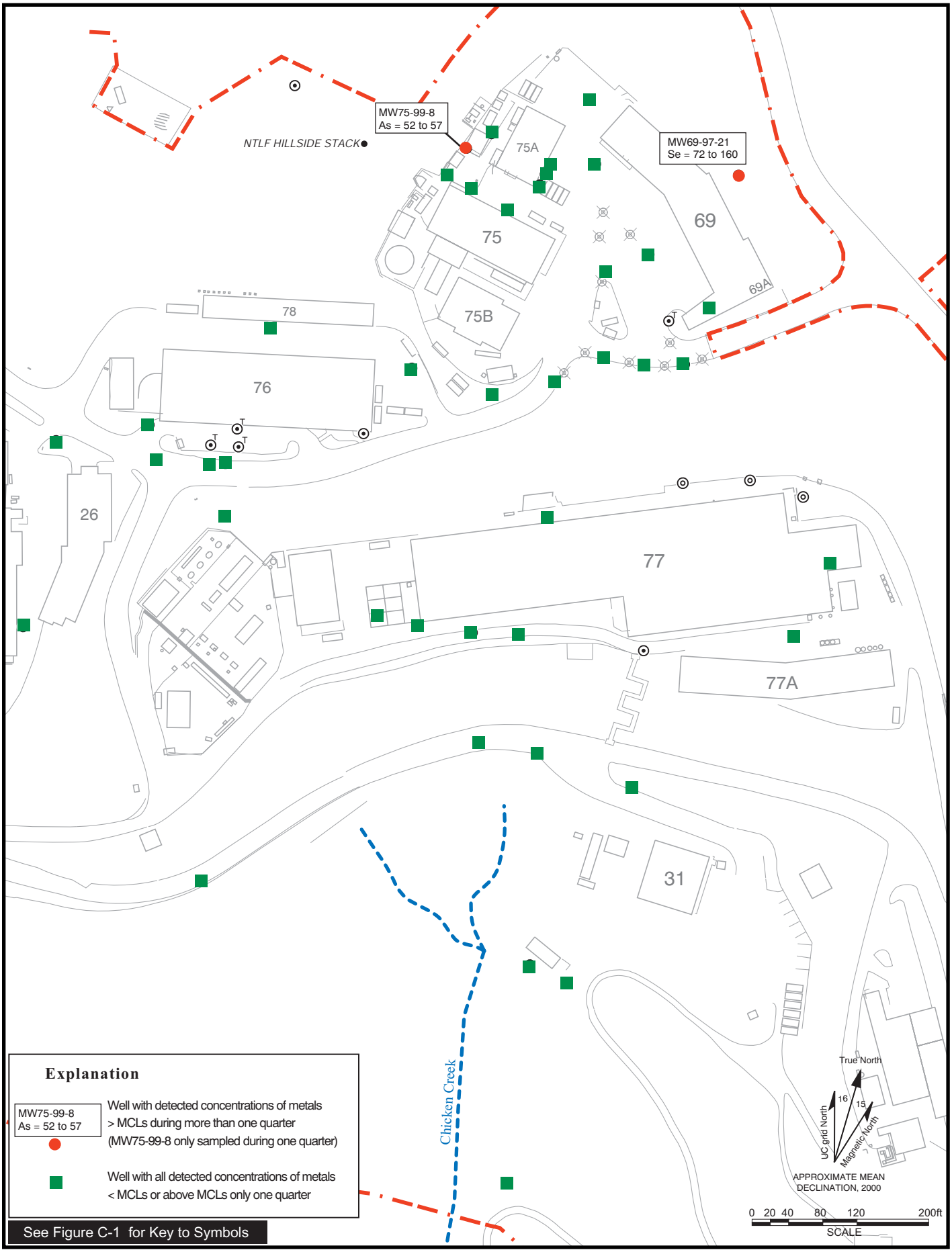
SupportServicesArea.ai
09/00

Figure C4.4-3. Locations of Wells Sampled for SVOCs in the Support Services Area With Locations of SWMUs and AOCs That Stored or Used SVOCs.



