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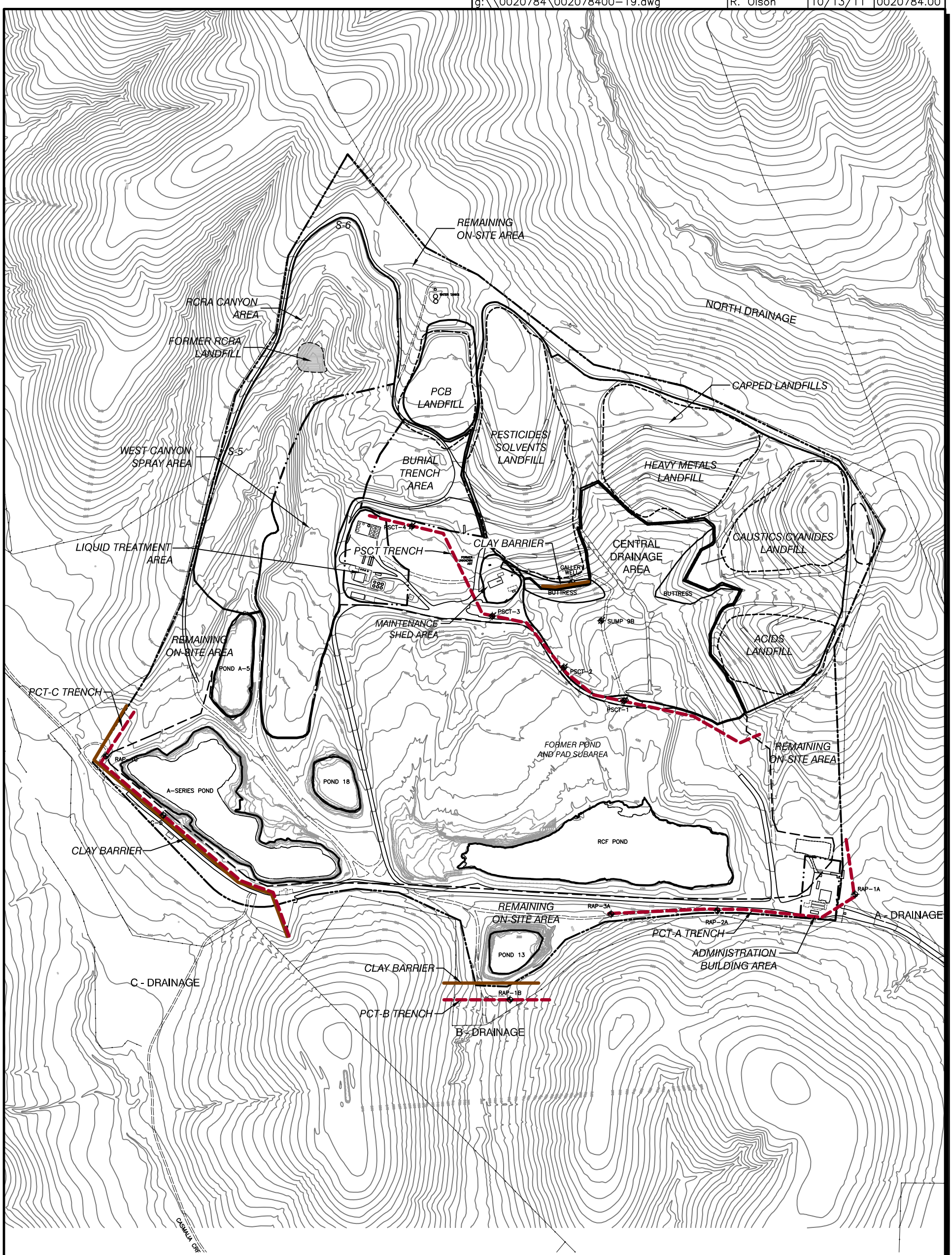


Topographic Source: Pacific Engineer Associates, July 8, 1998

LEGEND

- STUDY AREA BOUNDARY
- LANDFILL LIMITS
- EXISTING EXTRACTION TRENCH (PSCT AND PCTS)
- CLAY BARRIER
- LIQUIDS EXTRACTION LOCATION

N

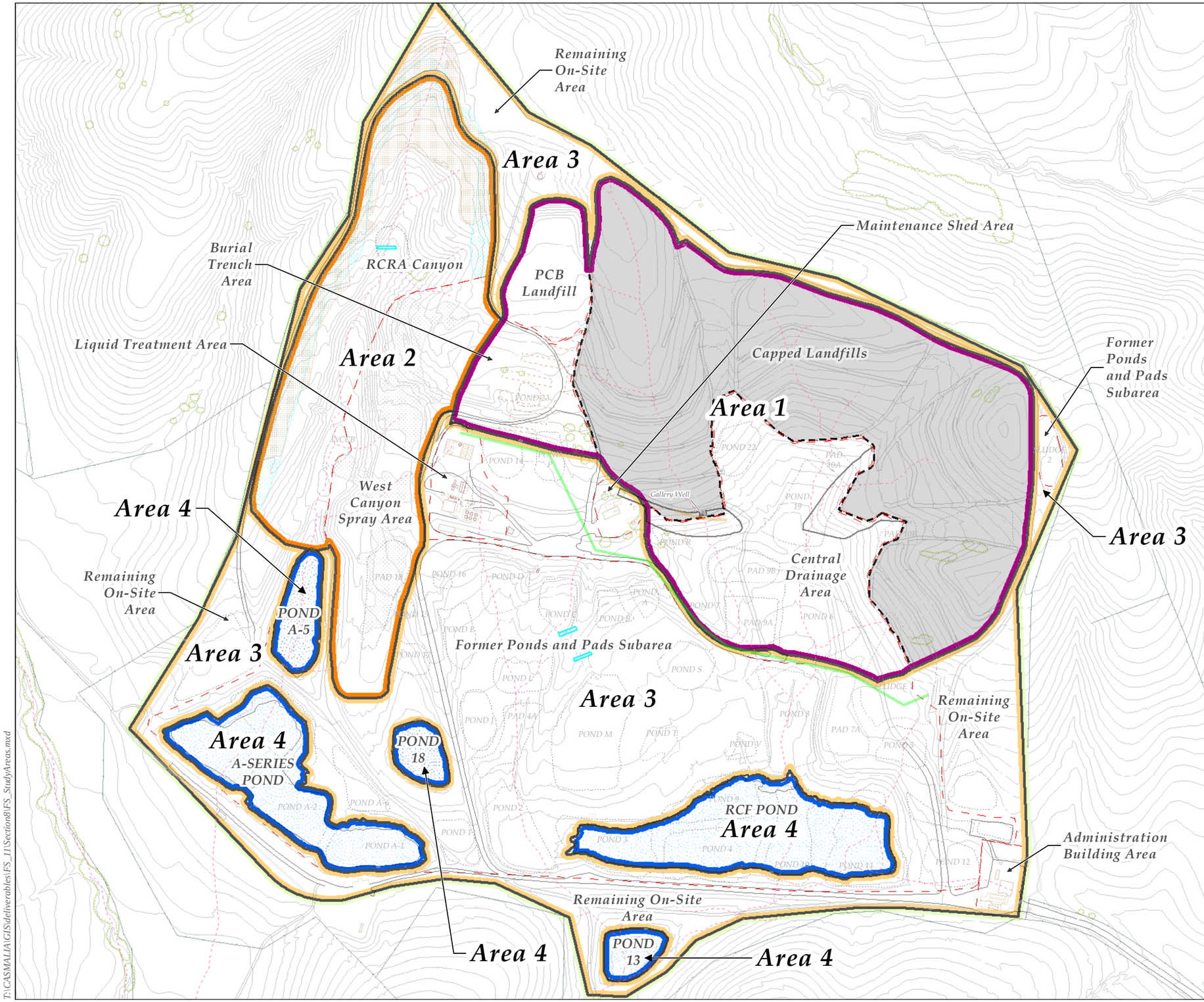
0 250 500

Scale in Feet

FIGURE A-1

Current Site Layout

Feasibility Study
Casmalia Resources Superfund Site



Explanation

FS Study Area Boundary

- Area 1
- Area 2
- Area 3
- Area 4

Other Site Features

- Casmalia Site Boundary
- RI Study Area
- Existing Extent of Capped Landfills
- P/S Landfill Clay Barrier (1981 Photograph)
- Perimeter Source Control Trench (Brierly & Lyman, 1989)
- Perimeter Control Trench (Brierly & Lyman, 1989)
- Buttress
- Burial Trench Location (Figure A21-1-1 Woodward-Clyde, 1988)
- Historical Natural Drainage (Based on 1956 Photo, 1974 Topographic Maps, and Figures 21-2 and 21-3 Woodward-Clyde, 1988)
- Historical Feature
- Former Waste Burial Area
- Fence
- Oil Field Waste Spreading Area (Based on 1983, 1985/86 Photos)
- Oil Field Waste Spreading Area (Figure A21-1-1 Woodward-Clyde, 1988)
- 1983 Spray Area
- Stormwater Pond
- Treated Liquid Impoundment

Source: Topographic base map provided by Pacific Engineering, Inc. from aerial survey dated March 4, 2004.

0 440

Scale in Feet (1 inch = 440 feet)

Figure A-2

FS Study Areas 1 - 4

Feasibility Study

Casmalia Resources Superfund Site

August 2014

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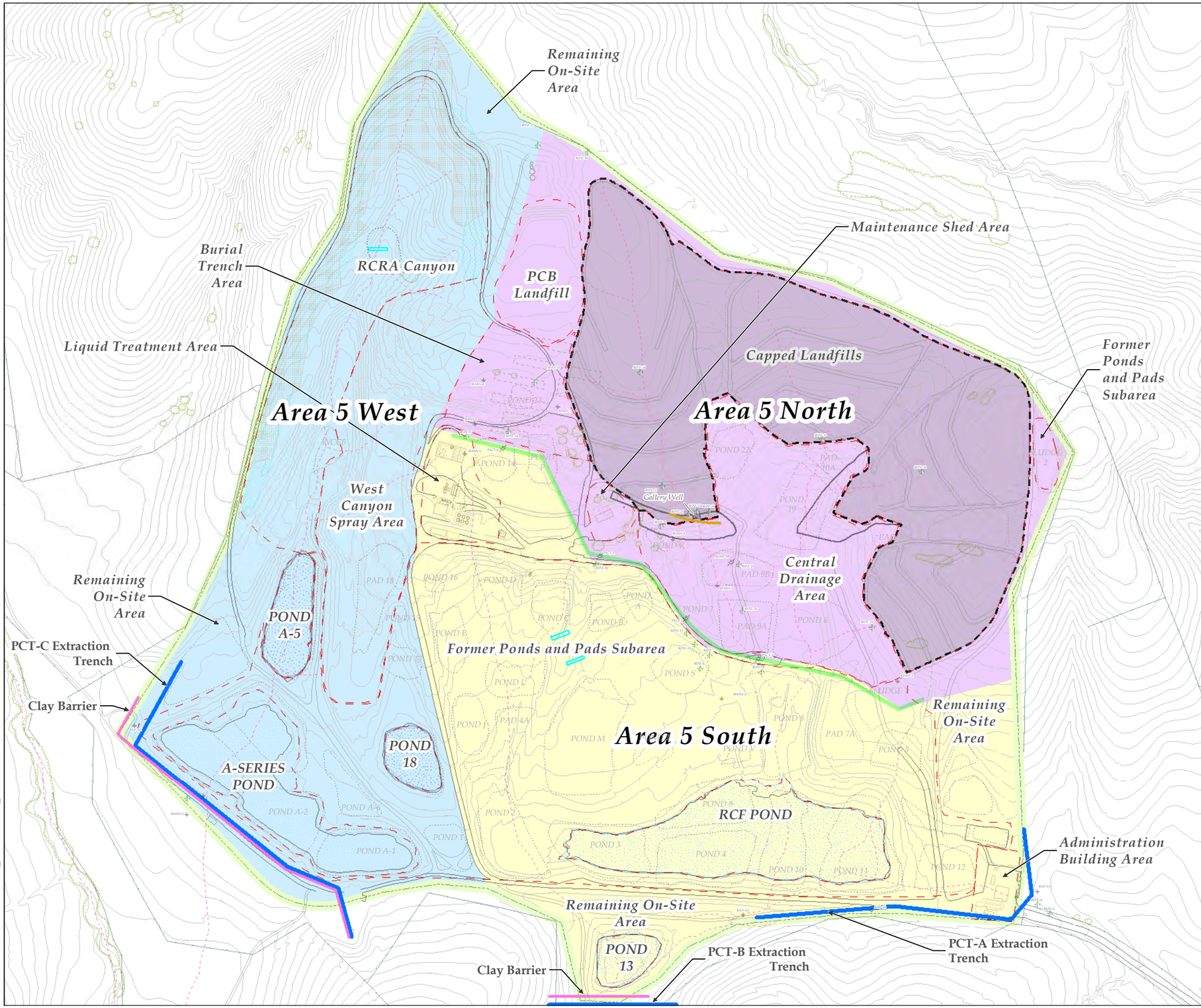

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Explanation

- Area 5 North
- Area 5 West
- Area 5 South

Other Site Features

- Casmalia Site Boundary
- RI Study Area
- Existing Extent of Capped Landfills
- Piezometer
- Monitoring Well
- Liquids Extraction Well
- P/S Landfill Clay Barrier (1981 Photograph)
- Perimeter Source Control Trench (Brierly & Lyman, 1989)
- PCT Extraction Trench
- Clay Barrier
- Buttress
- Burial Trench Location (Figure A21-1-1 Woodward-Clyde, 1988)
- Historical Natural Drainage (Based on 1956 Photo, 1974 Topographic Maps, and Figures 21-2 and 21-3 Woodward-Clyde, 1988)
- Historical Feature
- Former Waste Burial Area
- Fence
- Oil Field Waste Spreading Area (Based on 1983, 1985/86 Photos)
- Oil Field Waste Spreading Area (Figure A21-1-1 Woodward-Clyde, 1988)
- 1983 Spray Area
- Stormwater Pond
- Treated Liquid Impoundment

Source: Topographic base map provided by Pacific Engineering, Inc. from aerial survey dated March 4, 2004.

0 440

Scale in Feet (1 inch = 440 feet)

Figure A-3

FS Study Area 5

Feasibility Study

Casmalia Resources Superfund Site

August 2014

CAD File:	Drawn By:	Date:	Project No.
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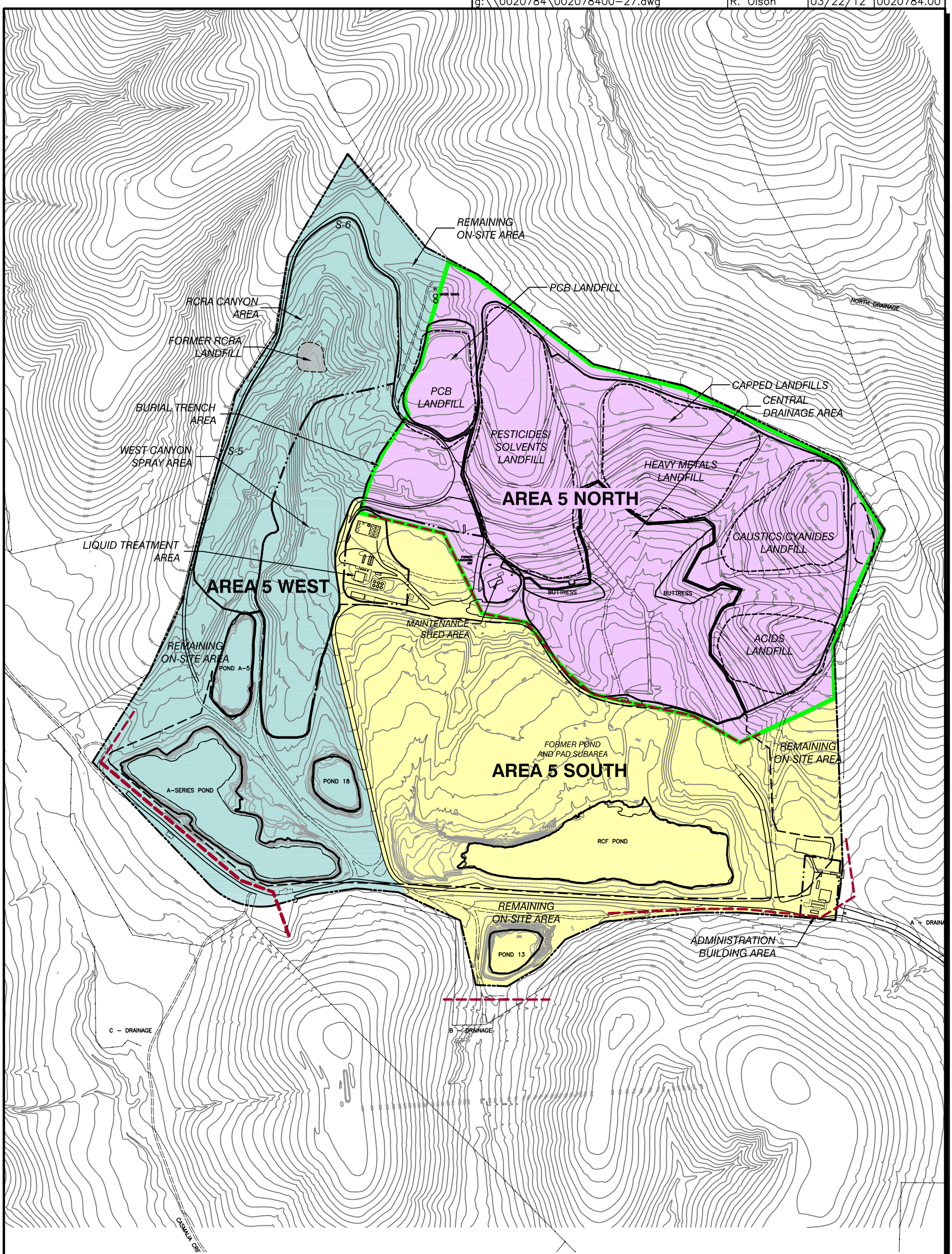


Topographic Source: Pacific Engineer Associates, July 8, 1998

LEGEND

- STUDY AREA BOUNDARY
- LANDFILL LIMITS
- PROPOSED TECHNICAL IMPRACTICABILITY ZONE, UPPER AND LOWER HSUS
- EXISTING EXTRACTION TRENCH (PSCT AND PCTS)

N

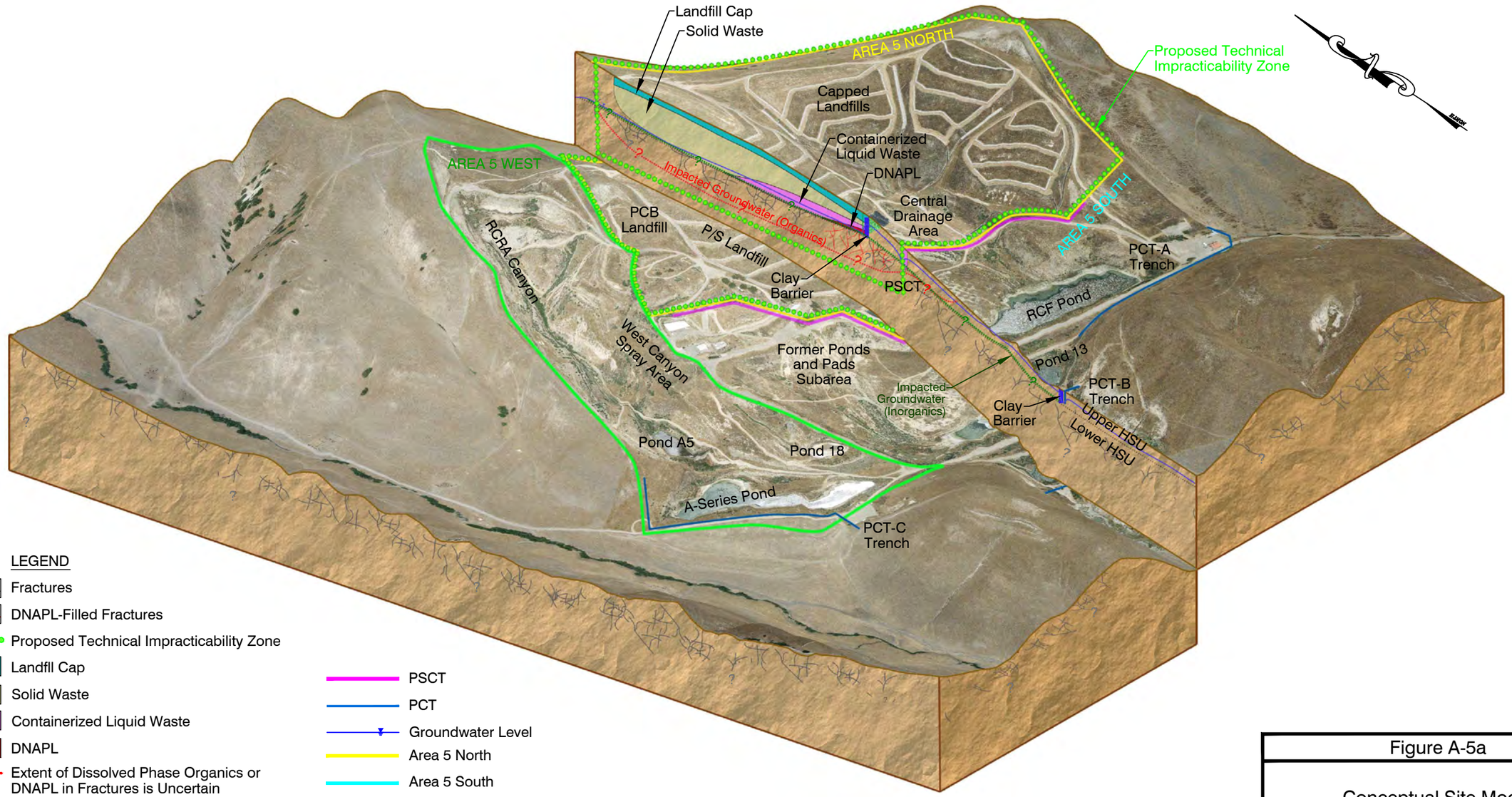
0 250 500

Scale in Feet

FIGURE A-4

Spatial Extent of Proposed Technical Impracticability Zones

Feasibility Study
Casmalia Resources Superfund Site



LEGEND

- Fractures
- DNAPL-Filled Fractures
- Proposed Technical Impracticability Zone
- Landfll Cap
- Solid Waste
- Containerized Liquid Waste
- DNAPL
- Extent of Dissolved Phase Organics or DNAPL in Fractures is Uncertain
- Extent of Dissolved Phase Metals is Uncertain
- Upper/Lower HSU Contact (Approximate)
- PSCT
- PCT
- Groundwater Level
- Area 5 North
- Area 5 South
- Area 5 West

Note: Oblique graphic, not to scale, vertical exaggeration is approximately 2 times.

Figure A-5a

Conceptual Site Model
Block Diagram

Feasibility Study
Casmalia Resources Superfund Site
August 2014

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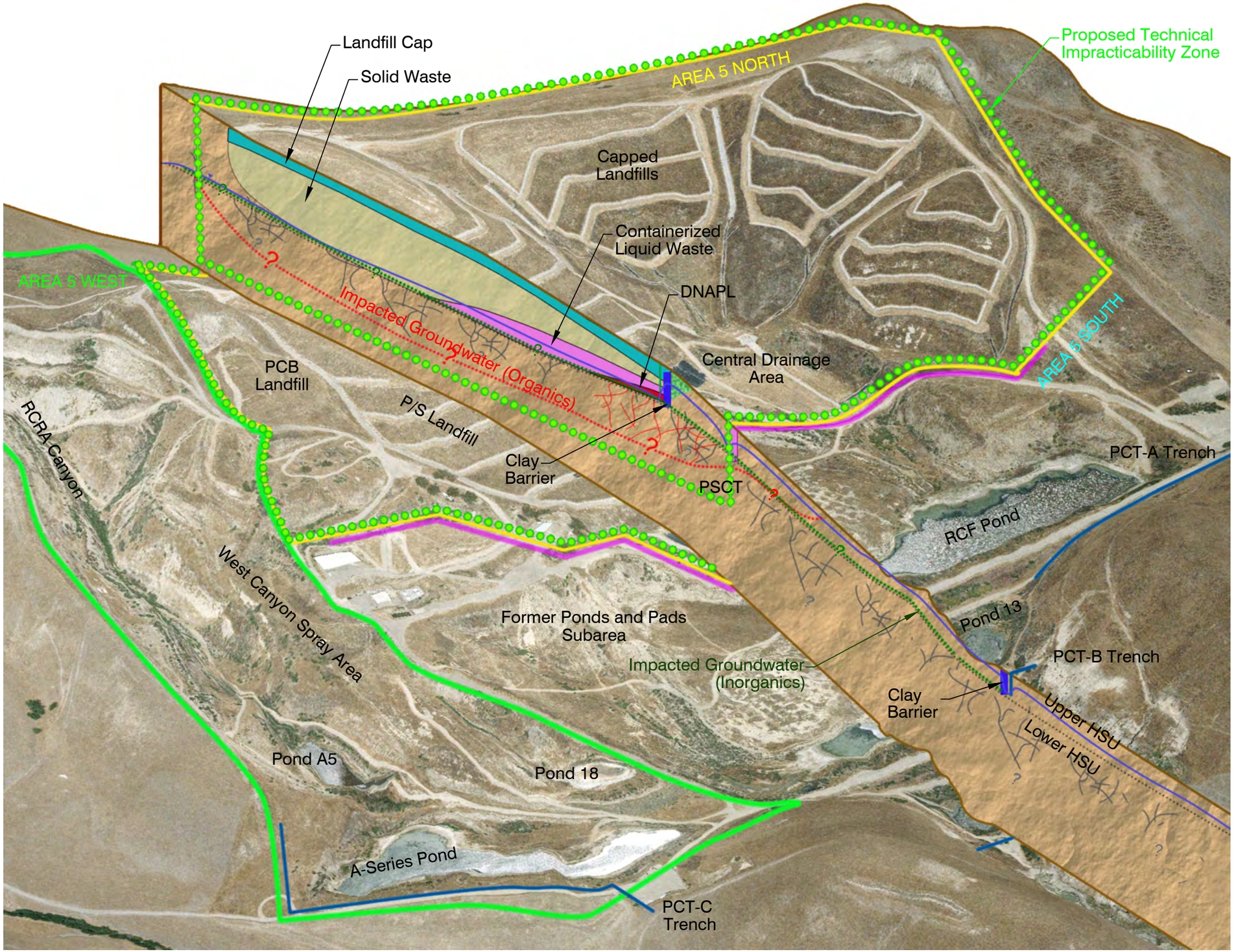

LEGEND

- Fractures
- DNAPL-Filled Fractures
- Proposed Technical Impracticability Zone
- Landfll Cap
- Solid Waste
- Containerized Liquid Waste
- DNAPL
- Extent of Dissolved Phase Organics or DNAPL in Fractures is Uncertain
- Extent of Dissolved Phase Metals is Uncertain
- Upper/Lower HSU Contact (Approximate)
- PSCT
- PCT
- Groundwater Level
- Area 5 North
- Area 5 South
- Area 5 West

Note: Oblique graphic, not to scale, vertical exaggeration is approximately 2 times.

Figure A-5b

Conceptual Site Model
Block Diagram Detail

Feasibility Study
Casmalia Resources Superfund Site
August 2014

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Qs | Qds | Qg | Qa | Qls

SURFICIAL SEDIMENTS

Qs *beach sand deposits*
Qds *dune sand deposits*
Qa *valley and floodplain alluvial deposits*
Qls *landslide debris*

Qos | Qoa | Qo

OLDER DISSECTED SURFICIAL SEDIMENTS

Qos *dune sand deposits, in places weakly consolidated*
Qoa *remnants of weakly consolidated stream terrace and alluvial fan deposits of silt, sand and gravel*
Qo *Orcutt Sand: tan to rusty brown, poorly consolidated to locally indurated, wind-deposited sand; pebble gravel at base locally*

Tsqd | Tsqo | Tsq

SISQUOC FORMATION

marine; late Miocene age

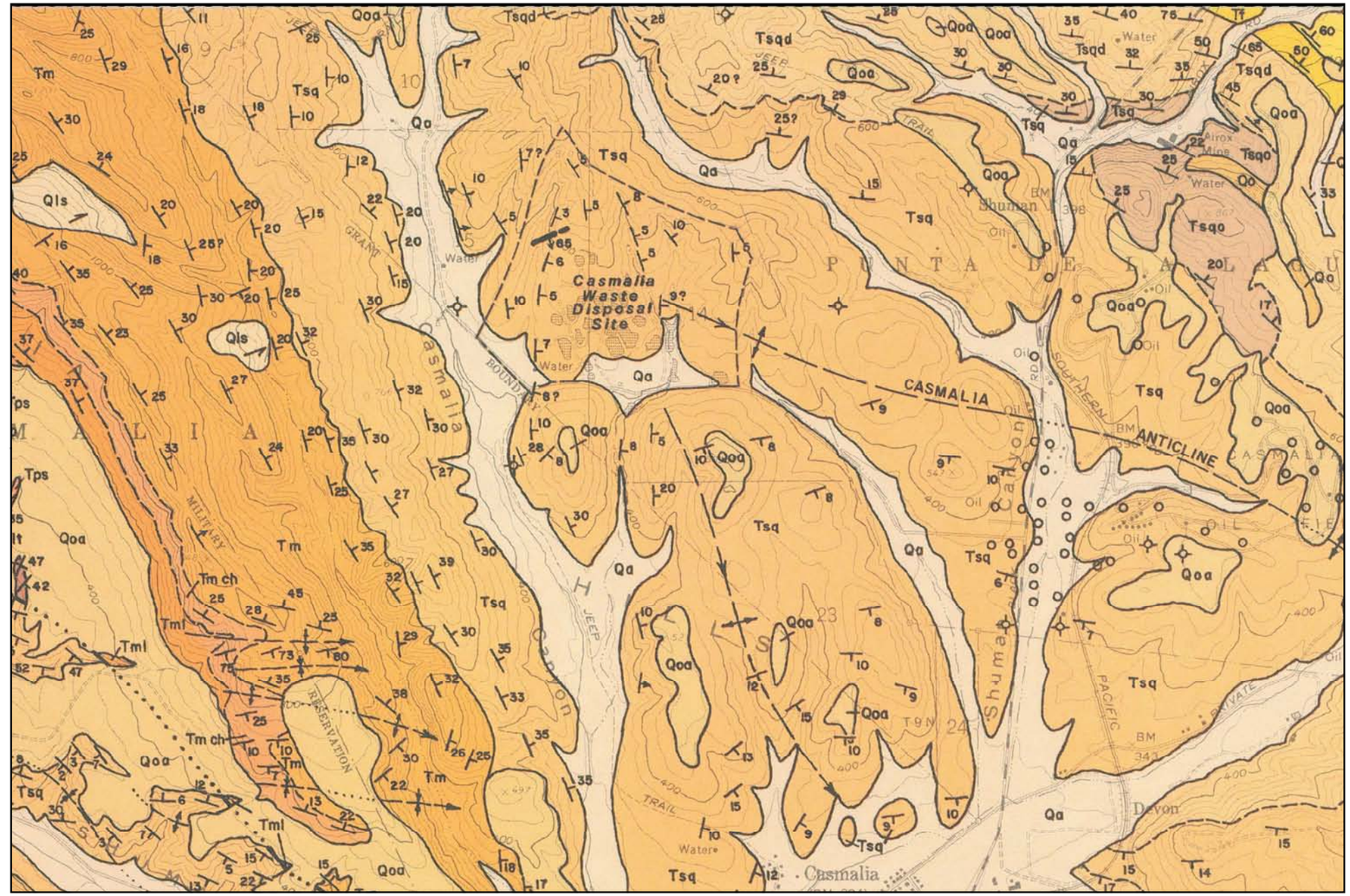
Tsqd *white to cream-white, punky, diatomaceous claystone and clayey diatomite*
Tsqo *same as Tsqd, but oil-saturated and partly burned locally to frothy stone*
Tsq *(Todos Santos Claystone Member of Woodring and Bramlette, 1950): light gray claystone and slightly diatomaceous or siliceous clay shale*

Tm | Tmch | Tml

MONTEREY SHALE

marine; middle to late Miocene age
Tm and Tmch - Mohnian Stage;
Tml - Luisian and Relizian(?) Stages

Tm *upper shale unit: white-weathering, thin bedded, hard, platy, porcelaneous siliceous shale*
Tmch *same as Tm, but brittle and cherty*
Tml *lower shale unit: white-weathering, thin bedded, fissile to platy, semi-siliceous shale with thin, hard limestone strata*



SYMBOLS

not all symbols present on each map

FORMATION CONTACT *dashed where inferred or indefinite*

MEMBER CONTACT

CONTACT BETWEEN SURFICIAL SEDIMENTS *located approximately in places*

U D 70 ?

