

FEBRUARY 22, 2013

ADDITIONAL GROUNDWATER ASSESSMENT WORK PLAN

ADDENDUM NO. 5

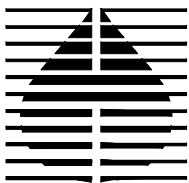
RAYTHEON COMPANY

(FORMER HUGHES AIRCRAFT COMPANY)

1901 WEST MALVERN AVENUE

FULLERTON, CALIFORNIA

PREPARED FOR:  
RAYTHEON COMPANY



**HARGIS + ASSOCIATES, INC.**  
HYDROGEOLOGY • ENGINEERING



**HARGIS + ASSOCIATES, INC.**  
HYDROGEOLOGY • ENGINEERING

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February 22, 2013

VIA FEDERAL EXPRESS – STANDARD

Mr. William F. Jeffers, PE  
Hazardous Substances Engineer  
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY  
DEPARTMENT OF TOXIC SUBSTANCES CONTROL  
9211 Oakdale Avenue  
Chatsworth, CA 91311-6505

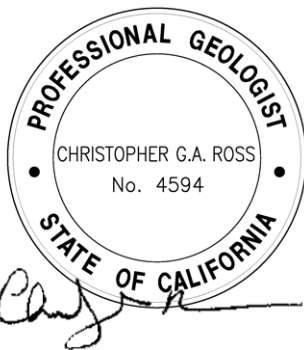
Re: Transmittal of Additional Groundwater Assessment Work Plan, Addendum No. 5, Raytheon Company, (Former Hughes Aircraft Company), 1901 West Malvern Avenue, Fullerton, California

Dear Mr. Jeffers:

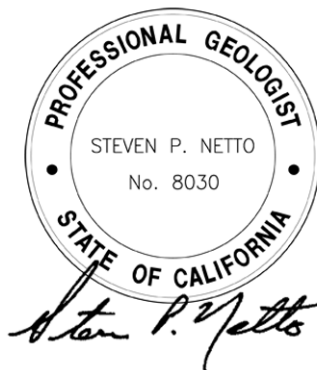
Enclosed is one hard copy with a compact disc that contains a copy of the above-referenced report. If you have any questions or require further information, please contact us at 858-455-6500.

Sincerely,

HARGIS + ASSOCIATES, INC.



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Enclosure: 1 copy w-CD

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Mr. William F. Jeffers, PE  
CALIFORNIA EPA DTSC  
February 22, 2013  
Page 2

cc w/encl: (1 copy w-CD)

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Mr. Paul E. Brewer, Raytheon Company  
Mr. Carl Bernhardt, California RWQCB, Santa Ana Region  
Mr. Dave Mark, Orange County Water District  
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ADDITIONAL GROUNDWATER ASSESSMENT WORK PLAN

ADDENDUM NO. 5

RAYTHEON COMPANY  
(FORMER HUGHES AIRCRAFT COMPANY)  
1901 WEST MALVERN AVENUE  
FULLERTON, CALIFORNIA

TABLE OF CONTENTS

Section	Page
ACRONYMS AND ABBREVIATIONS.....	iii
1.0 INTRODUCTION.....	1
1.1 PURPOSE AND SCOPE .....	2
1.2 BACKGROUND.....	3
2.0 ADDITIONAL PROPOSED GROUNDWATER ASSESSMENT .....	5
2.1 GENERAL APPROACH – WATER TABLE MONITOR WELL MW-38 .....	5
2.2 GENERAL APPROACH – TARGET ZONE MONITOR WELLS MW-39 AND MW-40 .....	8
3.0 PROJECT SCHEDULE AND REPORTING .....	11
4.0 REFERENCES CITED.....	12

TABLE OF CONTENTS (continued)TABLES

## Table

1	PROJECT SCHEDULE
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FIGURES

## Figure

## Drawing Number

1	SITE LOCATION	410-8281A
2	WELL AND PIEZOMETER LOCATIONS	410-8861A
3	PROPOSED MONITOR WELL LOCATIONS	410-8880A
4	CONCEPTUAL WELL CONSTRUCTION SCHEMATIC, WATER TABLE HOLLOW STEM AUGER MONITOR WELL	710-0783A
5	CONCEPTUAL WELL CONSTRUCTION SCHEMATIC, UNIT B MUD ROTARY MONITOR WELL	710-0782A

ACRONYMS AND ABBREVIATIONS

1,1-DCE	1,1-Dichloroethylene
AGAWP	Additional Groundwater Assessment Work Plan
bls	Below land surface
CMS	Corrective Measures Study
DTSC	California Environmental Protection Agency, Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
H+A	Hargis + Associates, Inc.
PVC	Polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
the Site	1901 West Malvern Avenue, Fullerton, California
SOPs	Standard Operating Procedures
SPT	Standard Penetration Testing
Target Zone	Site Conceptual Groundwater Model Hydrostratigraphic Unit B
ug/l	Micrograms per liter
VOCs	Volatile Organic Compounds

## ADDITIONAL GROUNDWATER ASSESSMENT WORK PLAN

ADDENDUM NO. 5

RAYTHEON COMPANY  
(FORMER HUGHES AIRCRAFT COMPANY)  
1901 WEST MALVERN AVENUE  
FULLERTON, CALIFORNIA

## 1.0 INTRODUCTION

This Additional Groundwater Assessment Work Plan (AGAWP) Addendum No. 5 has been prepared by Hargis + Associates, Inc. (H+A), on behalf of Raytheon Company, for the former Hughes Aircraft Company facility located at 1901 West Malvern Avenue, Fullerton, California (the Site) (Figures 1 and 2). The proposed groundwater assessment will be conducted in association with the general requirements of a Resource Conservation and Recovery Act (RCRA) Corrective Action Consent Agreement (California Environmental Protection Agency, Department of Toxic Substances Control [DTSC], 2003).

In December 2007, volatile organic compounds (VOCs) and 1,4-dioxane were detected for the first time in groundwater samples collected from monitor well MW-26C as described in the December 2007 and subsequent quarterly groundwater monitoring reports (H+A, 2008a). In response to this observation, additional groundwater assessment was proposed in four successive phases in 2008, 2009, 2010, and 2011 (H+A, 2008b, 2009b, 2010b, and 2011b). Well Construction Reports were prepared in 2009, 2010, 2011, and 2013 which detail the four successive phases of groundwater assessments completed since December 2007, which included the installation of monitor wells MW-27; MW-28; MW-29; MW-30 (dual-nested with MW-30A and MW-30B well screens); MW-31; MW-32 (triple-nested with MW-32A, MW-32B, and MW-32C well screens); MW-33; MW-34 (triple-clustered with three separate but closely-spaced well borings MW-34A, MW-34B, and MW-34C); MW-35 (triple-nested with MW-35A, MW-35B, and MW-35C well screens); MW-36; and MW-37; totaling 18 separate well screen/casing installations ranging in depths from 230 feet below land surface (bls) to 1,090 feet bls (H+A, 2009a, 2010c, 2011a, 2013b [in press]).

