SGI environmental THE SOURCE GROUP, INC.

December 15, 2014

Paul Cho, P.G.
Water Resources Control Engineer
California Regional Water Quality Control Board, Site Cleanup Unit IV
Los Angeles Region
320 West 4th Street, Suite 200
Los Angeles, CA 90013

Subject: Revised Work Plan for Further Evaluation of GMW-62 Light Non-Aqueous Phase Liquid; Defense Fuel Support Point Norwalk, 15306 Norwalk Boulevard, Norwalk, California (SCP NO. 0286A, Site ID NO. 16638)

Dear Mr. Cho:

On October 28, 2014, the Source Group, Inc. (SGI) on behalf of the Defense Logistics Agency Energy (DLA Energy), submitted a revised *Work Plan for Further Evaluation of GMW-62 LNAPL Plume*. On November 14, 2014 the Los Angeles Regional Water Quality Control Board (LARWQCB) responded with a review of the revised Work Plan and requested modifications.

The attached revised Work Plan incorporates the modifications requested which include:

1. Physical property testing for pore fluid saturation (API RP40) and free product mobility (Modified ASTM D425)
2. Photo documentation of core from each of the three new monitoring wells
3. Identification of the abandoned pipeline along eastern perimeter of the site

We appreciate the LARWQCB considering this request and reviewing the associated Work Plan. If you have any questions, please call me at (562) 597-1055.

Sincerely,

Ken E. Wall
Senior Project Engineer
The Source Group, Inc

Ec: Mr. Everett Bole, DLA Energy
Mr. Neil F. Irish, P.G., SGI
File: DFSP Norwalk – 04-NDLA-007

Enclosure:

Attachment A – Work Plan For Further Evaluation of GMW-62 LNAPL Plume

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REVISED WORK PLAN FOR FURTHER EVALUATION OF GMW-62 LNAPL PLUME

Defense Fuel Support Point Norwalk
15306 Norwalk Boulevard
Norwalk, California 90650

Prepared For:

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Prepared By:

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1.0 INTRODUCTION

This *Revised Work Plan for Further Evaluation of GMW-62 LNAPL Plume* (Work Plan) was prepared by The Source Group, Inc. (SGI), on behalf of the Defense Logistics Agency - Energy (DLA-Energy). This Work Plan was requested by the Regional Water Quality Control Board (RWQCB) in conjunction with the ongoing assessment and remediation of soil and groundwater at the Defense Fuel Supply Point Norwalk facility (DFSP Norwalk). The RWQCB required that DLA-Energy evaluate the occurrence of light, non-aqueous phase liquid (LNAPL) present in off-site groundwater monitoring well GMW-62. Recent gauging of this well showed that greater than one foot of LNAPL is present. Although, recovery of LNAPL is ongoing, additional investigation of the area to the east of GMW-62 is justified to determine whether recoverable LNAPL is present.

Groundwater monitoring well GMW-62 is located on City of Norwalk-owned property adjacent to the eastern boundary of DFSP Norwalk. GMW-62 is situated within Holifield Park and thus access to the Park and the well must be performed in accordance with the conditions of an access agreement issued by the City.

GMW-62 was installed between a walking path and a baseball field. Based on previously collected assessment data, there is reason to believe that the LNAPL detected in GMW-62 extends further to the east. However, the area east of GMW-62 is nearer to the baseball field. The proximity of the athletic field requires that consideration be given during planning for the placement of additional wells to ensure that such new wells do not pose a safety risk to park and baseball field users.

1.1 Site Location and Vicinity

The DFSP Norwalk facility is a 50-acre facility that formerly included 12 aboveground storage tanks used for storage of Jet Propellant No.4 (JP-4), JP-5, and JP-8. Aviation gasoline was reportedly distributed at the truck rack, but not stored in the aboveground tanks. Santa Fe Pacific Pipeline, L.P. (SFPP), an operating partner of Kinder Morgan Energy Partners, L.P. (KMEP), leases a 2-acre easement along the southern and eastern boundaries of DFSP Norwalk for operation of its pipelines, which convey gasoline, diesel, and jet fuel. Within the southern easement lie three active pipelines, one of which is a 16-inch diameter pipeline, designated LS-1 that bends at the southeastern corner of the facility and continues northward within the eastern easement. An abandoned pipeline, likely owned or formerly operated by Golden West Pipeline, also runs along the eastern boundary of the site. DLA-Energy has decommissioned the site, but SFPP pipelines continue to operate.

1.2 Objective of the Workplan

This Work Plan presents the rationale and investigation methods to further evaluate the subsurface occurrence and potential migration pathways of LNAPL present in the vicinity of GMW-62. The

findings of the proposed investigation will be used to evaluate the need to modify or expand current remediation activities. The potential occurrence of a new release will also be evaluated.

1.3 Background

During a meeting in October 2003 between the California Regional Water Quality Control Board, Los Angeles Region, (RWQCB) and DLA-Energy (formerly known as the Defense Energy Supply Center or DESC), the RWQCB requested that additional groundwater monitoring wells be installed along the eastern site boundary to delineate the eastern extent of the shallow aquifer dissolved plume. In April 2004, pursuant to the RWQCB's request, two groundwater-monitoring wells, designated GMW-60 and GMW-61 (Figure 2 through Figure 4), were installed along the eastern site boundary. Volatile organic compounds (VOCs) and total petroleum hydrocarbons (TPH) as JP-5 were detected in some soil and groundwater samples from these two wells. Detected VOCs included lighter-end petroleum compounds, including benzene, toluene, ethylbenzene, and xylenes (BTEX), 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene. No methyl tertiary-butyl ether (MTBE) was detected in the groundwater samples from GMW-60 or GMW-61. Tertiary-butyl alcohol (TBA) has been reported in both GMW-60 and GMW-62 at concentrations ranging up to 1,200 micrograms per liter (µg/L; reported in GMW-60 on April 17, 2014) and 210 µg/L (reported in GMW-61 on October 8, 2013). TPH as JP-5 was detected in soil samples collected at 10 and 30 feet below ground surface (bgs) during the installation of GMW-60.

Additional drilling and soil sampling activities were performed west of GMW-60 in the northeastern part of the DFSP Norwalk site in July 2004. No soil impacts were detected during the step-out soil investigation west of GMW-60. However, TPH as gasoline (TPH-G), TPH as free product (TPH-FP), and BTEX were detected in the groundwater samples. In a letter dated February 16, 2005, the RWQCB requested that DLA-Energy and KMEP investigate the eastern boundary area of the subject site to evaluate the extent of affected groundwater in the eastern area and to identify the source of the impact. Consequently, KMEP and DLA-Energy jointly conducted soil and groundwater investigations in the eastern boundary area of the facility in July 2005, and in the eastern boundary area and the adjacent off-site area in the west side of Holifield Park in August 2006. Results from these investigations were presented in the *Eastern Boundary and Eastern Boundary Off-Site Area Soil and Groundwater Preliminary Investigation Report* (Parsons, 2006). No source area of the LNAPL was identified.

