Fort Ord, Monterey County, California

Groundwater Cleanup Update
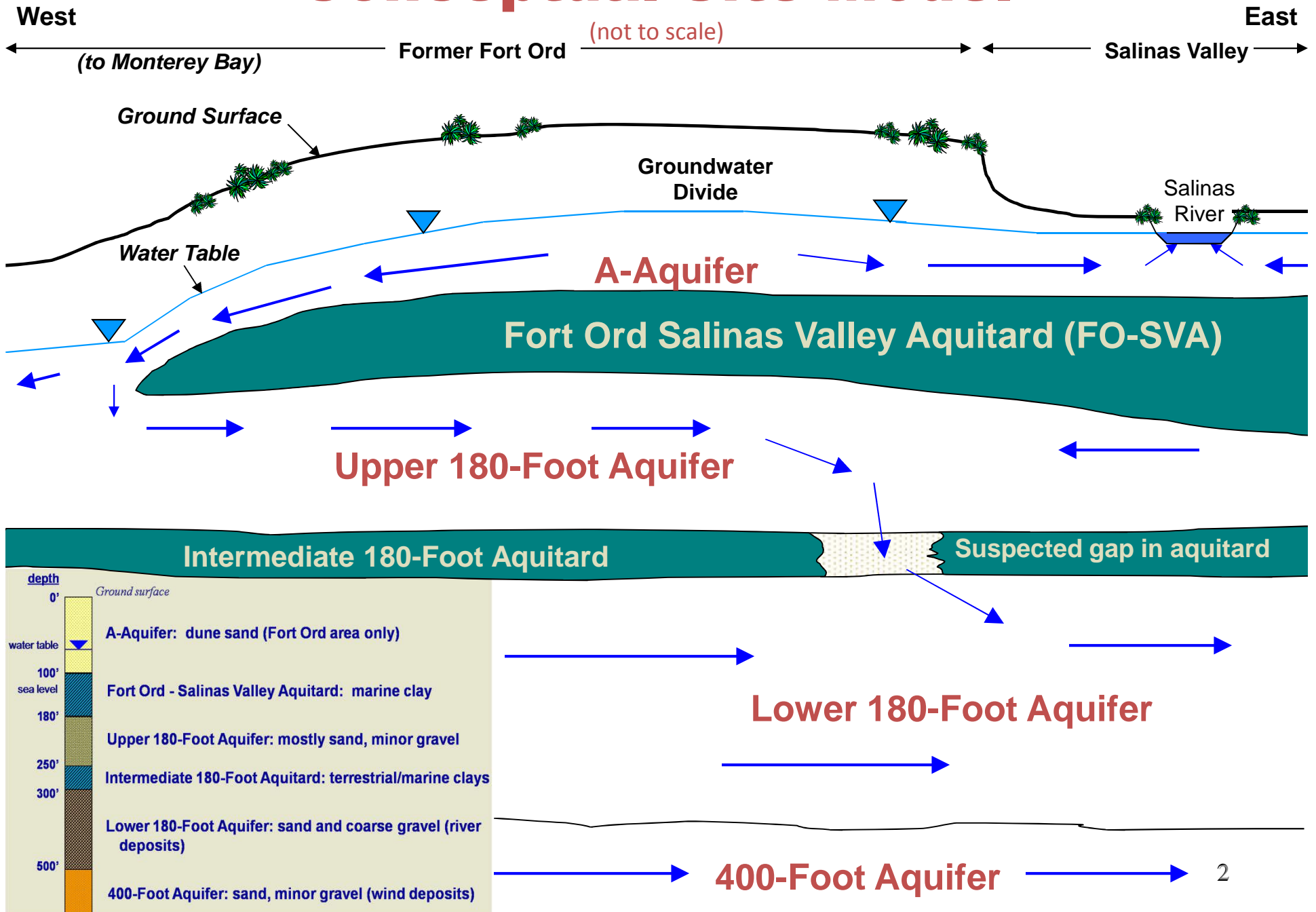## Community Involvement Workshop, March 1, 2014