Three additional groundwater monitor wells are proposed to support evaluation and selection of the final groundwater clean-up plan, as part of the Corrective Measures Study (CMS) for the Site. In accordance with discussions with the DTSC in January 2013, this AGAWP Addendum No. 5 outlines additional groundwater assessment activities. Proposed monitor well MW-38 (within location A on Figure 3) will assess the potential for the presence of a hydraulically isolating geologic structure in the vicinity of recently installed monitor well MW-37 (Figure 2). Proposed monitor well MW-39 (within location B on Figure 3) will provide further delineation of the distribution of VOCs, principally 1,1-dichloroethylene (1,1-DCE), and 1,4-dioxane in the primary transport zone to the west of recently installed monitor well MW-36. For the purposes of this document the primary transport zone will be referred to as the Target Zone (also referred to as Site Conceptual Groundwater Model Hydrostratigraphic Unit B). Proposed monitor well MW-40 (within location C on Figure 3) will assess the hydraulic properties on the upgradient portion of the Site to evaluate potential injection of treated groundwater as part of the CMS.

## 1.1 PURPOSE AND SCOPE

This document describes tasks and procedures to obtain additional data required to assess the hydrogeologic conditions and distribution of VOCs and 1,4-dioxane in the Target Zone. The additional groundwater assessment described in this work plan will be conducted to support the CMS, and the data generated by these activities will be used in the Corrective Measures Implementation.

Field activities described in this work plan addendum will be conducted in accordance with the Groundwater Monitoring Work Plan and Sampling and Analysis Plan (H+A, 2003a); the AGAWP Revision 1.0, which includes Standard Operating Procedures (SOPs) (H+A, 2003b); the AGAWP Addendum No. 1, with Amendments A and B (H+A, 2004a, 2004b, and 2004c); applicable subsequent AGAWP addenda, attachments, and technical memoranda (H+A, 2008b, 2008c, 2008d, 2009b, 2009c, 2010a, 2010b, 2011b, and 2011c); Site Health and Safety Plan for Phase 2 RCRA Facility Investigation (H+A, 1996); and the Site Health and Safety Plan for CMS (H+A, 2003c).



This work plan addendum is organized as follows:

- Section 1 includes the purpose and organization of the report, and background information related to groundwater investigations.
- Section 2 presents the proposed additional groundwater assessment activities.
- Section 3 presents the activity and reporting schedules.
- Section 4 lists the references cited in this work plan addendum.

## 1.2 BACKGROUND

This section presents a summary of recent investigations conducted at the Site in late 2011 and 2012 that are pertinent to proposed additional groundwater assessment activities. Refer to the AGAWP Addendum No. 4 for a summary of Site conditions and background information related to groundwater investigations conducted prior to 2012 (H+A, 2011b).

In accordance with the AGAWP Addendum 4, two monitor wells were installed and sampled in 2012 to assess the depth of the Target Zone, and distribution of VOCs and 1,4-dioxane in the Target Zone west of the Site (H+A, 2013b [in press]). MW-36 was installed west of MW-32 along Brea Creek; and MW-37 was installed west of MW-34 (Figure 2). Water levels and water quality have been monitored periodically since their installation in 2012 (H+A, 2013a).

1,1-DCE and 1,4-Dioxane have been detected in the target zone at monitor well MW-36 at concentrations up to 140 micrograms per liter (ug/l) and 2.8 ug/l, respectively. Proposed monitor well MW-39 is located to the west of monitor well MW-36 to assess the distribution of these compounds.

VOCs and 1,4-dioxane have not been detected above maximum contaminant levels at monitor well MW 37, however, higher than expected water levels suggest that there may be geologic structure in the vicinity acting as a hydraulic barrier, or the well may not be screened in the target zone. Geophysical data collected at MW-37 suggest the well is screened in the Target Zone, however, there are alternative correlations possible that may suggest the well is screened

below the Target Zone. Water level elevations and trends at MW-37 suggest the well may be screened below the Target Zone. Proposed monitor well MW-38 will be constructed near the water table to assess whether there is a geologic structure in the vicinity of monitor well MW-37 that acts as a hydraulic barrier, or whether monitor well MW-37 is screened in a unit beneath the Target Zone.

End use of treated groundwater is an integral part of the final clean-up plan for the Site. Injection of treated groundwater is one of the end use options that will be evaluated in the CMS Report. Proposed monitor well MW-40 is located on the upgradient portion of the Site and will be installed in the Target Zone to assess hydraulic properties in this area to support evaluation of injection end use in this area.

## 2.0 ADDITIONAL PROPOSED GROUNDWATER ASSESSMENT

Additional groundwater assessment is proposed to assess the distribution of VOCs and 1,4-dioxane, assess geologic structure, and/or assess hydraulic properties at and to the west of the Site. The proposed tasks are broadly characterized below; a more detailed approach is outlined in subsequent sections.

- Install and sample one new monitor well (MW-38) screened at the water table in the vicinity of existing monitor well MW-37 west of the Site to evaluate water levels and water quality for hydrogeologic unit correlation and assessment of geologic structure in this area.
- Install and sample one new monitor well (MW-39) to the west of existing monitor well MW 36, to delineate the lateral distribution of VOCs and 1,4-dioxane within the Target Zone in this area.
- Install, conduct hydraulic testing, and sample one new monitor well (MW-40) on the upgradient southeastern portion of the Site to assess water quality and hydraulic properties to support evaluation of potential injection of treated groundwater in this area.

These three additional single-completion monitor wells will be installed as described in the following sections.

### 2.1 GENERAL APPROACH – WATER TABLE MONITOR WELL MW-38

Monitor well MW-38 is proposed to be installed in the vicinity of existing monitor well MW-37 located west of the Site (Figure 3 – Proposed Location A). The exact location of the well will be dependent on available access. In accordance with discussions with the DTSC in January 2013, MW-38 is proposed to be a single completion well screened across the water table to help correlate hydrostratigraphic units and evaluate geologic structure in this area, and to determine

if existing monitor well MW-37 is screened in the Target Zone and a potential hydraulic barrier exists, or if monitor well MW-37 is screened deeper than the Target Zone.