As part of the ongoing evaluation of the occurrence of LNAPL in Holifield Park, groundwater well GMW-62 was installed in 2007. Although the well did not show product when installed in 2010, LNAPL was detected when the well was monitored in January 2011. LNAPL in this well has persisted, with a slowly increasing trend in thickness. Although the source of the LNAPL present in GMW-62 has not been definitively determined, DLA-Energy has assumed the responsibility for the recovery of LNAPL and for conducting the assessment of soil, soil gas, and groundwater

conditions as directed by the RWQCB. Groundwater monitoring wells GMW-63, GMW-64, GMW-65 were subsequently installed between 200 and 500 feet northeast and southeast of GMW-62. Although these wells have contained low concentrations of petroleum hydrocarbons, no LNAPL has been detected.

2.0 SITE GEOLOGY AND HYDROGEOLOGY AND GMW-62 LNAPL

The *Conceptual Site Model and Remedial Action Evaluation for Soil, Groundwater and LNAPL* (Parsons, 2013), provides a detail description of the site geology and hydrogeology. A summary of this information is provided in this section as well as a summary of the occurrence of LNAPL at GMW-62.

2.1 Site Geology

DFSP Norwalk is located between the Montebello Forebay and the Downey Plain in the Central Basin pressure area. Approximately 50 to 60 feet of alluvium (primarily sand, gravel, silt, and clay) cover the underlying Lakewood Formation in this area. Alluvial sediments exposed in the area of the site include mixtures and layers of sand, gravel, silt, and clay. The underlying Lakewood Formation consists of marine and continental gravel, sand, silt, and clay deposits, under which the San Pedro Formation, approximately 300 feet below grade, consists of marine and continental gravel, sandy silt, silt, and clay deposits.

Lithologic logs of borings drilled during previous investigations indicate that sediments beneath the site consist of clayey silt, sandy silt, silty sand, fine- to coarse-grained sand, and deeper coarse-grained sand with granitic cobbles. The top of a clay layer, preliminarily identified as the uppermost sediment layer of the Bellflower Aquitard, was encountered at a depth of approximately 55 to 65 feet during previous investigations.

2.2 Site Hydrogeology

A shallow semiperched aquifer, consisting of silt and fine- to coarse-grained sand, exists in the alluvial sediments underlying the site. Groundwater from this semiperched aquifer was reported between 24 and 34 feet bgs between January and March 2010, and has been decreasing since 2010. The water level data indicate that static groundwater flow direction within this aquifer is generally toward the northwest, but is contained by the active groundwater extraction systems operating at the site. This shallow aquifer is approximately 30 to 35 feet thick, based on the reported presence of a clay layer at approximately 55 to 65 feet below grade. The Exposition Aquifer underlies the Bellflower Aquitard. Groundwater depths within the Exposition Aquifer range between 49 and 56 feet below grade with a reported gradient toward the southeast.

Recent groundwater level declines in the shallow aquifer have resulted in localized increases in LNAPL thicknesses reported at the site.

2.3 GMW-62 Area

Recent liquid level gauging conducted April 15, 2014, indicated a measured LNAPL thickness of 2.69 feet GMW-62. The first notable increase in free product was reported in the second semi-

annual monitoring event of 2013. Parson's *Second Semiannual 2013 Groundwater Monitoring Report* (Parson, 2013) reported a free product thickness of 1.78 feet. The previous readings were typically less than .5 feet. Previous investigations in the vicinity of GMW-62, including soil, soil gas, and Ultraviolet Optical Screening Tool (UVOST) investigations, did not identify a potential shallow source of the observed GMW-62 LNAPL. Soil matrix samples and soil gas samples contained very low to non-detectable concentrations of petroleum hydrocarbons. Thus, a source area could not be identified. However, groundwater data collected during these investigations provides details as to the distribution of the highest concentrations of hydrocarbons in the shallow, semiperched aquifer.

UVOST was used at borehole location UV-12 (Appendix A, Figure 1-2). The borehole was located along the east perimeter of the site adjacent to Holifield Park and between wells GW-15 and GW-62. Free product (0.11 feet) was measured in GW-15 and 0.18 feet of free product was measured at GMW-62 in October 2010. The UVOST log indicated a moderate UV reflectance spike at a depth of 29.8 to 30.1 feet bgs. The waveform character in the "callout" for this interval indicated a kerosene (jet fuel) type source. The UVOST log did not indicate any contamination below 31 feet.

A soil sample was collected at location UV-12 at a depth of 30 feet bgs, in the exact interval of the moderate UV reflectance spike. The composition of the hydrocarbon fractions was further analyzed to determine more precise characteristics of the hydrocarbons. Low concentrations of TPH as JP-5 were more prevalent. In addition to the TPH analyses, the soil sample was also analyzed for VOCs. No oxygenates (MTBE, TBA, and others) were detected.

Appendix A provides a summary map (Figure 5) from Parson's January 25, 2008, work plan entitled *Holifield Park Supplemental Investigation and Groundwater Remediation Work Plan.* As indicated in Parson's Figure 5, direct push boring B-120 contained elevated concentrations of TPH-FP and TPH-G as well as BTEX. Groundwater monitoring well GMW-62 is located within 20 feet of B-120, thus indicating that elevated TPH and BTEX concentrations found in a direct push boring water sample are potentially indicative of the occurrence of LNAPL. This observation was used to select the location of additional groundwater monitoring wells proposed in this work plan.

2.4 Conceptual Site Model

Groundwater monitoring well GMW-62 was installed in 2007 as part of an evaluation of the occurrence of LNAPL in Holified Park. Although dissolved phase hydrocarbons were initially detected in GWM -62, it was not until January 10, 2011, that LNAPL was detected in the well. Subsequently, LNAPL has been regularly, but not always, detected in GWM-62. The source or sources of the LNAPL observed in GMW-62 has not been found. However, because of the proximity of the well to a pipeline easement that traverses the eastern boundary of DFSP Norwalk, a historical release of product cannot be ruled out.