Technical Review Committee Meeting, March 4, 2014
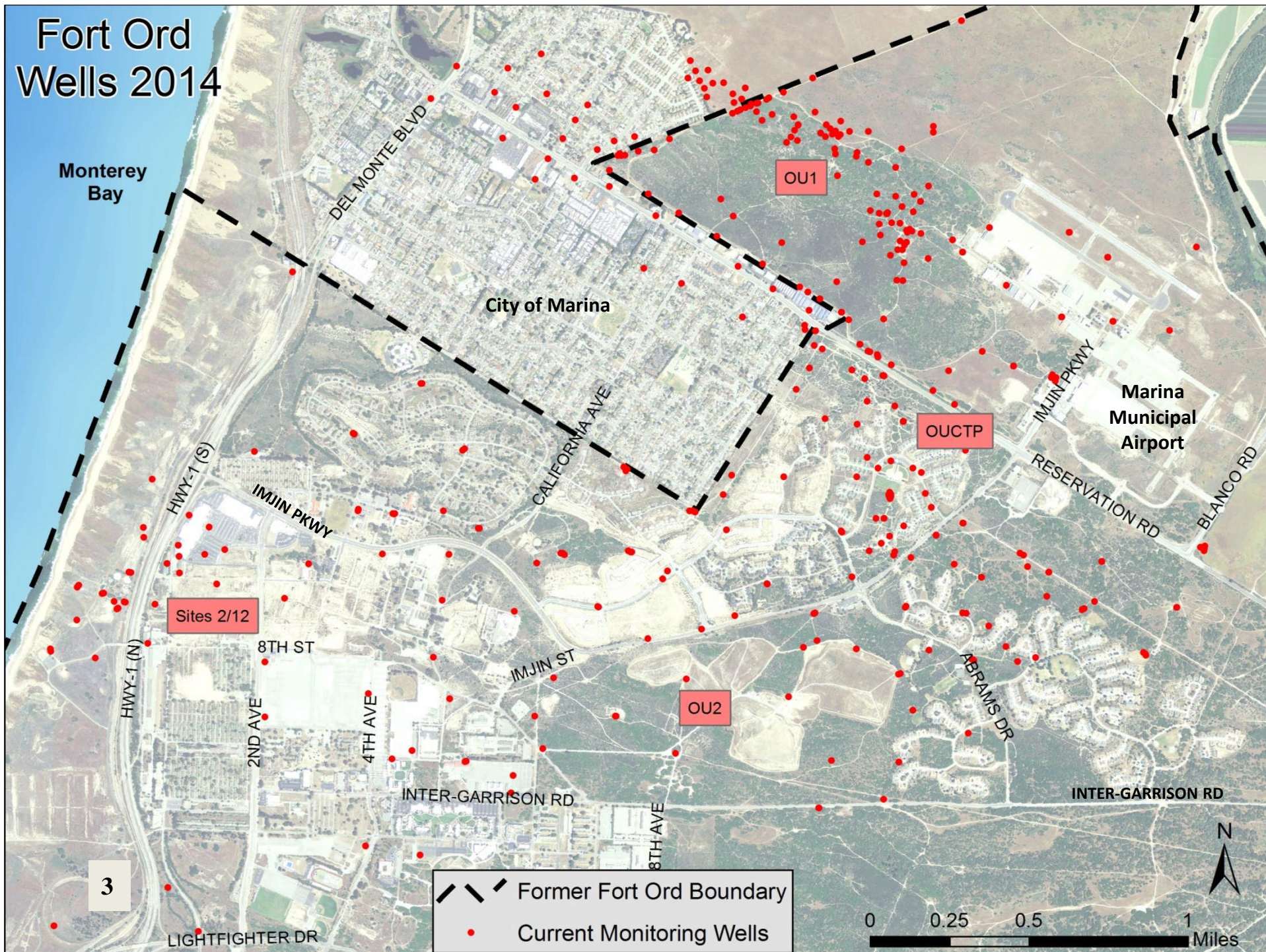
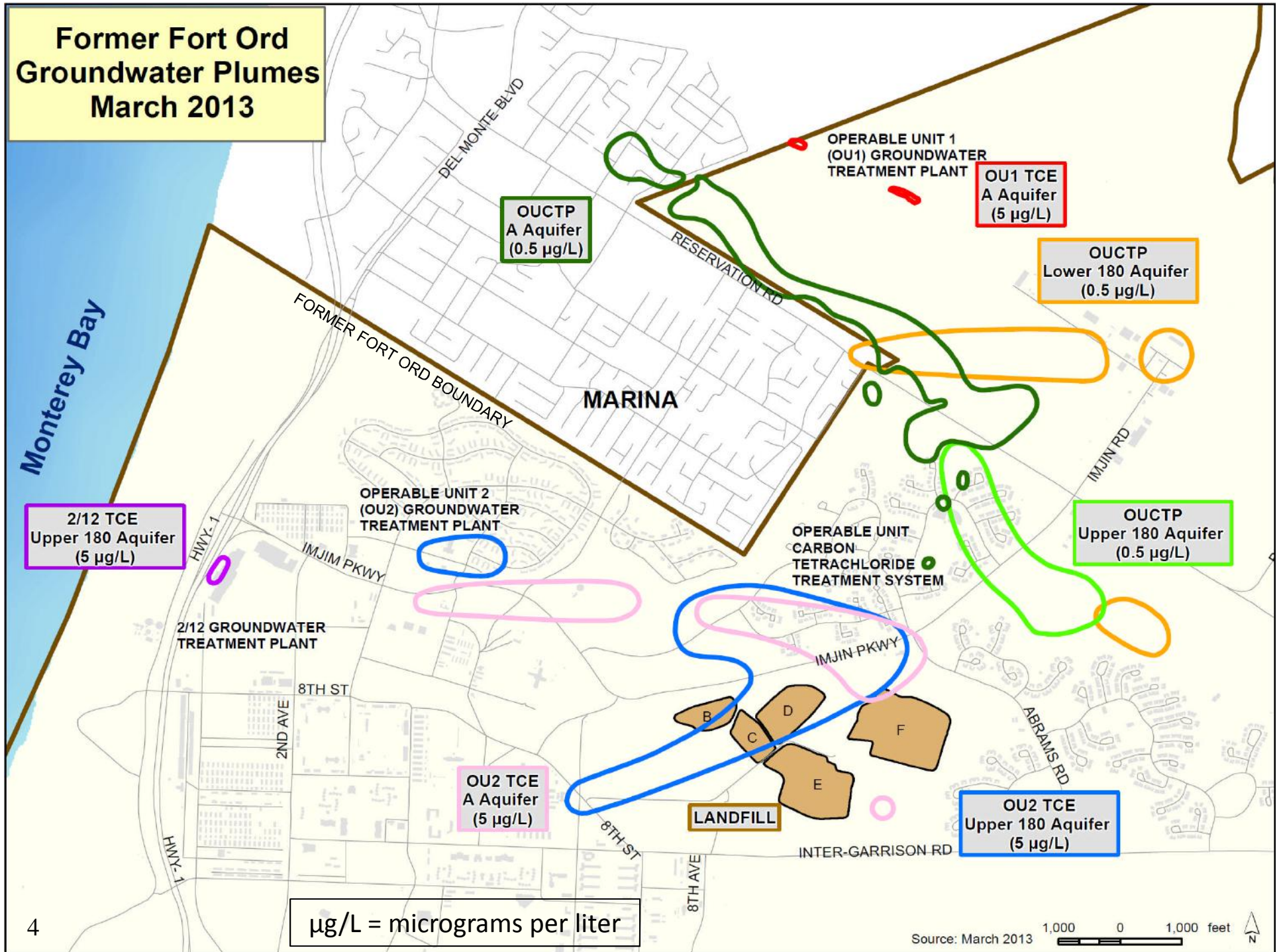Derek S. Lieberman, P.E.
Ahtna Engineering Services