The total depth of monitor well MW-38 is proposed to be 200 feet bls, and constructed such that the well screen and filter pack interval occurs over the historical range in Target Zone water levels in the area. Monitor well MW-38 is proposed to be screened from approximately 145 to 195 feet bls with filter pack from 135 to 200 feet bls. All depths will be verified in the field. A conceptual well construction schematic is provided in Figure 4.

The proposed monitor well MW-38 will be constructed using hollow stem auger drilling techniques which will minimize disruption in the neighborhood as compared to the mud-rotary method used to install nearby monitor well MW-37. A 10-inch diameter borehole will be drilled with lithologic logging conducted from about 10 feet above the target well screen interval to the bottom of the borehole using Standard Penetration Testing (SPT) or California-Modified SPT drive samples collected at 5-foot intervals, to the extent feasible. Lithologic logging will not be conducted from land surface to 10 feet above the top of the well screen as this monitor well will be in the immediate vicinity of monitor well MW-37, which was lithologically logged during prior well construction.

Monitor well MW-38 will be installed and sealed in accordance with applicable work plans and the SOPs presented in Appendix A of the AGAWP and amendments (H+A, 2003b and 2011c). The screen interval will consist of 50 feet of nominal 4-inch diameter schedule 80 polyvinyl chloride (PVC) 0.020 inch factory slotted well screen with #2/12 sand filter pack extending 10 feet above the top of the well screen. The blank casing will consist of nominal 4-inch diameter schedule 80 PVC, and the annular seal will consist of approximately 5 to 10 feet of granular bentonite above the filter pack and neat cement or bentonite-cement (approximately 5 percent bentonite) above the granular bentonite seal to land surface.

Lithologic logging, well construction, and annular grouting will be conducted under the supervision of a California Registered Professional Geologist.

The well will be developed using a combination of the following methods: bailing, swabbing/surging, and/or pumping. Following well development, a dedicated electric submersible pump will be installed for purging and sampling purposes. After the monitor well has been installed and developed, the well will be sampled twice within approximately 2 weeks and water level data will be collected and evaluated.

Initial and confirmation groundwater sampling will be conducted in accordance with SOPs for groundwater sampling (H+A, 2003b). Groundwater samples will be analyzed for VOCs using U.S. Environmental Protection Agency (EPA) Method 8260B and for 1,4-dioxane using EPA Method 8270 modified for this compound. A Quality Assurance Project Plan for groundwater sampling activities has been provided in Appendix B of the AGAWP (H+A, 2003b).

Results of water level and water quality monitoring at MW-38 will be evaluated to determine if there is a geologic structure acting as a hydraulic barrier in the vicinity of monitor well MW-37 resulting in relatively high water levels throughout the hydrostratigraphic column, or if monitor well MW-37 is screened in a unit beneath the Target Zone. There are two potential expected outcomes after installation of MW-38:

1. If the water level elevation in monitor well MW-38 is generally similar to or higher than those measured in monitor well MW-37, then there is likely a geologic structure that provides hydraulic isolation in this area. Under this scenario, additional assessment would not be required at this location and one or both of the monitor wells (MW-37 and/or MW-38) may not be required. An additional work plan would be prepared in the event that one or both of these monitor wells are proposed to be destroyed.
2. If water level elevations in monitor well MW-38 are substantially lower than in monitor well MW-37, and consistent with water level elevations and trends at nearby Target Zone monitor wells, then MW-37 is likely screened in a deeper unit than the Target Zone. Under this scenario, there are two potential depth intervals for the Target Zone that are above the zone in which monitor well MW-37 is screened. One of the two depth intervals is at/near the water table and, as such, the newly installed monitor well MW-38 could serve as the Target Zone monitor well in this area; the other depth interval is approximately 380 to 450 feet bls, which might require installation of an additional

monitor well screened across this interval at this location, depending on the results of groundwater monitoring at monitor well MW-38. Water levels and groundwater samples will be collected from monitor well MW-38 over three months. If groundwater samples collected from monitor well MW-38 contain 1,1-DCE, then monitor well MW-38 would likely represent a Target Zone monitor well and an additional monitor well would not be required at this location. Otherwise, an additional monitor well may be constructed in this general vicinity with a screened interval in the approximate interval from 380 to 450 feet bls. If an additional monitor well is proposed, a work plan addendum will be provided to DTSC for review and approval.

## 2.2 GENERAL APPROACH – TARGET ZONE MONITOR WELLS MW-39 AND MW-40

Two new monitor wells are proposed to be drilled to depths intercepting the projected bottom of the Target Zone at selected locations (Figure 3 – Potential Locations B and C). The depth to the bottom of the Target Zone is anticipated to be approximately 1,040 feet bls at monitor well MW-39 (proposed location “B”), and approximately 850 to 1,000 feet bls at monitor well MW-40 (proposed location “C”). Pilot boreholes for geophysical logging at these monitor well locations will be drilled to total depths that are about 100 to 200 feet below the projected bottom of the Target Zone, approximately 1,140 feet bls, and 1,100 feet bls, at proposed locations “B”, and “C”, respectively.

The proposed monitor wells will be single-completion screened within the Target Zone. Proposed monitor wells will be located approximately as shown on Figure 3 (locations B and C). The proposed monitor wells will be constructed using mud-rotary drilling techniques with the capability of collecting core samples from selected depth intervals as the borehole is advanced. Monitor well construction will consist of the following sequential program (Figure 5):

- Advance a 6- to 8-inch diameter pilot borehole to obtain lithologic aggregate samples from mud returns, and potentially collect a core sample of the coarse zone at the proposed screen interval and the fine zone immediately under the base of the Target Zone. After the coring has been completed at each depth, if conducted, continue to drill until the pilot borehole has been advanced to the total depth. Depending on driller

capabilities, a single 12¼-inch diameter borehole may be drilled in a single pass in lieu of a smaller diameter pilot borehole which is subsequently reamed to 12¼-inch diameter.