FAULT

dashed where indefinite or inferred, dotted where concealed, queried where existence doubtful. Parallel arrows indicate inferred relative lateral movement. Relative vertical movement shown by U/D (U = upthrown side D = downthrown side). Short arrow indicates dip of fault plane.

ANTICLINE **SYNCLINE**

arrow on axis indicates direction of plunge, dotted where concealed

horizontal | 25 inclined | 20 inclined (approximate) | vertical | 25 overturned | 25 inclined metamorphic foliation

STRIKE AND DIP OF BEDDED ROCKS

DIRECTION OF LANDSLIDE MOVEMENT **SANDSTONE BED** **CONGLOMERATE BED**

ABANDONED EXPLORATORY OIL WELL

OIL WELL LOCATIONS INDICATED ON TOPOGRAPHIC BASE MAP.

Reference:
Dibblee, T.W. Jr., 1989, Geologic map of the Casmalia and Orcutt quadrangles, Santa Barbara County, California: Diblee Geological Foundation, Map DF-24 (Ehrenspeck, H.E., ed.), scale 1:24,000.

PUBLISHED IN COOPERATION WITH CALIFORNIA DEPARTMENT OF CONSERVATION, DIVISION OF MINES AND GEOLOGY; AND U.S. GEOLOGICAL SURVEY

0 2,000 4,000

Scale in Feet

1 inch = 2,000 feet

Figure A-6

Geologic Map of the Casmalia Quadrangle, Santa Barbara County, California

Feasibility Study

Casmalia Resources Superfund Site

August 2014

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Notes:

1) Coordinate system same as state plane coordinate system but has different datum.

2) Attitudes in areas of fill were taken by A. Loomis prior to or during site contstruction. Terrace deposits mapped by Woodring and Bramlette, (1950, plate 1).

3) Attitudes taken within facility boundary by WCC may not be exposed at present because of earth moving operations.

Explanation

QUATERNARY

- HOLOCENE
  - af — Artificial Fill Material Approximate Located
  - Qal — Alluvium and or Colluvium: Gravel, sand, silt, clay
- PLEISTOCENE
  - Qls 1,2,3 — Landslide
    - Qls 1 landslide debris (Loomis, June 1981)
    - Qls 2 landslide debris (WCC, 1986)
    - Qls 3 landslide debris (WCC, 1988)
  - Qt — Terrace Deposits: Fluvial deposits of silt, clay, sand, gravel and boulders

TERTIARY — MIOCENE TO PLIOCENE — SISQUOC FM

- Tsts — Todos Santos Claystone Member: Somewhat porcelaneous claystone, thin zones of porcelaneous shale.

- 62 — Strike and dip of bedrock fracture, containing significant clay
- 90 — Strike of vertical bedrock fracture, containing significant clay
- 45 — Strike and dip of shear zone containing significant clay or crushed rock
- 55 — Strike and dip of fault, with minor displacement of bedding
- Strike of vertical fault, with minor displacement of bedding
- 7 — Strike and dip of bedding (from Loomis, 1980, 1982; Canonie Environmental, 1986; WCC, 1988)
- 3C 20 — Strike and dip of joints (WCC)
- 5C 80 — Strike and dip of joints (from Loomis, 1980, 1982; Canonie Environmental, 1986; WCC 1988)
- Strike of vertical joints (WCC)
- Strike of vertical joints (from Loomis, 1980, 1982; Canonie Environmental, 1986; WCC, 1988)

- Approximate limits of landslide, arrows show inferred direction of movement of material
- Contact, approximately located
- Diagrammatic strike and dip of closely spaced jointing (from Loomis, 1982)
- Seep
- General location of trench on Metals Landfill Unit (see Figure 5.3-9 for log)
- Approximate axis of syncline (modified from: Woodring, W.P., and Bramlette, M.N., 1950)
- Approximate axis of anticline, arrow indicates direction of plunge (modified from: Woodring, W.P., and Bramlette, M.N., 1950)

- Faint low velocity zone in seismic travel time data
- Very faint low velocity zone in seismic travel time data
- Indication in seismic data of change in thickness of soil/colluvium and /or weathered claystone section above unweathered bedrock. Point is in direction of thinner section.

This map was compiled from photography dated 04/06/87 and supplemented with mapping from photography dated 06/02/82.

Pacific Western

Reference:
Figure 5-1-1, Site Geologic Map
HSCER (WCC, 1988)

Figure A-7

Site Geologic Map

Feasibility Study
Casmalia Resources Superfund Site
August 2014

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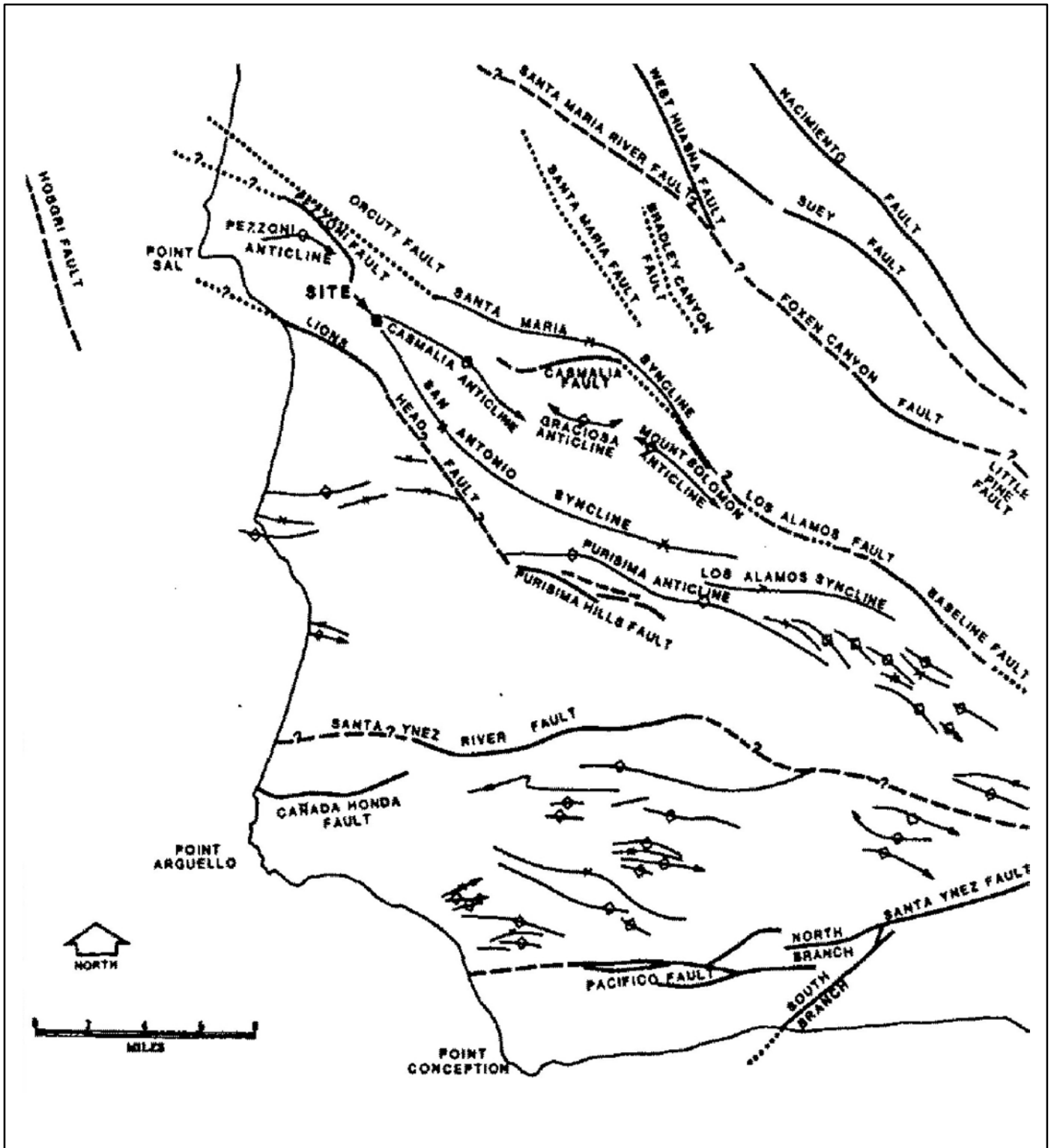

Explanation

ANTICLINAL AXIS, END ARROWS INDICATE PLUNGE

SYNCLINAL AXIS, END ARROWS INDICATE PLUNGE

FAULTS, SOLID WHERE EXPOSED, DASHED WHERE INFERRED, DOTTED WHERE CONCEALED AND ? WHERE UNCERTAIN

Figure A-8

Regional Folds and Faults

Feasibility Study
Casmalia Resources Superfund Site
August 2014

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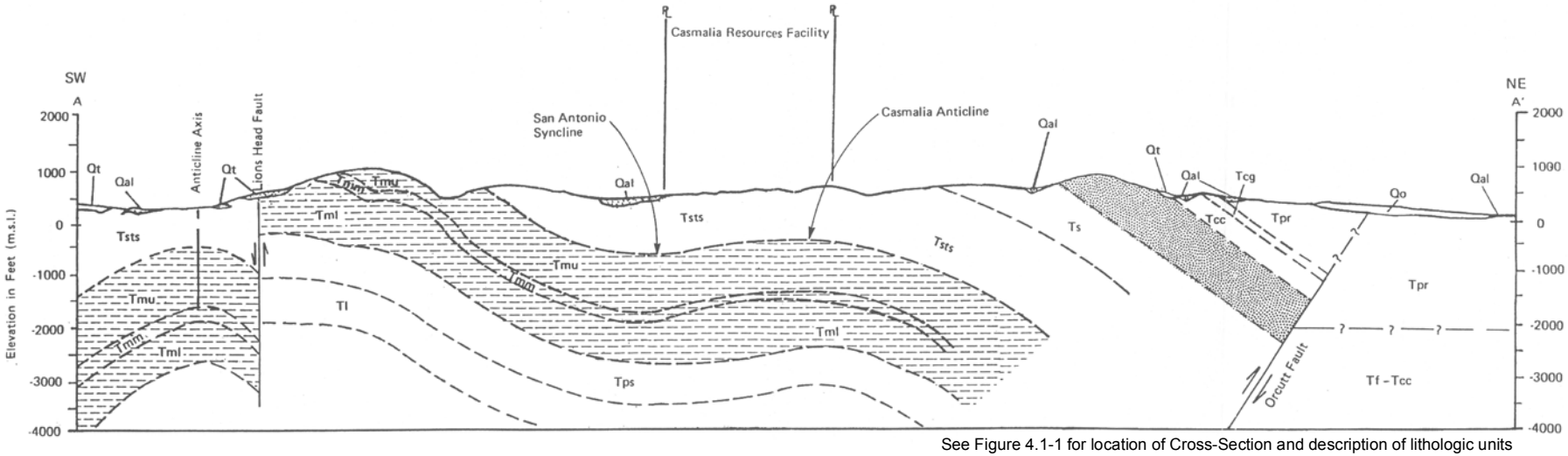
Modified from Woodward-Clyde, 1988



See Figure 4.1-1 for location of Cross-Section and description of lithologic units

Source:
Modified from Woodring, W.P., and Bramlette, M.N., 1950, Geology and Paleontology of the Santa Maria District, California: U.S. Geological Survey Prof. Paper 222.

Note: All faults are schematic and are not to scale.

Explanation

Qal – Alluvium	Tcg – Graciosa Member	Tsts – Todos Santos Claystone Member	Tps – Point Sal Formation
Qt – Terrace Deposits	Tcc – Cebada Member	Tmu – Monterey Shale Upper Member	Tl – Undifferentiated Lospe Formation
Qo – Orcutt Sand	Tf – Foxen Mudstone	Tmm – Monterey Shale Middle Member	
Tpr – Paso Robles Formation	Ts – Sisquoc Formation	Tml – Monterey Shale Lower Member	

2000 0 2000 4000

Figure A-9

Regional Geologic Cross-Section

Feasibility Study
Casmalia Resources Superfund Site
August 2014

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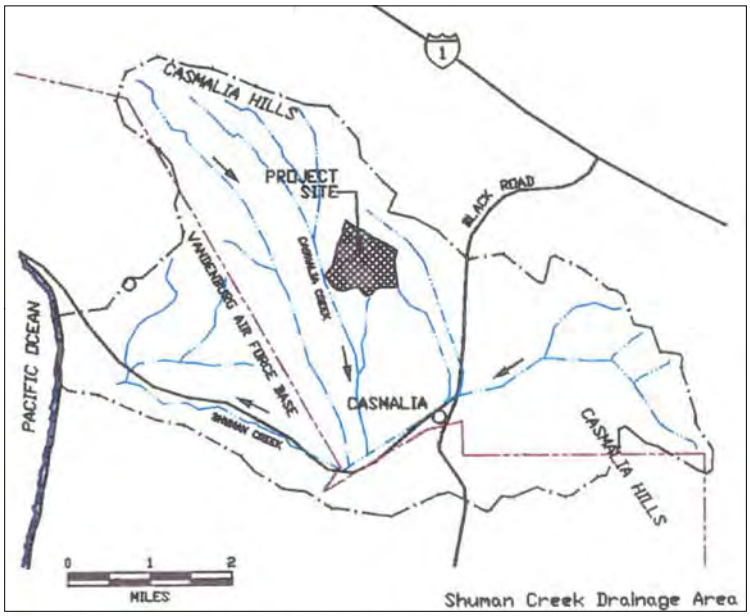

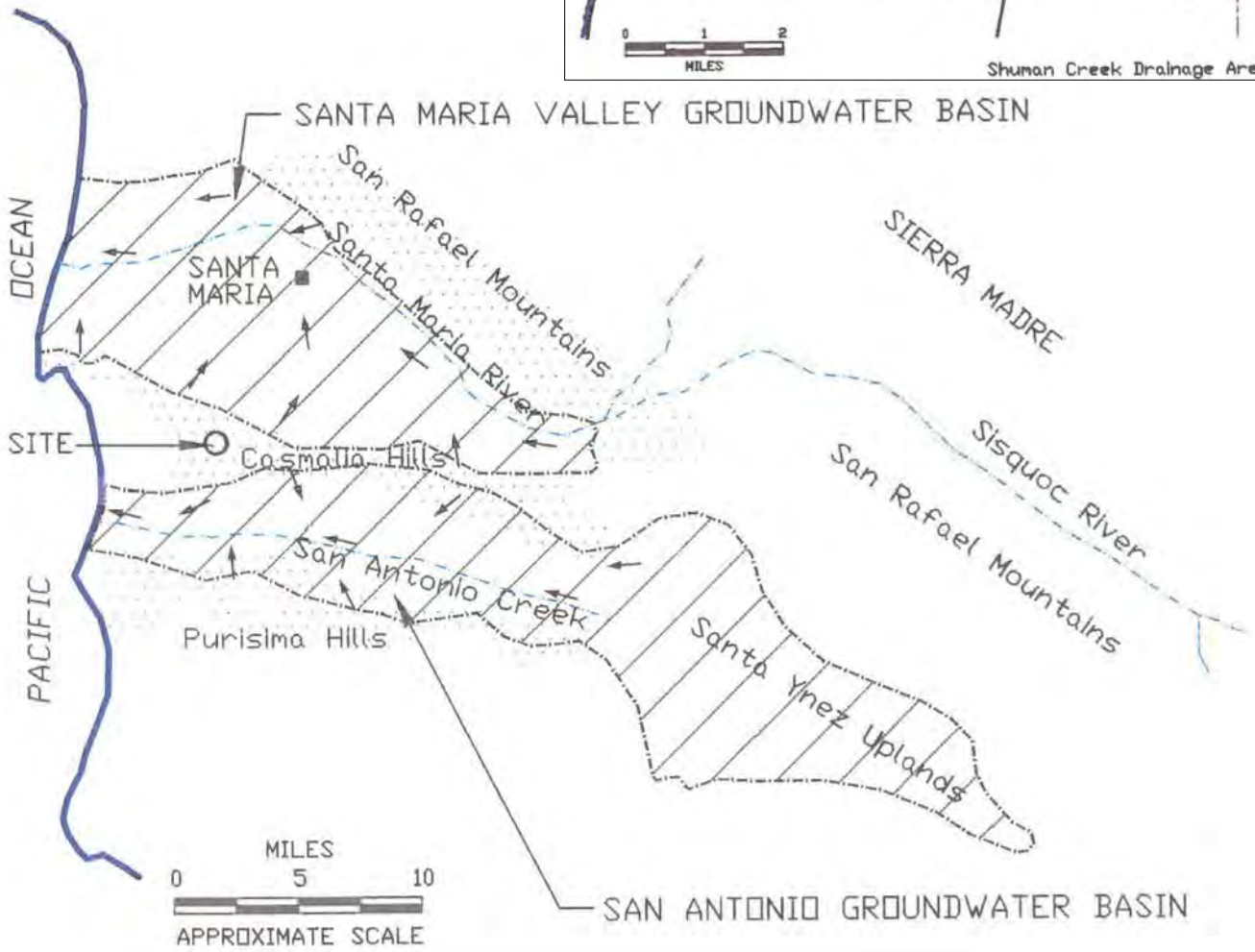

Explanation

- Approximate Boundary of Groundwater Basin
- Casmalia Resources Facility
- Hills
- River/Creek
- Roads
- Pacific Coast
- Vandenburg Air Force Base Boundary
- Groundwater Flow Direction

Figure A-10

Local Groundwater Basins

Feasibility Study
Casmalia Resources Superfund Site
August 2014

Source: Topographic base map provided by Pacific Engineering, Inc. from aerial survey dated March 4, 2004.

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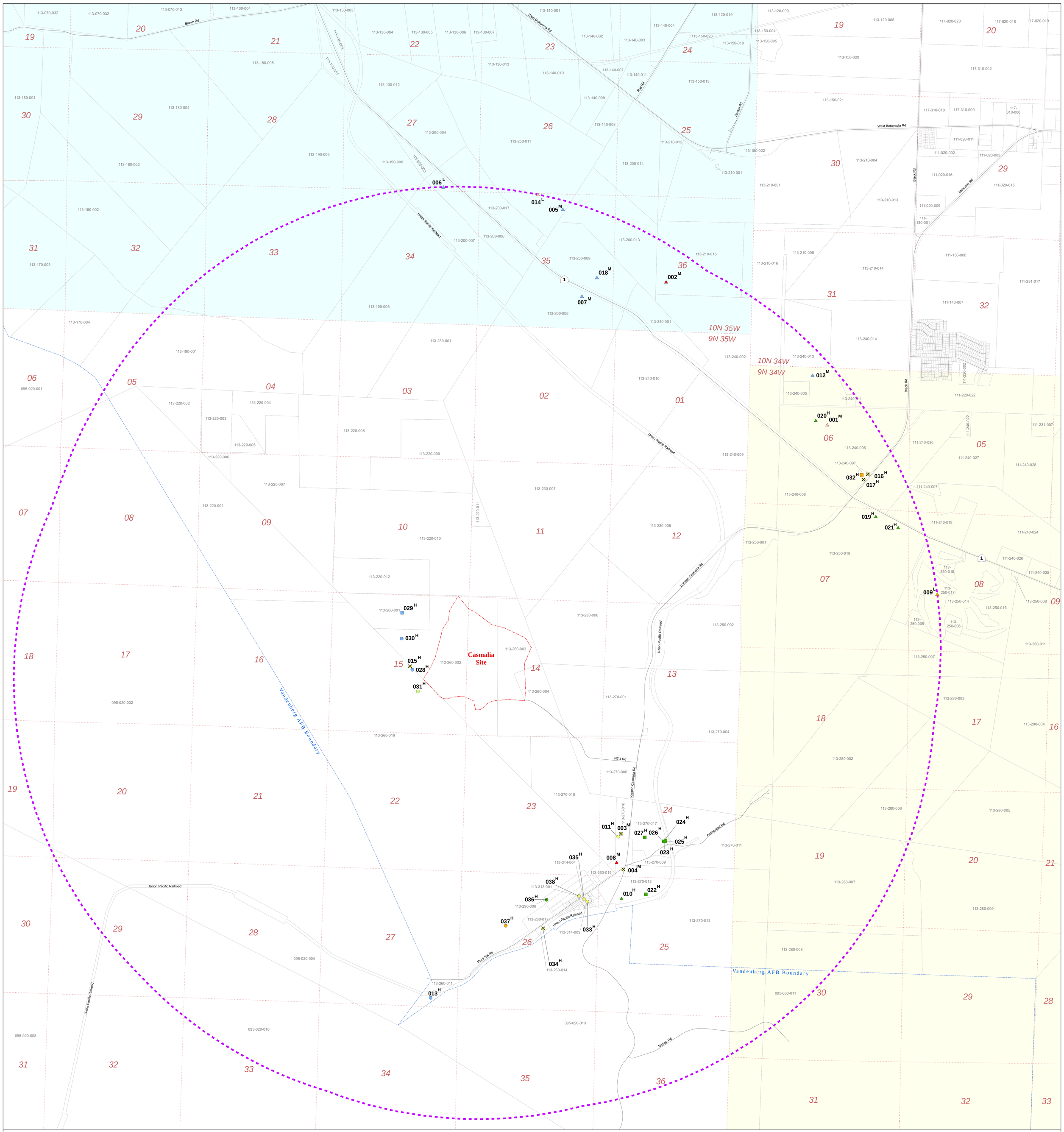

EXPLANATION

Well Usage (Color Code)
- Domestic
- Domestic & Irrigation
- Agriculture
- Agriculture & Irrigation
- Irrigation
- Industrial
- Test Well
- Usage Unknown

Well Status (Symbol)
- Active
- Inactive
- Abandoned/Destroyed
- Status Unknown

Well Label
- 035 H URS Well ID # with Locational Accuracy [1]

- Parcel Boundary with Assessor's [2] Parcel Number (e.g., 113-260-002)
- Union Pacific Railroad Parcels
- 3-Mile Radius from Casmalia Site Boundary
- Casmalia Site Boundary
- Vandenberg Air Force Base (AFB) Boundary

Public Land Survey System's [3] Township, Range, Section (PLSS TRS)
- 06 05 Township 09N Range 34W
- 34 35 Township 09N Range 35W
- 30 29 Township 10N Range 34W
- 33 34 Township 10N Range 35W

1:15,840

1 inch = 0.25 miles

0 0.25 0.5 1
Miles

Notes

[1] Locational Accuracy Definitions for Mapped Wells:

H = High
Represents a level of confidence in placement that lies within approximately 25 to 600 feet of the well's actual location.

M = Medium
Represents a level of confidence in placement that lies within approximately 100 to 950 feet of the well's actual location.

L = Low
Represents a level of confidence in placement that lies within approximately 2,000 to 3,700 feet of the well's actual location.

[2] APN labels were omitted within smaller parcels that do not contain a known water well location.

[3] The PLSS TRS data layer was obtained from the State of California's Division of Oil, Gas and Geothermal Resources (DOGGR). DOGGR modified the original PLSS TRS data layer by projecting section lines into land grant areas using scanned USGS 7.5' (1:24,000) topographic quad maps containing USGS defined projected section lines.

Data Sources

- 3-mile radius and water well locations created by URS. (Fall 2005)
- Vandenberg AFB and Union Pacific Railroad parcels created by URS Corporation from County of Santa Barbara parcel data. (October 2005)
- Assessor's Parcel Numbers and Boundaries provided by County of Santa Barbara. (December 2004)
- PLSS TRS provided by the California Division of Oil, Gas and Geothermal Resources (DOGGR). (December 2000)
- Casmalia site boundary provided by Pacific Engineering, Inc. (April 2004)

Figure A-11

Offsite Well Locations

Feasibility Study
Casmalia Resources Superfund Site
August 2014

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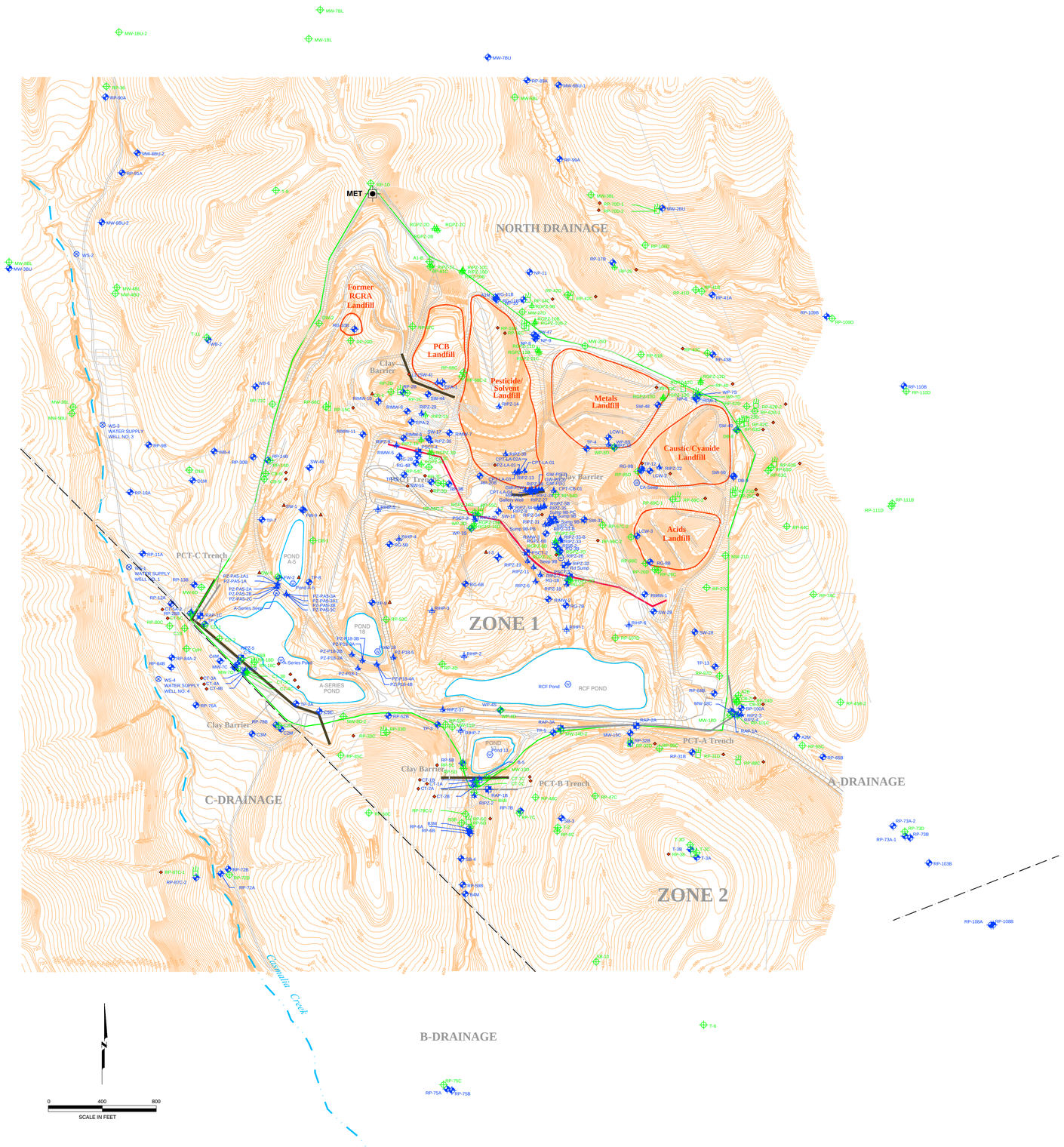

LEGEND

- Burial Trench
- Landfill Boundaries
- Facility and Zone 1 Boundary
- Perimeter Source Control Trench (PSCT)
- Plume Capture Collection Trench (PCT)
- Clay Barrier
- Creek
- Pond Outline
- Approximate Bognuda Ranch Property Boundary (no well access)
- MW-15C — Upper HSU Monitoring Well
- GW-P(E) — Upper HSU Piezometer
- RAP-2A — Upper HSU Extraction Point
- POND18 — Upper HSU Surface Water Sample
- SW-17 — Upper HSU Other Sampling Point
- RHP-1 — Upper HSU Hydropunch
- Lower HSU Vibrating Wire Transducer
- RGPZ-6D — Lower HSU Piezometer
- RP-63C — Lower HSU Monitoring Well
- MET — Meteorological Station
- CB-4 — Indicates well is unsafe to access
- RP-63B — Indicates well is damaged/inoperable

NOTES:

Topo map revised 1998, 2000, 2004. Topo with P/S landfill and borrow area revised 2000. (Foster-Wheeler).

Zone 1 boundary (green) is approximate and includes the area within the facility boundary.

Map does not include historical wells.