SupportServicesArea.ai
09/00

Figure C4.4-4. Locations of Wells Sampled for PCBs in the Support Services Area With Locations of PCBs Detected in Soil and SWMUs and AOCs That Stored or Used PCBs.



SupportServicesArea.ai
09/00

Figure C4.4-5. Maximum Concentrations of Metals Detected in Groundwater Above MCLs During More Than One Quarter in the Support Services Area.

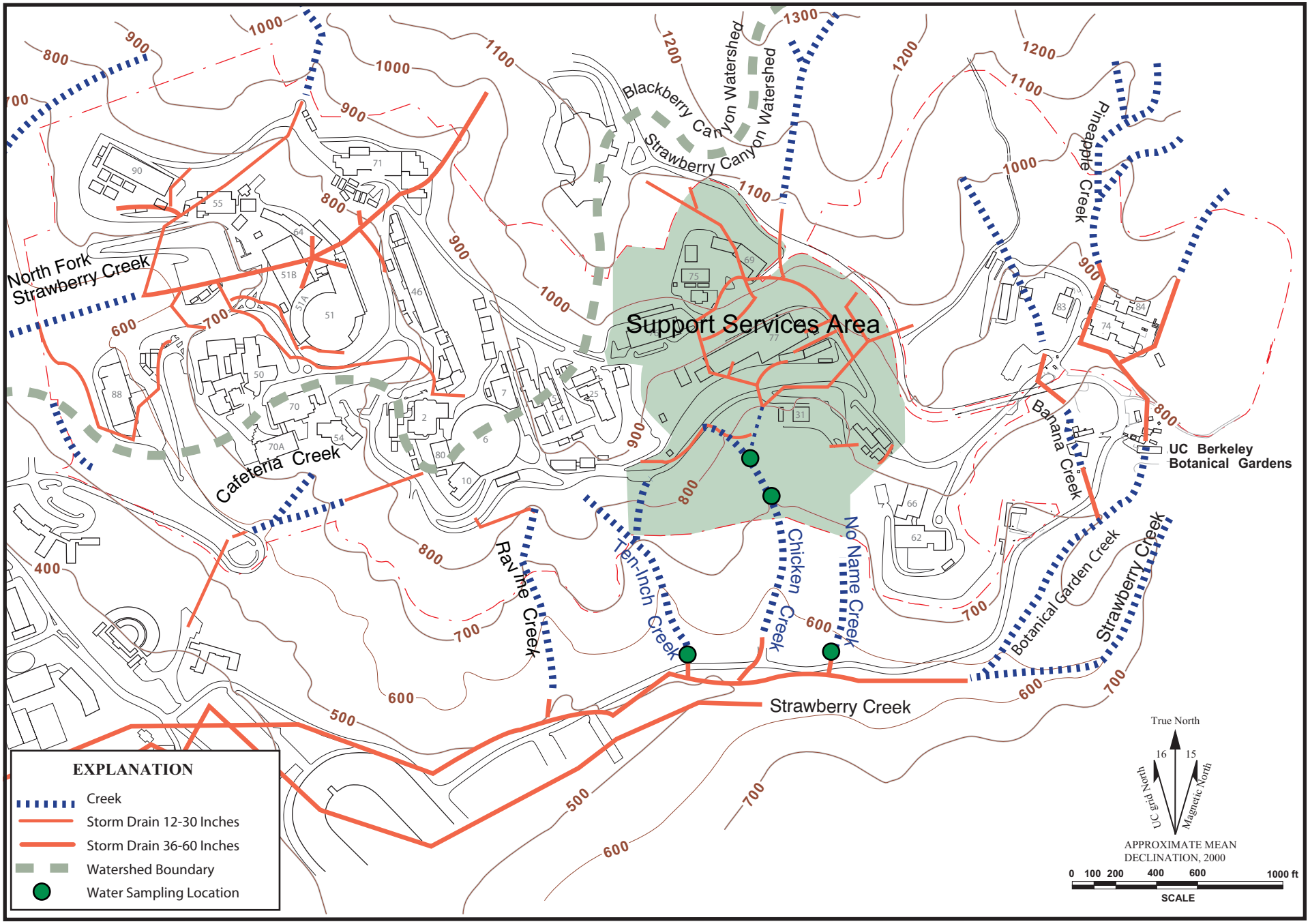


Figure C4.5-1. **Surface Water Sampling Locations Evaluating Potential Migration Pathways of Contamination in Support Services Area to Surface Water.**