- A suite of geophysical logs will be run in each pilot borehole. The suite of geophysical logs will be the same as previously used for the geophysical logging of exploratory borings EB-1 through EB-4 and monitor wells MW-27, MW-28, and MW-30 through MW-37, and will be conducted by the same geophysical logging contractor, Pacific Surveys, Claremont, California (H+A, 2000, 2005, 2009a, 2010c, 2011a, and 2013b [in press]). After the bottom of the Target Zone and the target screen interval has been confirmed, the portion of the pilot borehole below the target screen interval at each well will be sealed with cement grout prior to reaming the borehole to final diameter and installation of the monitor well.
- Before grouting the lower portion of each pilot borehole, it will be confirmed that the borehole is clear to the total depth of the boring. A tremie pipe will be installed to the bottom of each borehole to pump a neat cement or bentonite-cement (no greater than 5 percent bentonite) grout through the tremie pipe. The cement grout specifications will be the same as those specified in previous work plans and SOPs for monitor well annular seals.

Soil cores, to the extent collected, will be logged and stored in labeled core boxes until the CMS Report has been finalized and accepted by DTSC. Monitor wells will be installed and sealed in accordance with applicable work plans and the SOPs presented in Appendix A of the AGAWP and amendments (H+A, 2003b and 2011c). Each screened interval will consist of 30 to 50 feet of nominal 4- to 6-inch diameter stainless steel wire-wrap well screen. The slot size and filter pack will nominally be 0.020-inch and #2/12, respectively, based on lithologic logging conducted at nearby monitor wells in the vicinity, but may be determined based on field evaluation of soil cuttings from the screen intervals and/or sieve analysis results from soil core sample(s) collected from within the respective screened interval, if conducted. If a core sample was not collected, the sieve analysis for soil core samples from other nearby monitor wells may be used to determine slot size and filter pack for the new monitor wells. The blank casing will consist of nominal 4- to 6-inch diameter schedule 80 PVC, and the annular seal below the approximate water table elevation will consist of high-solids (approximately 20 to 30 percent solids) bentonite

grout. Above the approximate water table elevation, neat-cement or bentonite-cement (approximately 5 percent bentonite) will be used to seal the upper portion of the annular space.

Lithologic logging, geophysical logging, well construction, and annular grouting will be conducted under the supervision of a California Registered Professional Geologist.

Wells will be developed using a combination of the following methods: bailing, swabbing/surging, air-lifting, and/or pumping. Following well development, a dedicated electric submersible pump will be installed in each well for purging and sampling purposes. After each monitor well has been installed and developed, the well will be sampled twice within approximately 2 weeks and water level data will be collected and evaluated.

Initial and confirmation groundwater sampling will be conducted in accordance with SOPs for groundwater sampling (H+A, 2003b). Groundwater samples will be analyzed for VOCs using EPA Method 8260B and for 1,4-dioxane using EPA Method 8270 modified for this compound. A Quality Assurance Project Plan for groundwater sampling activities has been provided in Appendix B of the AGAWP (H+A, 2003b).



### 3.0 PROJECT SCHEDULE AND REPORTING

The conceptual schedule for the Additional Groundwater Assessment tasks outlined in this AGAWP Addendum No. 5 has been developed based on the scope of work presented in this document and assumes a minimal amount of time to gain access to locations at the Site (Table 1).

As discussed during the January 2013 meeting with DTSC, it is anticipated that a status meeting with DTSC will be scheduled shortly after monitor wells have been installed and sample results are available. The primary goal of this meeting is to determine if additional groundwater monitor wells are required to support the CMS Report.

Descriptions and results of field activities, including lithologic logs, geophysical logs, well construction data, field sampling data including groundwater purge parameters, and analytical results of initial groundwater sampling will be provided in a Well Construction and Groundwater Sampling Report. This report will be submitted to DTSC within approximately 60 days of the completion of field activities described in this AGAWP Addendum No. 5.

#### 4.0 REFERENCES CITED

- California Environmental Protection Agency, Department of Toxic Substances Control (DTSC), 2003. Corrective Action Consent Agreement, Raytheon Company, 1901 W. Malvern Ave., Fullerton, California 92634, EPA ID No. CAD063109243. Docket HWCA: P3-01/02-001. January 15, 2003.
- Hargis + Associates, Inc. (H+A), 1996. Site Health and Safety Plan for Phase 2 RCRA Facility Investigation, Hughes Aircraft Company, Fullerton, California. December 9, 1996.
- \_\_\_\_\_, 2000. Well Construction and Groundwater Sampling Report, Raytheon Company, 1901 West Malvern Avenue, Fullerton, California. September 29, 2000.
- \_\_\_\_\_, 2003a. Groundwater Monitoring Work Plan and Sampling and Analysis Plan, Raytheon Company, (Former Hughes Aircraft Company), 1901 West Malvern Avenue, Fullerton, California. April 25, 2003.
- \_\_\_\_\_, 2003b. Additional Groundwater Assessment Work Plan, Revision 1.0, Raytheon Company, (Former Hughes Aircraft Company), 1901 West Malvern Avenue, Fullerton, California. April 25, 2003.
- \_\_\_\_\_, 2003c. Site Health and Safety Plan for Corrective Measures Study, Raytheon Company (Former Hughes Aircraft Company), Fullerton, California. June 9, 2003.
- \_\_\_\_\_, 2004a. Additional Groundwater Assessment Work Plan, Addendum No. 1, Raytheon Company (formerly Hughes Aircraft Company), 1901 West Malvern Avenue, Fullerton, California. March 23, 2004.
- \_\_\_\_\_, 2004b. Letter from C.G.A. Ross to W.F. Jeffers, DTSC, re Amendment A, Additional Groundwater Assessment Workplan Addendum 1, Former Raytheon Company Site, 1901 West Malvern Avenue, Fullerton, California. June 1, 2004.
- \_\_\_\_\_, 2004c. Letter from C.G.A. Ross to W.F. Jeffers, DTSC, re Amendment B, Additional Groundwater Assessment Workplan Addendum 1, Former Raytheon Company Site, 1901 West Malvern Avenue, Fullerton, California. July 29, 2004.
- \_\_\_\_\_, 2005. Deep Boring and Well Construction and Groundwater Sampling Report, Raytheon Company, 1901 West Malvern Avenue, Fullerton, California. March 28, 2005.
- \_\_\_\_\_, 2008a. Results of Groundwater Monitoring, December 2007, Raytheon Company (former Hughes Aircraft Company), 1901 West Malvern Avenue, Fullerton, California. January 31, 2008.
- \_\_\_\_\_, 2008b. Additional Groundwater Assessment Work Plan Addendum No. 2, Raytheon Company (formerly Hughes Aircraft Company), 1901 West Malvern Avenue, Fullerton, California. February 1, 2008.