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Path: S:\61002\61002\CAD\FS_Support\OD12162800\0000.dwg

NO.	DATE	REVISIONS	BY	CHK

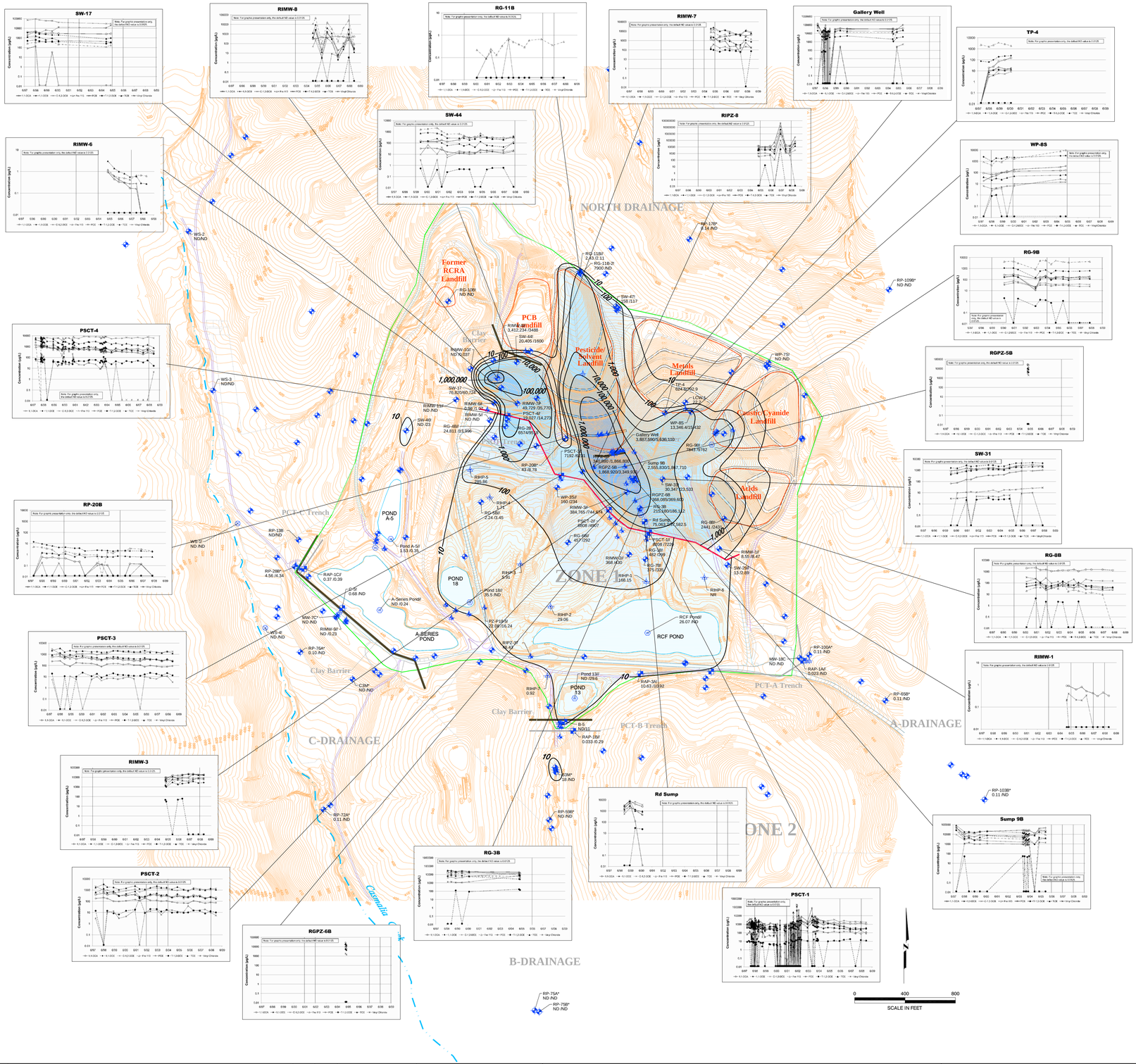
DRAWN: RJP	PROJECT NO: OD12162800		
ENGINEER:	SCALE: 1"= 400'		
CHECKED: WJF	APPROVED: WBC		
DATE: 8/2014	DATE: 8/2014		

Feasibility Study

Casmalia Resources Superfund Site
Casmalia, California

Well Location Map
All Site Wells

FIGURE: A-12
SHEET: 1 OF 1
REVISION NUMBER: 0
DATE: August 2014



LEGEND

- Burial Trench
- Landfill Boundaries
- Perimeter Source Control Trench (PSCT)
- Plume Capture Collection Trench (PCT)
- Facility and Zone 1 Boundary
- Clay Barrier
- Creek
- Pond Outline
- MW-15C — Upper HSU Monitoring Well
- RAP-2A — Upper HSU Extraction Point
- POND18 — Upper HSU Surface Water Sample
- L2 (SW-4) — Upper HSU Piezometer
- RHP-1 — Upper HSU Hydropunch
- MET — Meteorological Station

- Total VOC 10 µg/L
- Total VOC 100 µg/L
- Total VOC 1000 µg/L
- Total VOC 10000 µg/L
- Total VOC 100000 µg/L
- Total VOC 1000000 µg/L

PSCT-2
215/285
- Spring 2005 value
- Fall 2004 value (µg/L)

* = Pre-RI Results, Fall 1999 and Summer 2000
+ = Pre-RI Results, Winter 1999
# = Pre-RI Results, Spring 1999 and Summer 2000
$ = RI Results, Fall 2006
< = Phase II Results, Winter 2007
? = RI Results, Spring 2005 and 2006
† = Semi-Annual Results, Spring 2007 and 2008
// = Semi-Annual Results, Spring and Fall 2008

The widths of the clay barriers, PSCT, and PCT trenches are exaggerated for presentation purposes.

ND Not detected, but sampled and analyzed
NS Not sampled

Wells that do not have symbols were sampled during the RI Sampling events of Fall 2004 and Spring 2005.

NOTES:

Topo map revised 1998, 2000, 2004. Topo with P/S landfill and borrow area revised 2000. (Foster-Wheeler).

Zone 1 boundary (green) is approximate and includes the area within the facility boundary.

Total VOC values are the sum of the detected values from EPA Test Method 8260B. Values that were not included in the sum were for analytes that were either detected in an associated blank sample or identified as a tentatively identified compound.

Posted graphs are time concentration graphs for selected VOCs for wells in the Upper HSU north of the PSCT.

NO.	DATE	REVISIONS	BY	CHK

DRAWN: PCB	PROJECT NO: 4088097619		
ENGINEER:	SCALE: 1"= 400'		
CHECKED: NAM	APPROVED: WJF		
DATE: 1/2011	DATE: 1/2011		

Feasibility Study

Casmalia Resources Superfund Site
Casmalia, California

Total VOC Groundwater Concentrations
Upper HSU Zone 1 Northern Area
Remedial Investigation Sampling

FIGURE **A-13**
SHEET: **1** OF **1**
REVISION NUMBER: 0
DATE: August 2014

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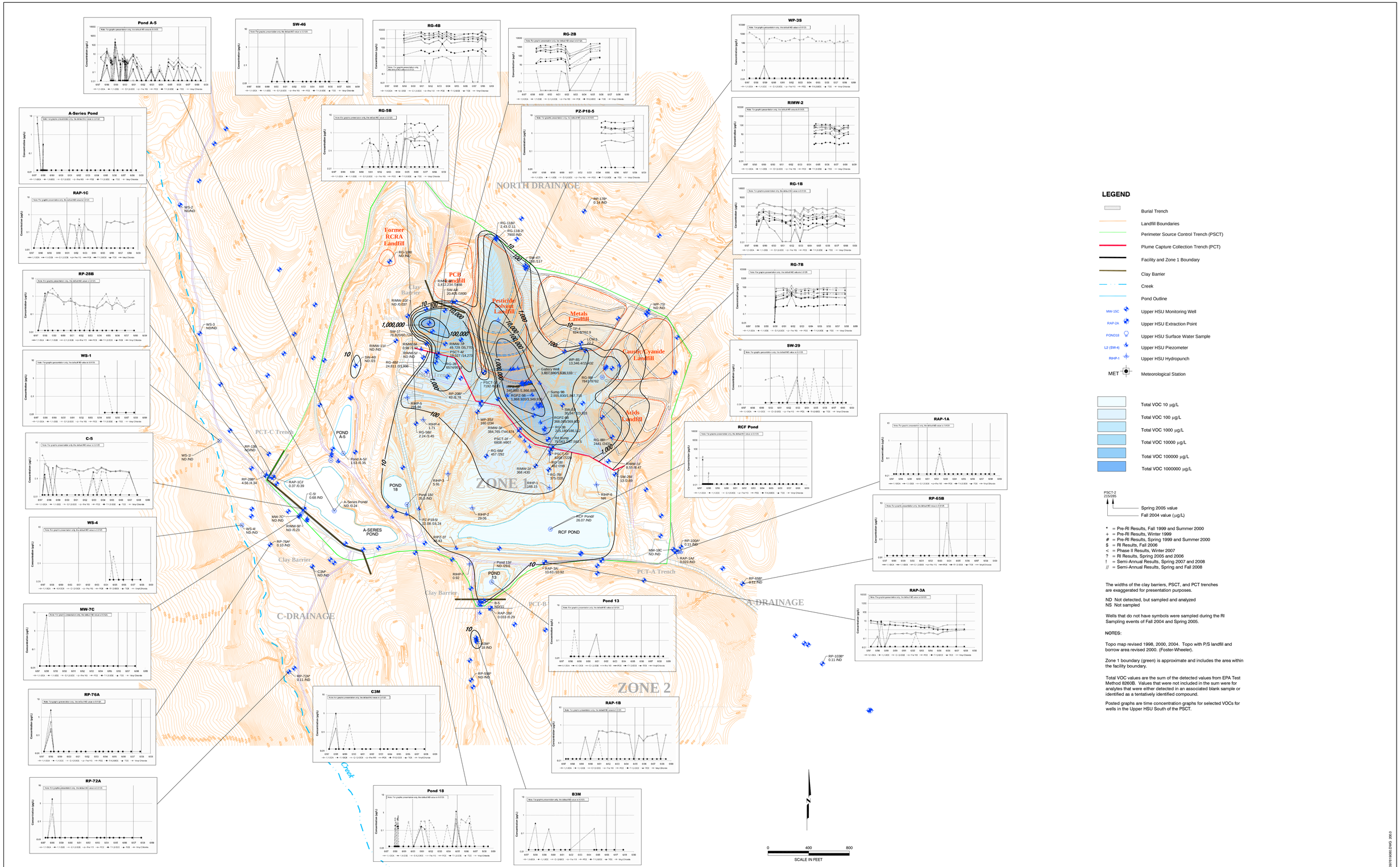
2/21/11 1:07 PM



NO.	DATE	REVISIONS	BY	CHK

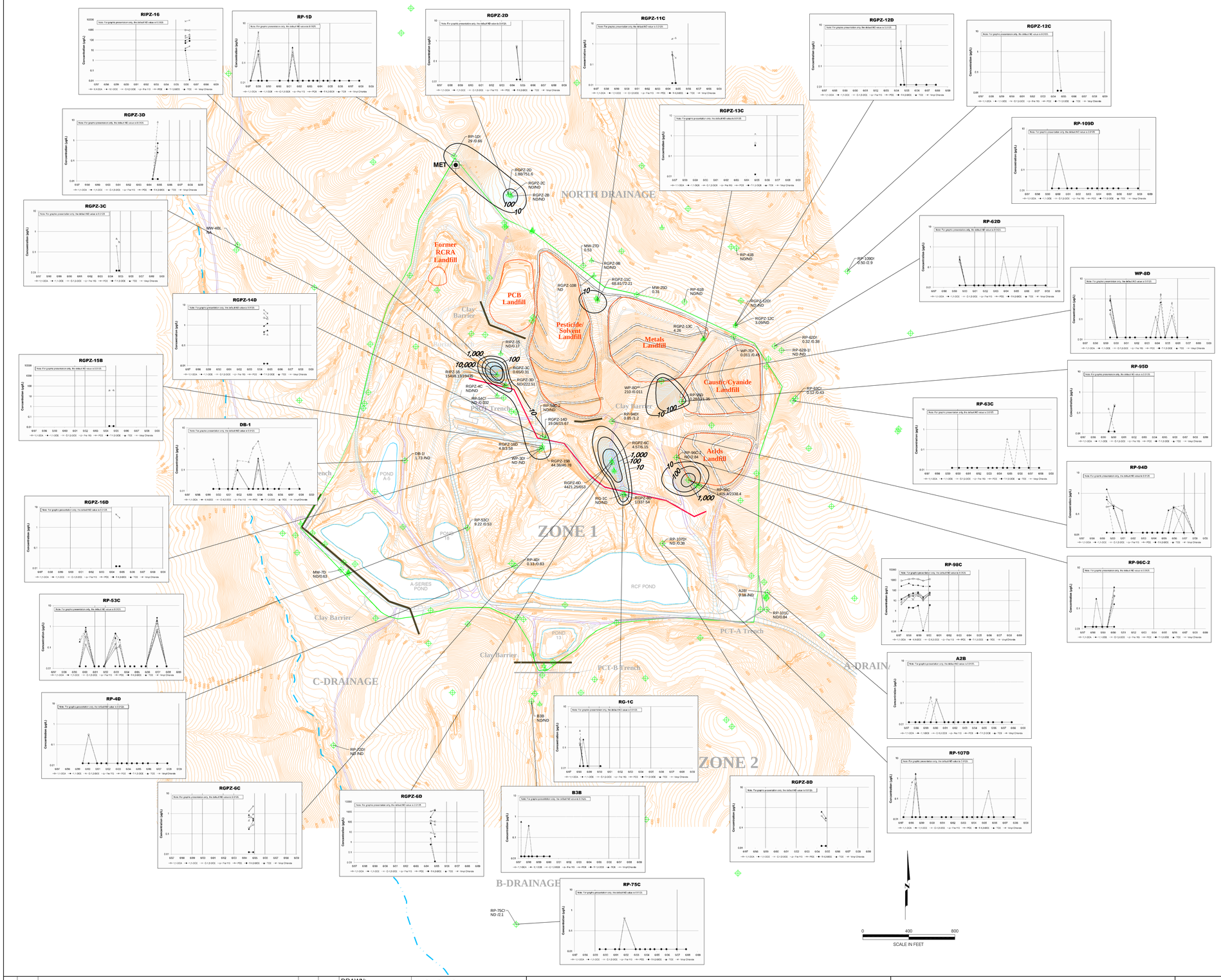
DRAWN: PCB	PROJECT NO: 4088097619
ENGINEER:	SCALE: 1"= 400'
CHECKED: NAM	APPROVED: WJF
DATE: 1/2011	DATE: 1/2011

Feasibility Study

Casmalia Resources Superfund Site
Casmalia, California

Total VOC Groundwater Concentrations
Upper HSU Zone 1 Southern Area
Remedial Investigation Sampling

FIGURE **A-14**
SHEET: **1** OF **1**
REVISION NUMBER: 0
DATE: August 2014



LEGEND

- Burial Trench
- Landfill Boundaries
- Facility and Zone 1 Boundary
- Perimeter Source Control Trench (PSCT)
- Plume Capture Collection Trench (PCT)
- Clay Barrier
- Creek
- Pond Outline
- RP-63C — Lower HSU Monitoring Well
- CT-1C — Lower HSU Piezometer
- MET — Meteorological Station
- Total VOC 10 µg/L
- Total VOC 100 µg/L
- Total VOC 1000 µg/L
- Total VOC 10000 µg/L

RGPZ-16D
314.3

Spring 2005 value
Fall 2004 value (µg/L)

* = Pre-RI Results, Fall 1999 and Summer 2000
\# = Pre-RI Results, Spring 1999 and Summer 2000
& = RI Results, Spring and Fall 2006
† = Semi-Annual Results, Spring 2007 and 2008
// = Semi-Annual Results, Spring and Fall 2008

The widths of the clay barriers, PSCT, and PCT trenches are exaggerated for presentation purposes.

ND Not detected, but sampled and analyzed
NS Not sampled

Wells that do not have symbols were sampled during the RI Sampling events of Fall 2004 and Spring 2005.

NOTES:

Topo map revised 1998, 2000, 2004. Topo with P/S landfill and borrow area revised 2000. (Foster-Wheeler).

Zone 1 boundary (green) is approximate and includes the area within the facility boundary.

Total VOC values are the sum of the detected values from EPA Test Method 8260B. Values that were not included in the sum were for analytes that were either detected in an associated blank sample or identified as a tentatively identified compound.

Posted graphs are time concentration graphs for selected VOCs for wells in the Lower HSU.

4088097619DS01 DWG 400
AUG 14, 2014 7:19PM

NO.	DATE	REVISIONS	BY	CHK

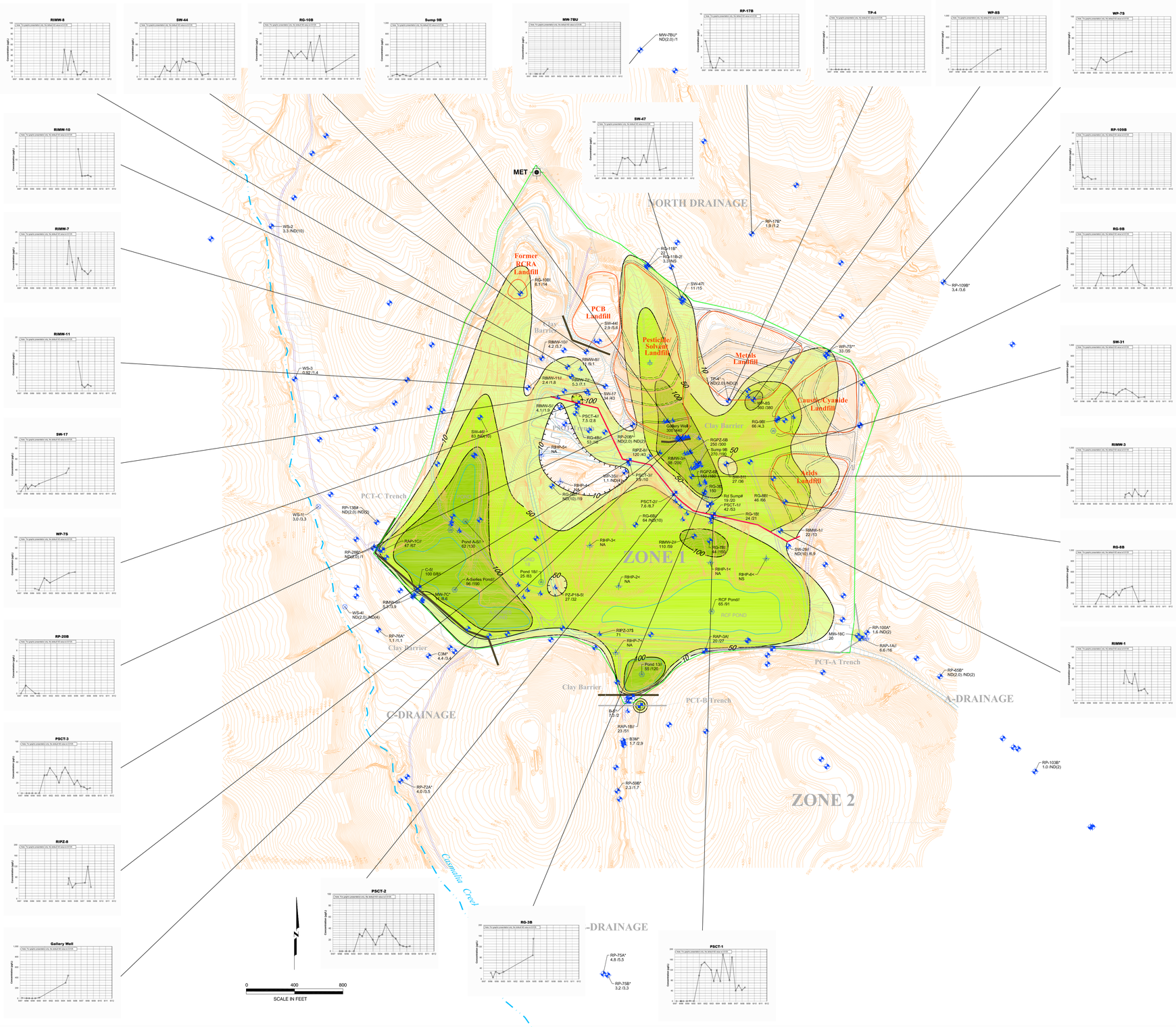
DRAWN: PCB		PROJECT NO: 4088097619	
ENGINEER:		SCALE: 1"= 400'	
CHECKED: NAM		APPROVED: WJF	
DATE: 1/2011		DATE: 1/2011	

Feasibility Study

Casmalia Resources Superfund Site
Casmalia, California

Total VOC Groundwater Concentrations
Lower HSU Zone 1 Area
Remedial Investigation Sampling

FIGURE **A-15**
SHEET: **1** OF **1**
REVISION NUMBER: 0
DATE: August 2014



LEGEND

- Burial Trench
- Landfill Boundaries
- Facility and Zone 1 Boundary
- Perimeter Source Control Trench (PSCT)
- Plume Capture Collection Trench (PCT)
- Clay Barrier
- Creek
- Pond Outline
- MW-15C — Upper HSU Monitoring Well
- RAP-2A — Upper HSU Extraction Point
- POND18 — Upper HSU Surface Water Sample
- L2 (SW-4) — Upper HSU Piezometer
- RHP-1 — Upper HSU Hydropunch
- MET — Meteorological Station

- Arsenic 10 µg/L (Federal MCL)
- Arsenic 50 µg/L (California MCL)
- Arsenic 100 µg/L

PSCT-2
215/285
- Spring 2005 value
- Fall 2004 value (µg/L)

MCL = Maximum Contaminant Level
* = Pre-RI Results, Fall 1999 and Summer 2000
\# = Pre-RI Results, Spring 1999 and Summer 2000
$ = RI Results, Fall 2006
< = Phase II Results, Winter 2007
// = Semi-Annual Results, Spring and Fall 2008
** = RI Results, Spring 2006 and 2007
! = Semi-Annual Results, Spring 2007 and 2008
* = Pre-RI Results, Spring 2001

Wells that do not have symbols were sampled during the RI Sampling events of Fall 2004 and Spring 2005.

The widths of the clay barriers, PSCT, and PCT trenches are exaggerated for presentation purposes.

NR Not sampled/analyzed due to lack of water recovered from sampling location.
NS Not sampled

NOTES:

Topo map revised 1998, 2000, 2004. Topo with P/S landfill and borrow area revised 2000. (Foster-Wheeler).

Zone 1 boundary (green) is approximate and includes the area within the facility boundary.

NO.	DATE	REVISIONS	BY	CHK

DRAWN: PCB	PROJECT NO: 4088097619		
ENGINEER:	SCALE: 1"= 400'		
CHECKED: NAM	APPROVED: WJF		
DATE: 4/2012	DATE: 4/2012		

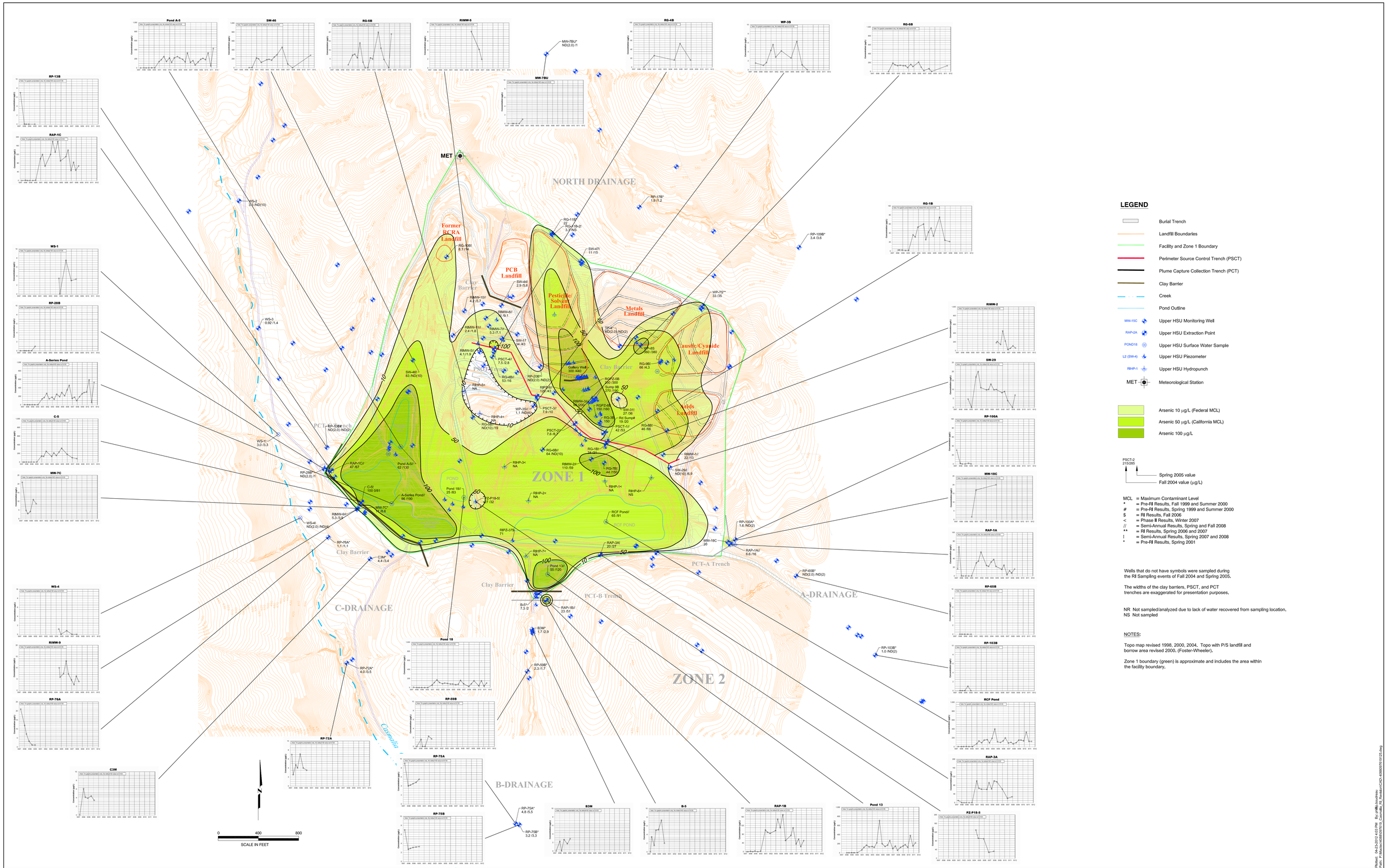
Feasibility Study

Casmalia Resources Superfund Site
Casmalia, California

Arsenic Groundwater Concentrations
Upper HSU Zone 1 Area
North of PSCT
Remedial Investigation Sampling

FIGURE **A-16a**
SHEET: **1** OF **1**
REVISION NUMBER: 0
DATE: August 2014

Plotted: 04-23-2012 3:55 PM By: pdiBo.bouchieau
Path: P:\Models\4088097619_Casmalia_RI_FeasibilityCAD\ 4088097619124.dwg



NO.	DATE	REVISIONS	BY	CHK

DRAWN: PCB	PROJECT NO: 4088097619		
ENGINEER:	SCALE: 1"= 400'		
CHECKED: NAM	APPROVED: WJF		
DATE: 4/2012	DATE: 4/2012		

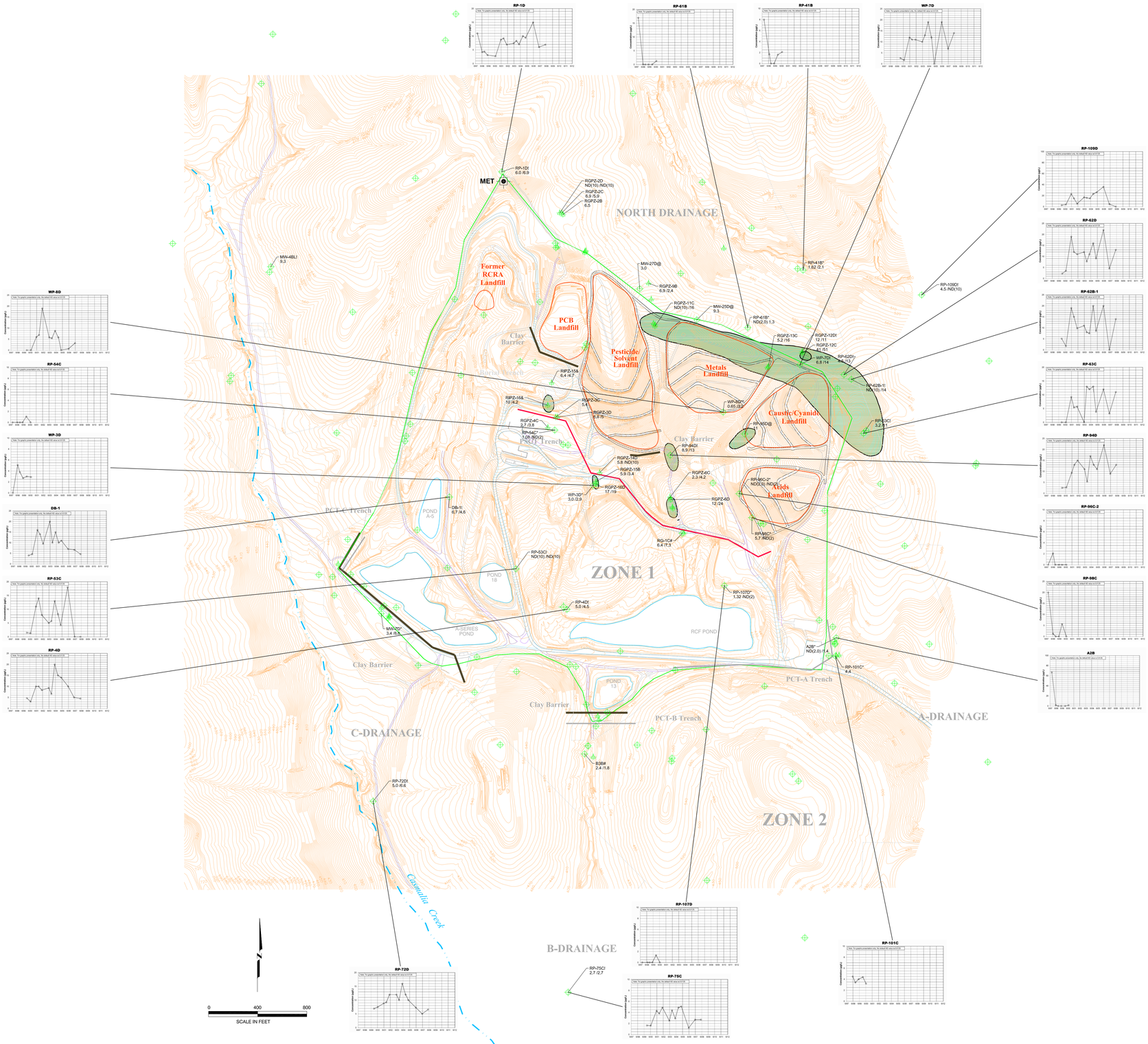
Feasibility Study

Casmalia Resources Superfund Site
Casmalia, California

Arsenic Groundwater Concentrations
Upper HSU Zone 1 Area
South of PSCT
Remedial Investigation Sampling

FIGURE **A-16b**
SHEET: 1 OF 1
REVISION NUMBER: 0
DATE: August 2014

Plotted: 04-23-2012 4:03 PM By: pnilles.bowtrees
Path: P:\Models\4088097619_Casmalia_RI_Review\CADD_4088097619120.dwg



LEGEND

- Burial Trench
- Landfill Boundaries
- Facility and Zone 1 Boundary
- Perimeter Source Control Trench (PSCT)
- Plume Capture Collection Trench (PCT)
- Clay Barrier
- Creek
- Pond Outline
- RP-63C — Lower HSU Monitoring Well
- CT-1C — Lower HSU Piezometer
- MET — Meteorological Station
- Arsenic 10 µg/L (Federal MCL)
- Arsenic 50 µg/L (California MCL)

RGPZ-16D
3/4.3

Spring 2005 value
Fall 2004 value (µg/L)

MCL = Maximum Contaminant Level
* = Pre-RI Results, Fall 1999 and Summer 2000
@ = Pre-RI Results, Summer 2000
& = RI Results, Spring and Fall 2006
** = RI Results, Spring 2006 and 2007
\# = Pre-RI Results, Spring 1999 and Summer 2000
! = Semi-Annual Results, Spring 2007 and 2008

Wells that do not have symbols were sampled during the RI Sampling events of Fall 2004 and Spring 2005.

The widths of the clay barriers, PSCT, and PCT trenches are exaggerated for presentation purposes.

NOTES:

Topo map revised 1998, 2000, 2004. Topo with P/S landfill and borrow area revised 2000, (Foster-Wheeler).

Zone 1 boundary (green) is approximate and includes the area within the facility boundary.