Ahtna Engineering

1

Conceptual Site Model

(not to scale)

West — *(to Monterey Bay)* — **Former Fort Ord** — **Salinas Valley** — **East**

Ground Surface

Groundwater Divide

Salinas River

Water Table

A-Aquifer

Fort Ord Salinas Valley Aquitard (FO-SVA)

Upper 180-Foot Aquifer

Intermediate 180-Foot Aquitard

Suspected gap in aquitard

Lower 180-Foot Aquifer

400-Foot Aquifer

depth	
0'	Ground surface
water table	**A-Aquifer:** dune sand (Fort Ord area only)
100' / sea level	**Fort Ord - Salinas Valley Aquitard:** marine clay
180'	**Upper 180-Foot Aquifer:** mostly sand, minor gravel
250'	**Intermediate 180-Foot Aquitard:** terrestrial/marine clays
300'	**Lower 180-Foot Aquifer:** sand and coarse gravel (river deposits)
500'	**400-Foot Aquifer:** sand, minor gravel (wind deposits)

2

Fort Ord Wells 2014

Monterey Bay

Marina Municipal Airport

City of Marina

OU1

OUCTP

Sites 2/12

OU2

DEL MONTE BLVD

CALIFORNIA AVE

IMJIN PKWY

HWY-1 (S)

HWY-1 (N)

2ND AVE

4TH AVE

8TH ST

IMJIN ST

8TH AVE

ABRAMS DR

RESERVATION RD

IMJIN PKWY

BLANCO RD

INTER-GARRISON RD

INTER-GARRISON RD

LIGHTFIGHTER DR

3

Former Fort Ord Boundary

Current Monitoring Wells

0   0.25   0.5   1
Miles

N

Former Fort Ord Groundwater Plumes March 2013

Monterey Bay

DEL MONTE BLVD

FORMER FORT ORD BOUNDARY

RESERVATION RD

MARINA

IMJIN RD

OPERABLE UNIT 1 (OU1) GROUNDWATER TREATMENT PLANT

OUCTP A Aquifer (0.5 µg/L)

OU1 TCE A Aquifer (5 µg/L)

OUCTP Lower 180 Aquifer (0.5 µg/L)

OUCTP Upper 180 Aquifer (0.5 µg/L)

2/12 TCE Upper 180 Aquifer (5 µg/L)

HWY-1

IMJIM PKWY

OPERABLE UNIT 2 (OU2) GROUNDWATER TREATMENT PLANT

OPERABLE UNIT CARBON TETRACHLORIDE TREATMENT SYSTEM

2/12 GROUNDWATER TREATMENT PLANT

2ND AVE

8TH ST

IMJIN PKWY

ABRAMS RD

B

D

C

E

F

OU2 TCE A Aquifer (5 µg/L)

LANDFILL

OU2 TCE Upper 180 Aquifer (5 µg/L)

8TH ST

8TH AVE

INTER-GARRISON RD

HWY-1

4

µg/L = micrograms per liter

Source: March 2013

1,000   0   1,000   feet

N

Groundwater Extraction and Treatment System Status

as of December 31, 2013

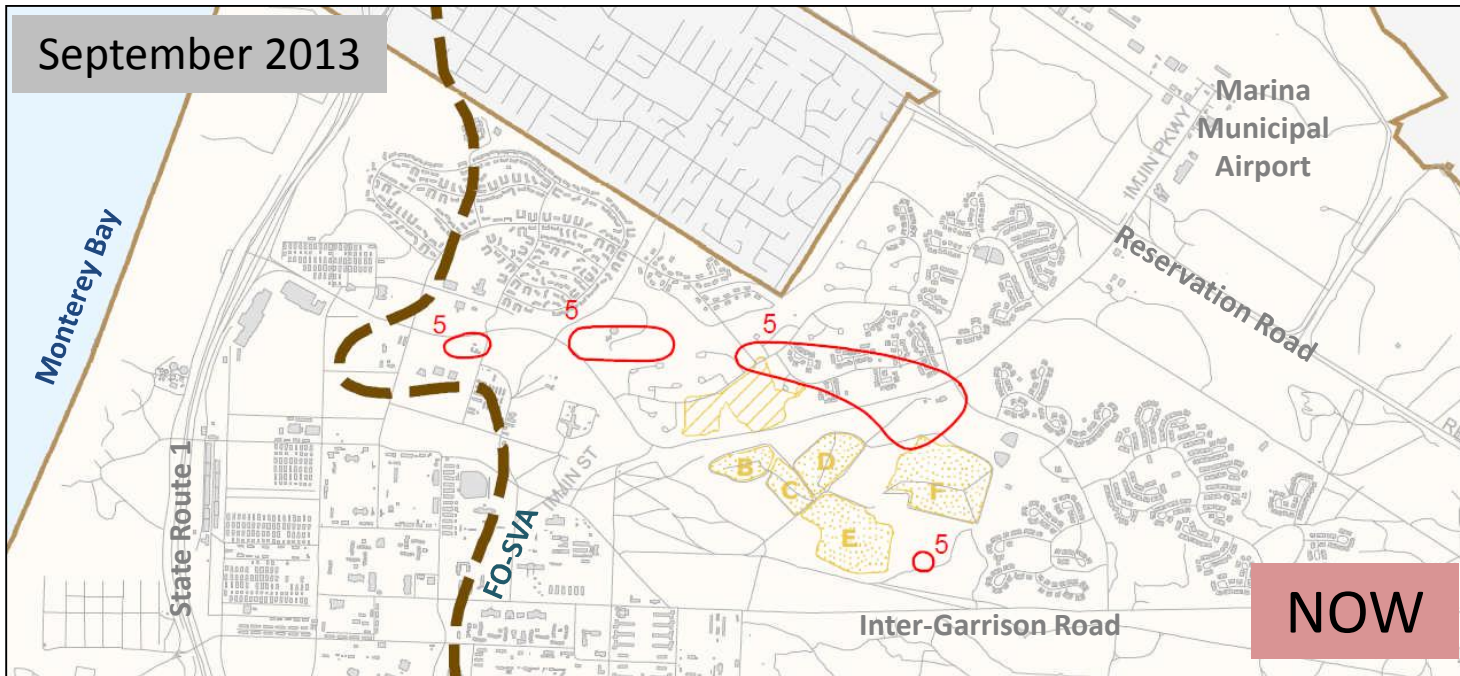|	OU1	OU2/OUCTP	Sites 2/12
Treatment started	July 1988	October 1995	April 1999
Gallons treated	313.2 million	6.134 billion	1.707 billion
Pounds of contaminants removed	31	751	462
Gallons of contaminants removed	3	60	37