Site assessments conducted in the vicinity of the GMW-62, both on the DFSP Norwalk property and the Holifield Park land, have failed to detect the presence of shallow contamination (in either soil gas or soil matrix samples) that would be indicative of a surface or near surface petroleum release. Soil gas and soil matrix data collected during investigations of this portion of DFSP Norwalk consistently show that elevated concentrations of petroleum hydrocarbons occur only at depths greater than 20 feet and in the vicinity of the groundwater table. Thus, the distribution mechanism of the subsurface hydrocarbons and LNAPL must be via groundwater transport laterally away from a yet to be determined source area.

The current conceptual model that explains the observed distribution of hydrocarbons and LNAPL is that an undocumented release of a petroleum product occurred in the past from one of the pipelines present in the vicinity of GMW-62 (see Appendix B, Figures 1). Three pipelines have been historically present in a pipeline easement approximately 25 feet wide; however, the western most pipeline was removed by DLA Energy in 2012 (Appendix B, Figure 2).

It is assumed that one of the pipelines present in the easement was repaired at least 10 years ago (the presence of dissolved phase TBA in the groundwater suggests that the release occurred when either MTBE or TBA were used as fuel oxygenates) and during that repair shallow, contaminated soil was excavated and removed from the site. This undocumented and speculated pipeline repair explains why no shallow hydrocarbons have been discovered at the site. Further masking the likely source of the contamination is that due to safety reasons, all previous assessments have been performed outside of the pipeline easement. Assuming that the pipeline release occurred within 100 feet of GMW-62 along the 25-feet wide, pipeline easement, a minimum of a 2,500 square area has not been assessed due to safety setback requirements. It is therefore extremely likely that source of the release may not be discovered until all of the pipelines are removed and a final assessment of the pipeline easement can be completed.

Another factor suggesting that no new release occurred in the area is the groundwater chemistry. A new release would be expected to change the character of the lighter end, and more readily biodegradable hydrocarbons present in the groundwater. Using the benzene concentrations in nearby GMW-60 and GMW-61 as proxies for evidence of a release, there is no indication that unweathered fuel has recently entered the environment. GMW-60 is located 75 feet northwest of GMW-61 and GMW-61 is located 80 to the southwest. The benzene concentrations in these two wells have decreased markedly since 2004 when both the wells were first sampled: The initial benzene concentrations in GMW-60 and GMW-61 were 1,700 µg/L and 2,400 µg/L, respectively, in 2004. The 2014 groundwater monitoring data indicated benzene concentrations of 11 µg/L and 9.9 µg/L. Thus, these wells do not provide any evidence of a new or recent release.

The occurrence of free product in GMW-62 may be best attributed to the effects of a nearby source and a falling groundwater table. Figure 3 in Appendix B depicts groundwater elevation and LNAPL thicknesses in GMW-62. Since the well was first installed in 2007, the groundwater elevation in GMW-62 has fallen over 6 feet. A falling groundwater table often results in the occurrence or re-

occurrence of LNAPL in groundwater monitoring wells that intersect LNAPL-containing sediments. As a recent and relevant example, note that KinderMorgan wells MW-SF-1, -4-, -1, and – 12 located in the south-central portion of DFSP Norwalk have not contained measurable LNAPL for several years. However during the spring of 2014 groundwater monitoring and sampling event, up to 6 feet of LNAPL was found to be present in the these wells. After a thorough assessment of their pipeline infrastructure, KinderMorgan attributed that reoccurrence of the LNAPL in these wells to a falling groundwater table. Given that the KinderMorgan wells and GMW-62 have similar screen intervals, intersect similar lithologies, and are located in the vicinity of a known or suspected fuel release source, it is reasonable to assume that a similar mechanism that caused the recurrence of LNAPL in the KinderMorgan wells is responsible for the occurrence of LNAPL in GMW-62.

3.0 PROPOSED INVESTIGATION

This investigation will consist of the installation of three groundwater monitoring wells. The proposed wells will be used to obtain groundwater gradient data, for groundwater sampling, and if present, the recovery of LNAPL. Three predetermined locations for the monitoring wells have been determined through the analysis of data collected from soil borings and cone penetrometer test (CPT) soundings previously completed in Holifield Park.

3.1 Selection of Proposed Monitoring Well Locations

As with previous direct push boring location B-120 (adjacent to the location of GMW-62), direct push borings B-117 and B-118 revealed elevated BTEX levels, and B-118 revealed elevated TPH levels (Appendix A, Figure 5). The concentrations of either TPH or BTEX at these locations were comparable to concentrations found at B-120. Direct push borings located further to the northeast, east, and southeast, including borings B-116, B-41, B-54, B-45, and B-48, did not reveal elevated concentrations of TPH or BTEX, thus providing control as to the lateral eastward distribution of LNAPL present at GMW-62.

Therefore, monitoring wells are proposed to be placed near former direct push borings B-117 and B-118, and a third between B-117 and B-118. Due to the presence of the baseball playing field, the wells will be installed approximately 35 feet west of the north-south line described by B-117 and B-118 (Figure 4). The wellhead completions could pose a risk to ball field users and thus the locations of borings B-117 and B-118 were avoided.

The proposed groundwater monitoring wells will follow the previous numbering scheme: Using GMW-62 as a point of reference, GMW-67 will be installed 100 feet to the northeast, GMW-68 will be installed 68 feet due east, and GMW-69 will be installed 100 feet to the southeast of GMW-62 (Figure 4).

3.2 Scope of Work

The proposed groundwater investigation will include the installation of three groundwater monitoring wells. At each location, the initial borehole will be drilled to a target depth of approximately 45 feet bgs using hollow stem auger with continuous coring to document the site lithology and identify the target lithologic zone for the well screen. The wells will be completed with at-grade wellboxes, developed, surveyed, and included in the site groundwater monitoring program.

To further refine the characterization of LNAPL-containing soil, physical parameter testing of soil samples for free product mobility and pore fluid saturation will be conducted. The performance of this testing assumes that one or more of the wells will intersect LNAPL-containingg soils.

An evaluation will also be done to determine if a new release has occurred. This will include sampling free product from GMW-62 and reviewing observations of KinderMorgan wells that have had notable increases. KinderMorgan operational records will also be reviewed. In addition, SGI will research owner, operator and operational status of the unidentified pipe line that runs through the north-south pipeline easement along the eastern end of the property.

3.3 Preparatory Activities

The site- and task-specific health and safety plan (HASP) will be updated prior to field work. SGI and subcontractor personnel will be required to familiarize themselves with the HASP, sign the HASP prior to working on site, and adhere to the provisions of the HASP during all aspects of field work. The HASP identifies the specific chemical compounds known to exist in the subsurface at the site. In addition, the HASP presents the chemical properties of the identified and typical compounds and identifies task-specific health and safety risks.