Plotted: 04-02-2012 5:32 AM By: pat@e-boundless
Path: P:\Macho\4088097619\Casmalia_RI_Revision\CAD\ 4088097619004.dwg

NO.	DATE	REVISIONS	BY	CHK

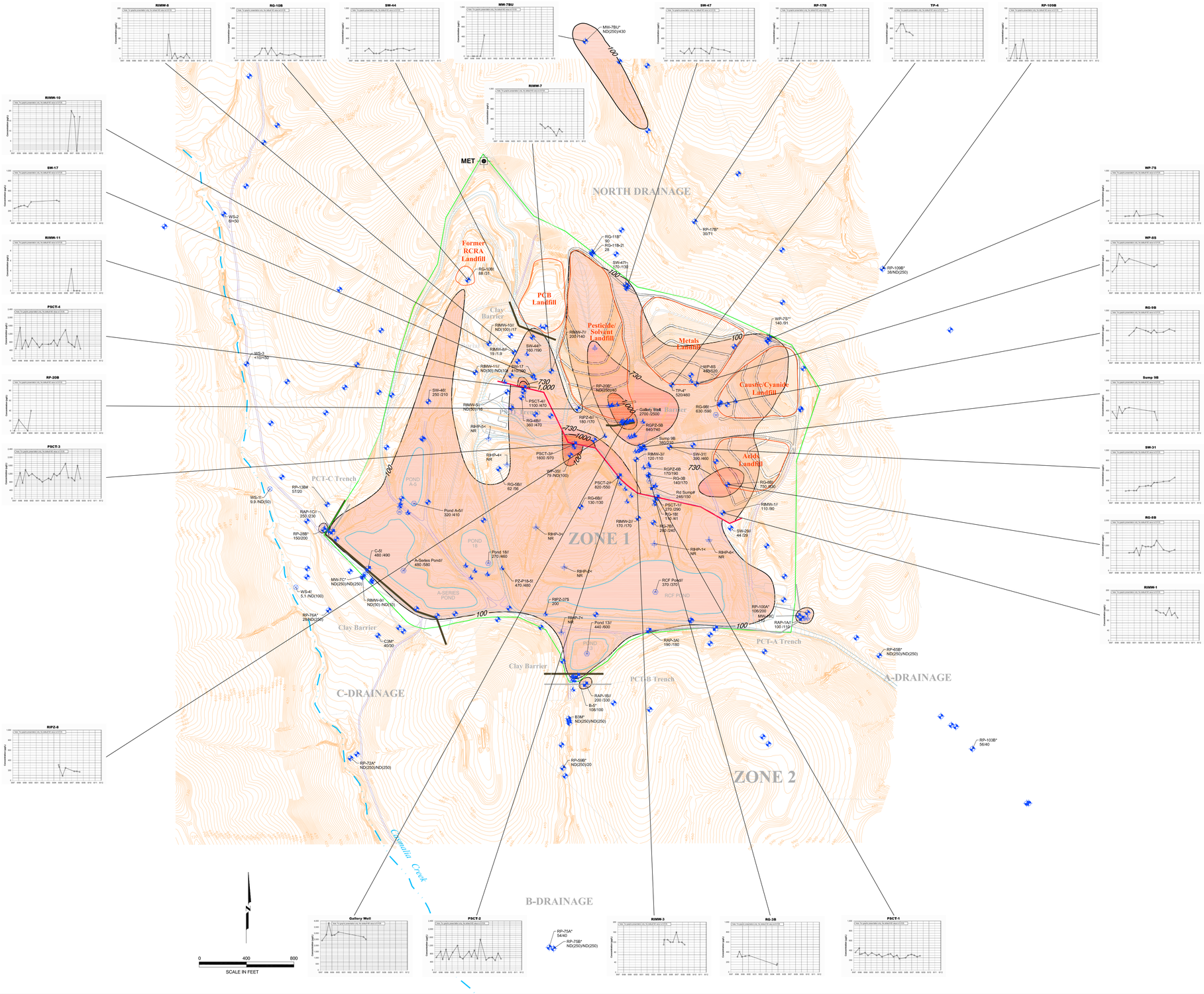
DRAWN:	PCB	PROJECT NO:	4088097619
ENGINEER:		SCALE:	1"= 400'
CHECKED:	NAM	APPROVED:	WJF
DATE:	4/2012	DATE:	4/2012

Feasibility Study

Casmalia Resources Superfund Site
Casmalia, California

Arsenic Groundwater Concentrations
Lower HSU Zone 1 Area
Remedial Investigation Sampling

FIGURE **A-17**
SHEET: **1** OF **1**
REVISION NUMBER: 0
DATE: August 2014



LEGEND

- Burial Trench
- Landfill Boundaries
- Facility and Zone 1 Boundary
- Perimeter Source Control Trench (PSCT)
- Plume Capture Collection Trench (PCT)
- Clay Barrier
- Creek
- Pond Outline
- MW-15C — Upper HSU Monitoring Well
- RAP-2A — Upper HSU Extraction Point
- POND18 — Upper HSU Surface Water Sample
- L2 (SW-4) — Upper HSU Piezometer
- RBHP-1 — Upper HSU Hydropunch
- MET — Meteorological Station

- Nickel 100 µg/L (California MCL)
- Nickel 730 µg/L (PRG)
- Nickel 1000 µg/L

PSCT-2 215/285
- Spring 2005 value
- Fall 2004 value (µg/L)

MCL = Maximum Contaminant Level
* = Pre-RI Results, Fall 1999 and Summer 2000
\# = Pre-RI Results, Spring 1999 and Summer 2000
* = Pre-RI Results, Spring 2001
$ = RI Results, Fall 2006
< = Phase II Results, Winter 2007
// = Semi-Annual Results, Spring and Fall 2008
! = Semi-Annual Results, Spring 2007 and 2008
** = RI Results, Spring 2006 and 2007

Wells that do not have symbols were sampled during the RI Sampling events of Fall 2004 and Spring 2005.

The widths of the clay barriers, PSCT, and PCT trenches are exaggerated for presentation purposes.

NR Not sampled/analyzed due to lack of water recovered from sampling location.

NOTES:

Topo map revised 1998, 2000, 2004. Topo with P/S landfill and borrow area revised 2000. (Foster-Wheeler).

Zone 1 boundary (green) is approximate and includes the area within the facility boundary.

0 400 800
SCALE IN FEET

Plotted: 04-23-2012 4:11 PM By: pdiBo.boudreau
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NO.	DATE	REVISIONS	BY	CHK

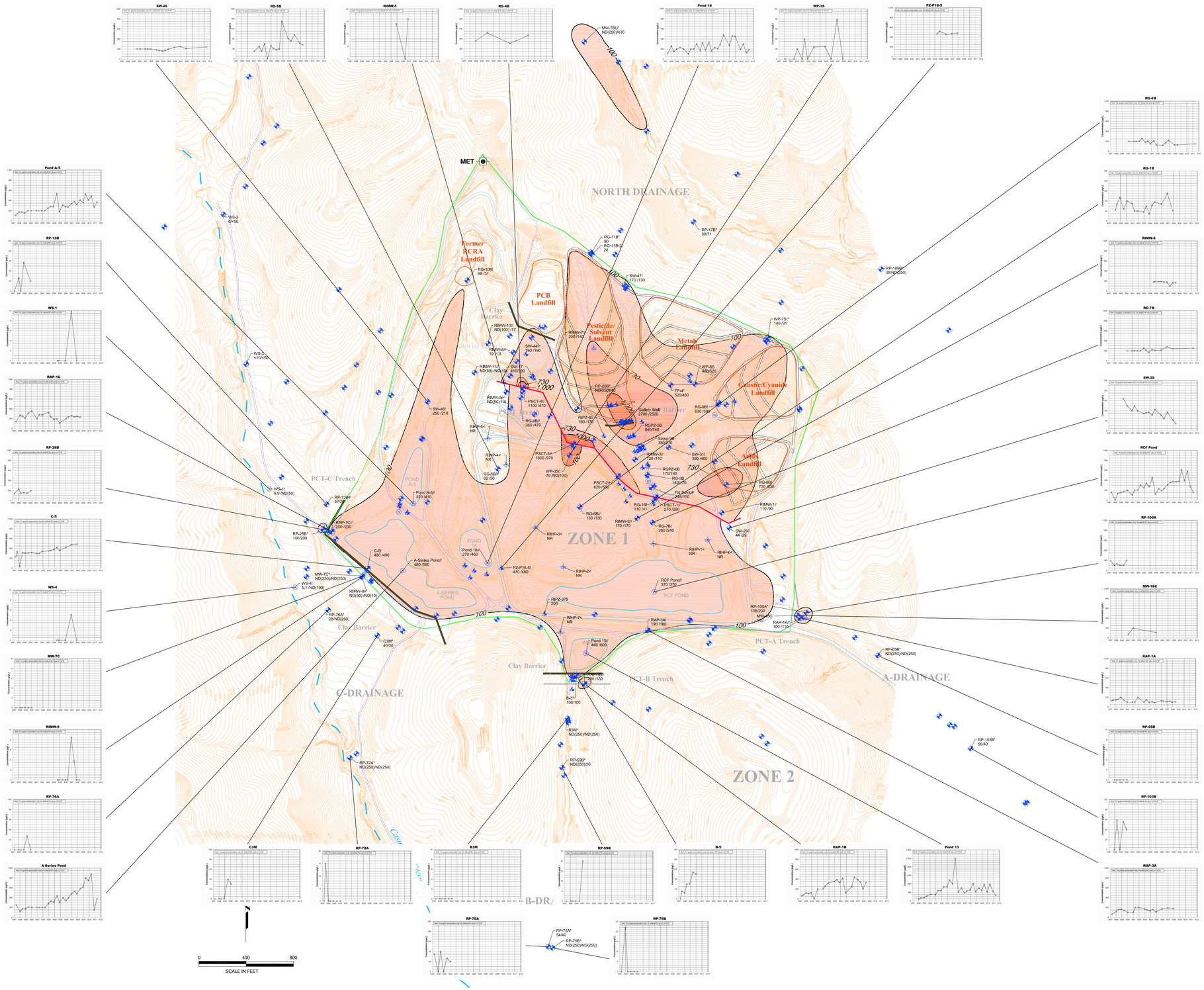
DRAWN: PCB	PROJECT NO: 4088097619		
ENGINEER:	SCALE: 1"= 400'		
CHECKED: NAM	APPROVED: WJF		
DATE: 4/2012	DATE: 4/2012		

Feasibility Study

Casmalia Resources Superfund Site
Casmalia, California

Nickel Groundwater Concentrations
Upper HSU Zone 1 Area
North of PSCT Trench
Remedial Investigation Sampling

FIGURE **A-18a**
SHEET: **1** OF **1**
REVISION NUMBER: 0
DATE: August 2014



LEGEND

- Burial Trench
- Landfill Boundaries
- Facility and Zone 1 Boundary
- Perimeter Source Control Trench (PSCT)
- Plume Capture Collection Trench (PCT)
- Clay Barrier
- Creek
- Pond Outline
- MW-15C — Upper HSU Monitoring Well
- RAP-2A — Upper HSU Extraction Point
- POND18 — Upper HSU Surface Water Sample
- L2 (SW-4) — Upper HSU Piezometer
- RBHP-1 — Upper HSU Hydropunch
- MET — Meteorological Station

- Nickel 100 µg/L (California MCL)
- Nickel 730 µg/L (PRG)
- Nickel 1000 µg/L

PSCT-2
215/285

Spring 2005 value
Fall 2004 value (µg/L)

MCL = Maximum Contaminant Level
* = Pre-RI Results, Fall 1999 and Summer 2000
# = Pre-RI Results, Spring 1999 and Summer 2000
* = Pre-RI Results, Spring 2001
$ = RI Results, Fall 2006
< = Phase II Results, Winter 2007
// = Semi-Annual Results, Spring and Fall 2008
! = Semi-Annual Results, Spring 2007 and 2008
* = RI Results, Spring 2006 and 2007

Wells that do not have symbols were sampled during the RI Sampling events of Fall 2004 and Spring 2005.

The widths of the clay barriers, PSCT, and PCT trenches are exaggerated for presentation purposes.

NR Not sampled/analyzed due to lack of water recovered from sampling location.

NOTES:

Topo map revised 1998, 2000, 2004. Topo with P/S landfill and borrow area revised 2000. (Foster-Wheeler).

Zone 1 boundary (green) is approximate and includes the area within the facility boundary.

Plotted: 04-23-2014 6:18 PM By: pdiffie,bouwineu
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NO.	DATE	REVISIONS	BY	CHK

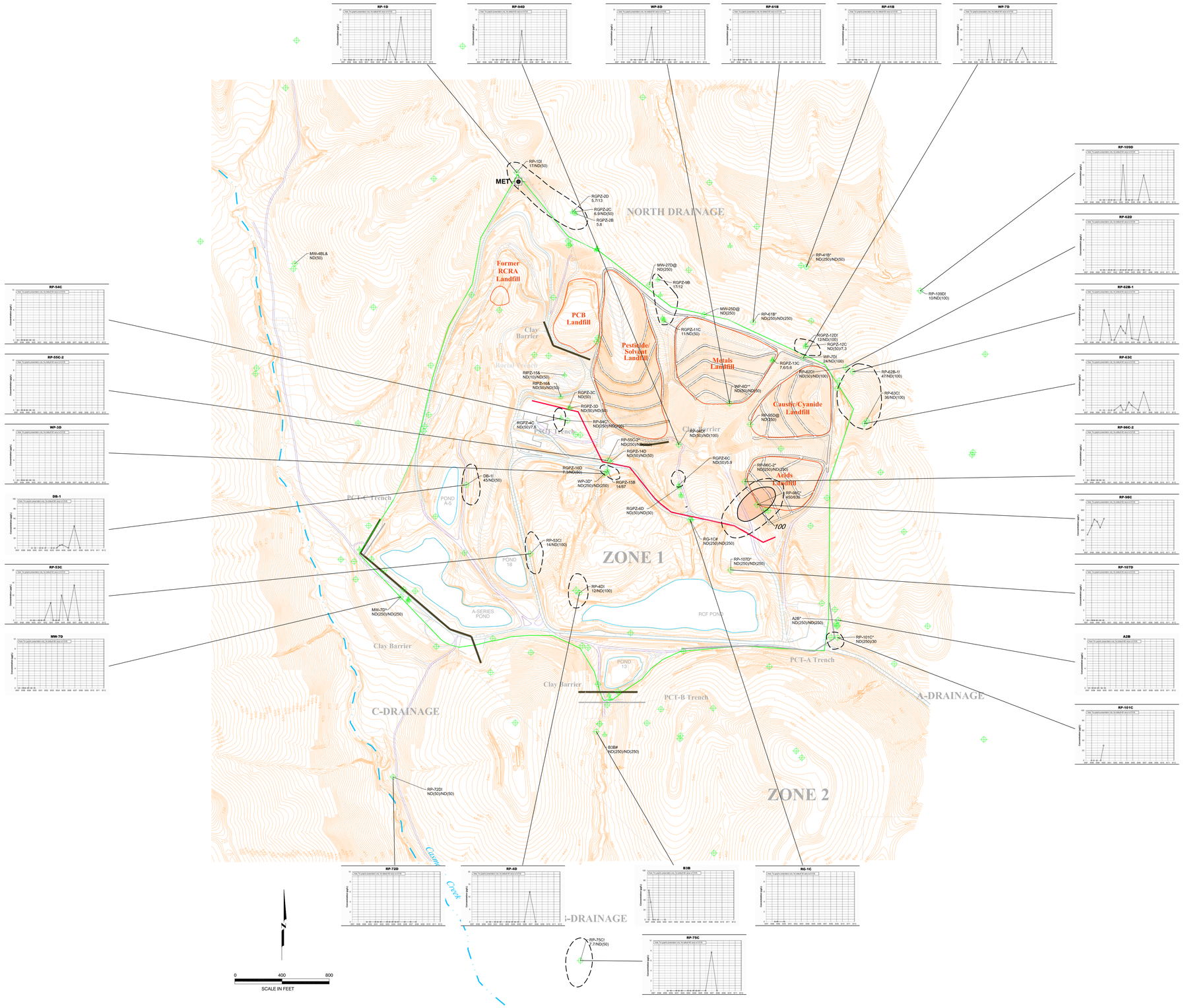
DRAWN: PCB	PROJECT NO: 4088097619		
ENGINEER:	SCALE: 1"= 400'		
CHECKED: NAM	APPROVED: WJF		
DATE: 4/2012	DATE: 4/2012		

Feasibility Study

Casmalia Resources Superfund Site
Casmalia, California

Nickel Groundwater Concentrations
Upper HSU Zone 1 Area
South of PSCT Trench
Remedial Investigation Sampling

FIGURE **A-18b**
SHEET: **1** OF **1**
REVISION NUMBER: 0
DATE: August 2014



LEGEND

- Burial Trench
- Landfill Boundaries
- Facility and Zone 1 Boundary
- Perimeter Source Control Trench (PSCT)
- Plume Capture Collection Trench (PCT)
- Clay Barrier
- Creek
- Pond Outline
- RP-63C — Lower HSU Monitoring Well
- CT-1C — Lower HSU Piezometer
- MET — Meteorological Station
- Nickel Non-Detect
- Nickel 100 µg/L

RGPZ-16D
34.3

Spring 2005 value
Fall 2004 value (µg/L)

MCL = Maximum Contaminant Level
# = Pre-RI Results, Spring 1999 and Summer 2000
* = Pre-RI Results, Fall 1999 and Summer 2000
& = Pre-RI Results, Spring 2002
@ = Pre-RI Results, Summer 2000
** = RI Results, Spring 2006 and 2007
! = Semi-Annual Results, Spring 2007 and 2008

Wells that do not have symbols were sampled during the RI Sampling events of Fall 2004 and Spring 2005.

The widths of the clay barriers, PSCT, and PCT trenches are exaggerated for presentation purposes.

NOTES:

Topo map revised 1998, 2000, 2004. Topo with P/S landfill and borrow area revised 2000. (Foster-Wheeler).

Zone 1 boundary (green) is approximate and includes the area within the facility boundary.

Plotted: 04-11-2012 11:14 AM By: pmills.bourdreau
Path: P:\Boeing\4088097619\13_Casmalia_RI_Sev\Base\CAD_4088097619\RI06.dwg

NO.	DATE	REVISIONS	BY	CHK

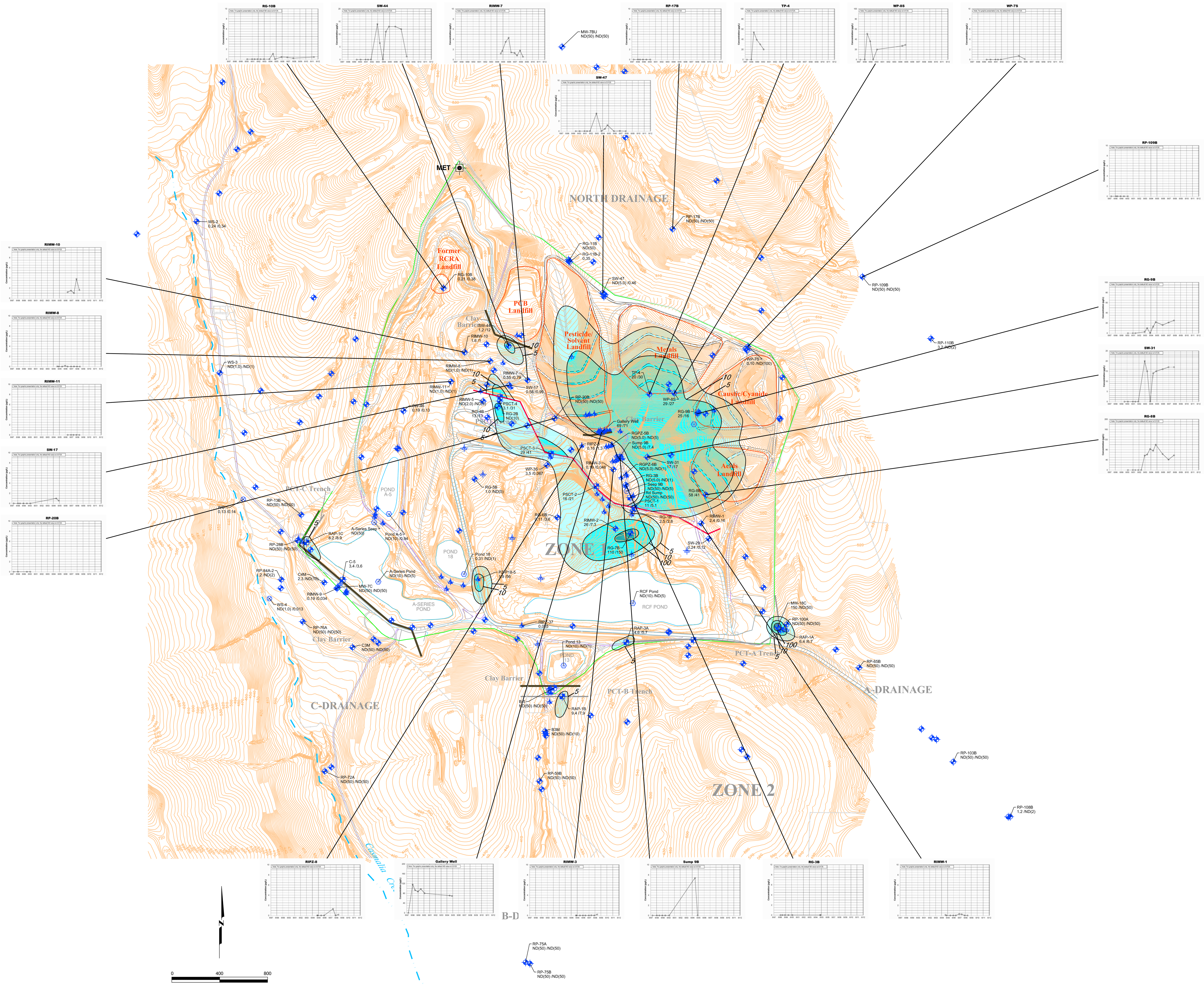
DRAWN: PCB	PROJECT NO: 4088097619		
ENGINEER:	SCALE: 1"= 400'		
CHECKED: NAM	APPROVED: WJF		
DATE: 4/2012	DATE: 4/2012		

Feasibility Study

Casmalia Resources Superfund Site
Casmalia, California

Nickel Groundwater Concentrations
Lower HSU Zone 1 Area
Remedial Investigation Sampling

FIGURE **A-19**
SHEET: **1** OF **1**
REVISION NUMBER: 0
DATE: August 2014



LEGEND

	Burial Trench
	Landfill Boundaries
	Facility and Zone 1 Boundary
	Perimeter Source Control Trench (PSCT)
	Plume Capture Collection Trench (PCT)
	Clay Barrier
	Creek
	Pond Outline
MW-15C	Upper HSU Monitoring Well
RAP-2A	Upper HSU Extraction Point
POND18	Upper HSU Surface Water Sample
L2 (SW-4)	Upper HSU Piezometer
RIHP-1	Upper HSU Hydropunch
MET	Meteorological Station
	Cadmium 5 μg/L (State and Federal MCL)
	Cadmium 10 μg/L
	Cadmium 100 μg/L

PSCT-2
215/285

Spring 2005 value
Fall 2004 value (μg/L)

The widths of the clay barriers, PSCT, and PCT trenches are exaggerated for presentation purposes.

NR Not sampled/analyzed due to lack of water recovered from sampling location.
NS Not sampled

NOTES:

Topo map revised 1998, 2000, 2004. Topo with P/S landfill and borrow area revised 2000. (Foster-Wheeler).

Zone 1 boundary (green) is approximate and includes the area within the facility boundary.

Wednesday, April 11,2012 11:34 AM
P:\Mactec\4088\097619_Casmalia_RI_Revision\CAD\4088097619127.dwg

NO.	DATE	REVISIONS	BY	CHK

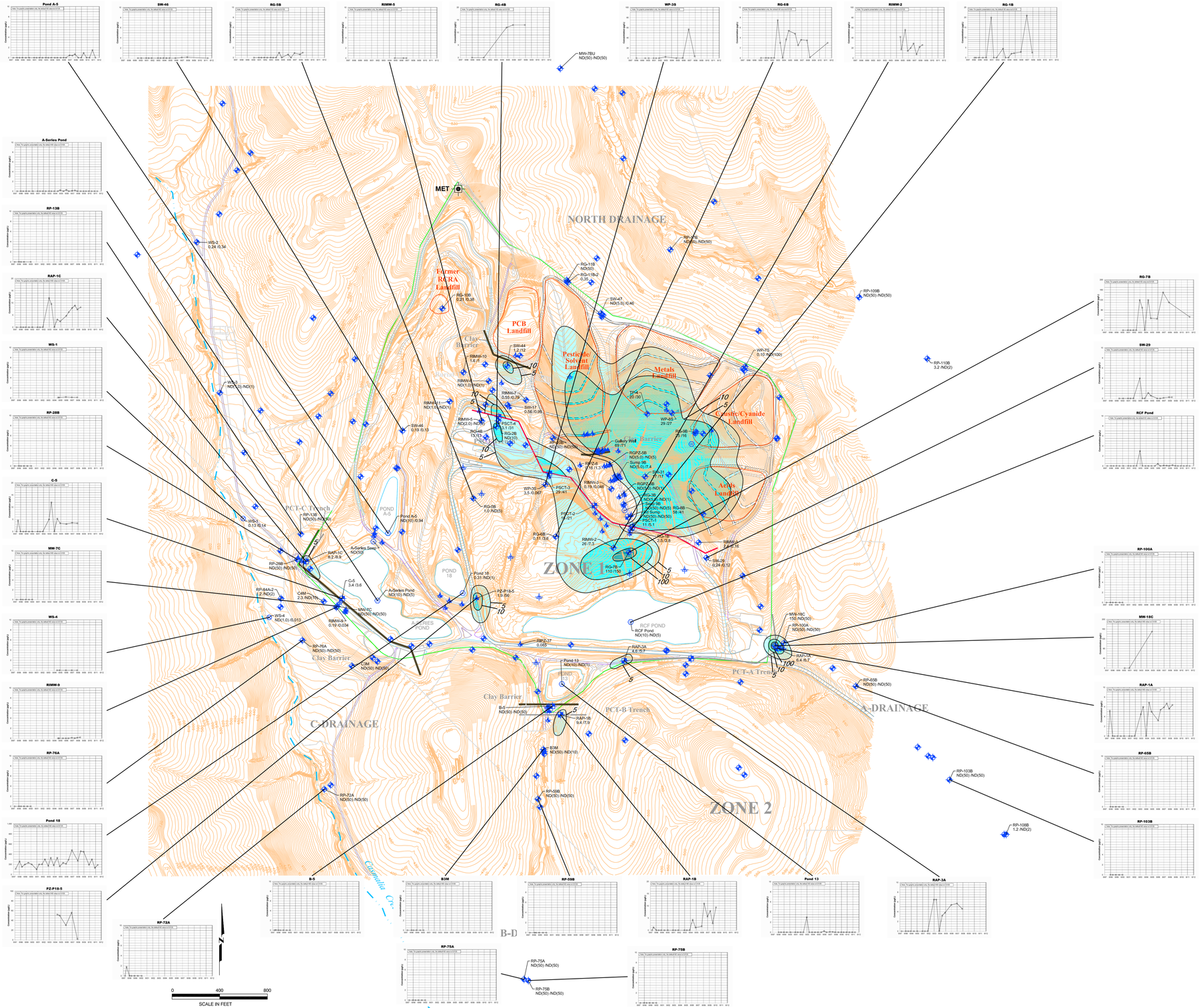
DRAWN:	PCB	PROJECT NO:	4088097619
ENGINEER:		SCALE:	1"= 400'
CHECKED:	NAM	APPROVED:	WJF
DATE:	4/2012	DATE:	4/2012

Feasibility Study

Casmalia Resources Superfund Site
Casmalia, California

Cadmium Groundwater Concentrations
Upper HSU Zone 1 Area
North of the PSCT
Remedial Investigation Sampling

FIGURE **A-20a**
SHEET: **1** OF **1**
REVISION NUMBER: 0
DATE: August 2014



LEGEND

- Burial Trench
- Landfill Boundaries
- Facility and Zone 1 Boundary
- Perimeter Source Control Trench (PSCT)
- Plume Capture Collection Trench (PCT)
- Clay Barrier
- Creek
- Pond Outline
- MW-15C — Upper HSU Monitoring Well
- RAP-2A — Upper HSU Extraction Point
- POND18 — Upper HSU Surface Water Sample
- L2 (SW-4) — Upper HSU Piezometer
- RHP-1 — Upper HSU Hydropunch
- MET — Meteorological Station
- Cadmium 5 µg/L (State and Federal MCL)
- Cadmium 10 µg/L
- Cadmium 100 µg/L

PSCT-2
215/285

Spring 2005 value
Fall 2004 value (µg/L)

The widths of the clay barriers, PSCT, and PCT trenches are exaggerated for presentation purposes.

NR Not sampled/analyzed due to lack of water recovered from sampling location.
NS Not sampled

NOTES:

Topo map revised 1998, 2000, 2004. Topo with P/S landfill and borrow area revised 2000. (Foster-Wheeler).

Zone 1 boundary (green) is approximate and includes the area within the facility boundary.

Wednesday, April 11,2012 11:38 AM
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NO.	DATE	REVISIONS	BY	CHK

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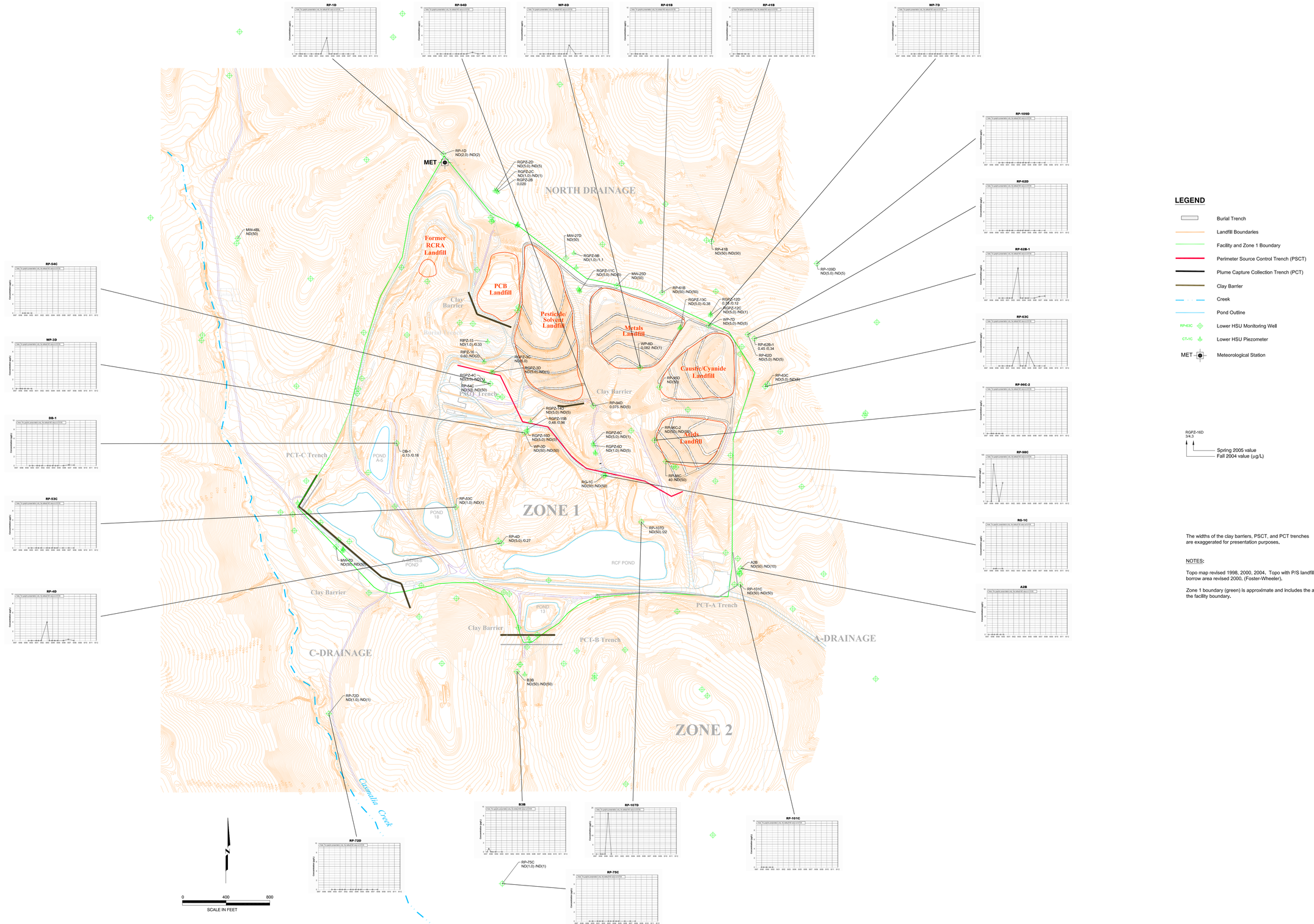
CHECKED:	NAM	APPROVED:	WJF
DATE:	4/2012	DATE:	4/2012

Feasibility Study

Casmalia Resources Superfund Site
Casmalia, California

Cadmium Groundwater Concentrations
Upper HSU Zone 1 Area
South of PSCT Trench
Remedial Investigation Sampling

FIGURE **A-20b**
SHEET: **1** OF **1**
REVISION NUMBER: 0
DATE: August 2014



The widths of the clay barriers, PSCT, and PCT trenches are exaggerated for presentation purposes.