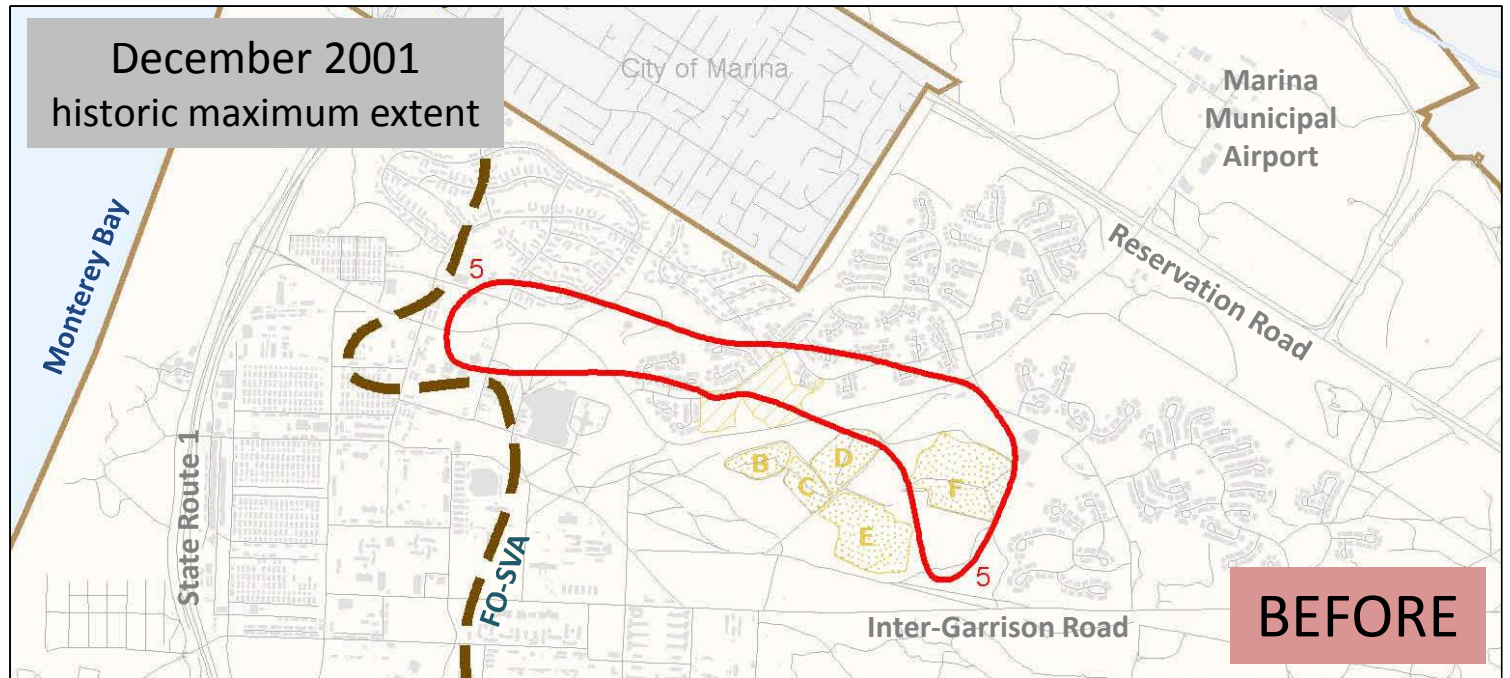# Groundwater Extraction and Treatment Systems Schematic

Granular Activated Carbon Vessel

Granular Activated Carbon Vessel

Groundwater Treatment

Extraction Wells

Injection Wells

water table

Plume

6
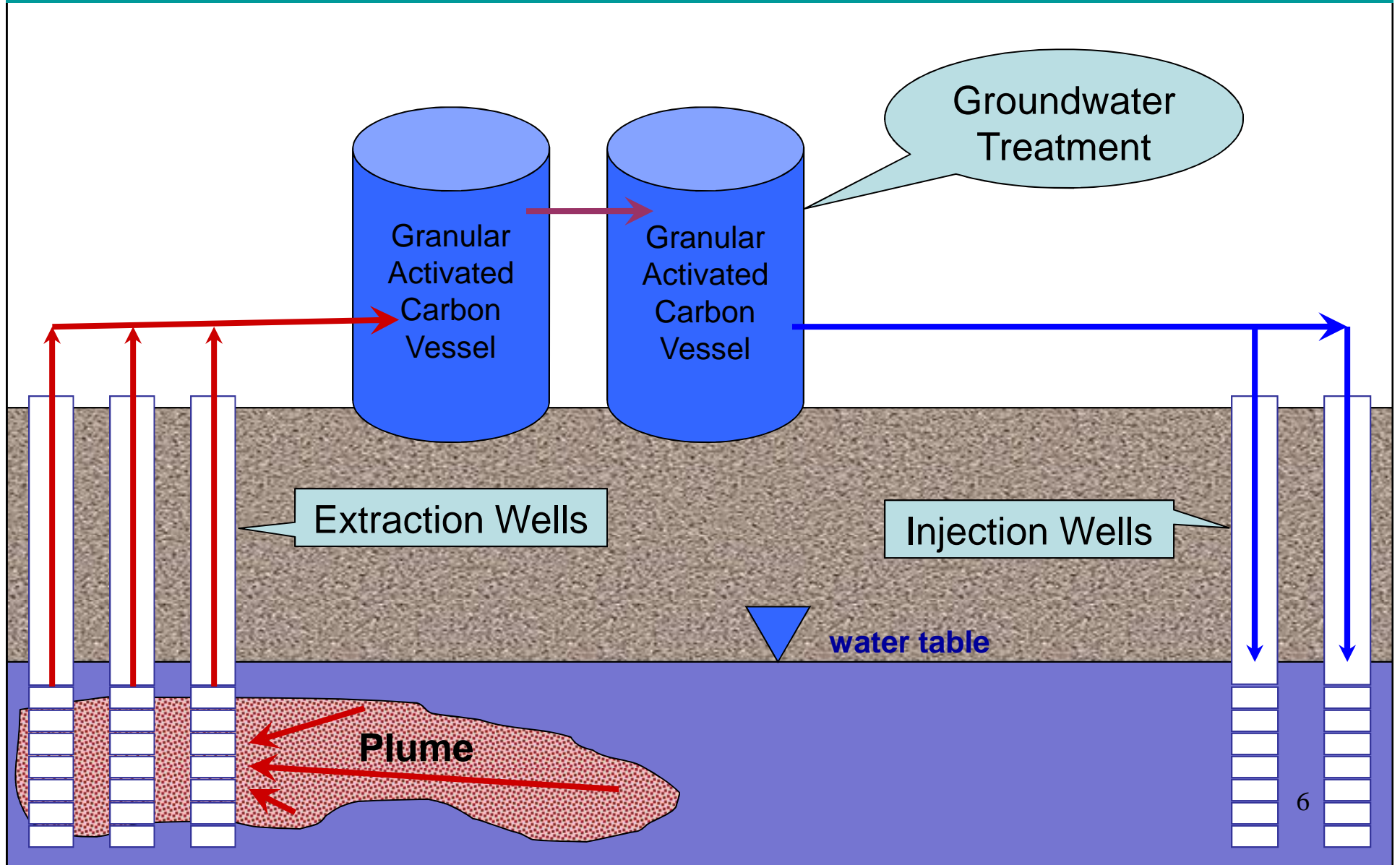
TCE at or above Aquifer Cleanup Level (ACL) in µg/L Operable Unit 1 (OU1) A-Aquifer