Prior to the initiation of field activities, monitoring well installation permits will be obtained from the Los Angeles County Department of Health Services. Additionally, the proposed drilling locations will be pre-marked at the Site. Underground Service Alert (USA) will be notified to identify any potential subsurface utilities, and the drilling locations will be cleared of subsurface utilities and structures using geophysical survey methods. As an added precaution to ensure that no underground utility is disturbed, each drilling location will be cleared manually using a hand auger and/or posthole digger to a minimum of 5 feet bgs).

The RWQCB will be notified a minimum of 48 hours prior to the initiation of field activities.

3.4 Drilling, Soil Sampling, and Well Installation

The proposed investigation includes three locations, as shown on Figure 4. At each location, a well will be installed to allow for the monitoring of groundwater in the shallow, semiperched aquifer. SGI will supervise the drilling, installation, and development of the wells. The installation of the groundwater monitoring wells will be performed using a CME-75 or CME-95 hollow-stem-auger (HSA) drill rig (or equivalent) equipped with 10-inch-outside-diameter augers and operated by a California-licensed drilling contractor.

Based on the an assumed depth to groundwater of approximately 25 feet below grade, the soil borings for the wells will be advanced to a total depth of 45 feet bgs. After initial hand-augering to 5 feet below grade, the HSA drilling will include the collection of a total of eight five-foot continuous core samples to allow for the detailed lithologic observation of the soil. Subsections 3.4.1 and 3.4.2 below provide details of analyses for the different intervals.

The wells will be constructed following the July 1995 CalEPA guidance manual “Monitoring Well Design and Construction for Hydrogeologic Characterization.” The general construction (figure 6)

of the wells will entail the use of four-inch diameter Schedule 40 polyvinyl chloride (PVC) with total depth of 45 feet bgs. The wells will be constructed with machine-milled slotted screen intervals between 15 to 45 feet bgs. The annulus of the borehole will be filled using sand pack from total depth to approximately 2 feet above the top of the screen interval (to approximately 13 feet bgs), a three-foot-thick hydrated bentonite chip seal to approximately 10 feet bgs, and bentonite/cement grout to approximately 1.5 feet bgs. A flush-mounted wellbox will be set in concrete at each wellhead. Both the slot thickness and the sand pack will be sized in accordance with formation material.

Prior to placing the bentonite chips and cement grout, the well will be surged to settle the sand pack. Additional sand will be added as necessary. The well will be completed at the surface with a 12-inch-diameter Emco-Wheaton, or equivalent, traffic-rated wellbox. Inside of the well box, the PVC casings will be cut to within four inches of the top of the wellbox.

As stated figure 6 presents the anticipated general construction. The physical parameter testing and associated evaluation of lithology as described in the physical parameter evaluation (section 3.4.2), may require a modification to final design for a given well. As an example if a distinct zone of impact is recognized it may be deemed more appropriate to shorten the screening interval.

SGI/DLA – Energy will notify the LARWQCB of proposed design changes and obtain concurrence prior to final construction.

3.4.1 Soil Characterization 5 feet to 25 feet bgs and 35 to 45 feet bgs

From 5 feet bgs to 25 feet bgs and from 35 to 45 feet bgs three soil samples will be collected within each five-foot soil core and will be field preserved through the use an Encore sampler (or equivalent Method 5035 sampling device) before photo ionization detector (PID) headspace measurements are taken. After the samples have been collected and preserved using the EPA 5035 methodology, PID measurements will be taken and recorded. Approximately 20 grams of saturated or unsaturated soil will be placed in a self-sealing plastic bag to allow the pore space to volatilize. The headspace in the plastic bag will then be monitored for VOCs with the PID. If PID headspace measurement detects organic vapors (indicated by the presence of PID measurements greater than 10 ppm), the nearby collected soil sample(s) will be submitted for laboratory analysis. If organic vapors are not detected in the PID soil headspace measurements, then a minimum of one soil sample will be analyzed for chemical analysis as described below from each 5-foot core. After the Encore samples have been collected and preserved, and PID readings taken and recorded, the soil samples will be reviewed for classification by a California-licensed professional geologist. Core in these intervals will be photographed in the field. Visual description of soil samples will include the following information:

- percentage of sample recovery,

- grain size classification (USCS; percentages of gravel, sand, silt, and clay);
- color (Munsell color chart);
- density;
- odor;
- degree of moisture; and
- depth to first encountered groundwater,

Each soil sample selected for laboratory analysis will be sealed, labeled, and placed on ice in a thermally insulated cooler pending transport to the analytical laboratory. Soil samples will be analyzed for TPH in accordance with Environmental Protection Agency (EPA) Method 8015M and for VOCs (including gasoline-range organics [GRO], oxygenates, and BTEX compounds) using EPA Method 8260B.

All sampling equipment will be cleaned in an aqueous solution of a non-phosphate cleanser, rinsed with tap water, and rinsed a second time with distilled water to prevent cross-contamination between sample intervals. Investigation-derived waste (soil cuttings, development water, and decontamination rinseate) will be placed in lined soil bins and/or United Nations- (UN-approved 55-gallon steel drums that will be sealed, labeled, and stored at the Site pending characterization and disposal. Waste will be handled, transported, and disposed of according to applicable State and Federal regulations.

3.4.2 Soil Physical Parameter Testing 25 to 35 feet bgs

Soil cores will be collected from the 25 to 35 feet bgs interval and will be logged, field screened, and sampled with Encore samples as described above. Soil samples will be selected for submittal for testing by EPA Methods 8015M and 8260B using the same evaluation described in above Section 3.4.1.

To further characterize the possible LNAPL occurrence in soil present in the vicinity of the watertable, soil cores collected from 25 the 35 bgs interval will be preserved and sent for physical parameter testing. The core will be packaged and preserved in ice chest with dry ice and sent to a geotechnical lab. The lab will photograph the core using both white light and ultraviolet light to record LNAPL fluorescence, if present.

If the testing laboratory determines that LNAPL may be present, the affected interval of the soil core will be subjected to further testing to quantify LNAPL saturation physical parameters. The testing laboratory will collect soil subsamples along the vertical interval of the LNAPL impact. Pore fluid saturation physical parameters will be quantified per test method API RP40 (American Petroleum Institute Recommended Practice for Core Analysis) and free product mobility will be

quantified per test method ASTM D425M (Standard Test Method for Centrifuge Moisture Equivalent of Soils).