- \_\_\_\_\_, 2008c. Letter to W. Jeffers, DTSC, from C. Ross and S. Netto, H+A, re Attachment 1, Additional Groundwater Assessment Work Plan, Addendum No. 2, Raytheon Company (former Hughes Aircraft Company), 1901 West Malvern Avenue, Fullerton, California. February 29, 2008.
- \_\_\_\_\_, 2008d. Technical Memorandum to W. Jeffers, DTSC, from S. Netto, H+A, re Proposed Location for Downgradient Unit CM1-B Monitor Well, Task 2 of Additional Groundwater Assessment Work Plan, Addendum No. 2, Raytheon Company (former Hughes Aircraft Company), 1901 West Malvern Avenue, Fullerton, California. September 12, 2008.
- \_\_\_\_\_, 2009a. Additional Groundwater Assessment Primary Transport Zone (Target Zone) Well Construction and Groundwater Sampling Report, Raytheon Company, 1901 West Malvern Avenue, Fullerton, California. March 26, 2009.
- \_\_\_\_\_, 2009b. Additional Groundwater Assessment Work Plan Addendum No. 2A, Raytheon Company (formerly Hughes Aircraft Company), 1901 West Malvern Avenue, Fullerton, California. March 26, 2009.
- \_\_\_\_\_, 2009c. Letter to W. Jeffers, DTSC, from C. Ross and S. Netto, H+A, re Summary of Monitor Well MW-31 Construction and Testing (Task 1) and Plan to Install and Test Off-Site Monitor Well MW-32 (Task 2), Raytheon Company (Former Hughes Aircraft Company), 1901 West Malvern Avenue, Fullerton, California. October 22, 2009.
- \_\_\_\_\_, 2010a. Transmittal of Results of Groundwater Monitoring and Groundwater Extraction and Treatment Pilot Testing, Fourth Quarter 2009, Raytheon Company, (Former Hughes Aircraft Company), 1901 West Malvern Avenue, Fullerton, California. February 9, 2010.
- \_\_\_\_\_, 2010b. Additional Groundwater Assessment Work Plan Addendum No. 3, Raytheon Company (Former Hughes Aircraft Company), 1901 West Malvern Avenue, Fullerton, California. October 15, 2010.
- \_\_\_\_\_, 2010c. Well Construction And Groundwater Sampling Report Additional Groundwater Assessment Primary Transport Zone (Target Zone) And Groundwater Extraction Treatment System Pilot Testing, Raytheon Company (Former Hughes Aircraft Company), 1901 West Malvern Avenue, Fullerton, California. November 18, 2010.
- \_\_\_\_\_, 2011a. Well Construction And Groundwater Sampling Report Additional Groundwater Assessment Primary Transport Zone (Target Zone), Raytheon Company (Former Hughes Aircraft Company), 1901 West Malvern Avenue, Fullerton, California. April 4, 2011.
- \_\_\_\_\_, 2011b. Additional Groundwater Assessment Work Plan Addendum No. 4, Raytheon Company (Former Hughes Aircraft Company), 1901 West Malvern Avenue, Fullerton, California. April 13, 2011
- \_\_\_\_\_, 2011c. Letter to W. Jeffers, DTSC, from C. Ross and S. Netto, H+A, re Amendment A, Additional Groundwater Assessment Work Plan Addendum No. 4, Former Raytheon Company Site, 1901 West Malvern Avenue, Fullerton, California. June 6, 2011.

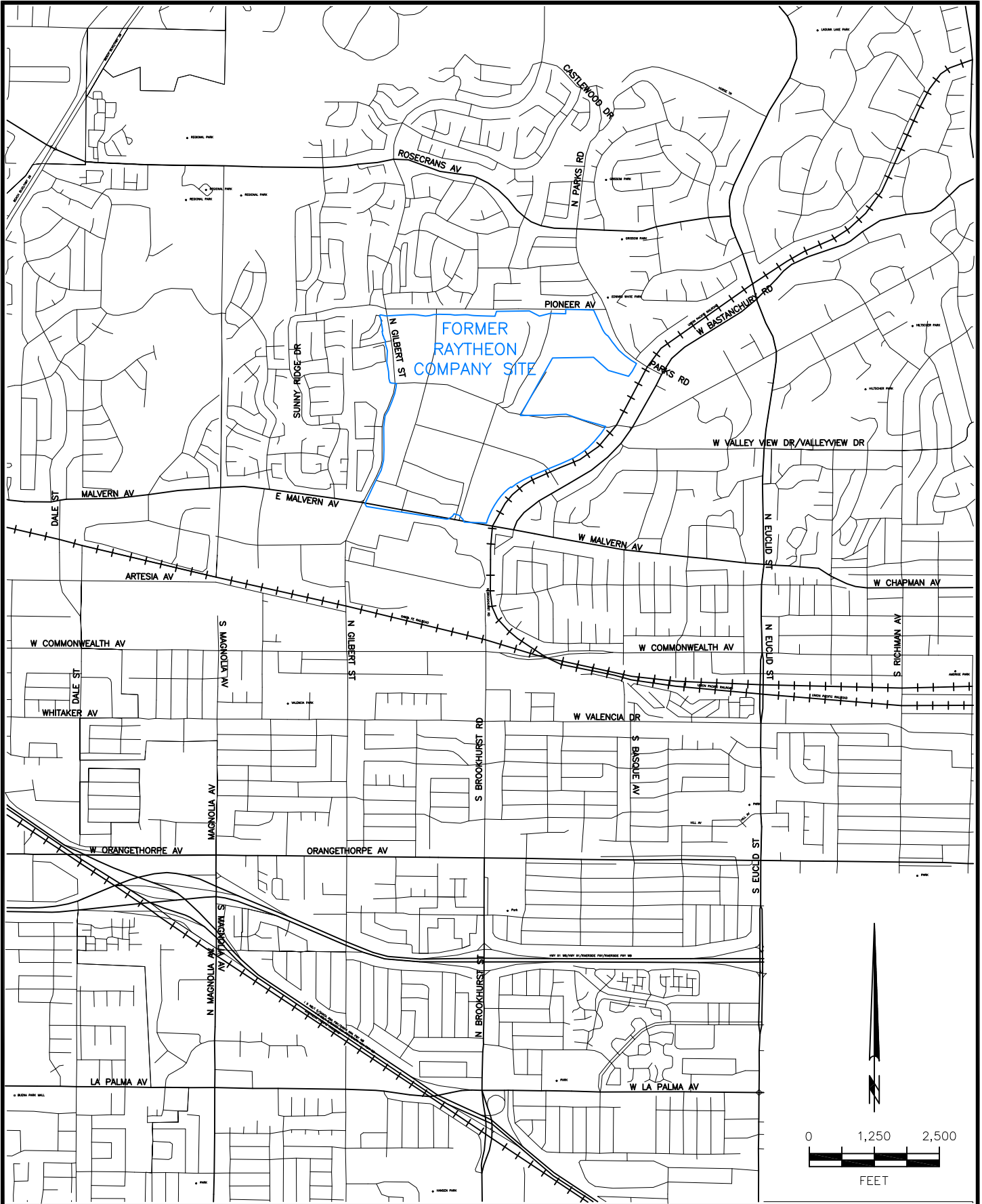
- \_\_\_\_\_, 2013a. Data Submittal for Groundwater Monitoring and Groundwater Extraction and Treatment Pilot Testing, Fourth Quarter 2012, Raytheon Company (Former Hughes Aircraft Company Facility), 1901 West Malvern Avenue, Fullerton, California. January 23, 2013.
- \_\_\_\_\_, 2013b, in press. Well Construction And Groundwater Sampling Report Additional Groundwater Assessment Primary Transport Zone (Target Zone), Raytheon Company (Former Hughes Aircraft Company), 1901 West Malvern Avenue, Fullerton, California. In preparation.