2006

Armstrong Ranch

Former Fort Ord Boundary

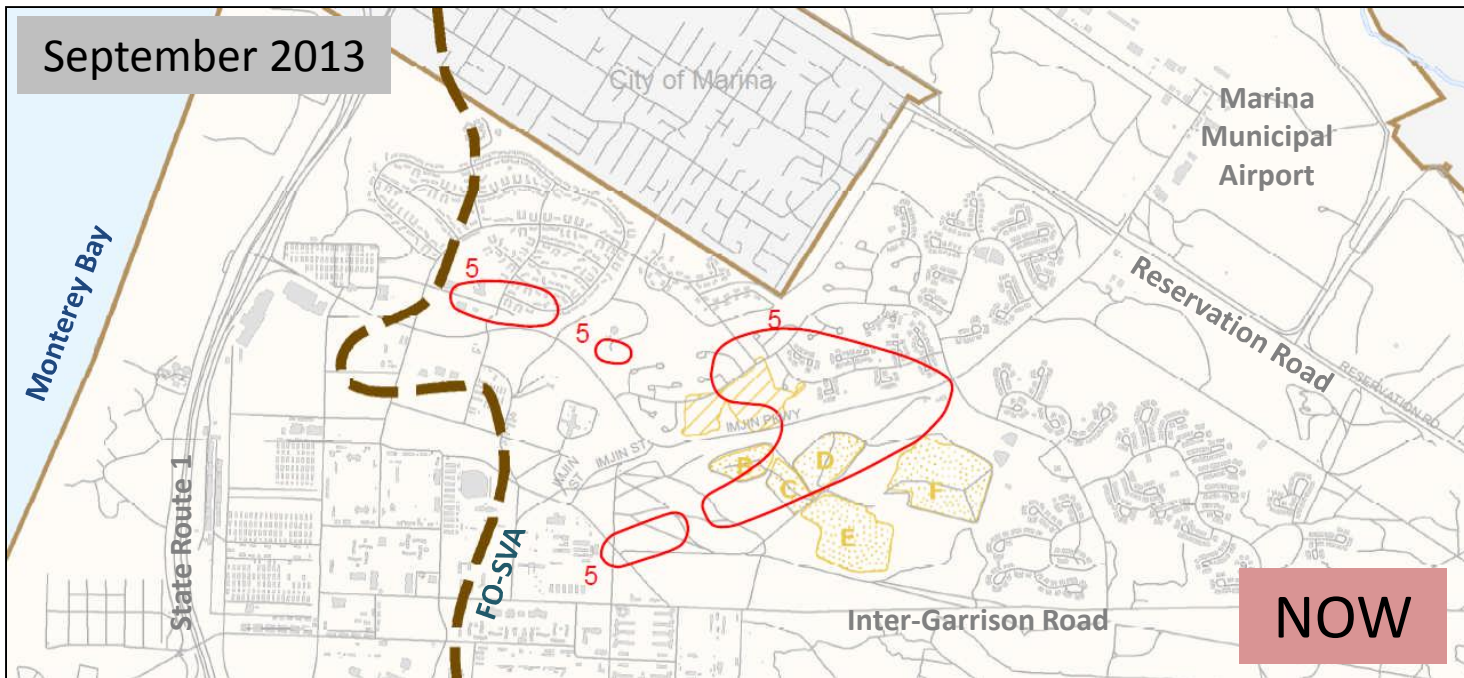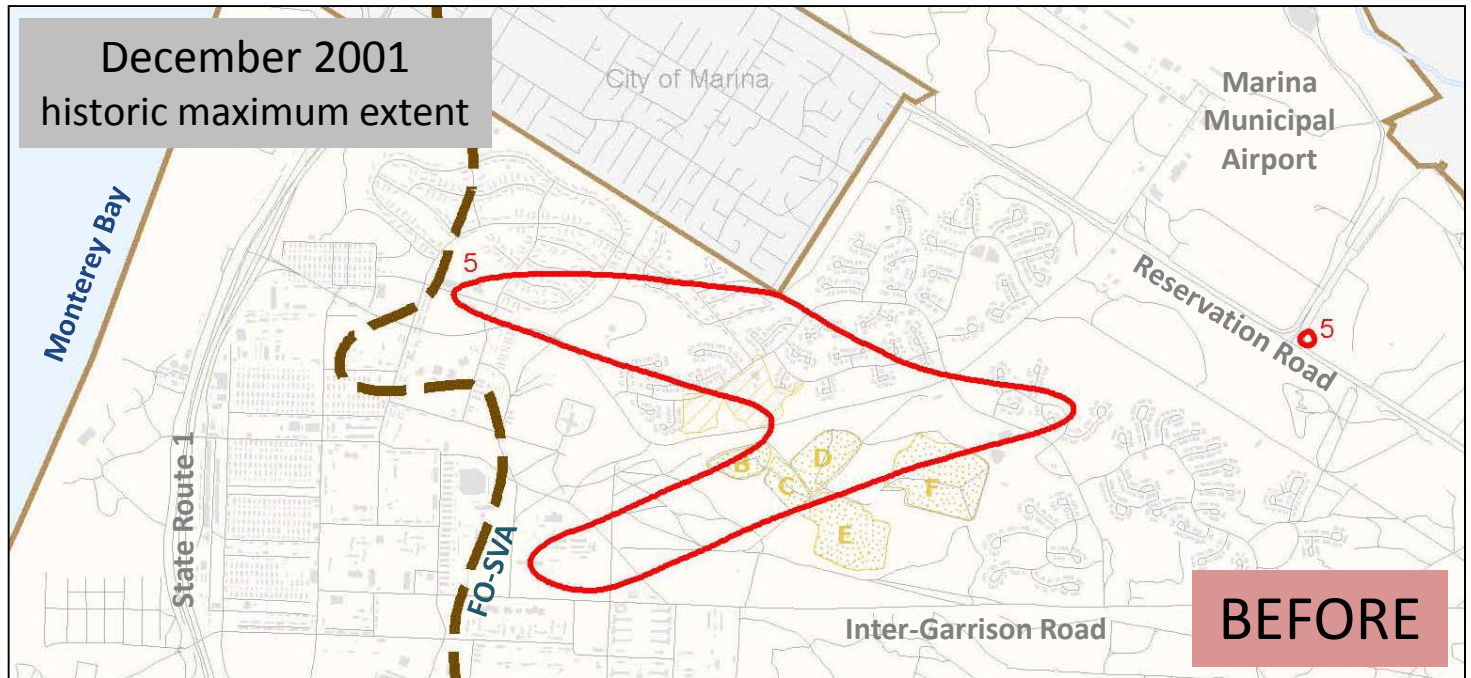BEFORE