The pore fluid saturation testing (API RP40) will include initial fluid saturations, total porosity, grain density, bulk density and air-filled porosity. The free product mobility testing (ASTM D425M) applies a centrifugal force of 1000 times gravity for one hour and values for initial and residual pore fluid situations, porosity and bulk density. One to two samples per lithology from zones with the highest LNAPL saturation will be tested.

3.4.3 Well Surveying and Development

Following a 72-hour curing period, each well will be developed to increase well efficiency and to optimize communication between the well and the surrounding water-bearing zone. During development, water quality parameters, including pH, temperature, conductivity, and turbidity, will be monitored. The well will be developed by alternately surging with a rubber surge block and bailing using a stainless-steel, bottom-loading bailer. Well development will continue until the groundwater is reasonably free of sediment.

During well development, measurements and observations of groundwater pH, electrical conductivity, temperature, and color will be recorded. A minimum of ten casing volumes of water will be removed from the wells during development. Well development field data will be documented on groundwater monitoring well field sampling forms. Following development and prior to groundwater sample collection, each monitoring well will be allowed to recover to within 80 percent of the initial static water level or will be sampled within 24 hours (if groundwater levels fail to recover to 80 percent of the initial level).

Following installation, each well will be surveyed. SGI will coordinate the surveying of the groundwater monitoring wells by a land surveyor licensed in the state of California per the requirements of AB2886. The survey points will document the horizontal location, ground surface elevation, and the top-of-casing elevation of each new groundwater monitoring well.

3.4.4 Well Gauging and Sampling

After well development, each well will be gauged and sampled. Well gauging will be conducted to verify the absence of free-phase hydrocarbons on groundwater, and to measure the piezometric surface of the water table in each well to allow for groundwater gradient determination. Each well will be sampled following initial low-flow purging of the groundwater well.

3.4.5 Well Monitoring and Proposed Quarterly Sampling Frequency

The proposed groundwater monitoring wells will be included in the groundwater monitoring program for the site. Accordingly, the wells will be sampled semi-annually, with the groundwater samples analyzed for TPH and VOCs. If measurable LNAPL occurs in any well, a product recovery schedule will be established and an appropriate LNAPL method will be selected (e.g., thin accumulations of LNAPL will be removed with absorbent materials and greater thicknesses will be removed via in-well passive recovery units or regularly scheduled hand bailing).

3.4.6 Groundwater Level Measurement

Water-level measurements will be taken using an interface-probe well monitoring instrument. The interface probe differentiates between water and hydrocarbons using conductivity measurements. Groundwater (and floating product) levels will be measured to an accuracy of 0.01-foot from the top of each well casing and the readings recorded by the environmental technician on field gauging sheets. Surveyed measuring points (usually on the north side of the casing) will be marked on each well casing for measurement consistency. The probe will be cleaned with a non-phosphatic detergent solution and double-rinsed with distilled water prior to each well measurement.

3.4.7 Groundwater Sampling and Analysis

3.4.7.1 New Well Sampling and Analysis

Prior to sampling, three well volumes will be purged from each well using a submersible pump. It is anticipated that purge rates will range between 1.0 gallons per minute (gpm) and 1.5 gpm. Groundwater temperature, pH, oxidation reduction potential (ORP), dissolved oxygen, and electrical conductivity will be monitored during purging using a YSI Model 556 MPS water quality instrument, and turbidity will be monitored using a Oakton Model T-100 turbidity meter, or equivalent. Calibration records for the field instruments will be maintained. Each well will be purged until groundwater parameters have stabilized and the purged groundwater is “clear” with Nephelometric turbidity units (NTU) of less than 11 NTUs.

New low-density polyethylene (LDPE) tubing will be used for each well and discarded after purging/sampling is completed. The pump will be thoroughly decontaminated prior to use at each well by scrubbing the exterior of the pump in a non-phosphate detergent solution and a double-rinse with distilled water. The detergent solution and distilled water will be pumped through the unit to decontaminate and rinse the interior portion of the pump.

Evaluation of groundwater parameter stabilization during purging will be conducted by comparing the change (or percent change) between the final two readings for each groundwater parameter with stabilization criteria published in the *Representative Sampling of Groundwater for Hazardous Substances* (CalEPA/DTSC, February 2008). The stabilization criteria targets will be:

- pH of ± 0.1 pH units;
- electrical conductivity of ± 3 percent;
- Oxygen reduction potential (ORP) of ±10 millivolts (mV);
- Groundwater temperature of ± 3 percent; and
- Dissolved oxygen values of ± 3 milligrams per liter (mg/L).

Groundwater samples will be collected immediately after purging. Samples will be collected directly from LDPE tubing connected to the pump outlet and will be collected in laboratory-supplied sample containers. The containers will be sealed, labeled, and stored on ice in a thermally insulated cooler pending transportation to state-certified American Analytics in Chatsworth, California.

Groundwater samples will be submitted for analysis of TPH carbon chain characterization, GRO, fuel oxygenates, and VOCs including BTEX. Groundwater samples will be analyzed in accordance with the following test methods:

- TPH will be analyzed in accordance with Environmental Protection Agency (EPA) Method 8015M; and
- VOCs (including GRO, oxygenates, and BTEX compounds) will be analyzed using EPA Method 8260B.

A laboratory-supplied trip blank will accompany the monitoring well samples during fieldwork and will be analyzed for VOCs (including GRO, oxygenates, and BTEX compounds) in accordance with EPA Method 8260B. For each day of fieldwork, two equipment blank samples will be collected to evaluate the effectiveness of decontamination procedures (one prior to sampling the first well, and one after the last well is sampled).

3.4.7.2 GMW-62 Sampling and Analysis

A sample of free product will be collected from GMW-62 and submitted for laboratory analysis. The analysis will be designed to evaluate the type(s) and proportions of fuel types present in the product. The product sample will also be analyzed for the presence of additives that may be indicative of the age of the fuel (including lead scavengers such as EDB, historical oxygenates such as MTBE and TBA, and current fuel additives such as ethanol). The results of these analyses will be compared against similar forensic analyses conducted by Parsons during the earlier evaluation of the occurrence of free product at and near Holifield Park. The analytical protocol will include determination of bulk composition as paraffinic, isoparaffinic, aromatic, nathenic, and olefinic (PIANO) hydrocarbons, density, and viscosity.

3.4.8 Waste Management

All decontamination rinse water and purge water will be placed in United Nations-approved 55-gallon drums, labeled, and stored on site pending characterization for off-site disposal. Waste will be profiled in accordance with California Code of Regulations, Title 22, Division 4.5, Chapters 10 through 32, and Federal RCRA regulations. After analytical results have been received and evaluated, the drums will be transported off site under manifest to a permitted recycling/disposal facility.