C4.5-1SSAreaSurfWtr.ai
09/00

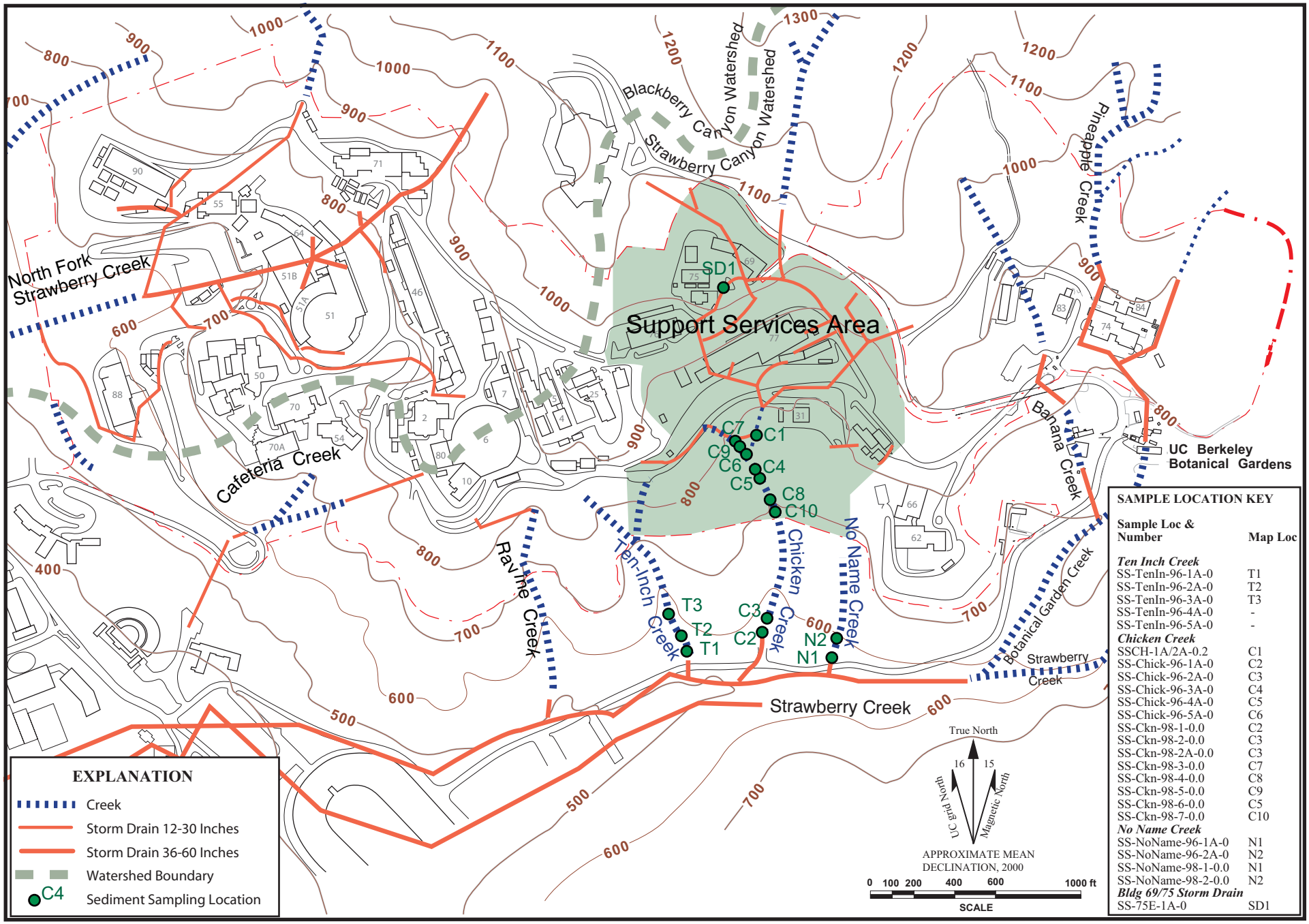
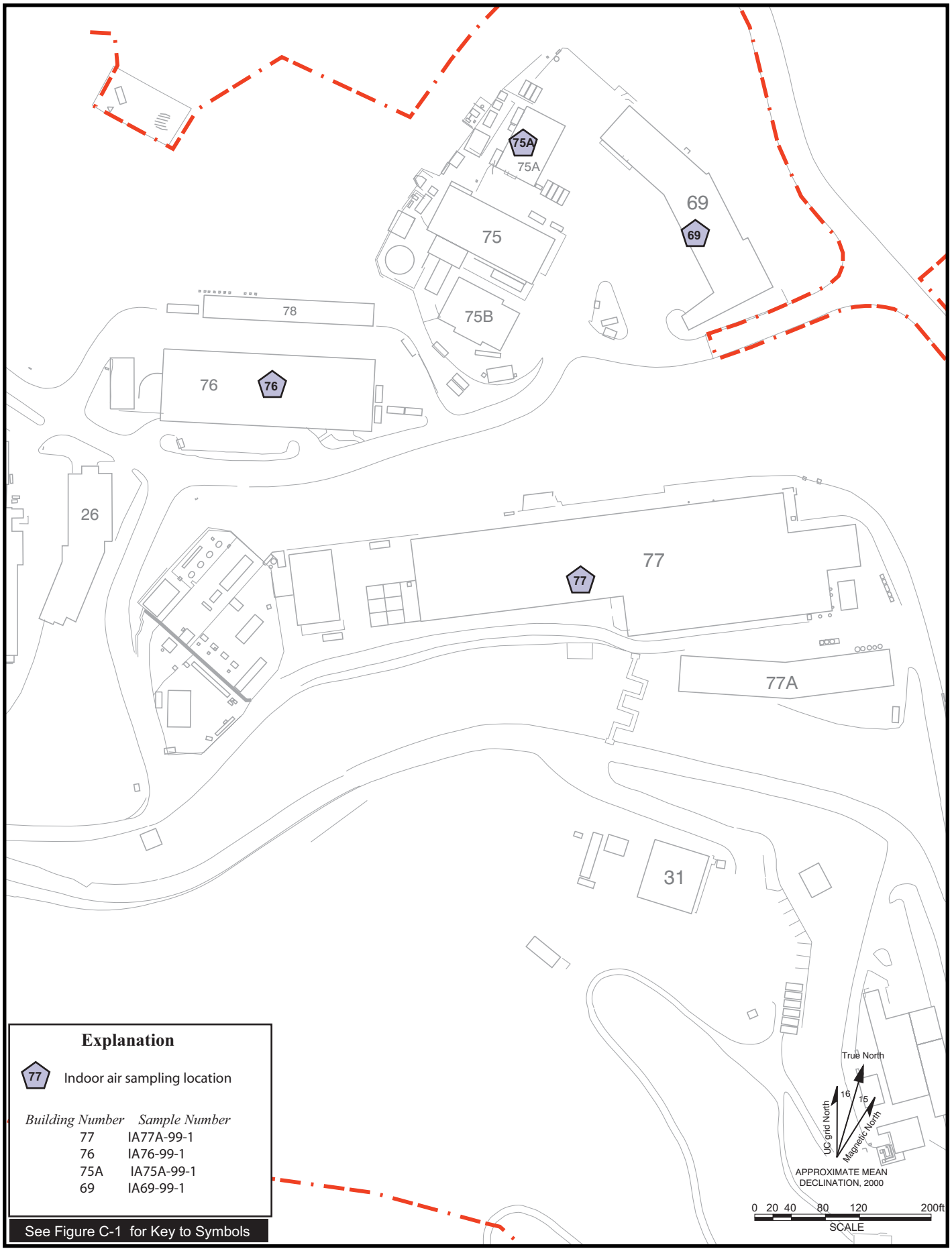


Figure C4.5-2. **Sediment Sampling Locations Evaluating Potential Migration Pathways of Contamination in Support Services Area to Surface Water.**

C4.5-2SSAreaSed.ai
09/00



C5.1-1air.ai
09/00

Figure C5.1-1. Indoor Air Sampling Locations, Support Services Area.