20
10
5

N

2013

Armstrong Ranch

Former Fort Ord Boundary

5

5

NOW
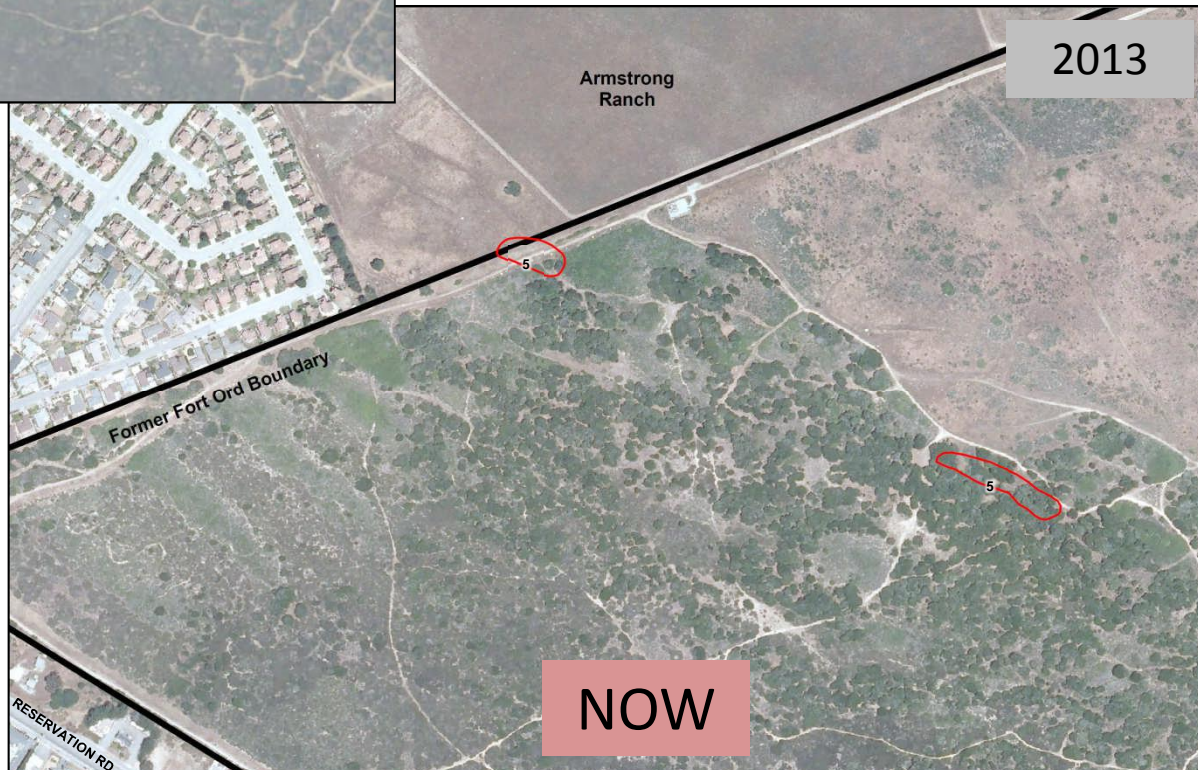
TCE at or above
ACL in µg/L
Operable Unit 2
(OU2)
A-Aquifer

December 2001
historic maximum extent

City of Marina

Marina
Municipal
Airport

Monterey Bay

State Route 1

Reservation Road

FO-SVA

5

B D
C   F
E

5

Inter-Garrison Road

BEFORE

September 2013

Monterey Bay

State Route 1

FO-SVA

Marina
Municipal
Airport

IMJIN PKWY

Reservation Road

5   5   5

B D
C   F
E

5

Inter-Garrison Road

NOW

N

8

TCE at or above ACL in µg/L OU2 Upper 180-Foot Aquifer

December 2001
historic maximum extent

BEFORE

September 2013

NOW

9

TCE at or above ACL in µg/L
Sites 2 and 12
Upper 180-Foot Aquifer
West of the FO-SVA