3.5 Site Survey

All well locations will be surveyed by a California state-licensed land surveyor. Horizontal locations and elevations at each sample location will be determined and will be measured using a datum common with previously surveyed site wells. Elevation will be surveyed relative to mean sea level (MSL). The survey will also capture relevant site features such as pre-existing nearby groundwater monitoring wells, fence lines, curbs, sidewalks, and streets.

3.6 Evaluation of Potential New Source

KinderMorgan will be contacted and requested to review their pipeline operational records for evidence of a possible release of fuel from their north-south pipeline(s) present on the eastern perimeter of DFSP Norwalk. KM will be requested to focus on the time period six months prior to the first indication of product in GMW-62 (January 2011).

Additionally, groundwater elevation trends and corresponding changes in the thickness of free product present in GWM-62 will continue to be evaluated. As a point of comparison and as described above in Section 2.4, Conceptual Site Model, groundwater monitoring wells present at KinderMorgan's lease area in the south-central portion of DFSP Norwalk have recently shown similar large increases in product thicknesses. According to KinderMorgan, when these product increases were first noted, their pipeline system was evaluated and determined to be free of any new or recent fuel releases. The increased product thicknesses were attributed to the effects of a falling groundwater table associated with the current California drought. DLA Energy anticipates that this same mechanism is the cause of the recent increase product thickness observed in GWM-62.

3.7 Identification of Owner and Operational Status of Abandoned Pipeline

As previously indicated, there is an abandoned pipeline present in the north-south pipeline easement present on the eastern border of the property. The following sections identify the entities that will be contacted, as necessary, to determine the ownership and the status of the pipeline. Upon completion of research into the ownership and status of the pipeline, a summary report will

be prepared and submitted to the RWQCB. This report will be submitted no later than March 31, 2015.

3.7.1 City of Norwalk

DLA/SGI will contact the City of Norwalk building and planning to determine if they have historical and/or current records of the pipeline.

3.7.2 Fire Departments

DLA/SGI will contact fire departments for the City of Norwalk and Los Angeles County.

3.7.3 Air Force Center for Engineering and the Environment (AFCEE)

The DSFP Norwalk site conveyed fuel to Marine bases Tustin and El Torro. If necessary DLA/SGI will contact AFCEE if they have any historical records associated of the pipeline.

3.7.4 Historical Refineries

Historically there were two refineries primarily known as the Powerine Oil Refinery and the Golden West Refinery that closed in the early to mid 1990's. Each are located in Santa Fe Springs approximately 5 miles north of the DFSP Norwalk site.

Current knowledge is that a property development company, Goodman Birtcher owns the property once used by the Powerine Oil Refinery. In addition it is believed that Thrifty Oil currently owns or manages the property used by the Golden West Oil refinery.

As necessary each current property owner will be contacted.

3.8 Schedule

The proposed well installation program and initial groundwater monitoring and sampling will be completed and reported within 120 days of RWQCB approval of this work plan. Subsequent groundwater monitoring will be performed and reported on a semi-annual basis.

4.0 DATA INTERPRETATION AND REPORTING

4.1 Data Interpretation

The proposed investigation will provide hydrogeologic and contaminant distribution information in the vicinity of GMW-62. Lithologic data and laboratory results of soil and groundwater samples will be integrated into the existing set of data for the area in the vicinity of GMW-62.

The lithologic data will be interpreted to identify lateral discontinuities or zones of high permeability that may affect LNAPL migration and recovery. The groundwater elevation data from the wells will be incorporated into the set of groundwater gauging data from the DFSP site to provide a depiction of likely LNAPL flow patterns in the shallow groundwater.

The concentrations of benzene and other hydrocarbons and oxygenates will be interpreted within the sitewide groundwater migration framework and will augment the hydrogeologic gradient fate and transport interpretations.

The presence, thickness, and recovery/recharges rates of LNAPL into the proposed groundwater monitoring wells will be used to develop a proposed LNAPL removal program. As described above, depending on LNAPL thickness, down-well absorbent material, passive skimmers, hand-bailing, or vacuum truck removal will be selected and adopted for each well, as warranted.

4.2 Reporting

After completing the above tasks, a technical report presenting the results of the well installation and initial sampling will be submitted to the RWQCB. The report will contain the following items:

- Sample location maps;
- Summary of the procedures and methodologies;
- Tabulated analytical data and interpretative maps;
- Field documentation, including drilling logs and well construction details;
- Laboratory reports, signed waste manifests, and survey reports; and
- Discussion, interpretation, and recommendations.

Included in the report will be an updated conceptual site model (CSM), with specific focus of describing groundwater conditions and LNAPL distribution within the area of GMW-62. The CSM will be based on the most recent site CSM as provided in this work plan. The updated CSM will serve to augment and further refine the existing CSM.

The report will include cross sections and one or more detailed groundwater gradient map(s) for all wells in the eastern part of the Property. LNAPL thickness, if present, benzene and other relevant VOC concentrations will also be depicted on the cross-sections and groundwater gradient maps.

5.0 LIMITATIONS

This Work Plan was prepared for the exclusive use of Defense Logistics Agency - Energy (DLA-Energy) for the express purpose of complying with regulatory directives for environmental investigation, in accordance with the scope of work, methodologies, and assumptions outlined in SGI's contract with DLA-Energy and as applicable to the location of the proposed investigation. Any re-use of this work product, in whole or in part, for a different purpose, or by others must be approved by SGI and DLA-Energy in writing. If any such unauthorized use occurs, it shall be at the user's sole risk without liability to SGI. To the extent that this plan is based on information provided to SGI by third parties, including DLA-Energy, their direct-contractors, previous workers, and other stakeholders, SGI cannot guarantee the completeness or accuracy of this information, even where efforts were made to verify third-party information. SGI has exercised professional judgment to collect and present a scope of work and opinions of a scientific and technical nature. The opinions expressed are based on the conditions of the site existing at the time of this plan preparation, current regulatory requirements, and any specified assumptions. Findings or conclusions presented in this plan are intended to be taken in their entirety to assist DLA-Energy and regulatory personnel in applying their own professional judgment in making decisions related to the property. SGI cannot provide conclusions on environmental conditions outside the completed scope of work. SGI cannot guarantee that future conditions will not change and affect the validity of the presented scope of work and any conclusions presented. No warranty or guarantee, whether expressed or implied, is made with respect to the data, observations, recommendations, and conclusions.