NOTES:

Topo map revised 1998, 2000, 2004. Topo with P/S landfill and borrow area revised 2000. (Foster-Wheeler).

Zone 1 boundary (green) is approximate and includes the area within the facility boundary.

Plotted: 04-11-2012 11:40 AM By: pattis.bouchteau
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NO.	DATE	REVISIONS	BY	CHK

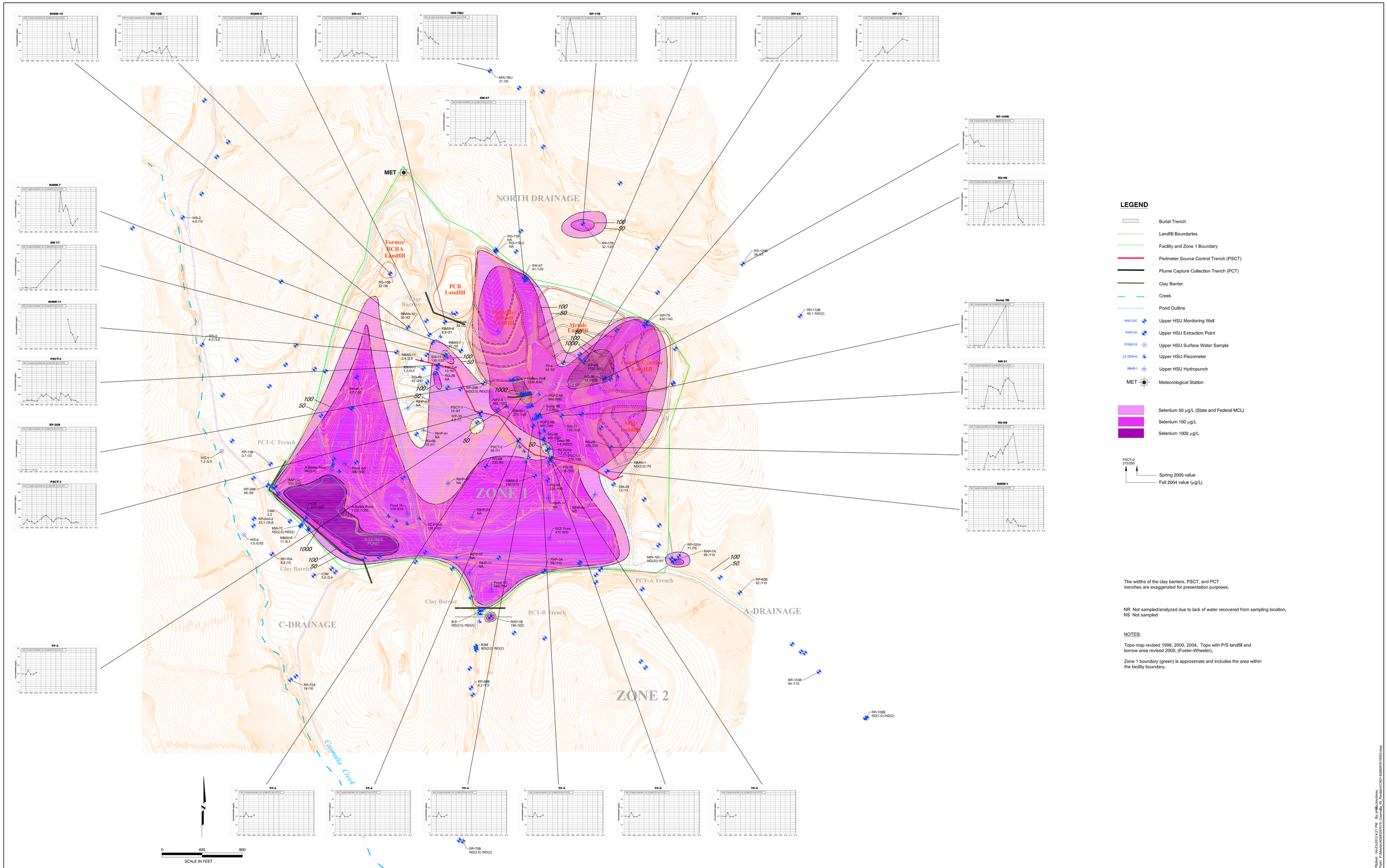
DRAWN: PCB	PROJECT NO: 4088097619		
ENGINEER:	SCALE: 1"= 400'		
CHECKED: NAM	APPROVED: WJF		
DATE: 4/2012	DATE: 4/2012		

Feasibility Study

Casmalia Resources Superfund Site
Casmalia, California

Cadmium Groundwater Concentrations
Lower HSU Zone 1 Area
Remedial Investigation Sampling

FIGURE **A-21**
SHEET: **1** OF **1**
REVISION NUMBER: 0
DATE: August 2014



NO.	DATE	REVISIONS	BY	CHK

DRAWN:	PCB	PROJECT NO:	4088097619
ENGINEER:		SCALE:	1"= 400'
CHECKED:	NAM	APPROVED:	WJF
DATE:	1/2011	DATE:	1/2011

Feasibility Study

Casmalia Resources Superfund Site
Casmalia, California

Selenium Groundwater Concentrations
Upper HSU Zone 1 Area
North of PSCT Trench
Remedial Investigation Sampling

FIGURE **A-22a**
SHEET: **1** OF **1**
REVISION NUMBER: 0
DATE: August 2014

Plotted: 04-23-2014 3:21 PM By: pattie.boudreau
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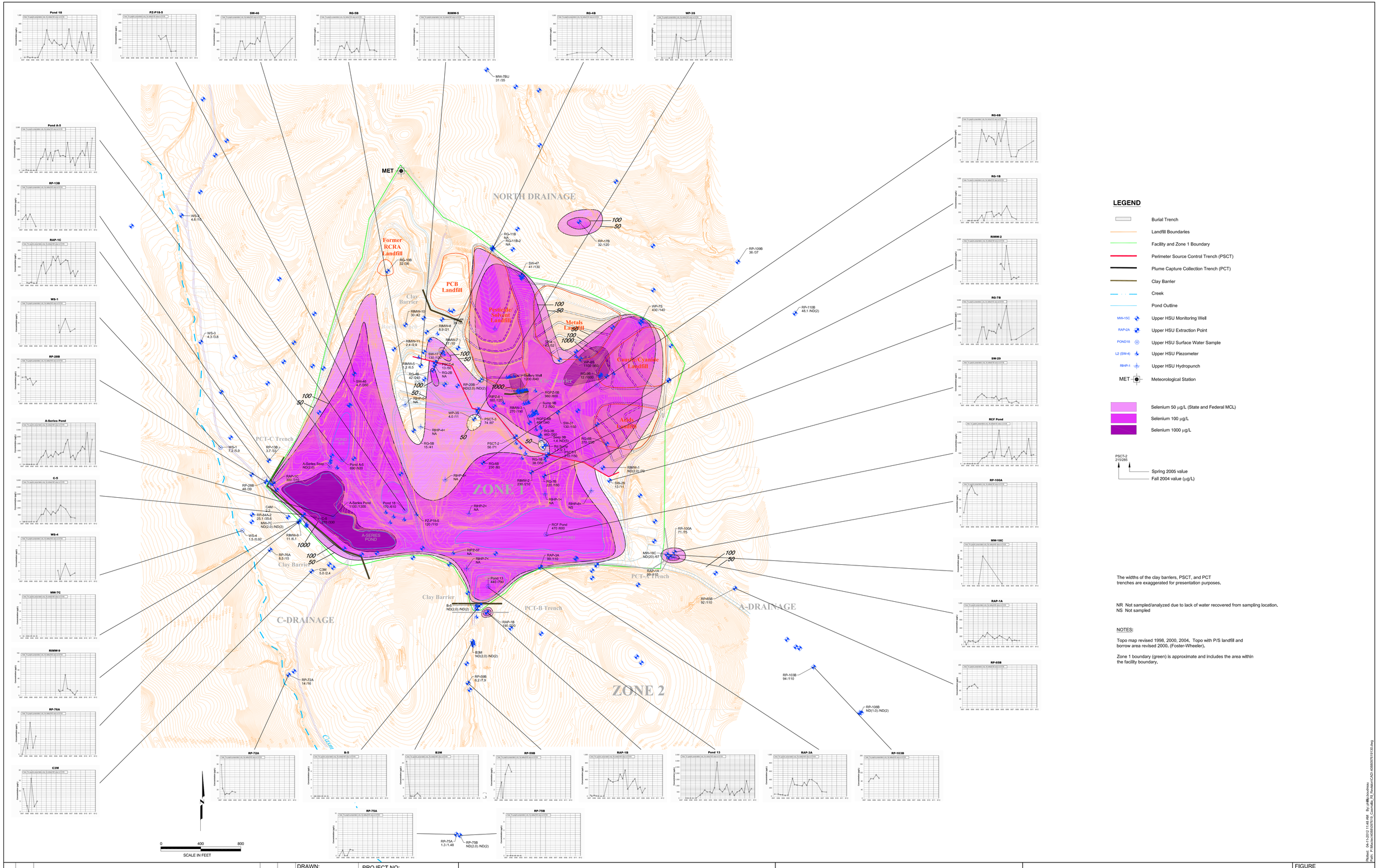

NO.	DATE	REVISIONS	BY	CHK

DRAWN: PCB	PROJECT NO: 4088097619		
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CHECKED: NAM	APPROVED: WJF		
DATE: 1/2011	DATE: 1/2011		

Feasibility Study

Casmalia Resources Superfund Site
Casmalia, California

Selenium Groundwater Concentrations
Upper HSU Zone 1 Area
South of PSCT Trench
Remedial Investigation Sampling

FIGURE **A-22b**
SHEET: **1** OF **1**
REVISION NUMBER: 0
DATE: August 2014

Plotted: Oct-1-2012 11:48 AM By: pdillbourdieu
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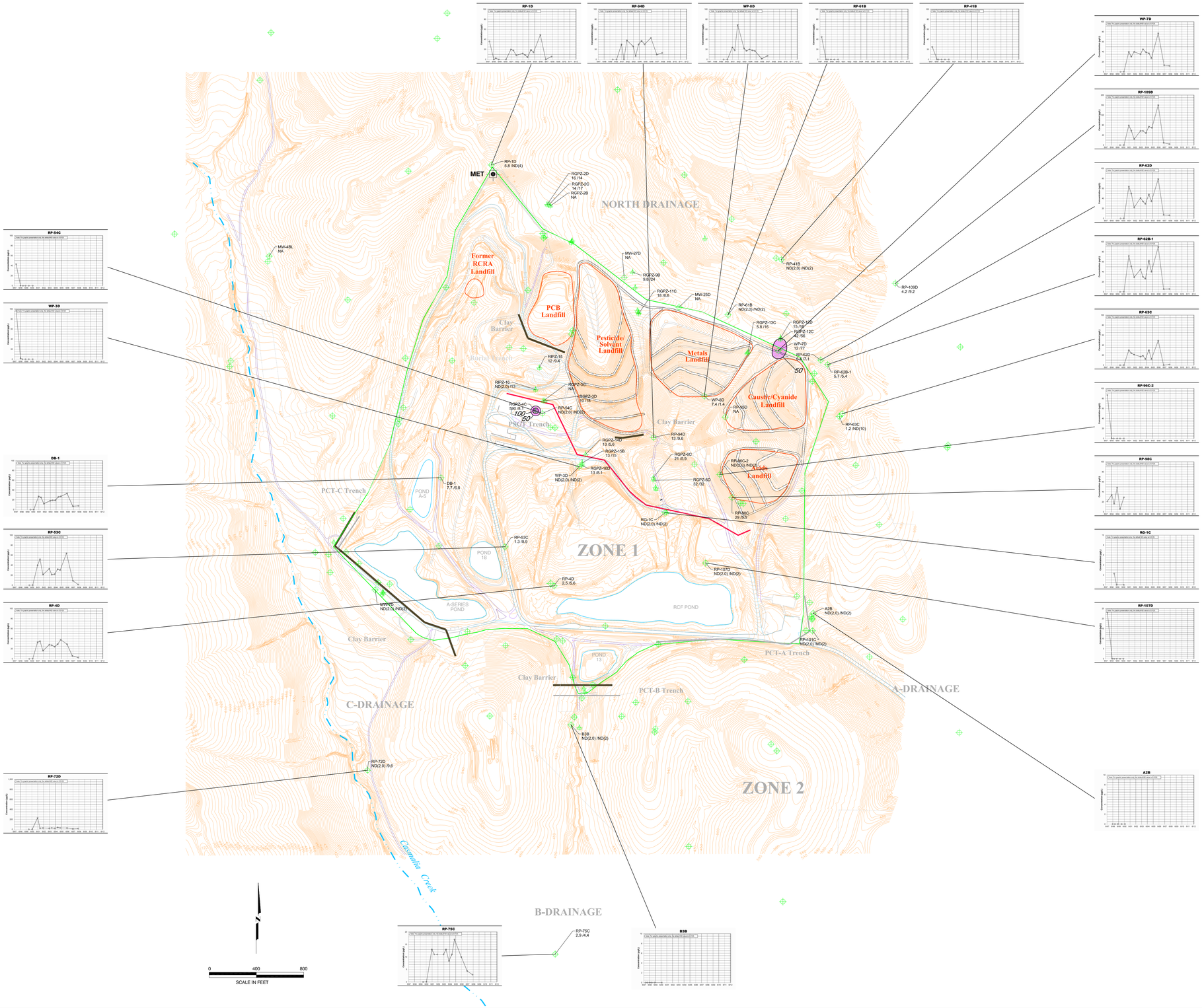


LEGEND

- Burial Trench
- Landfill Boundaries
- Facility and Zone 1 Boundary
- Perimeter Source Control Trench (PSCT)
- Plume Capture Collection Trench (PCT)
- Clay Barrier
- Creek
- Pond Outline
- RP-63C — Lower HSU Monitoring Well
- CT-1C — Lower HSU Piezometer
- MET — Meteorological Station
- Selenium 50 µg/L (Sate and Federal MCL)
- Selenium 100 µg/L

RGPZ-16D 34.3 — Spring 2005 value; Fall 2004 value (µg/L)

The widths of the clay barriers, PSCT, and PCT trenches are exaggerated for presentation purposes.

NOTES:

Topo map revised 1998, 2000, 2004. Topo with P/S landfill and borrow area revised 2000. (Foster-Wheeler).

Zone 1 boundary (green) is approximate and includes the area within the facility boundary.

NO.	DATE	REVISIONS	BY	CHK

DRAWN: PCB	PROJECT NO: 4088097619		
ENGINEER:	SCALE: 1"= 400'		
CHECKED: NAM	APPROVED: WJF		
DATE: 4/2012	DATE: 4/2012		

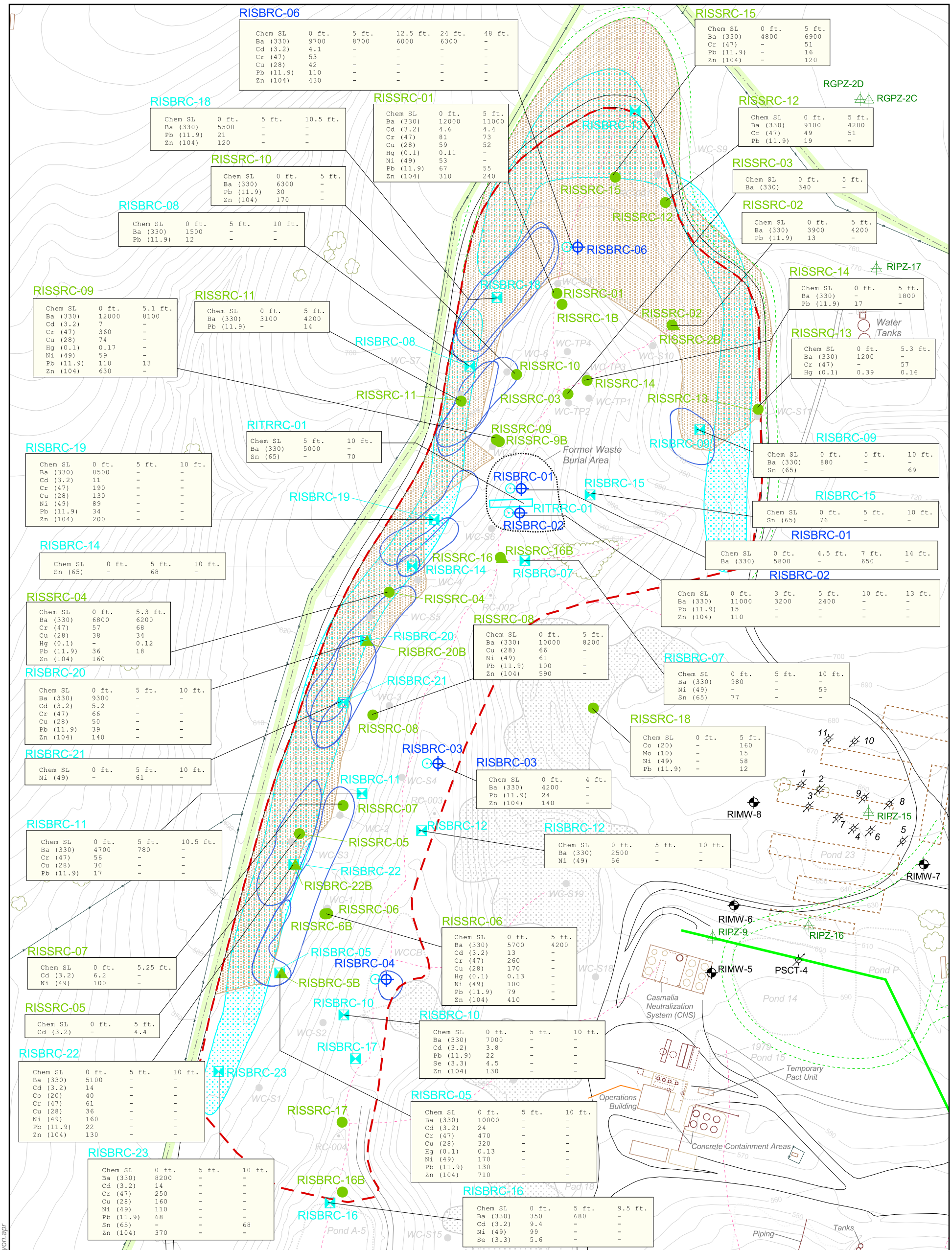
Feasibility Study

Casmalia Resources Superfund Site
Casmalia, California

Selenium Groundwater Concentrations
Lower HSU Zone 1 Area
Remedial Investigation Sampling

FIGURE **A-23**
SHEET: **1** OF **1**
REVISION NUMBER: 0
DATE: August 2014

Plotted: 04-11-2012 11:55 AM By: pfitz@cbcinc.com
Path: T:\Models\4088097619_Casmalia_RI_2\models\ACD\ 4088097619050.dwg



Source: Topographic base map provided by Pacific Engineering, Inc. from aerial survey dated March 4, 2004.

0 180 360
Scale in Feet

All Values in mg/kg

Explanation

Soil Sample Locations

- Surface Soil (Type 2)
- Surface to Shallow Soil (Type 3)
- Surface to Medium Soil (Type 4)
- Surface to Deep Soil - Groundwater and/or Contact if Encountered (Type 6)
- NAPL (Type 7)
- Trench Sample

Other Site Features

- Casmalia Site Boundary
- RCRA Canyon Area Boundary
- Monitoring Well
- Piezometer
- Liquids Extraction Well
- Historical Soil Samples
- Former Injection Well (Surveyed March 25, 1987)
- Perimeter Source Control Trench (Brierly & Lyman, 1989)
- Terraces and Surface Impoundments (Based on 10/06/83 & 07/06/84 Photos)
- Existing Sanitary Sewer Line
- Fence
- Burial Trench Location Woodward Clyde (Figure A21-1-1, 1988)
- Road Remnants
- Historical Natural Drainage (Based on 1956 Photo, 1974 Topographic Maps, and Figures 21-2 and 21-3 Woodward-Clyde, 1988)
- Historical Features
- Oil Field Waste Spreading Area Woodward Clyde (Figure A21-1-1, 1988)
- Oil Field Waste Spreading Area (Based on 1983, 1985/86 Photos)
- 1983 Spray Area

Figure A-23a

Summary Analytical Results
Inorganics Detected Above Screening Levels
RCRA Canyon Area

Feasibility Study

Casmalia Resources Superfund Site

August 2014

T:\CASMALIA\GIS\deliverables\RI_Final_11\AppendixB\rcra_canyon.apr

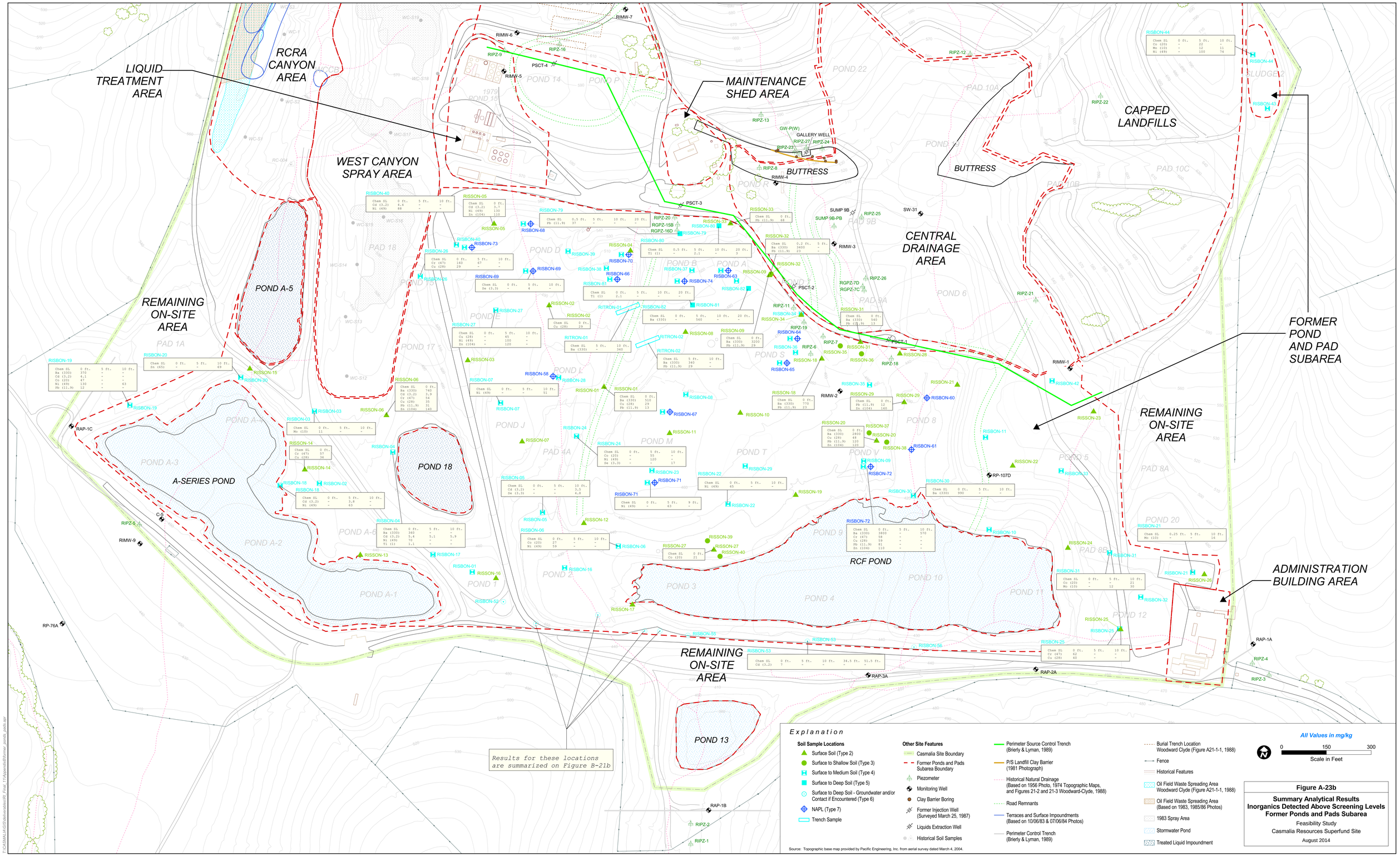


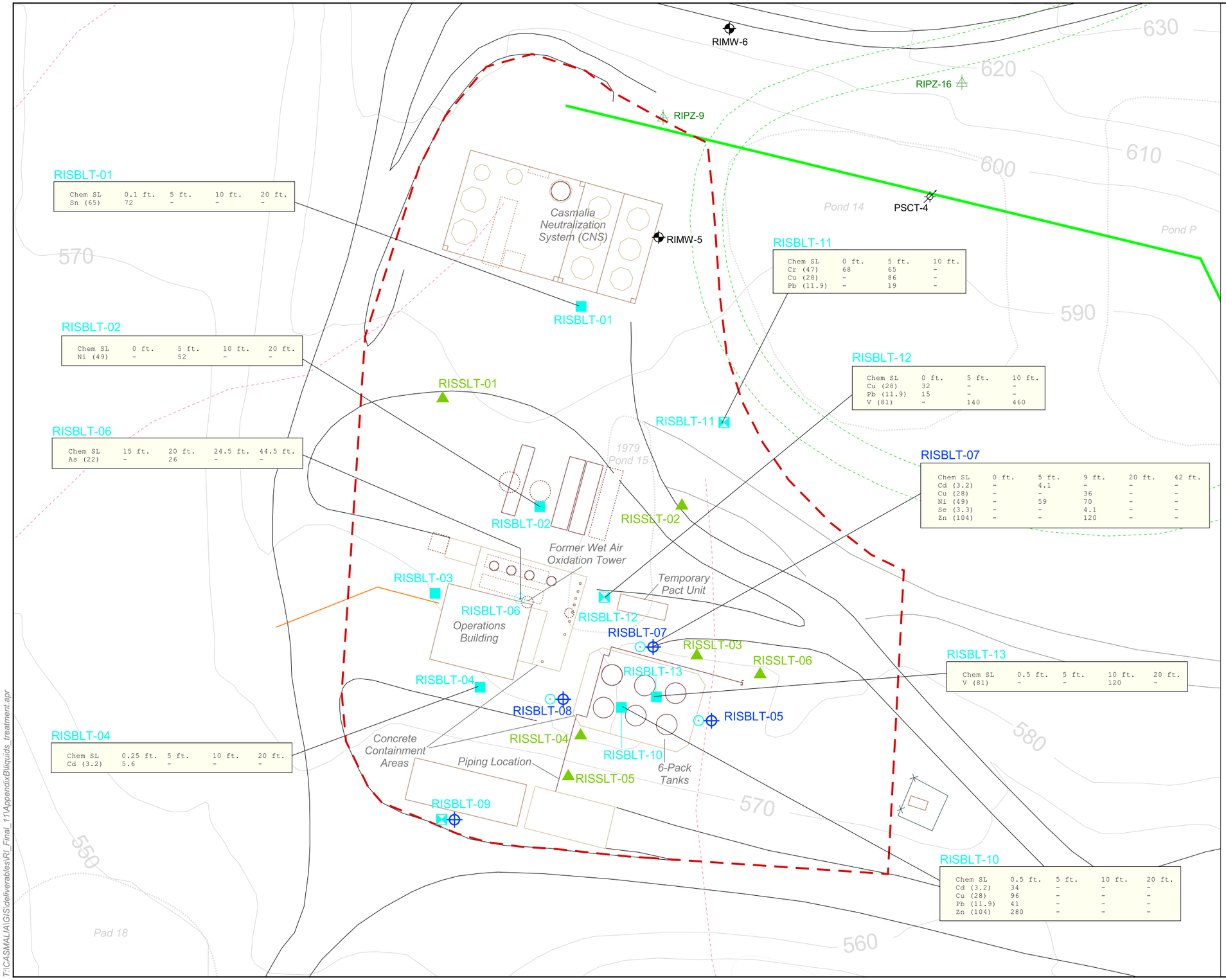
Figure A-23b

Summary Analytical Results Inorganics Detected Above Screening Levels Former Ponds and Pads Subarea

Feasibility Study

Casmalia Resources Superfund Site

August 2014



Explanation

Soil Sample Locations

- Surface Soil (Type 2)
- Surface to Shallow Soil (Type 3)
- Surface to Medium Soil (Type 4)
- Surface to Deep Soil (Type 5)
- Surface to Deep Soil - Groundwater and/or Contact if Encountered (Type 6)
- NAPL (Type 7)

Other Site Features

- Liquids Treatment Area Boundary
- Monitoring Well
- Liquids Extraction Well
- Piezometer
- Perimeter Source Control Trench (Brierly & Lyman, 1989)
- Existing Sanitary Sewer Line
- Historical Natural Drainage (Based on 1956 Photo, 1974 Topographic Maps, and Figures 21-2 and 21-3 Woodward-Clyde, 1988)
- Road Remnants
- Historical Features

Source: Topographic base map provided by Pacific Engineering, Inc. from aerial survey dated March 4, 2004.