December 2000
historic maximum extent

BEFORE

September 2013
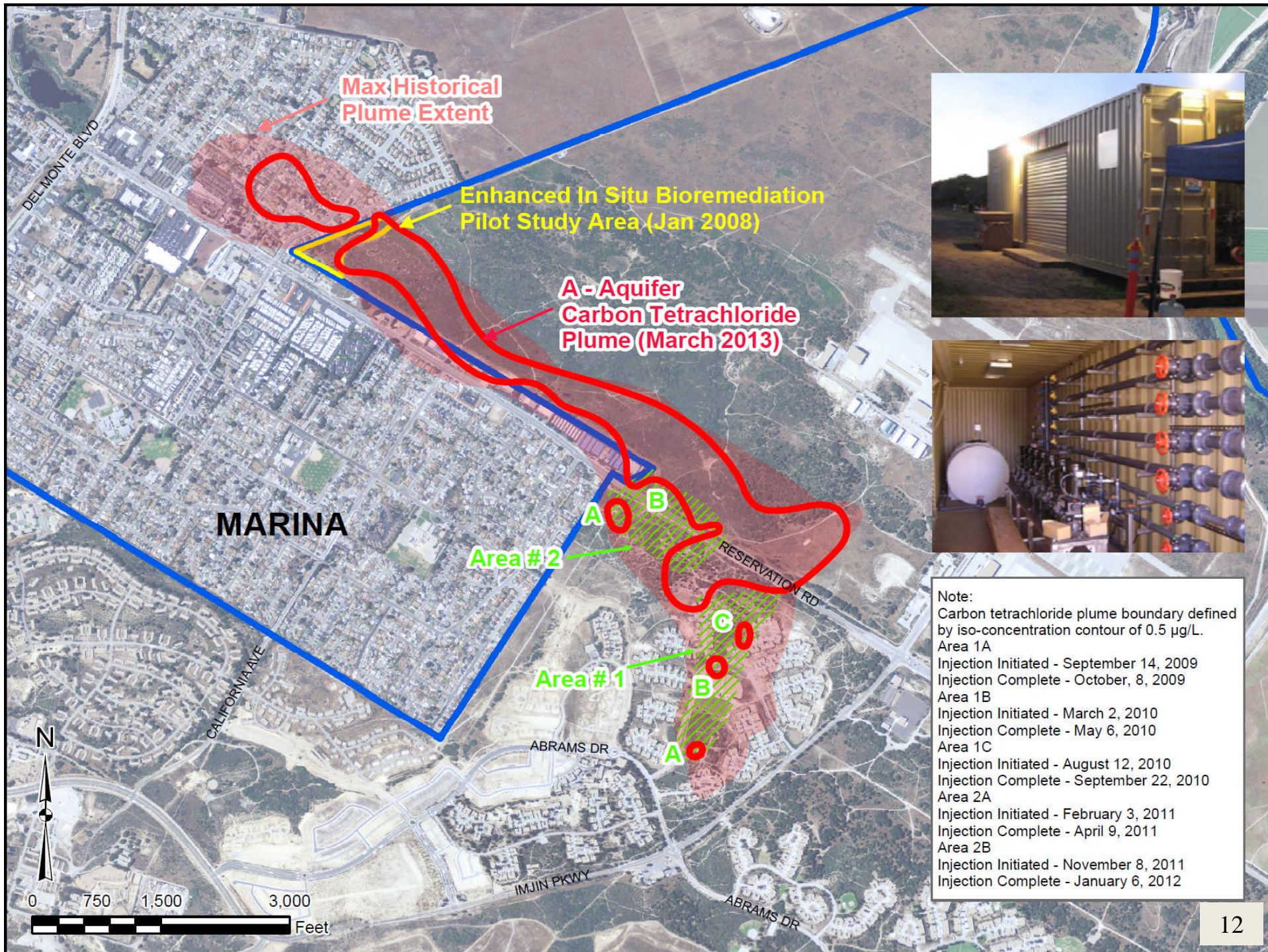
NOW

10
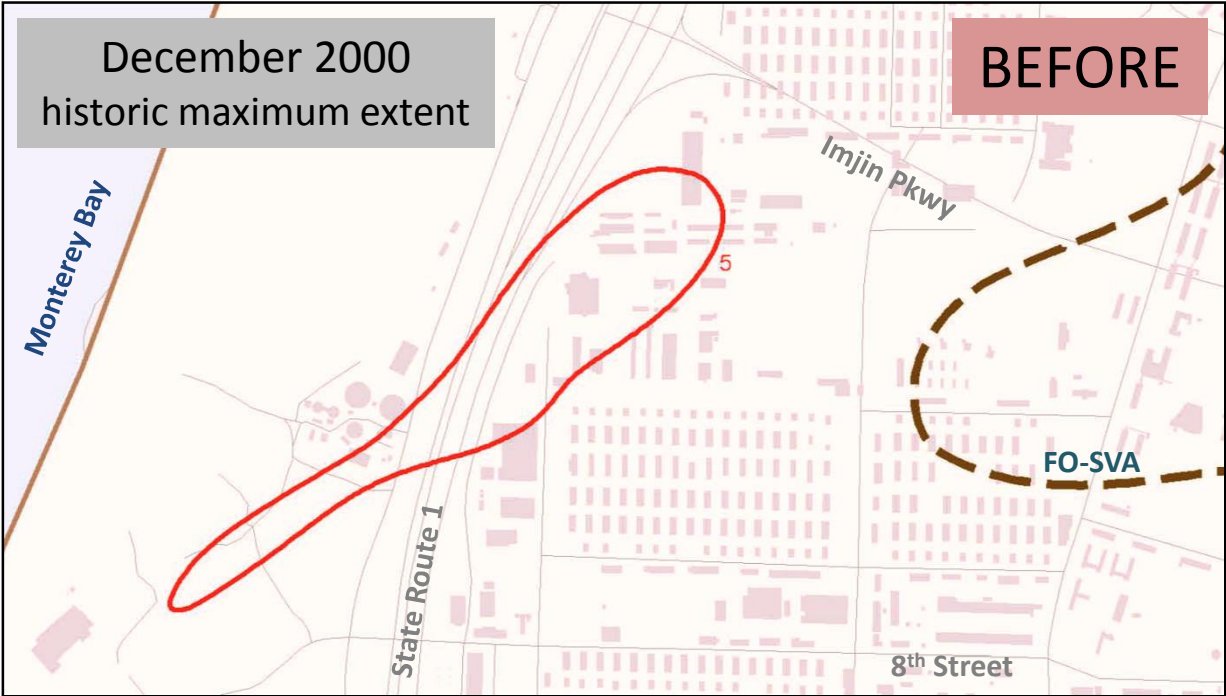
CT at or above ACL in µg/L Operable Unit Carbon Tetrachloride Plume (OUCTP) A-Aquifer

December 2009
historic maximum extent

BEFORE

0.5

Monterey Bay

State Route 1

FO-SVA

City of Marina

Marina Municipal Airport

RESERVATION RD

Reservation Road

September 2013

NOW

Monterey Bay

State Route 1

FO-SVA

0.5

City of Marina

0.5

0.5

0.5

0.5

IMJIN PKWY

Marina Municipal Airport

RESERVATION RD

Reservation Road

N

11

Max Historical Plume Extent

Enhanced In Situ Bioremediation Pilot Study Area (Jan 2008)