6.0 REFERENCES

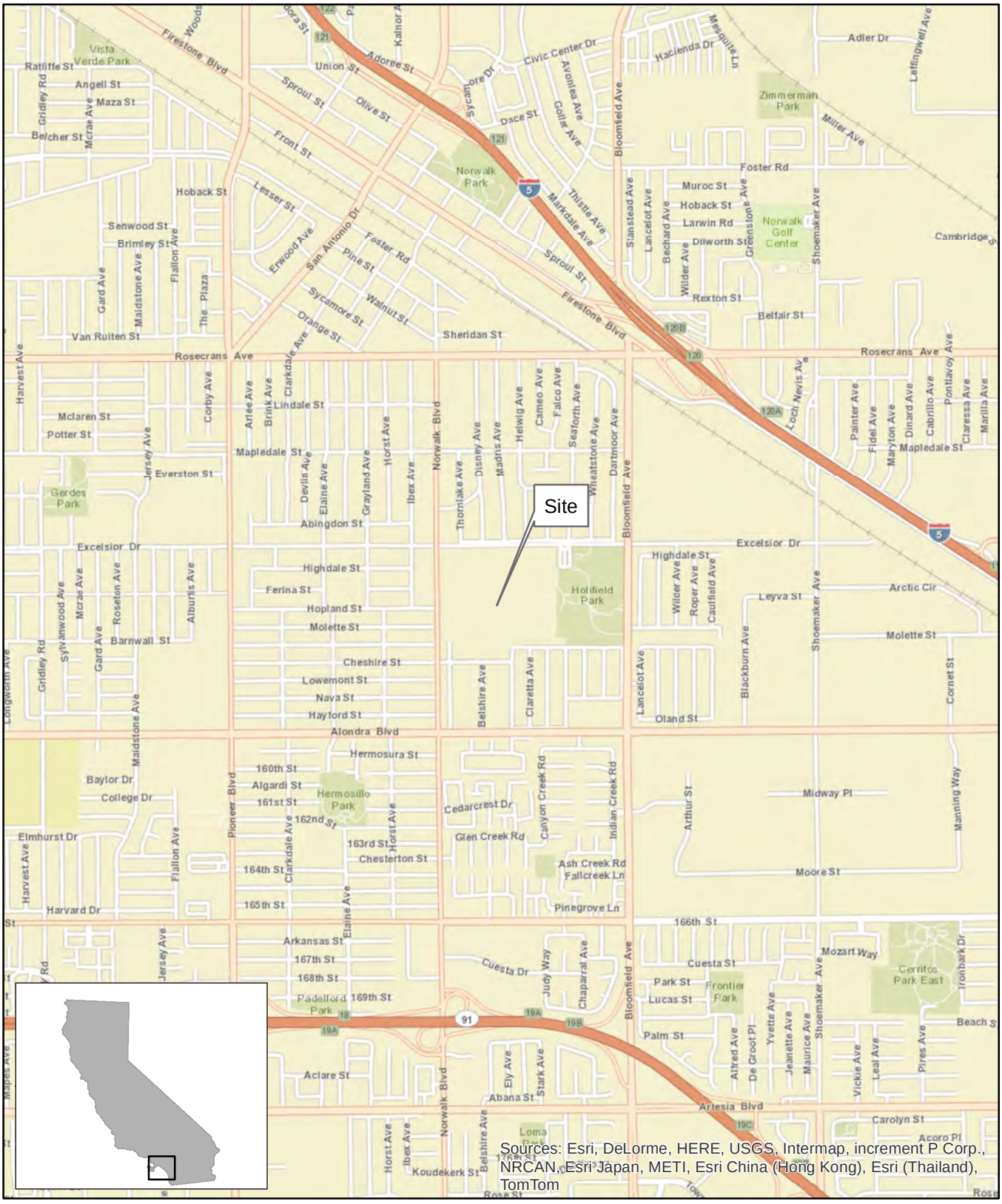
Parsons, 2006, *Eastern Boundary and Eastern Boundary Off-site Area and Groundwater Preliminary Investigation*

Parsons, 2008, *Holifield Park Supplemental Investigation and Groundwater Remediation Work Plan*, January 25

California Environmental Protection Agency, Department of Toxics Substances Control, 2008, *Representative Sampling of Groundwater for Hazardous Substances*, February

Parsons, 2013, *Conceptual Site Model and Remedial Action Evaluation for Soil, Groundwater and LNAPL*. September 30.

FIGURES



SOURCE:	PROJECT NO.:	DATE:	DR.BY:	APP.BY:	SCALE= 1:24,000	N
ESRI 7.5 MINUTE TOPOGRAPHIC MAP. http://resources.esri.com/arcgisonlineservices	04-NDLA-003	5/28/2014	JK	PP	0 875 1,750 3,500 Feet	