**TABLE 1  
PROJECT SCHEDULE**

<b>ITEM</b>	<b>TENTATIVE SCHEDULE (Months after DTSC Approval)</b>
DTSC Approval of Work Plan Addendum	0
Contracting	1 to 2
Monitor Well Access	
Locations "A" (MW-38)	2
Locations "B" (MW-39)	3
Locations "C" (MW-40)	2
Location "A" (MW-38)	
Construct	3
Develop/Set Pump	4
Initial and Confirmation Sampling	4
Location "B" (MW-39)	
Construct	4
Develop/Set Pump	5
Initial and Confirmation Sampling	5
Location "C" (MW-40)	
Construct	3 to 4
Develop/Set Pump	4 to 5
Initial and Confirmation Sampling	4 to 5
Meet with DTSC after sample results are available	6 to 7
Submit Monitor Well Construction Report	7

**FOOTNOTES**

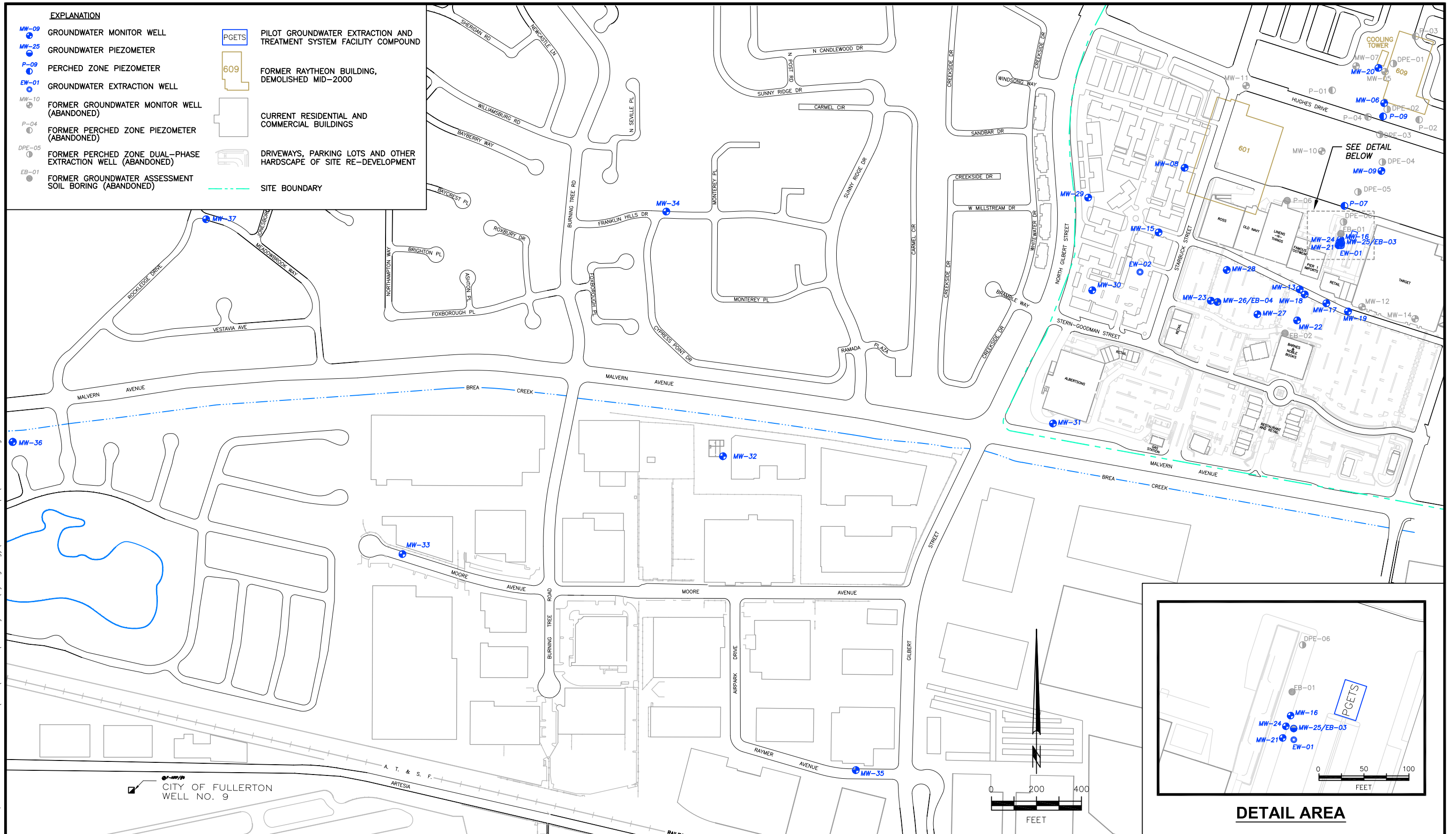
DTSC = California Environmental Protection Agency,  
Department of Toxic Substances Control