A - Aquifer Carbon Tetrachloride Plume (March 2013)

MARINA

Area # 2

Area # 1

A

B

C

B

A

DEL MONTE BLVD

CALIFORNIA AVE

RESERVATION RD

ABRAMS DR

IMJIN PKWY

ABRAMS DR

N

0   750   1,500   3,000
Feet

Note:
Carbon tetrachloride plume boundary defined
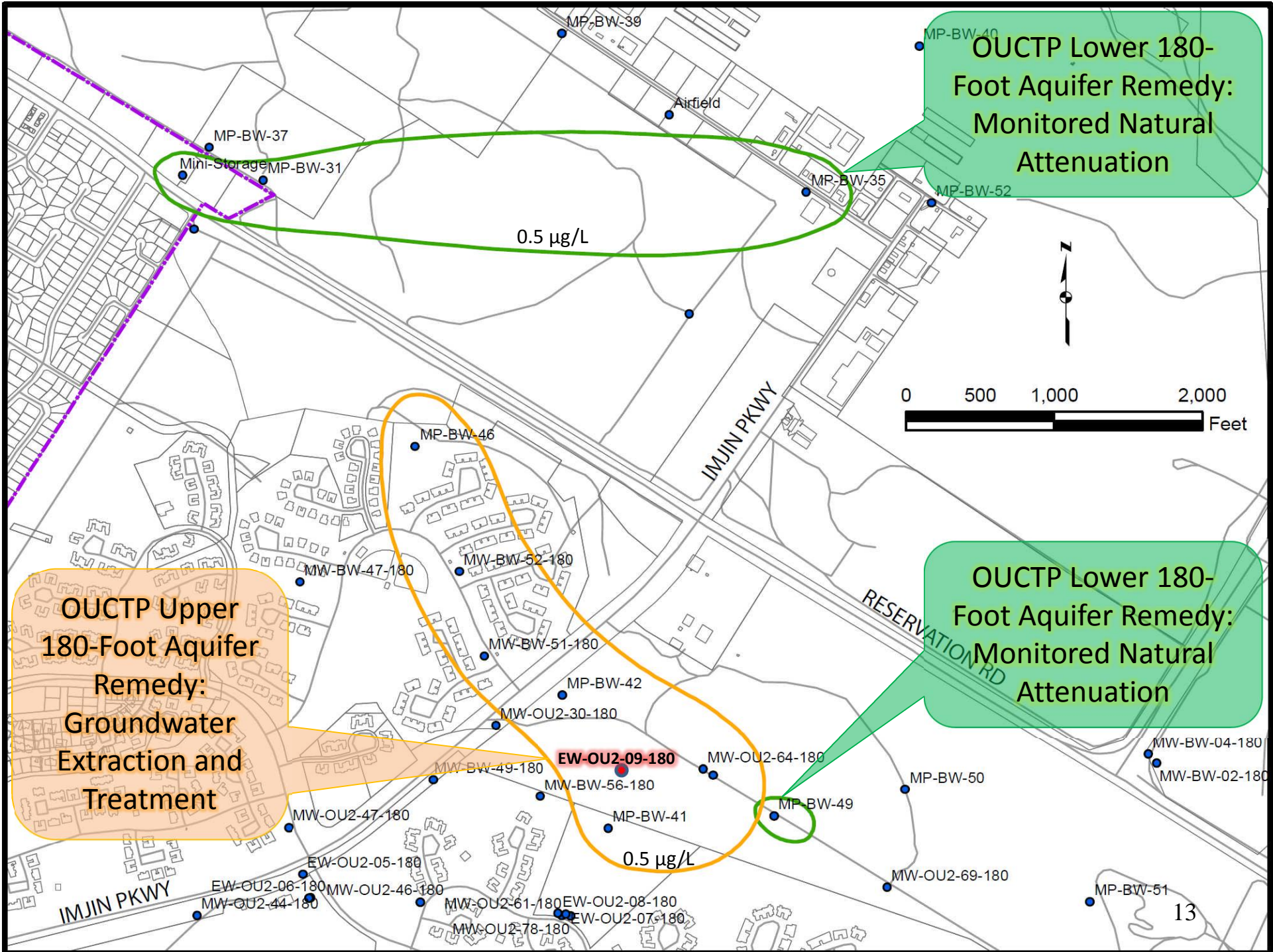by iso-concentration contour of 0.5 μg/L.
Area 1A
Injection Initiated - September 14, 2009
Injection Complete - October, 8, 2009
Area 1B
Injection Initiated - March 2, 2010
Injection Complete - May 6, 2010
Area 1C
Injection Initiated - August 12, 2010
Injection Complete - September 22, 2010
Area 2A
Injection Initiated - February 3, 2011
Injection Complete - April 9, 2011
Area 2B
Injection Initiated - November 8, 2011
Injection Complete - January 6, 2012

12

OUCTP Lower 180-Foot Aquifer Remedy: Monitored Natural Attenuation

OUCTP Lower 180-Foot Aquifer Remedy: Monitored Natural Attenuation

OUCTP Upper 180-Foot Aquifer Remedy: Groundwater Extraction and Treatment

MP-BW-39

Airfield

MP-BW-40

MP-BW-37

Mini-Storage   MP-BW-31

MP-BW-35

MP-BW-52

0.5 µg/L

MP-BW-46

IMJIN PKWY

MW-BW-47-180

MW-BW-52-180

MW-BW-51-180

RESERVATION RD

MP-BW-42

MW-OU2-30-180

EW-OU2-09-180

MW-OU2-64-180

MW-BW-49-180

MW-BW-56-180

MP-BW-49

MW-BW-04-180

MW-BW-02-180

MP-BW-50

MW-OU2-47-180

MP-BW-41

0.5 µg/L

EW-OU2-05-180

MW-OU2-69-180

IMJIN PKWY

EW-OU2-06-180   MW-OU2-46-180

MW-OU2-44-180

MW-OU2-61-180   EW-OU2-08-180

EW-OU2-07-180

MW-OU2-78-180

MP-BW-51

0   500   1,000   2,000

Feet

13

For Additional Information

Visit the Army's website at:

www.fortordcleanup.com

Visit the Fort Ord Administrative Record at:

Building 4463 Gigling Road, Room 101

Ord Military Community

Seaside, CA 93955

831-393-9693

adminrecord@fortordcleanup.com