0 60 120
Scale in Feet

All Values in mg/kg

Figure A-23c

Summary Analytical Results
Inorganics Detected Above Screening Levels
Liquids Treatment Area

Feasibility Study
Casmalia Resources Superfund Site
August 2014

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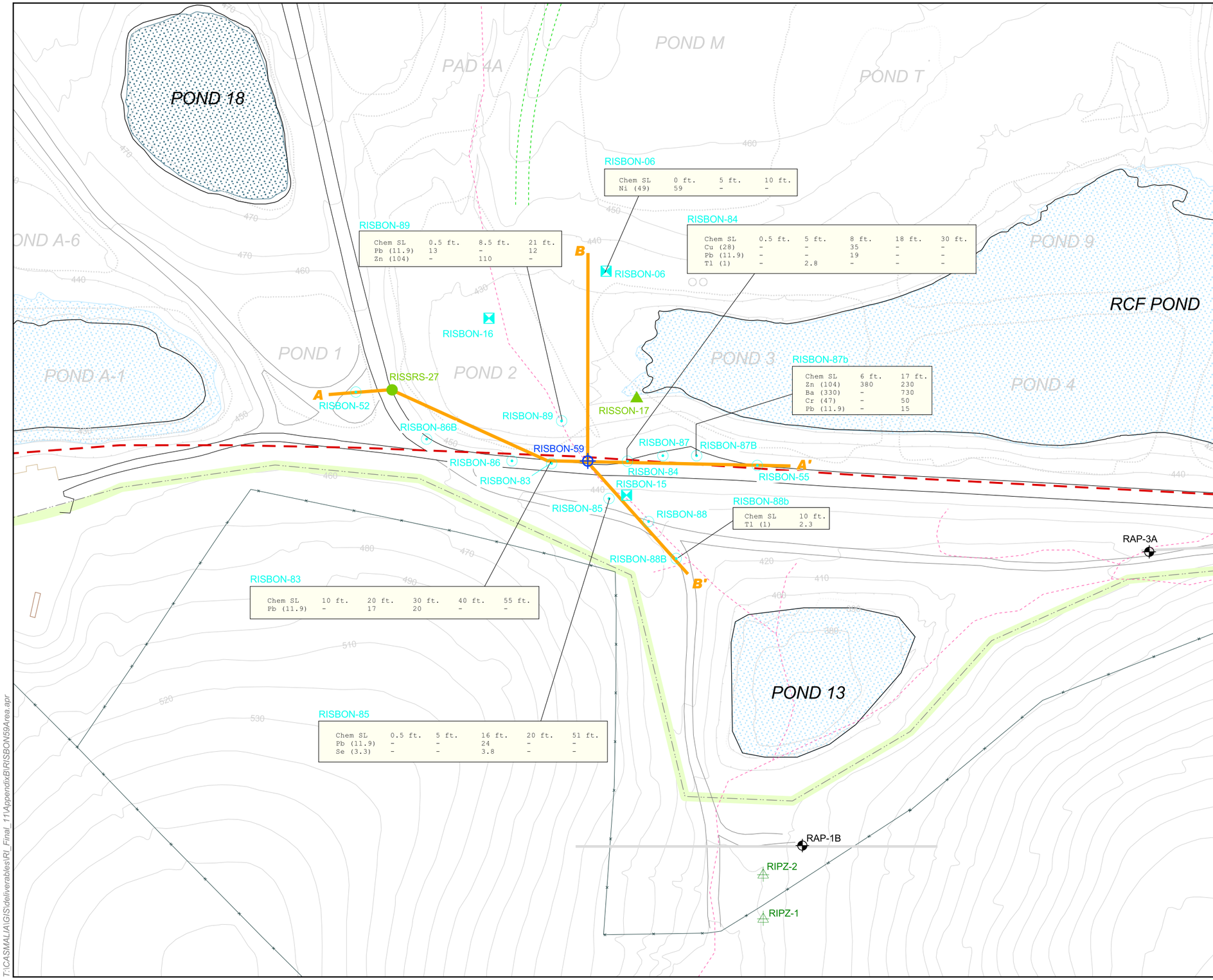

Explanation

Soil Sample Locations

- Surface Soil (Type 2)
- Surface to Shallow Soil (Type 3)
- Surface to Medium Soil (Type 4)
- Surface to Deep Soil - Groundwater and/or Contact if Encountered (Type 6)
- NAPL (Type 7)

Other Site Features

- Casmalia Site Boundary
- Study Area Boundary
- Cross Section Line
- Piezometer
- Monitoring Well
- Perimeter Control Trench (Brierly & Lyman, 1989)
- Fence
- Road Remnants
- Historical Natural Drainage (Based on 1956 Photo, 1974 Topographic Maps, and Figures 21-2 and 21-3 Woodward-Clyde, 1988)
- Historical Features
- Stormwater Pond
- Treated Liquid Impoundment

Source: Topographic base map provided by Pacific Engineering, Inc. from aerial survey dated March 4, 2004.

0 150 300

Scale in Feet

All Values in mg/kg

Figure A-23d

Summary Analytical Results
Inorganics Detected Above Screening Levels
RISBON-59 Area

Feasibility Study

Casmalia Resources Superfund Site

August 2014

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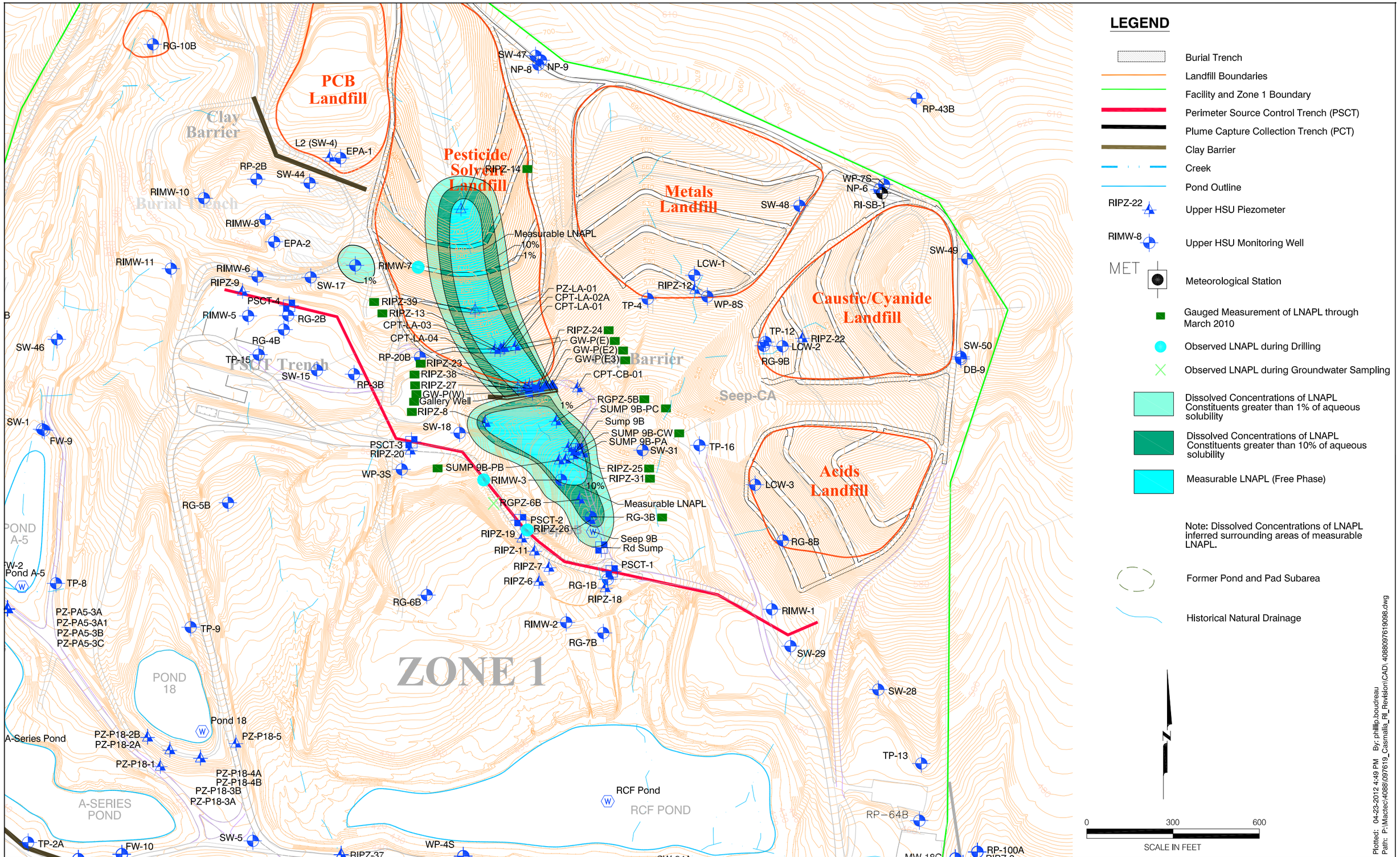

NO.	DATE	REVISIONS	BY	CHK

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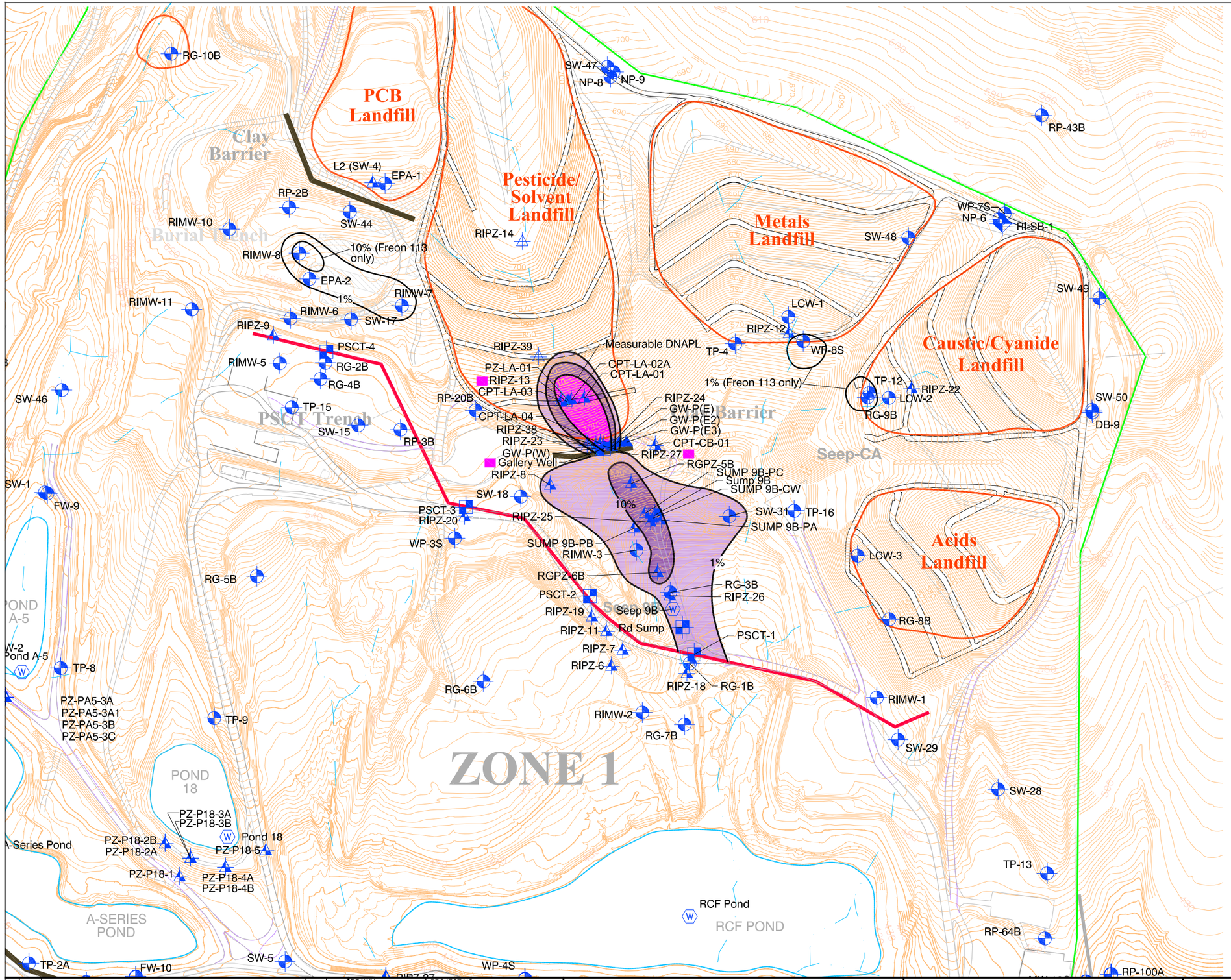
ENGINEER:		SCALE:	1"=400'
CHECKED:	NAM	APPROVED:	WJF
DATE:	4/2012	DATE:	4/2012

Feasibility Study

Casmalia Resources Superfund Site
Casmalia, California

LNAPL in Upper HSU Observed or Inferred from Groundwater Concentrations Fall 2004 and Spring 2005 RI Sampling

PLATE: **A-24**
SHEET: 1 OF 1
REVISION NUMBER: 0
DATE: August 2014



LEGEND

- Burial Trench
- Landfill Boundaries
- Facility and Zone 1 Boundary
- Perimeter Source Control Trench (PSCT)
- Plume Capture Collection Trench (PCT)
- Clay Barrier
- Creek
- Pond Outline
- RIPZ-22 — Upper HSU Piezometer
- RIMW-8 — Upper HSU Monitoring Well
- MET — Meteorological Station
- Gauged Measurement of DNAPL through March 2010
- Dissolved Concentrations of DNAPL Constituents greater than 1% of aqueous solubility
- Dissolved Concentrations of DNAPL Constituents greater than 10% of aqueous solubility
- Measurable DNAPL (Free Phase)
- Dissolved Concentrations of Freon 113 greater than 1% and 10% of aqueous solubility

Note: Dissolved concentrations of DNAPL inferred surrounding areas of measurable DNAPL.

- Former Pond and Pad Subarea
- Historical Natural Drainage

0 300 600
SCALE IN FEET

Plotted: 04-24-2012 9:30 AM By: phillip.boudreau
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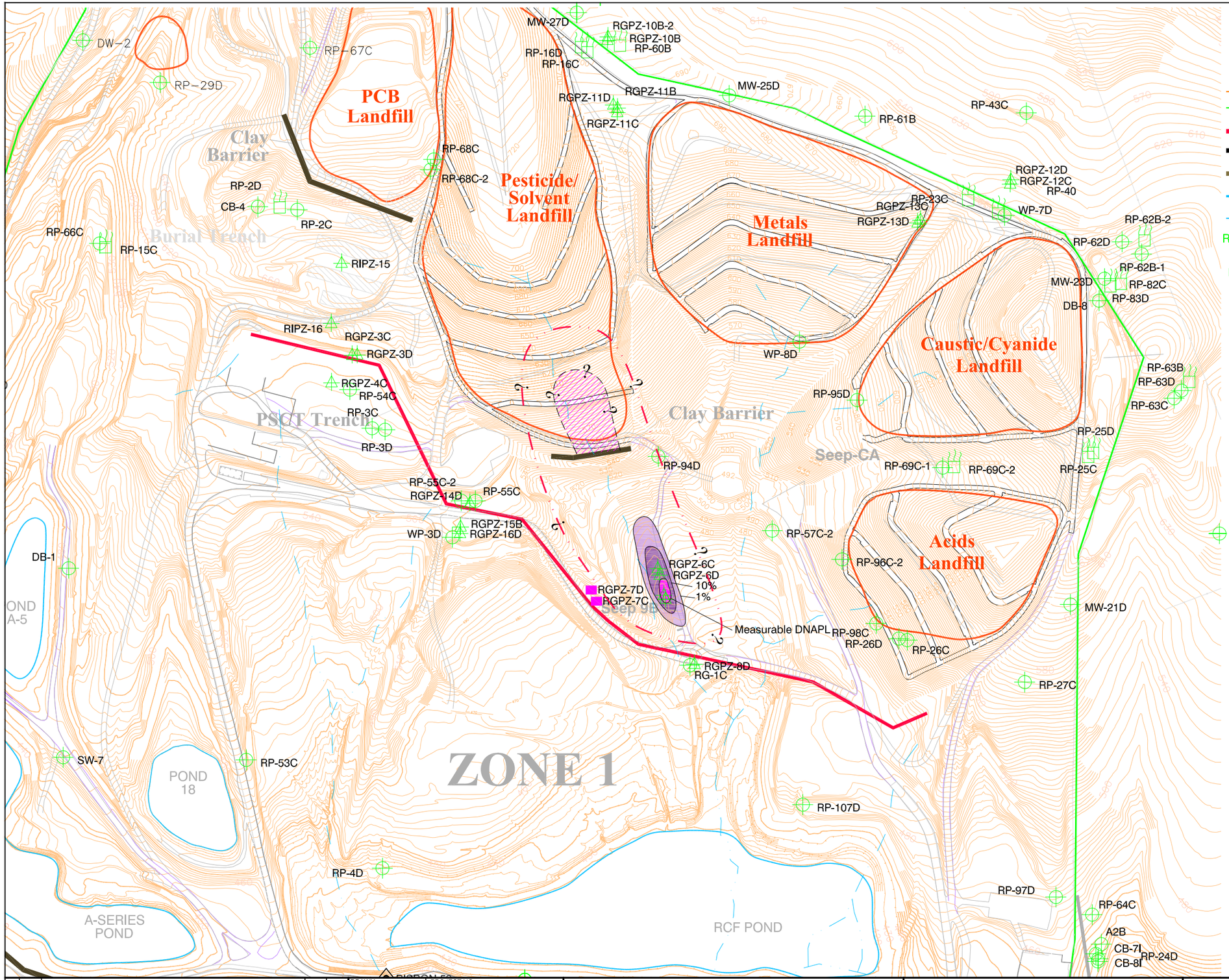
NO.	DATE	REVISIONS	BY	CHK

DRAWN:	PCB	PROJECT NO:	4088097619
ENGINEER:		SCALE:	1"=400'
CHECKED:	NAM	APPROVED:	WJF
DATE:	4/2012	DATE:	4/2012

Feasibility Study
Casmalia Resources Superfund Site
Casmalia, California

DNAPL in Upper HSU Observed or Inferred from Groundwater Concentrations Fall 2004 and Spring 2005 RI Sampling

PLATE: **A-25**
SHEET: 1 OF 1
REVISION NUMBER: 0
DATE: August 2014



LEGEND

- Burial Trench
- Landfill Boundaries
- Facility and Zone 1 Boundary
- Perimeter Source Control Trench (PSCT)
- Plume Capture Collection Trench (PCT)
- Clay Barrier
- Creek
- Pond Outline
- RGPZ-15B — Lower HSU Piezometer
- RP-63C — Lower HSU Monitoring Well
- MET — Meteorological Station
- Gauged Measurement of DNAPL through March 2010
- Dissolved Concentrations of DNAPL Constituents greater than 1% of aqueous solubility
- Dissolved Concentrations of DNAPL Constituents greater than 10% of aqueous solubility
- Measurable DNAPL (free phase)
- Presence of DNAPL inferred by DNAPL at Landfill/Lower HSU contact
- Potential DNAPL Zone. Horizontal and Vertical extent uncertain.
- Former Pond and Pad Subarea
- Historical Natural Drainage

Plotted: 04-24-2012 8:52 AM By: philip.boudreau
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NO.	DATE	REVISIONS	BY	CHK

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ENGINEER:	SCALE: 1"=400'
CHECKED: NAM	APPROVED: WJF
DATE: 4/2012	DATE: 4/2012

Feasibility Study
Casmalia Resources Superfund Site
Casmalia, California

DNAPL in Lower HSU Observed or Inferred from Groundwater Concentrations Fall 2004 and Spring 2005 RI Sampling

PLATE: **A-26**
SHEET: 1 OF 1
REVISION NUMBER: 0
DATE: August 2014

T/Ladd/Casmalia/FS Report1-11/0111-11A

LEGEND

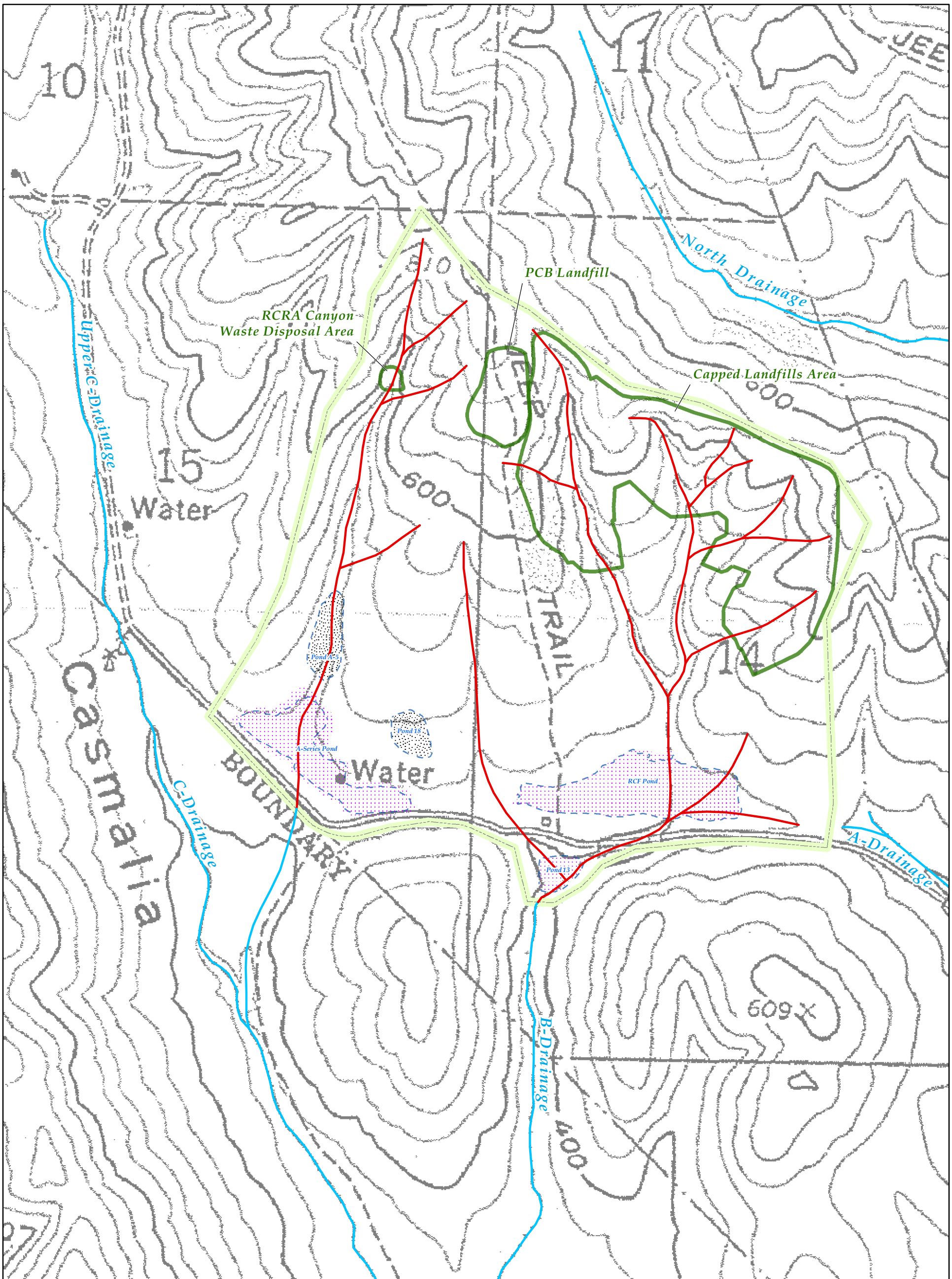
- Direct Discharge
- Acid/Alkaline Wastes
- Oil Field Wastes
- Truck Washout
- Landfill Runoff, Leachate Control
- Runoff, Evaporation, Storage
- Sewer and Grease Trap Sludge (Non-RCRA)
- Wastewater From Stringfellow Site ("RCRA Liquids")
- Treatment System/WAO Effluent, Runoff
- Aerated Ponds
- SI-1 Surface Impoundment Unit Designation

Note: The following single ponds were also noted as Individual "SI" Units: A, B, C, D, M, P, R, S, T, V, 14, 16, and 23.

Figure A-27

Primary Pond/Pad Uses

Feasibility Study
Casmalia Resources Superfund Site
August 2014



Explanation

Historical (1959) Features

- Off-Site Drainage
- On-Site Drainage

Current (2009) Features

- Casmalia Site Boundary
- Landfill Limits
- Approximate Pond Waterline
- Approximate Location of Stormwater Pond
- Approximate Location of Treated Liquid Impoundment

0 600 1,200

Scale in Feet (1 " = 600 ft)

Figure A-28

1959 Site Drainage

Feasibility Study

Casmalia Resources Superfund Site

August 2014

Source: Topographic base map provided by Pacific Engineering, Inc. from aerial survey dated March 4, 2004.

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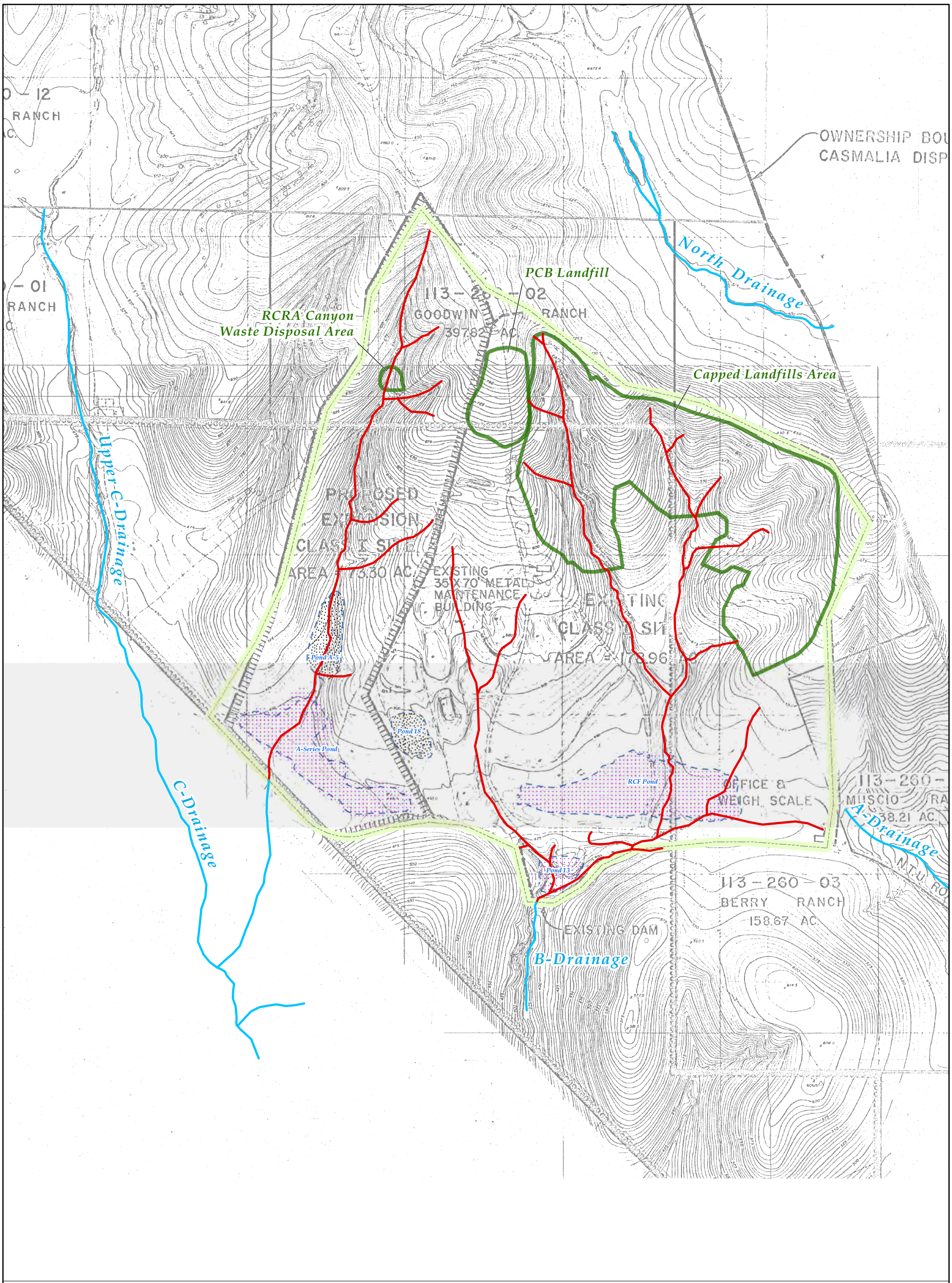


Explanation

Historical (1974) Features

- Off-Site Drainage
- On-Site Drainage

Current (2009) Features

- Casmalia Site Boundary
- Landfill Limits
- Approximate Pond Waterline
- Approximate Location of Stormwater Pond
- Approximate Location of Treated Liquid Impoundment

0 600 1,200

Scale in Feet (1 " = 600 ft)

Source: Topographic base map provided by Pacific Engineering, Inc. from aerial survey dated March 4, 2004.

Figure A-29

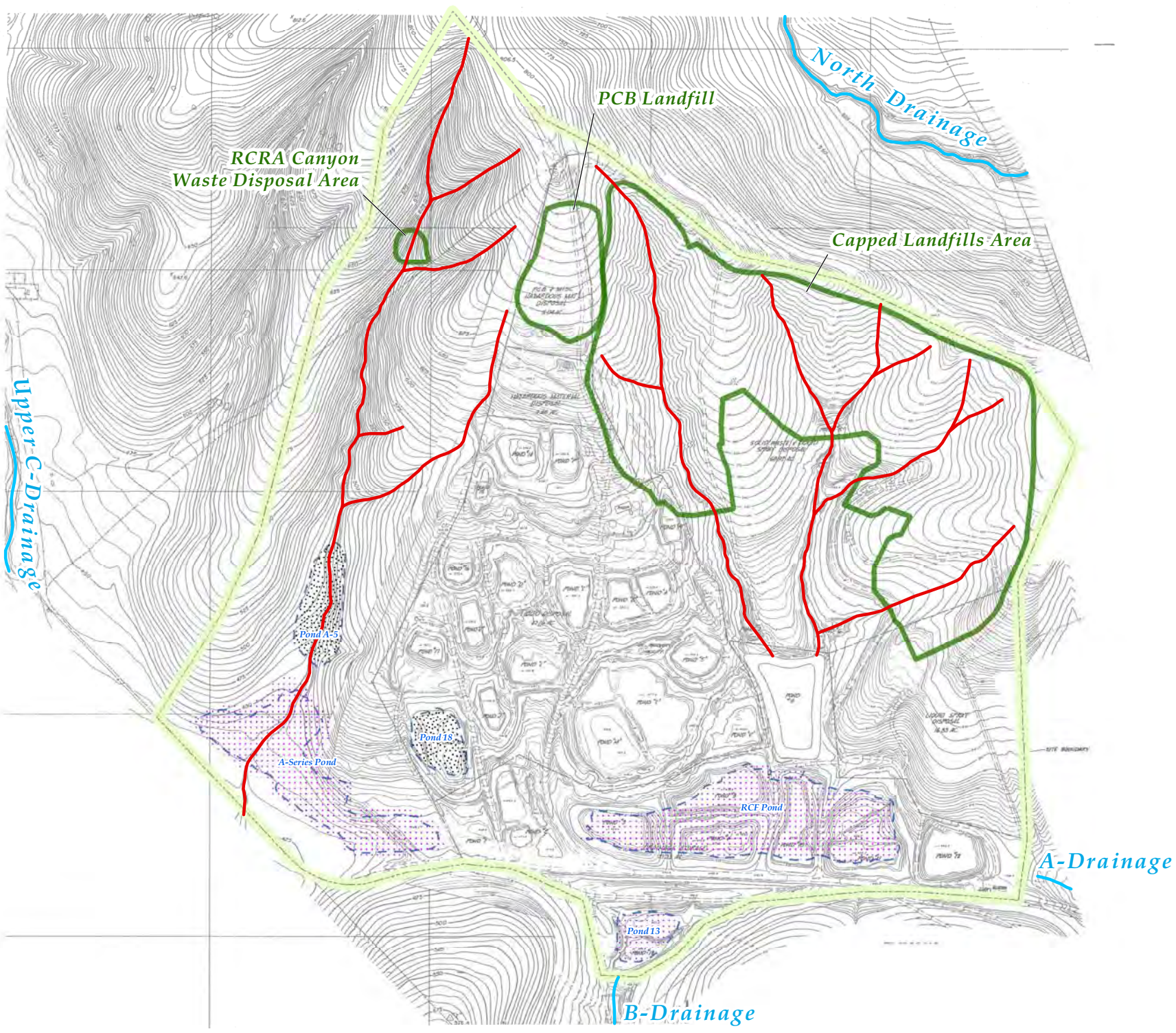
1974 Site Drainage

Feasibility Study

Casmalia Resources Superfund Site

August 2014

T:\CASMALIA\GIS\deliverables\RI_Final_11\Figure4-2_1974SiteDrainage.mxd



Explanation

Historical (1979) Features

- Off-Site Drainage
- On-Site Drainage

Current (2009) Features

- Casmalia Site Boundary
- Landfill Limits
- Approximate Pond Waterline
- Approximate Location of Stormwater Pond
- Approximate Location of Treated Liquid Impoundment

0 600 1,200

Scale in Feet (1 " = 600 ft)

Figure A-30

1979 Site Drainage

Feasibility Study

Casmalia Resources Superfund Site

August 2014

Source: Topographic base map provided by Pacific Engineering, Inc. from aerial survey dated March 4, 2004.