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**FIGURE 1. SITE LOCATION**

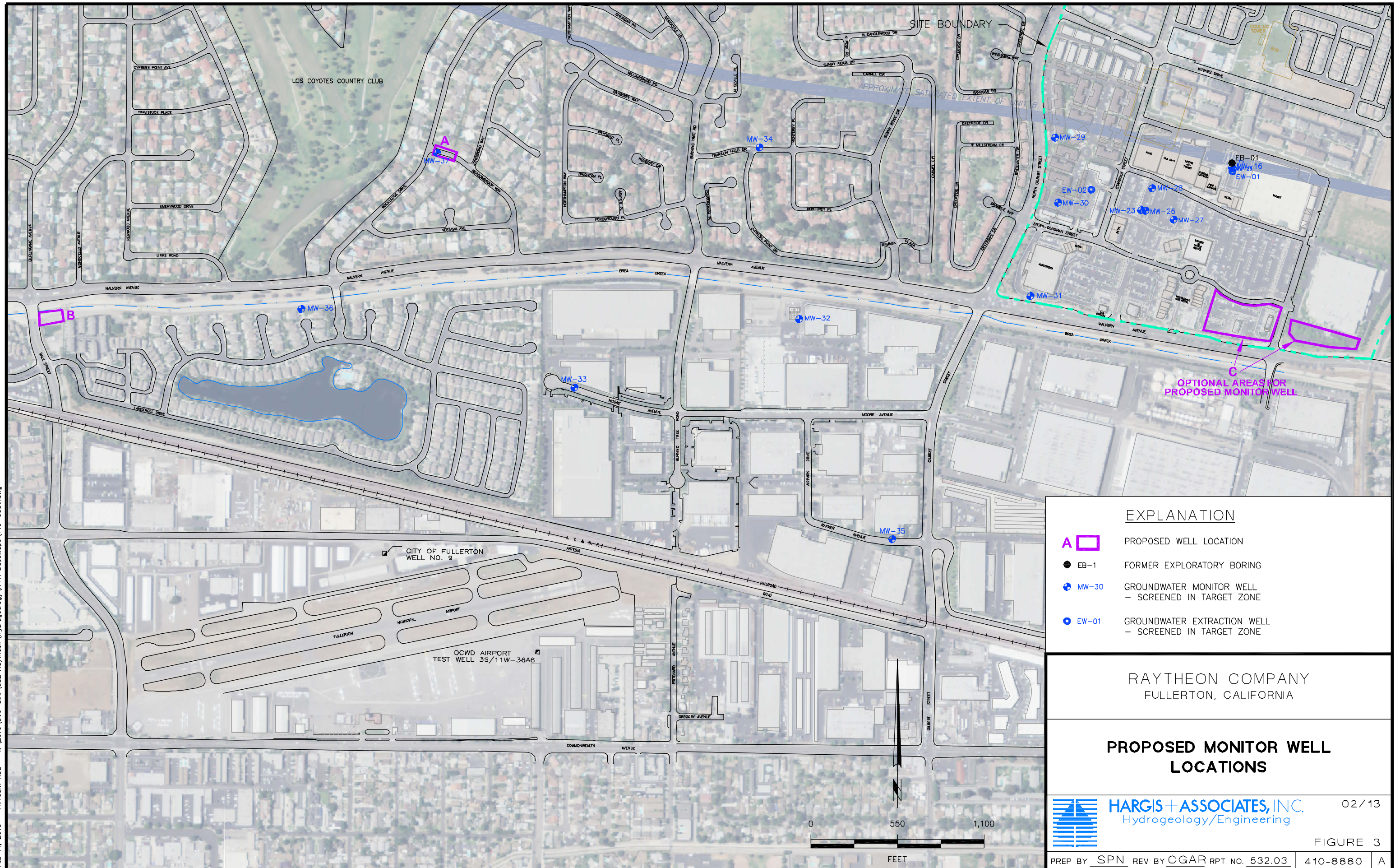
Jan 18, 2013 8:18am ADE - T: 2013\500-599\532 Raytheon Hydrogeology\H+A BaseMaps\410-8861.dwg



**FIGURE 2.**  
**WELL AND PIEZOMETER LOCATIONS**



Feb 11, 2013 - 11:15am ADE - T:\2013\500-599\532 Raytheon Hydrogeology\H+A BaseMaps\410-8880.dwg



EXPLANATION	
	PROPOSED WELL LOCATION
	EB-1 FORMER EXPLORATORY BORING
	MW-30 GROUNDWATER MONITOR WELL - SCREENED IN TARGET ZONE
	EW-01 GROUNDWATER EXTRACTION WELL - SCREENED IN TARGET ZONE

RAYTHEON COMPANY  
FULLERTON, CALIFORNIA

### PROPOSED MONITOR WELL LOCATIONS

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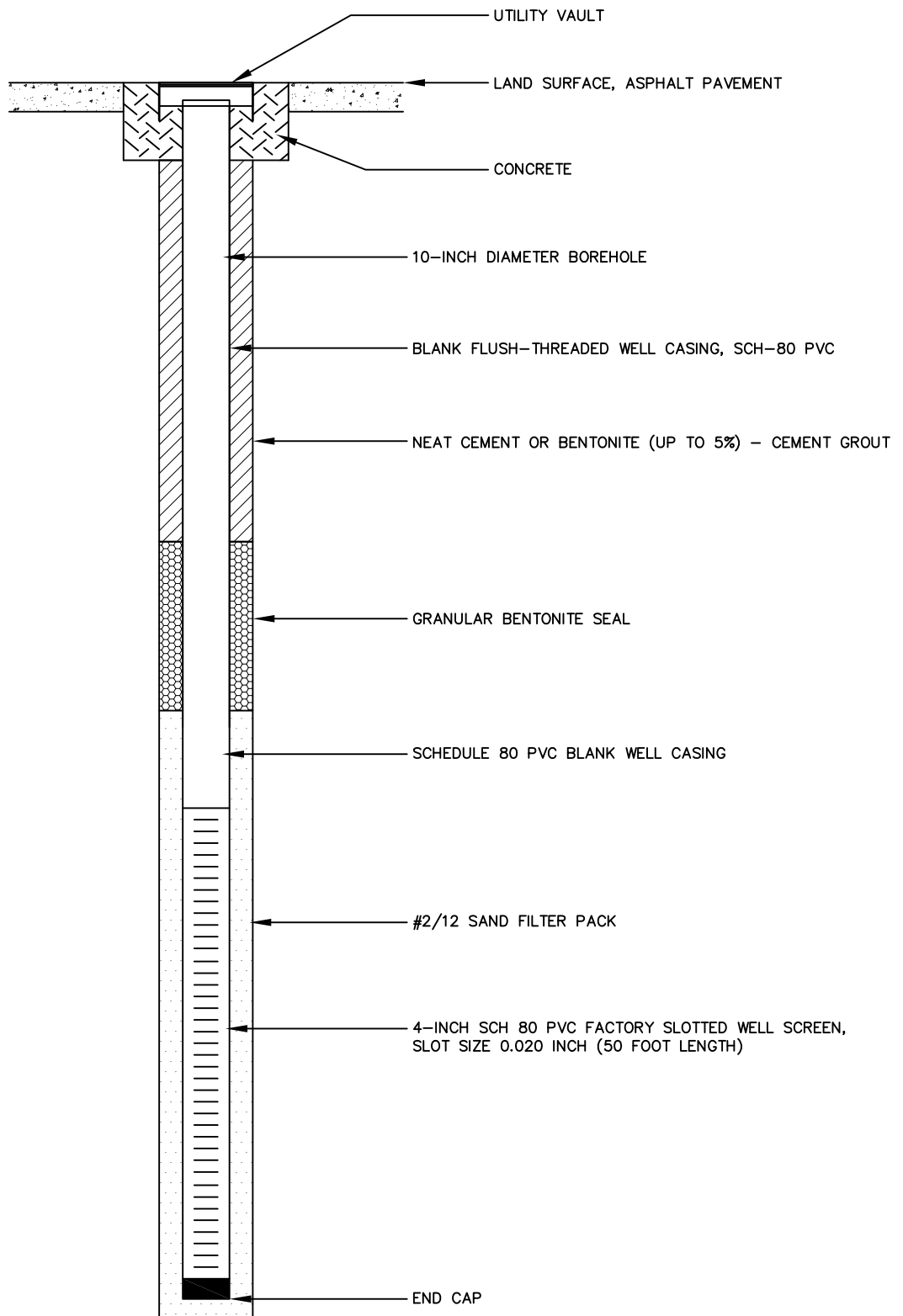
02/13