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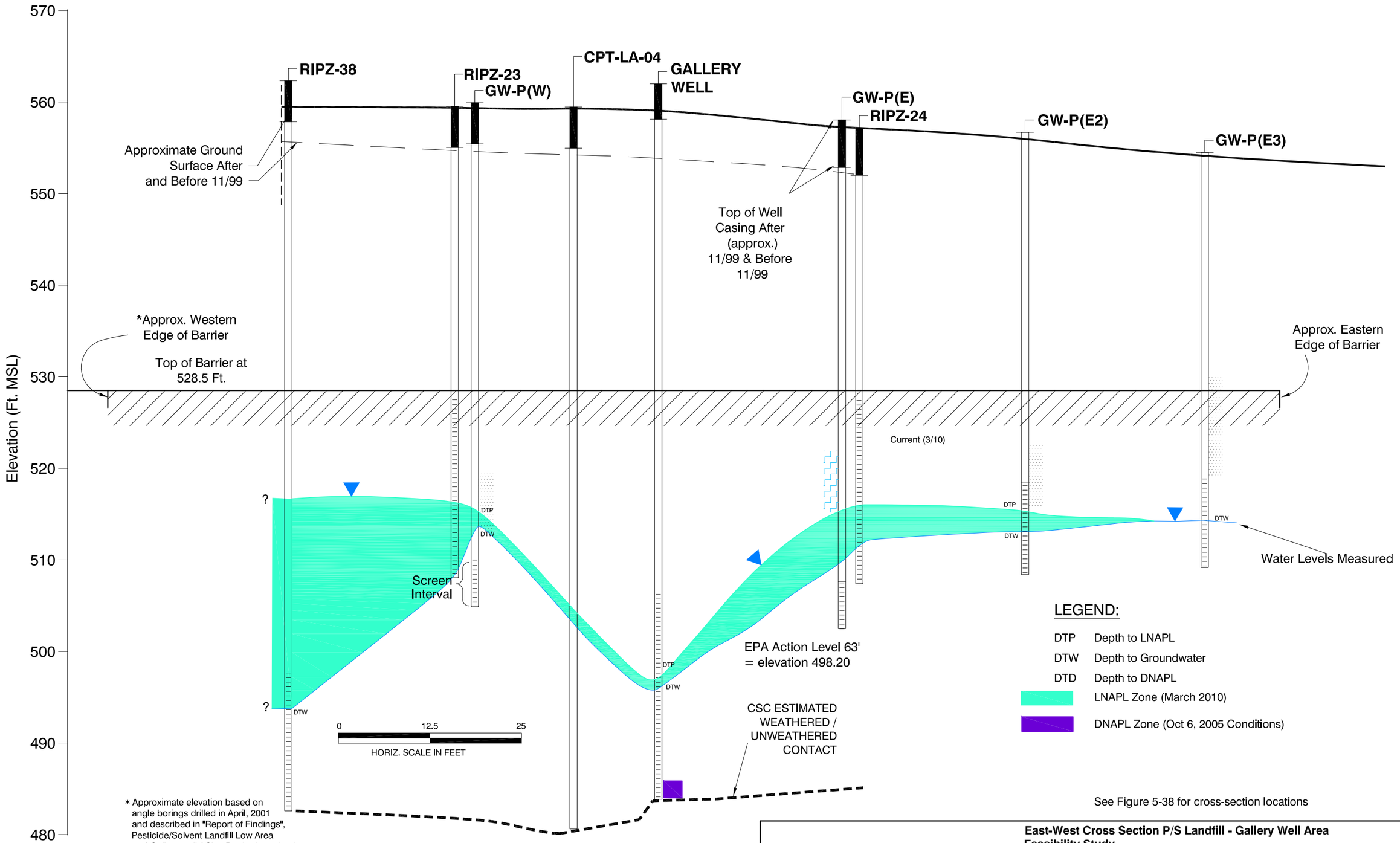

* Approximate elevation based on angle borings drilled in April, 2001 and described in "Report of Findings", Pesticide/Solvent Landfill Low Area and Gallery well / Clay Barrier Investigation (Harding ESE, July 31, 2001). Uncertainty still remains regarding the exact location of the Clay Barrier.

Plotted: 01-17-2011 11:36 AM By: pcboudreau
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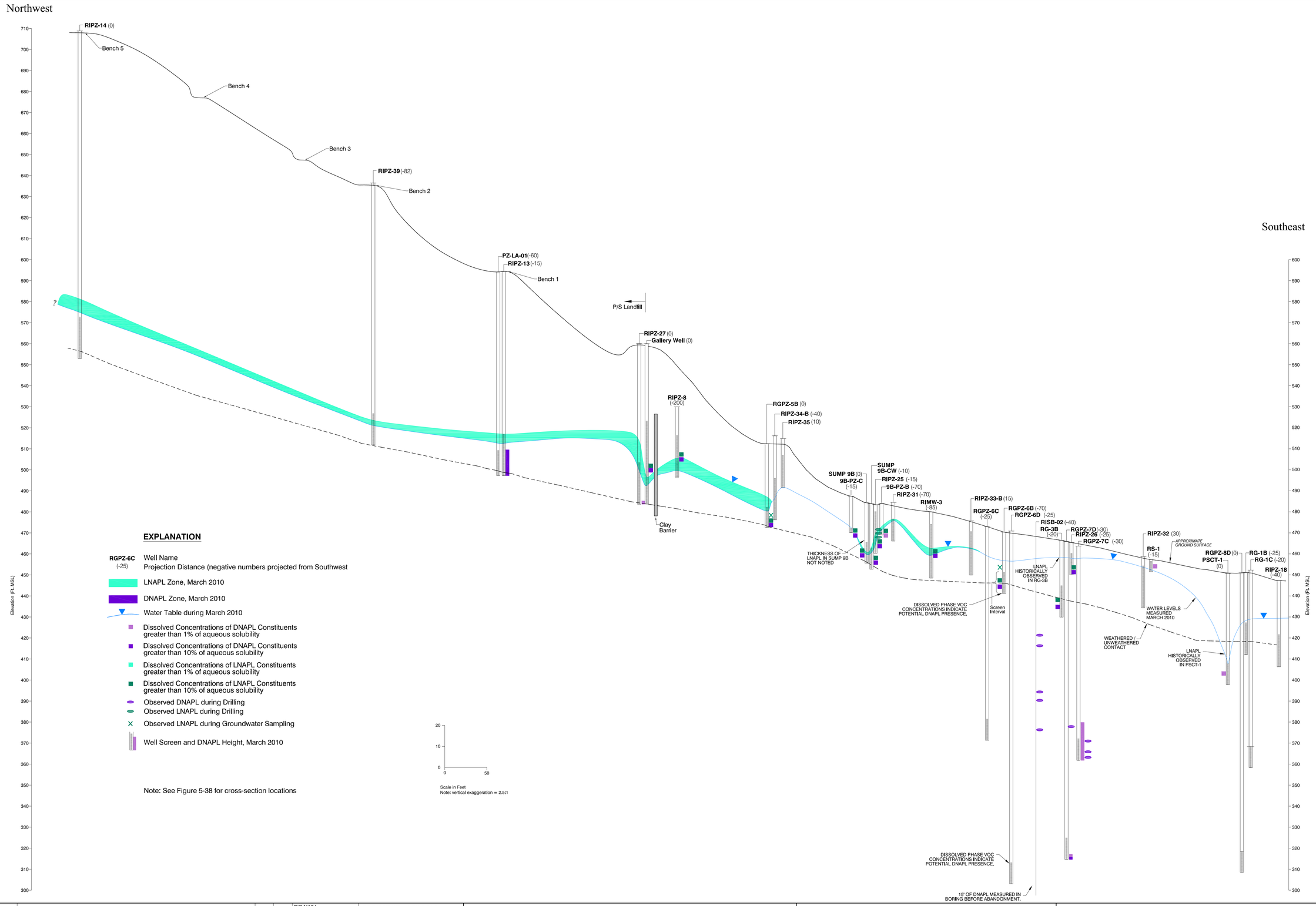
East-West Cross Section P/S Landfill - Gallery Well Area
Feasibility Study
Casmalia Resources Superfund Site
Casmalia, California

FIGURE
A-31

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
PCB	4088097619	NAM	8/2014	



NO.	DATE	REVISIONS	BY	CHK

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ENGINEER:	SCALE: 1"= 400'		
CHECKED: NAM	APPROVED: WJF		
DATE: 1/2011	DATE: 1/2011		

Feasibility Study

Casmalia Resources Superfund Site
Casmalia, California

North-South Cross-Section
P/S Landfill and Central Drainage Area

FIGURE **A-32**
SHEET: **1** OF **1**
REVISION NUMBER: 0
DATE: August 2014

Plotted: 01-17-2011 11:25 AM By: pcboucher
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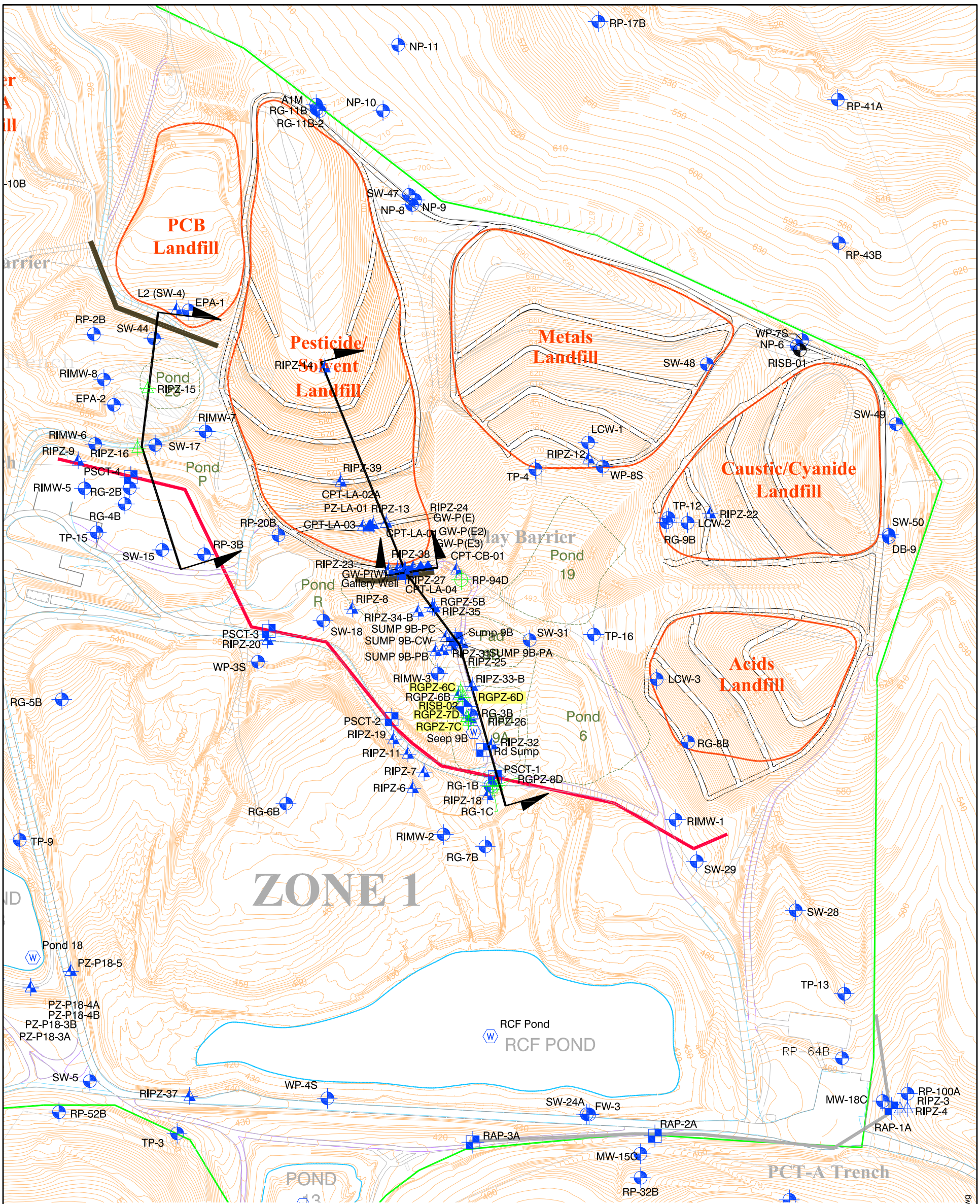

LEGEND

- Burial trench
- Landfill Boundaries
- Facility and Zone 1 Boundary
- Perimeter Source Control Trench (PSCT)
- Plume Capture Collection Trench (PCT)
- Clay Barrier
- Creek
- Pond Outline
- MW-15C — Upper HSU Monitoring Well
- RAP-2A — Upper HSU Extraction Point
- POND18 — Upper HSU Surface Water Sample
- L2 (SW-4) — Piezometer
- MET — Meteorological Station
- RGPZ-6C — DNAPL Observed in fractures

Cross-Section

N

0 300 600

SCALE IN FEET

Plotted: 01-17-2011 10:39 AM By: pcboudreau
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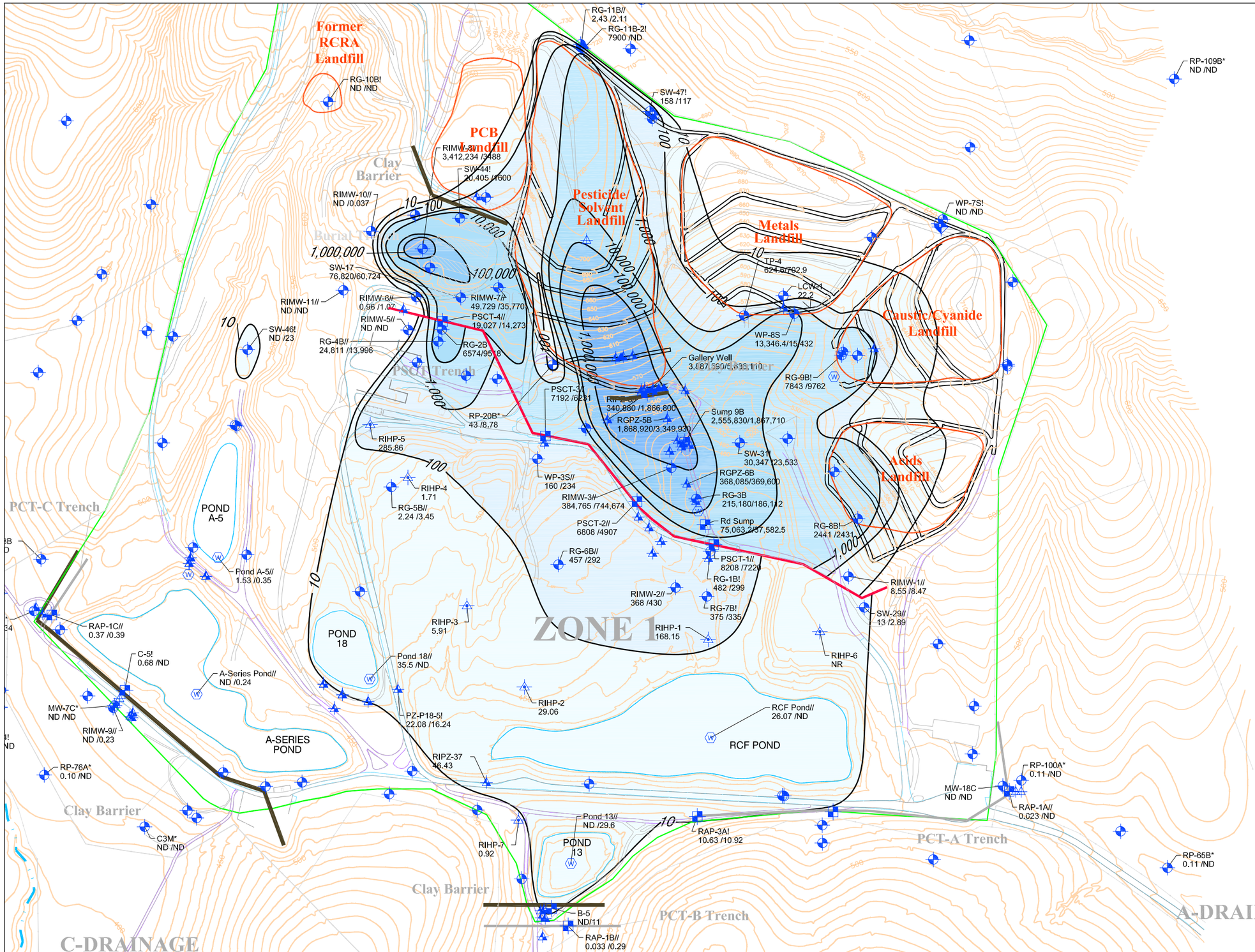
NAPL Cross-Section and Boring Location Map
Feasibility Study
Casmalia Resources Superfund Site
Casmalia, California

PLATE

A-33

DRAWN	JOB NUMBER	CHECKED	CHECKED DATE	APPROVED	APPROVED DATE
PCB	4088097619	NAM	4/2012	WJF	8/2014



LEGEND

- Burial Trench
- Landfill Boundaries
- Perimeter Source Control Trench (PSCT)
- Plume Capture Collection Trench (PCT)
- Facility and Zone 1 Boundary
- Clay Barrier
- Creek
- Pond Outline
- MW-15C — Upper HSU Monitoring Well
- RAP-2A — Upper HSU Extraction Point
- POND18 — Upper HSU Surface Water Sample
- L2 (SW-4) — Upper HSU Piezometer
- RIHP-1 — Upper HSU Hydropunch
- MET — Meteorological Station
- Total VOC 10 µg/L
- Total VOC 100 µg/L
- Total VOC 1000 µg/L
- Total VOC 10000 µg/L
- Total VOC 100000 µg/L
- Total VOC 1000000 µg/L

PSCT-2
215/285

Spring 2005 value
Fall 2004 value (µg/L)

* = Pre-RI Results, Fall 1999 and Summer 2000
\+ = Pre-RI Results, Winter 1999
\# = Pre-RI Results, Spring 1999 and Summer 2000
$ = RI Results, Fall 2006
< = Phase II Results, Winter 2007
? = RI Results, Spring 2005 and 2006
! = Semi-Annual Results, Spring 2007 and 2008
// = Semi-Annual Results, Spring and Fall 2008

The widths of the clay barriers, PSCT, and PCT trenches are exaggerated for presentation purposes.

ND Not detected, but sampled and analyzed
NS Not sampled

Wells that do not have symbols were sampled during the RI Sampling events of Fall 2004 and Spring 2005.

N

0 400 800
SCALE IN FEET

4088097619121.DWG 40.0
20110121.1558

NO.	DATE	REVISIONS	BY	CHK

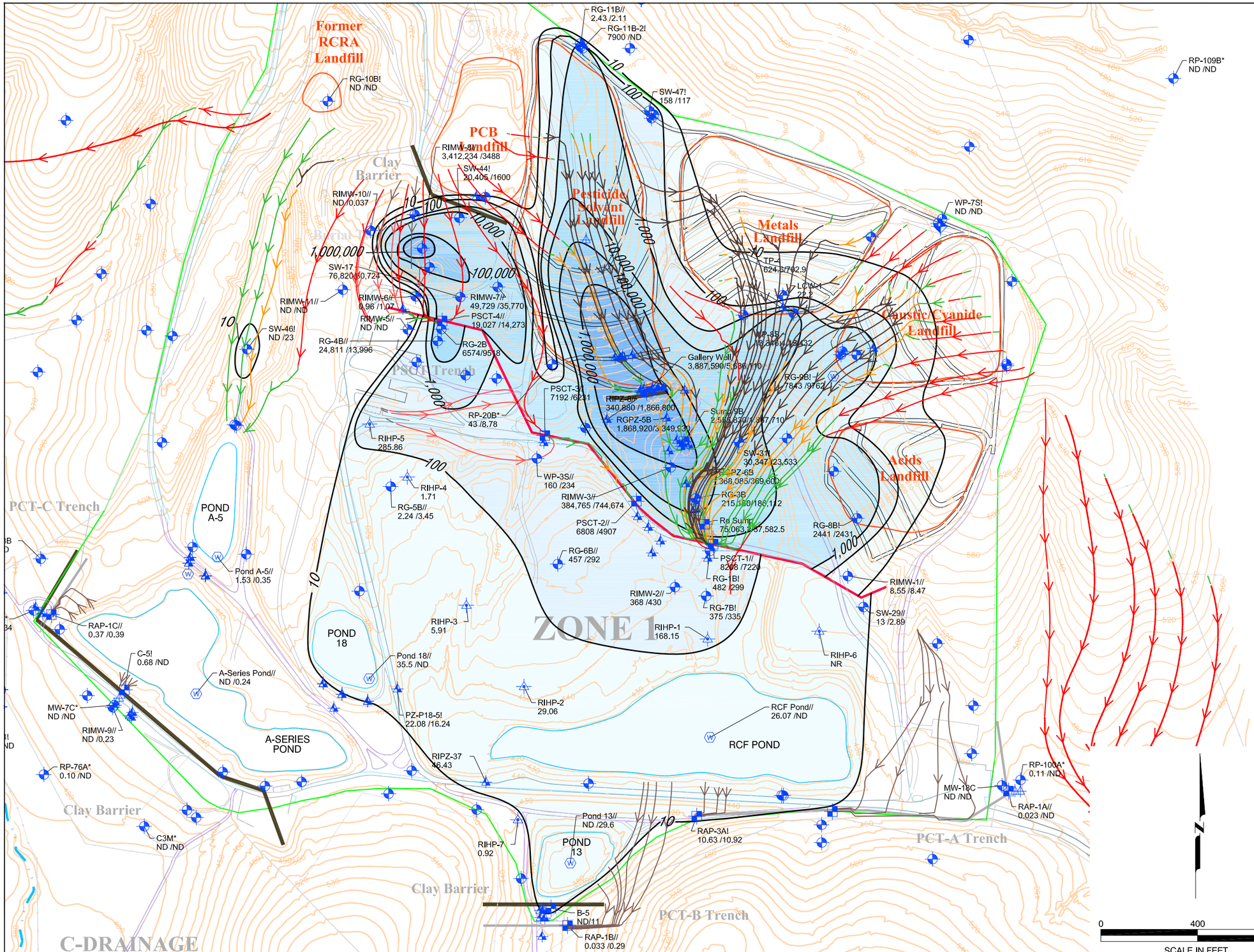
DRAWN:	LNC	PROJECT NO:	4088097619
ENGINEER:		SCALE:	1"=400'
CHECKED:	NAM	APPROVED:	WJF
DATE:	1/2011	DATE:	1/2011

Feasibility Study

Casmalia Resources Superfund Site
Casmalia, California

VOC-GW/Particle Flow Map
Upper HSU, 2004 (Dry)

PLATE: **A-34**
SHEET: 1 OF 1
REVISION NUMBER: 0
DATE: August 2014



LEGEND

- Burial Trench
- Landfill Boundaries
- Facility and Zone 1 Boundary
- Plume Capture Collection Trench (PCT)
- Perimeter Source Control Trench (PSCT)
- Clay Barrier
- Creek
- Pond Outline
- Particle Path Lines (Layer 1)
- Particle Path Lines (Layer 2)
- Particle Path Lines (Layer 3)
- Particle Path Lines (Layer 4)
- MW-15C — Upper HSU Monitoring Well
- RAP-2A — Upper HSU Extraction Point
- POND18 — Upper HSU Surface Water Sample
- L2 (SW-4) — Upper HSU Piezometer
- RIHP-1 — Upper HSU Hydropunch
- MET — Meteorological Station
- Total VOC 10 µg/L
- Total VOC 100 µg/L
- Total VOC 1000 µg/L
- Total VOC 10000 µg/L
- Total VOC 100000 µg/L
- Total VOC 1000000 µg/L

PSCT-2 215/285
- Spring 2005 value
- Fall 2004 value (µg/L)

* = Pre-RI Results, Fall 1999 and Summer 2000
! = Semi-Annual Results, Spring 2007 and 2008
// = Semi-Annual Results, Spring and Fall 2008

The widths of the clay barriers, PSCT, and PCT trenches are exaggerated for presentation purposes.

ND Not detected, but sampled and analyzed
NR No recovery

Wells that do not have symbols were sampled during the RI Sampling events of Fall 2004 and Spring 2005.

0 400 800
SCALE IN FEET

Plotted: 04-24-2012 8:33 AM By: phillip.boudreau
Path: P:\Maclec\4088\097619_Casmalia_RI Revision\CAD\ 4088097619122.dwg

NO.	DATE	REVISIONS	BY	CHK

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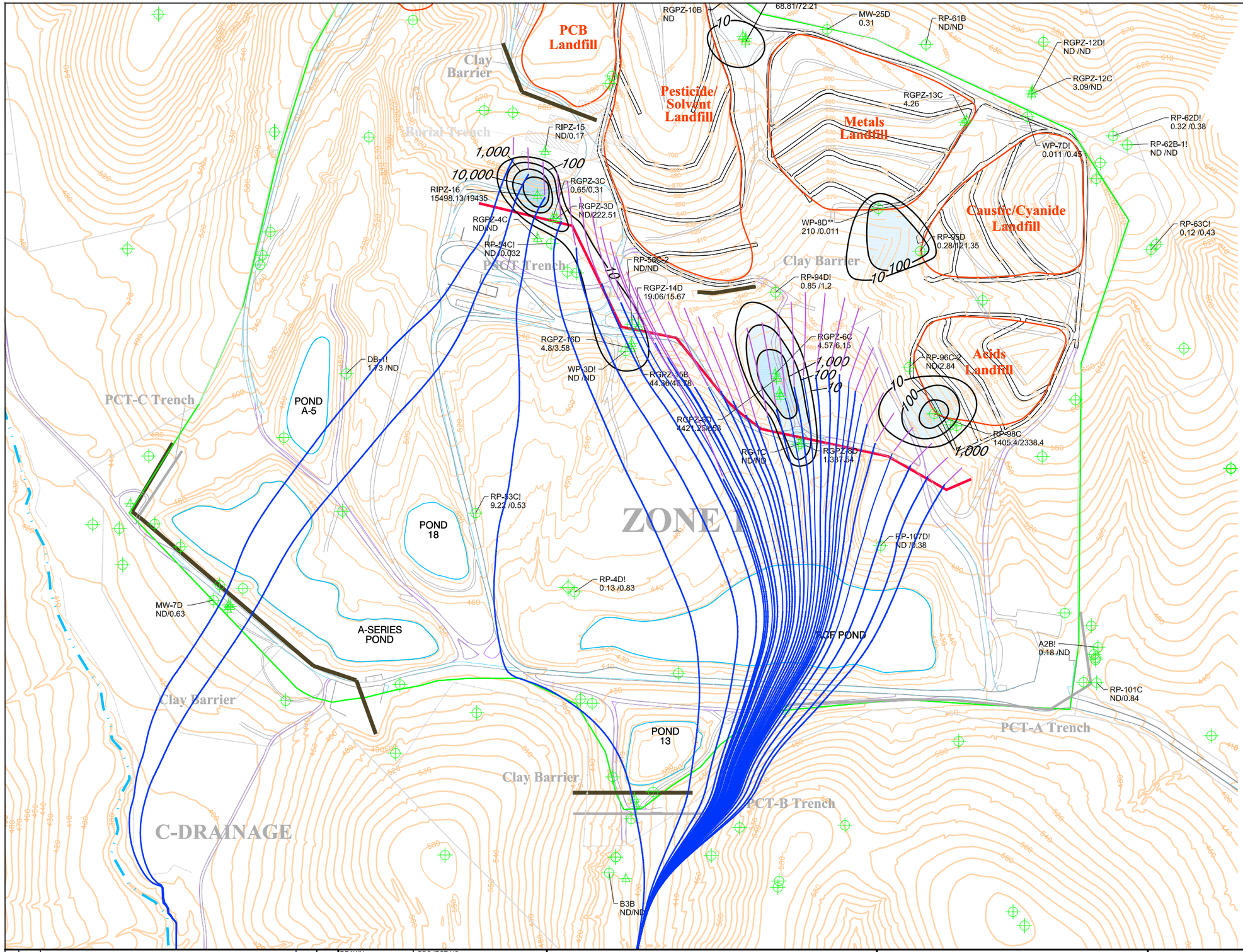
ENGINEER:	SCALE: 1"=400'		
CHECKED: NAM	APPROVED: WJF		
DATE: 4/2012	DATE: 4/2012		

Feasibility Study
Casmalia Resources Superfund Site
Casmalia, California

VOC-GW/Particle Flow Map
Upper HSU, 2001 (Wet)

PLATE: **A-35**
SHEET: 1 OF 1
REVISION NUMBER: 0
DATE: August 2014



LEGEND

- Burial Trench
- Landfill Boundaries
  - Facility and Zone 1 Boundary
  - Plume Capture Collection Trench (PCT)
  - Perimeter Source Control Trench (PSCT)
  - Clay Barrier
- Creek
- Pond Outline
- Particle Path Lines (Layer 6)
- Particle Path Lines (Layer 7)
- RP-63C — Lower HSU Monitoring Well
- CT-1C — Lower HSU Piezometer
- MET — Meteorological Station
- Total VOC 10 µg/L
- Total VOC 100 µg/L
- Total VOC 1000 µg/L
- Total VOC 10000 µg/L

RGPZ-16D
3/4.3

- Spring 2005 value
- Fall 2004 value (µg/L)

! = Semi-Annual Results, Spring 2007 and 2008
** = RI Results, Spring 2006 and 2007

The widths of the clay barriers, PSCT, and PCT trenches are exaggerated for presentation purposes.

ND Not detected, but sampled and analyzed

Wells that do not have symbols were sampled during the RI Sampling events of Fall 2004 and Spring 2005.

N

0 400 800
SCALE IN FEET

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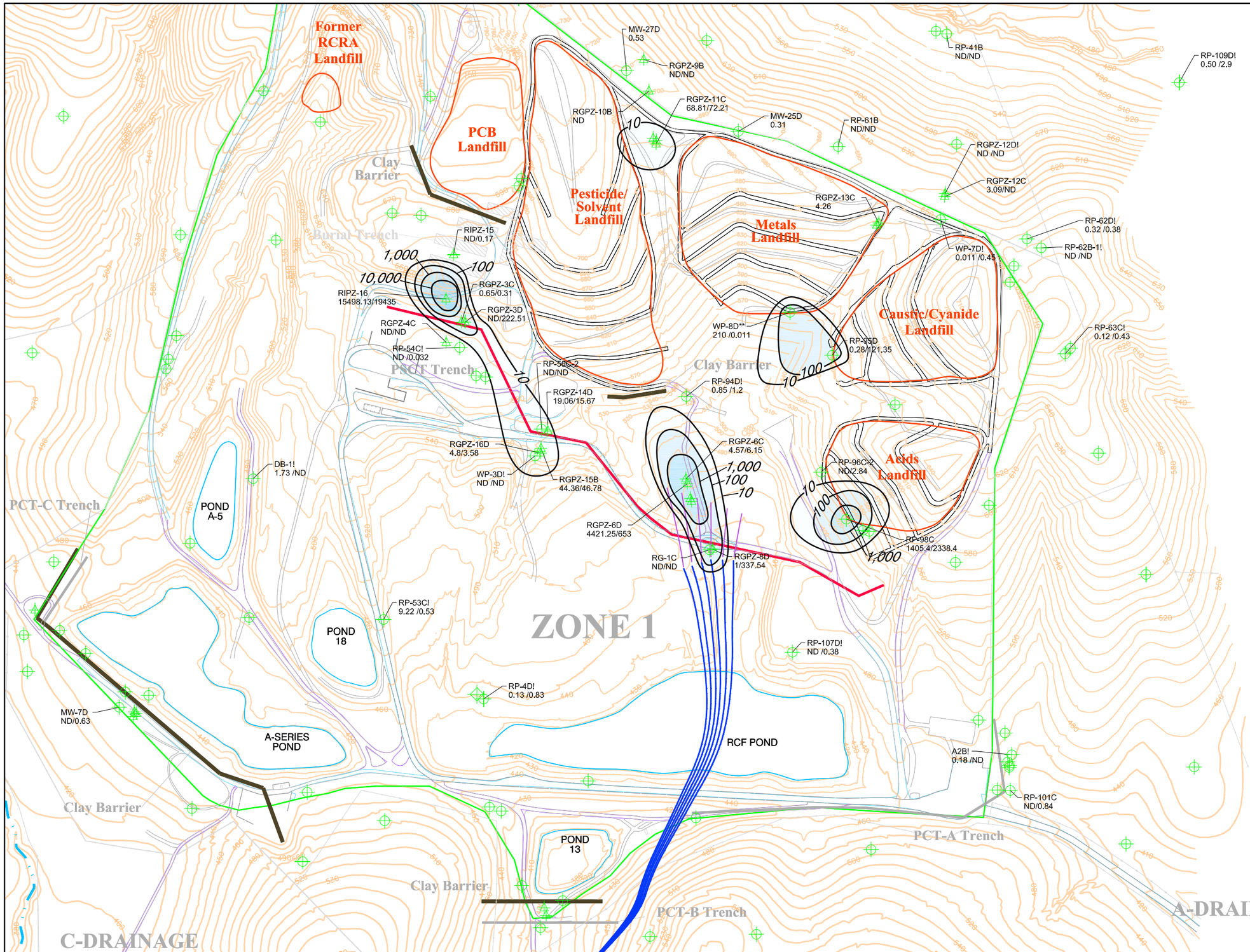
CHECKED: NAM	APPROVED: WJF
DATE: 4/2012	DATE: 4/2012

Feasiblity Study

Casmalia Resources Superfund Site
Casmalia, California

VOC-GW/Particle Flow Map
Lower HSU, 2004 (Dry)
Between PCB Landfill and PSCT-4

FIGURE: A-36
SHEET: 1 OF 1
REVISION NUMBER: 0
DATE: August 2014



LEGEND

- Burial Trench
- Landfill Boundaries
- Facility and Zone 1 Boundary
- Plume Capture Collection Trench (PCT)
- Perimeter Source Control Trench (PSCT)
- Clay Barrier
- Creek
- Pond Outline
- Particle Path Lines (Layer 6)
- Particle Path Lines (Layer 7)
- RP-63C — Lower HSU Monitoring Well
- CT-1C — Lower HSU Piezometer
- MET — Meteorological Station
- Total VOC 10 µg/L
- Total VOC 100 µg/L
- Total VOC 1000 µg/L
- Total VOC 10000 µg/L
- RGPZ-16D 3/4.3 — Spring 2005 value; Fall 2004 value (µg/L)
- ! = Semi-Annual Results, Spring 2007 and 2008

The widths of the clay barriers, PSCT, and PCT trenches are exaggerated for presentation purposes.

ND Not detected, but sampled and analyzed

Wells that do not have symbols were sampled during the RI Sampling events of Fall 2004 and Spring 2005.

N

0 400 800
SCALE IN FEET

Plotted: 04-24-2012 8:43 AM By: phillip.boudreau
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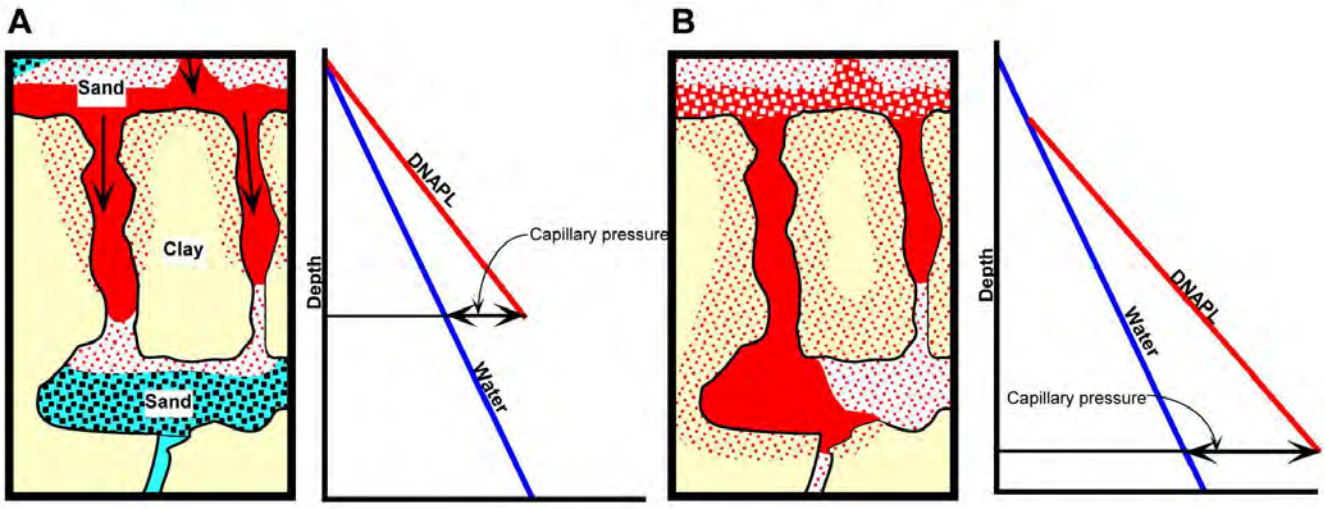
ENGINEER:		SCALE:	1"=400'
CHECKED:	NAM	APPROVED:	WJF
DATE:	4/2012	DATE:	4/2012

Feasibility Study

Casmalia Resources Superfund Site
Casmalia, California

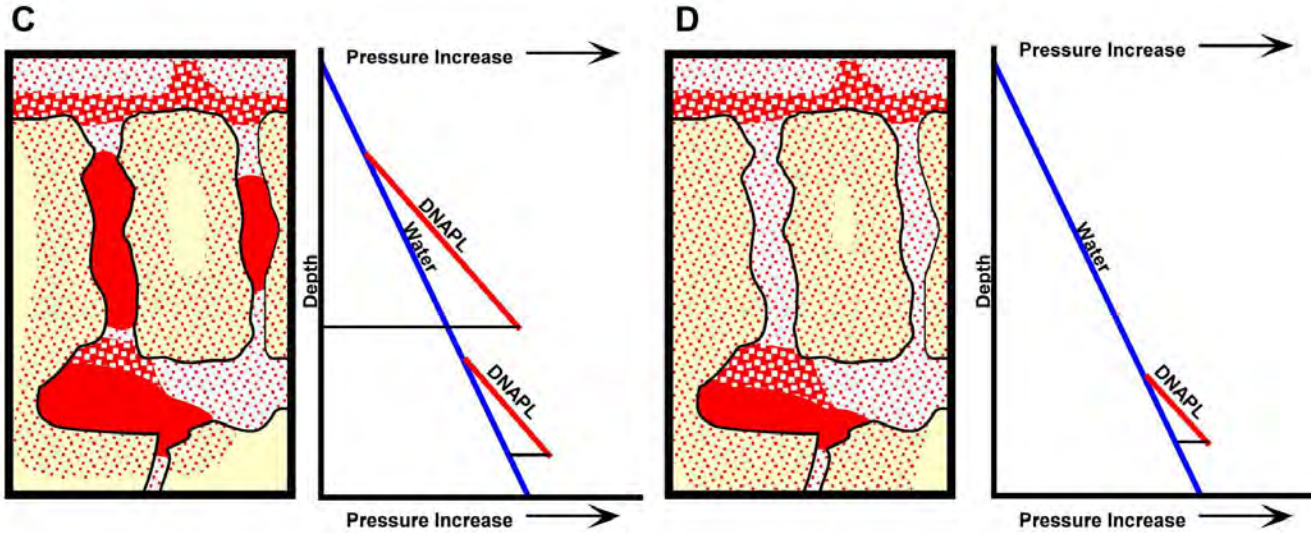
VOC-GW/Particle Flow Map
Lower HSU, 2004 (Dry)
Near RGPZ-6 and RGPZ-7

FIGURE: A-37
SHEET: 1 OF 1
REVISION NUMBER: 0
DATE: August 2014



A. DNAPL Flows Downward into Largest Fractures with Lowest Entry Pressure

B. DNAPL Dissolves into Groundwater and Dissolved Phase Diffuses into Porous Matrix



C. DNAPL Becomes Discontinuous at Residual Saturation

D. DNAPL Mass Mostly to Entirely Diffused into Porous Matrix

LEGEND

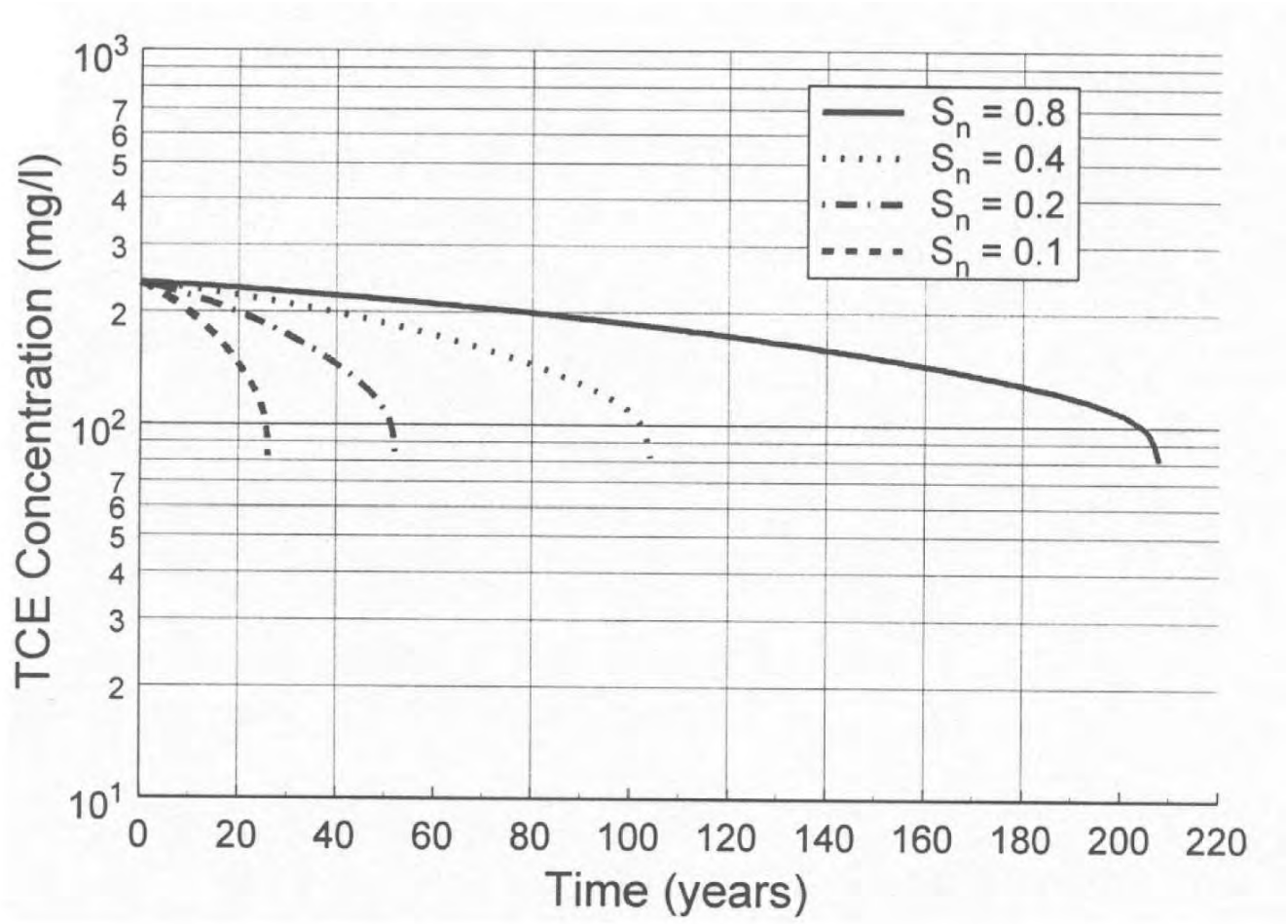
- DNAPL
- Residual DNAPL
- Clean Groundwater
- Affected Groundwater
- Clay
- Sand
- Pressure gradient

REFERENCE: after Parker et al., 1994, 1996, and 1997

FIGURE A-38

DNAPL Dissolution Through Matrix

Feasibility Study
Casmalia Resources Superfund Site



(REFERENCE: after Sale, 1998)

DNAPL : Dense Non Aqueous Phase Liquid
TCE : Tetrachloroethene
mg/l : Milligrams per liter

FIGURE A-39

Groundwater Concentrations as a Function of Time Over a Range of DNAPL Pool Saturations

Feasibility Study
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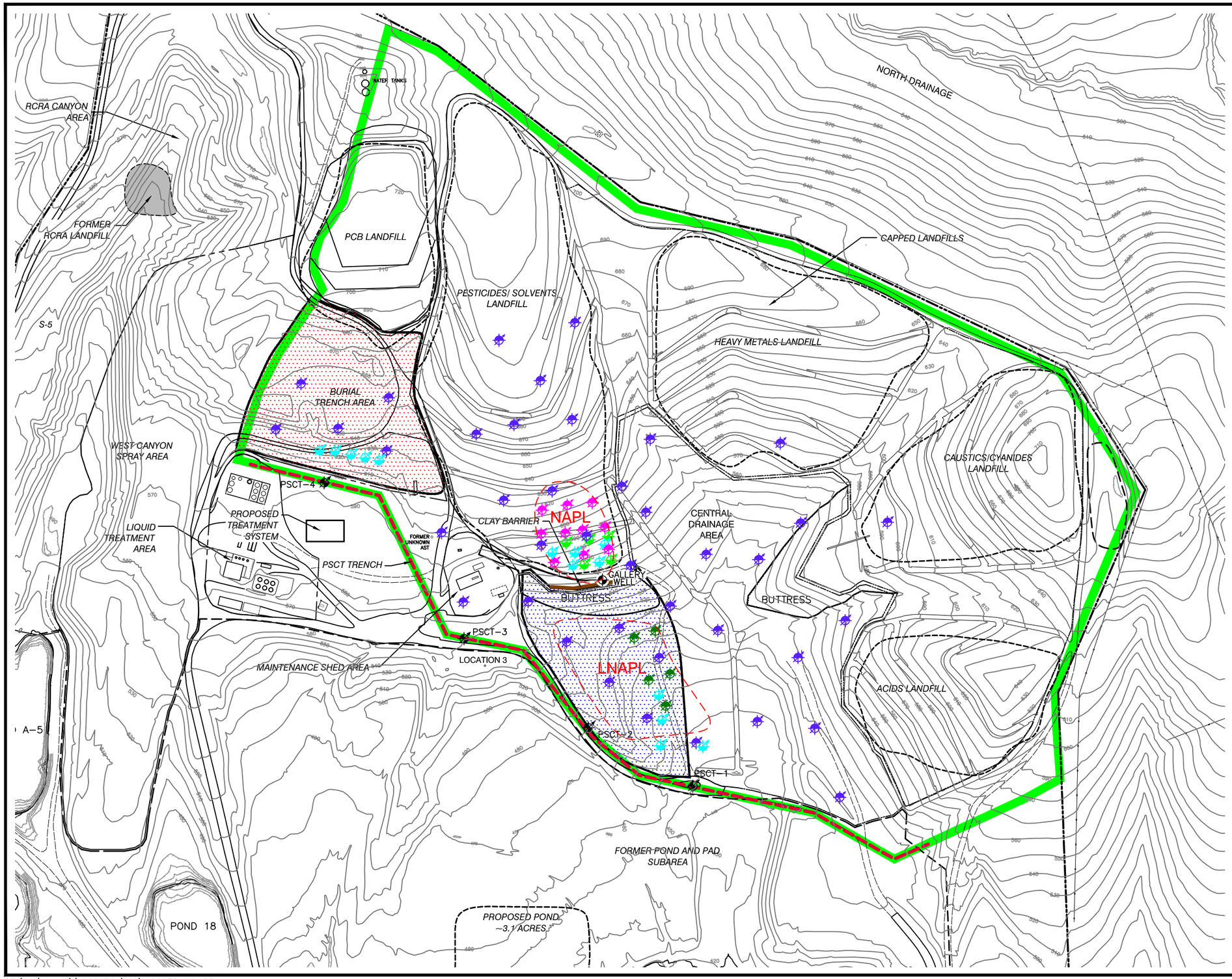

LEGEND

- AREA 5 NORTH BOUNDARY
- STUDY AREA BOUNDARY
- LANDFILL LIMITS – EXCAVATE ALL WASTE AND BACKFILL TO GRADE
- EXISTING EXTRACTION TRENCH (PSCT AND PCTS)
- CLAY BARRIER
- LIMITS OF NAPL/LNAPL
- LIQUIDS EXTRACTION LOCATION

PROPOSED WELL LOCATIONS

- UPPER HSU DNAPL EXTRACTION WELL
- LOWER HSU DNAPL EXTRACTION WELL
- UPPER HSU LNAPL AND DNAPL EXTRACTION WELL
- UPPER HSU TOTAL FLUIDS EXTRACTION WELL
- LOWER HSU TOTAL FLUIDS EXTRACTION WELL
- EXCAVATION (40') AND BACKFILL
- EXCAVATION (5') AND BACKFILL
- CHANNELED STORMWATER RUNOFF

Topographic Source: Pacific Engineer Associates, July 8, 1998

N

0 300
FEET

FIGURE A-40a

Restoration Alternative
Area 5 North

Feasibility Study
Casmalia Resources Superfund Site
August 2014

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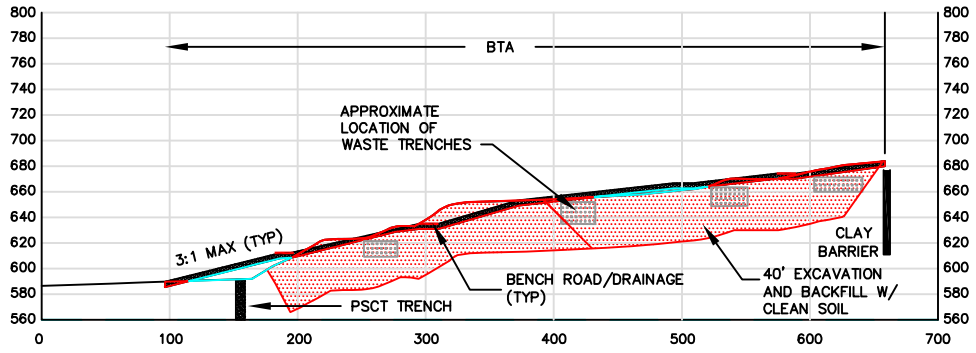
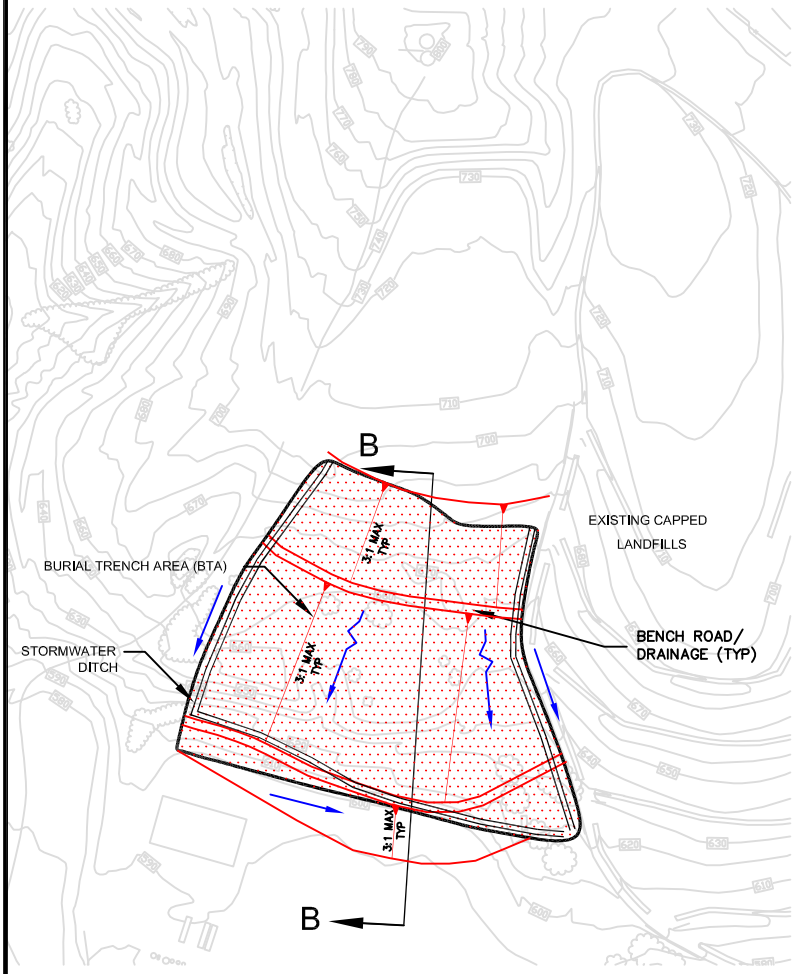


SECTION B-B
1"=150'

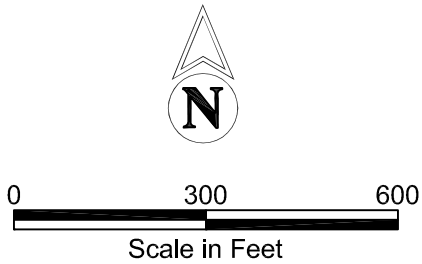


PRELIMINARY EARTHWORK SUMMARY

BTA AREA = 240,000 SQ FT (5.51 ACRES)

GRADING	VOLUMES (CY)
40' EXCAVATION (CUT)	356,000

* CUT AND FILL VOLUMES INCLUDE EXISTING SURFACE PREP/SLOPE BENCHING AND 10% FILL SHRINKAGE DURING PLACEMENT AND COMPACTION



LEGEND:

EXCAVATION (40') AND BACKFILL

NATURAL STORMWATER RUNOFF

CHANNELED STORMWATER RUNOFF

NOTES:
1. EXISTING ROADS AND STORMWATER COLLECTION DRAINS TO BE RECONFIGURED DURING DESIGN

FIGURE A-40b

Restoration Alternative
Area 5 North
Burial Trench Area Excavation and Grading Plan

Feasibility Study
Casmalia Resources Superfund Site

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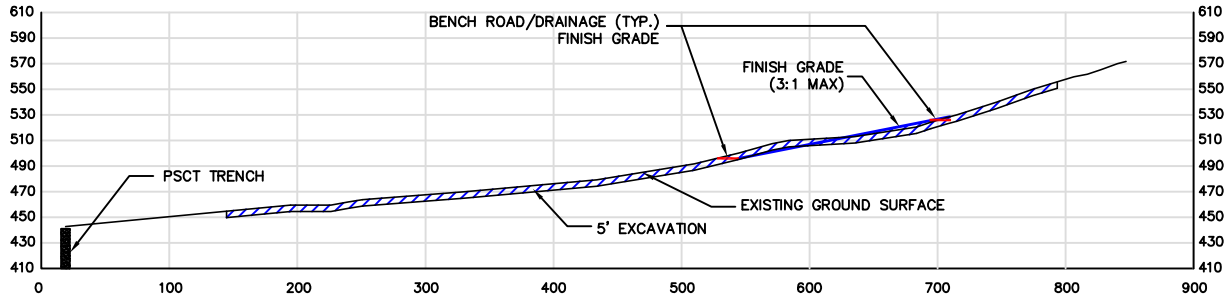
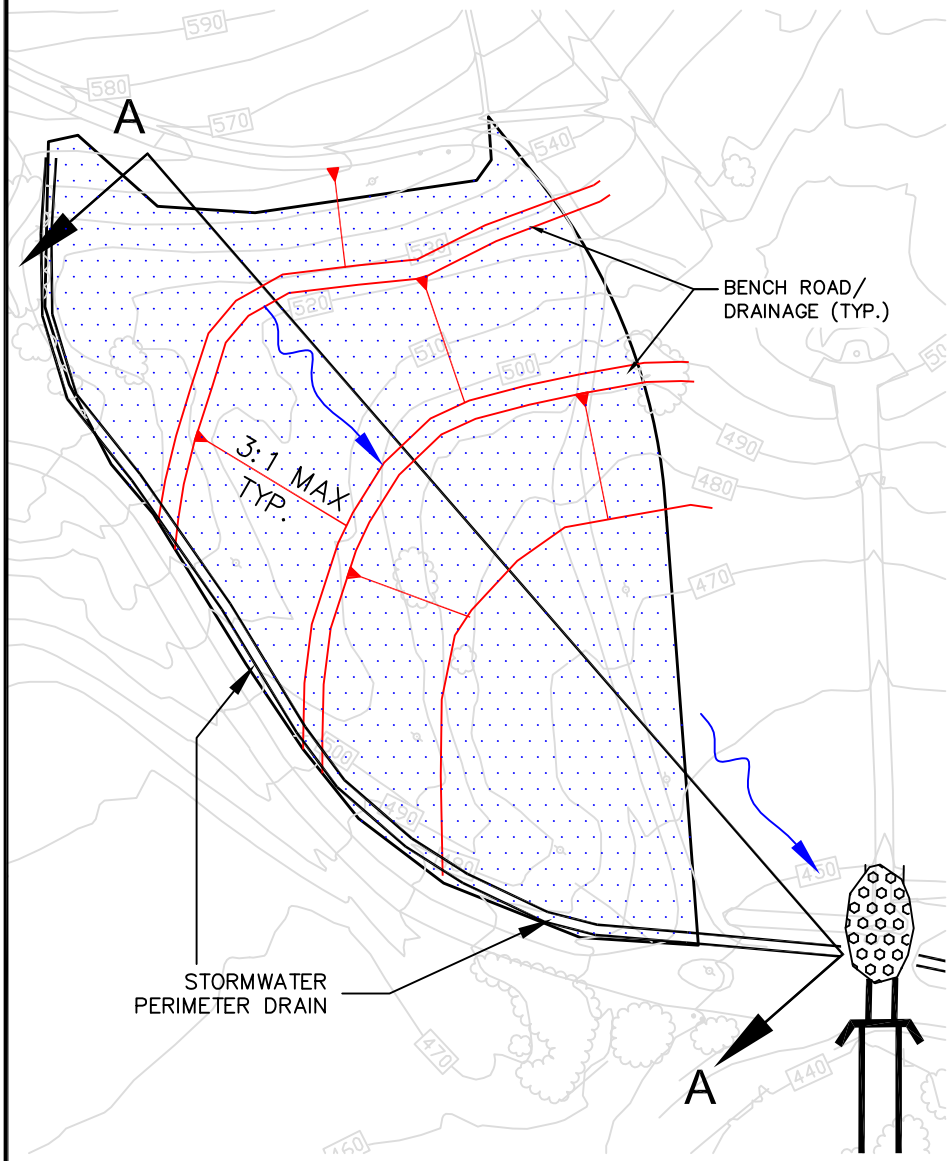


SECTION A-A
1"=150'



PRELIMINARY EARTHWORK SUMMARY

CDA AREA = 207,300 SQ FT (4.76 ACRES)

GRADING	VOLUMES (CY)
5' EXCAVATION (CUT)	38,000

* CUT AND FILL VOLUMES INCLUDE EXISTING SURFACE PREP/SLOPE BENCHING AND 10% FILL SHRINKAGE DURING PLACEMENT AND COMPACTION

N

0 150 300
Scale in Feet

LEGEND:

EXCAVATION (5') AND BACKFILL

NATURAL STORMWATER RUNOFF

CHANNELED STORMWATER RUNOFF

NOTES:
1. EXISTING ROADS AND STORMWATER COLLECTION DRAINS TO BE RECONFIGURED DURING EXCAVATION DESIGN
2. THE LOCATIONS OF THE BENCH ROADS ARE TYPICAL BUT WILL BE DETERMINED DURING DESIGN.

FIGURE A-40c

Restoration Alternative
Area 5 North
Central Drainage Area
Excavation and Grading Plan

Feasibility Study
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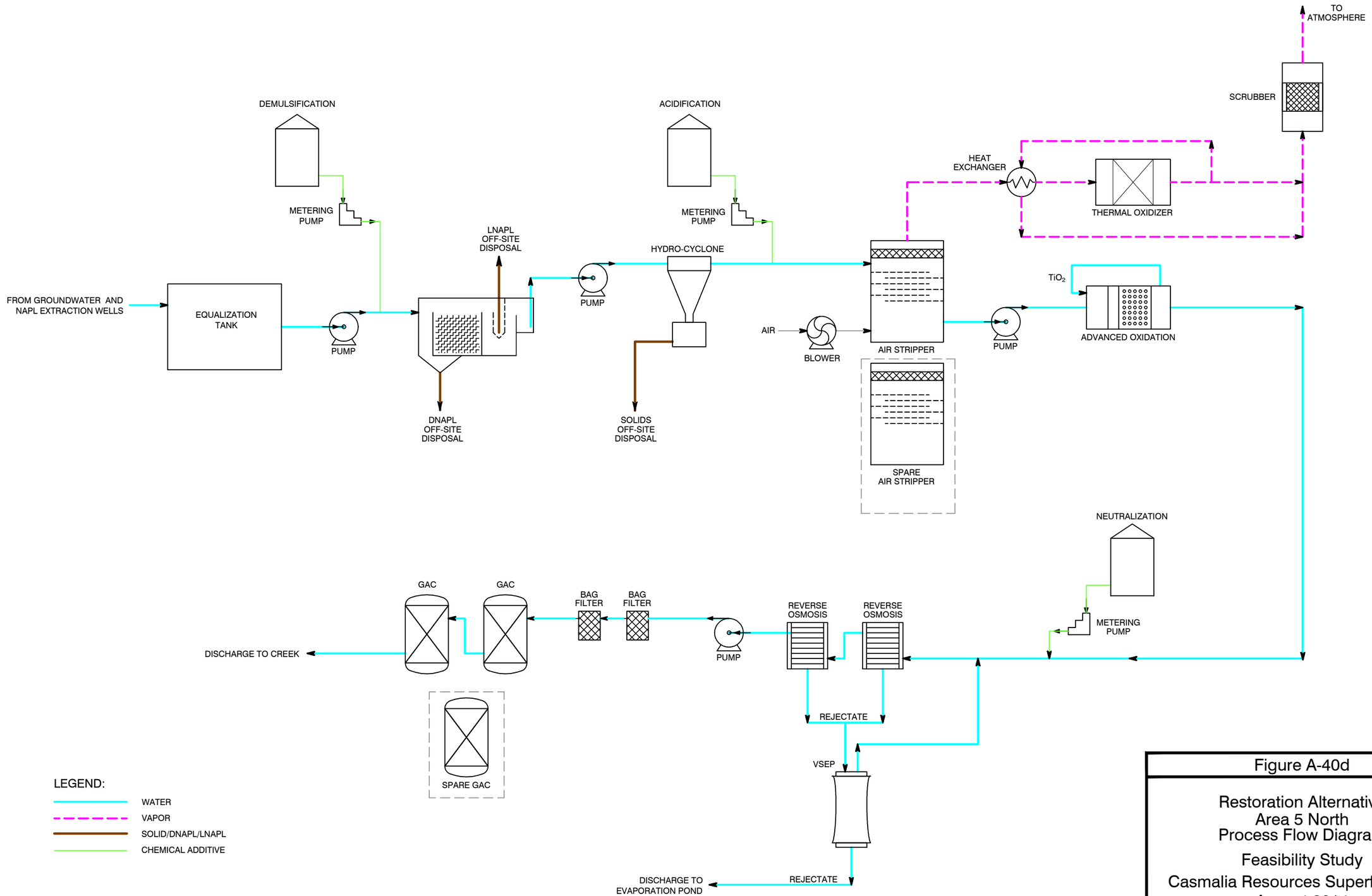

Figure A-40d

Restoration Alternative
Area 5 North
Process Flow Diagram

Feasibility Study

Casmalia Resources Superfund Site
August 2014

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