FIGURE 3

PREP BY SPN REV BY CGAR RPT NO. 532.03 410-8880 A







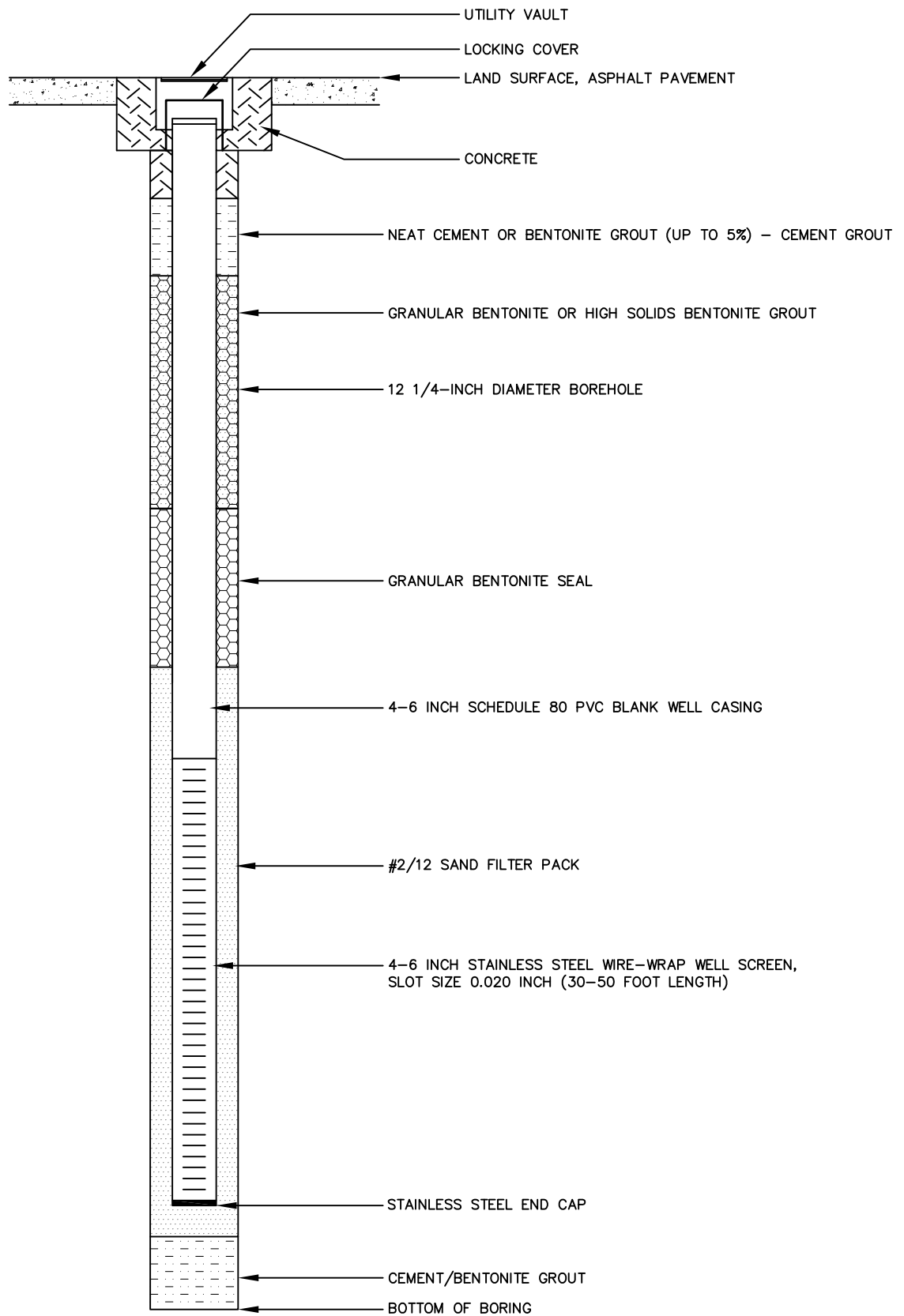
Feb 14, 2013 - 2:02pm ADE - T:\2013\500-599\532 Raytheon\Hydrogeology\WellDiag\710-0783.dwg

NOT TO SCALE



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**FIGURE 4.**  
**CONCEPTUAL WELL CONSTRUCTION SCHEMATIC**  
**WATER TABLE HOLLOW STEM AUGER MONITOR WELL**



NOT TO SCALE

Feb 14, 2013 - 1:26pm ADE - T:\2013\500-599-532 Raytheon\Hydrogeology\WellDiag\710-0782.dwg



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2/13 | RPT NO. 532.03 | 710-0782 | A

**FIGURE 5.**  
**CONCEPTUAL WELL CONSTRUCTION SCHEMATIC**  
**UNIT B MUD ROTARY MONITOR WELL**