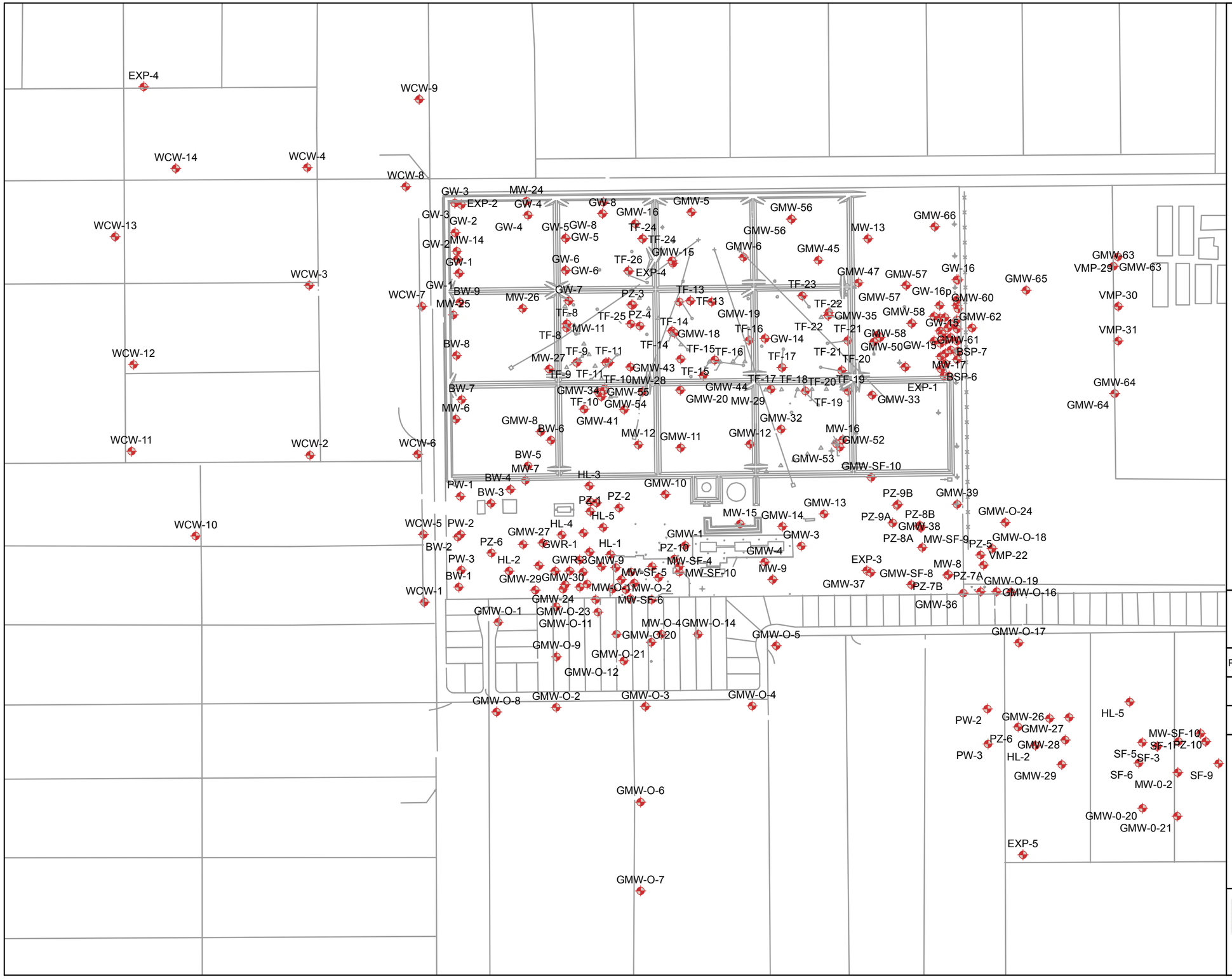
SGI environmental THE SOURCE GROUP, INC.
1962 FREEMAN AVENUE
SIGNAL HILL, CA 90755
(562) 597-1055

DEFENSE FUEL SUPPORT POINT NORWALK

15306 NORWALK BOULEVARD
NORWALK, CALIFORNIA

SITE LOCATION MAP

FIGURE
1



Legend

- Monitoring Well Location

15306 Norwalk Blvd.
Norwalk, California 90650

PROJECT NO.:	DATE:	DR.BY:	APP. BY:
04-NDLA-003	06/03/2014	J. KURASHIGE	P. PARMENTIER

0 85 170 340 510 680 Feet

SITE PLAN

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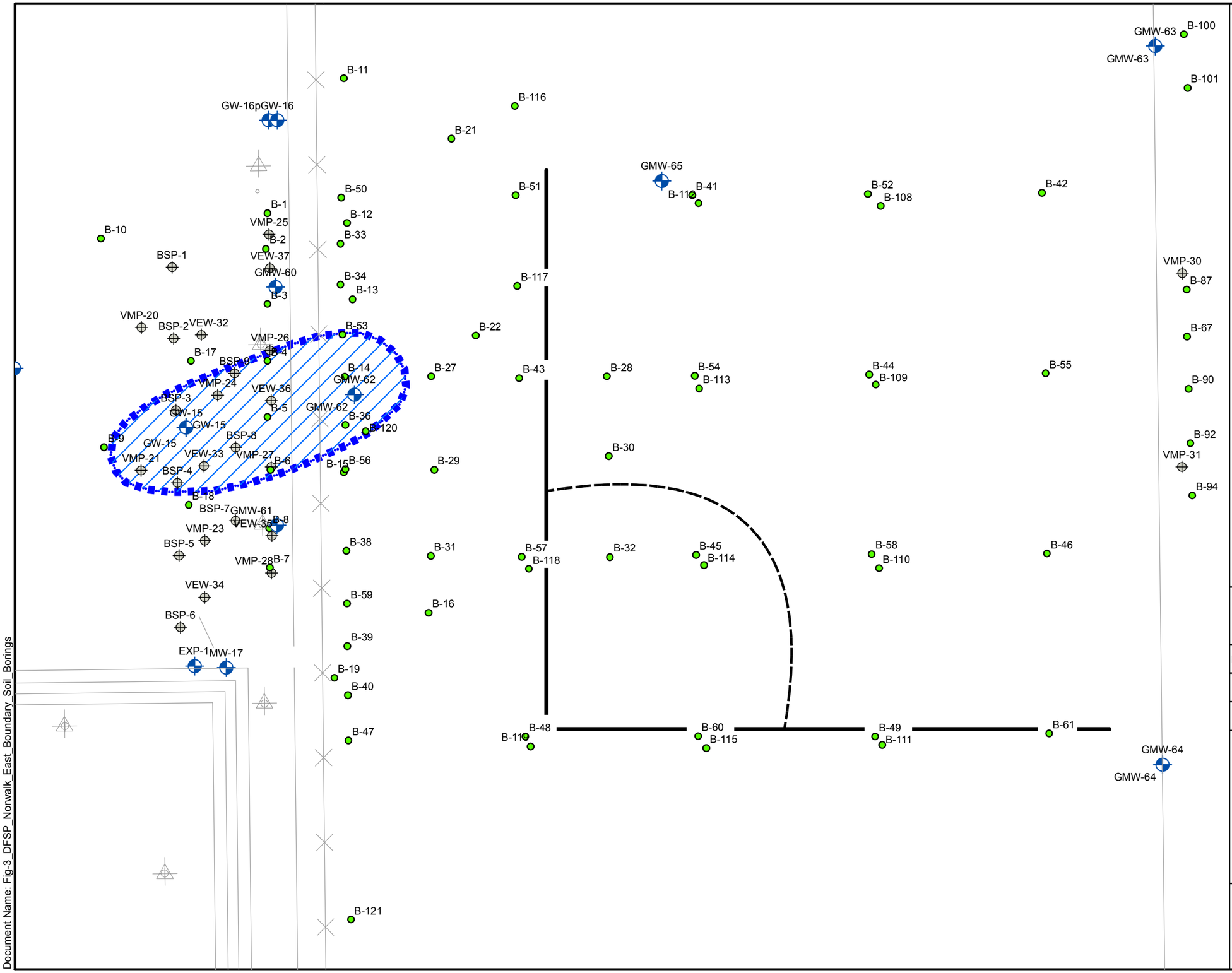
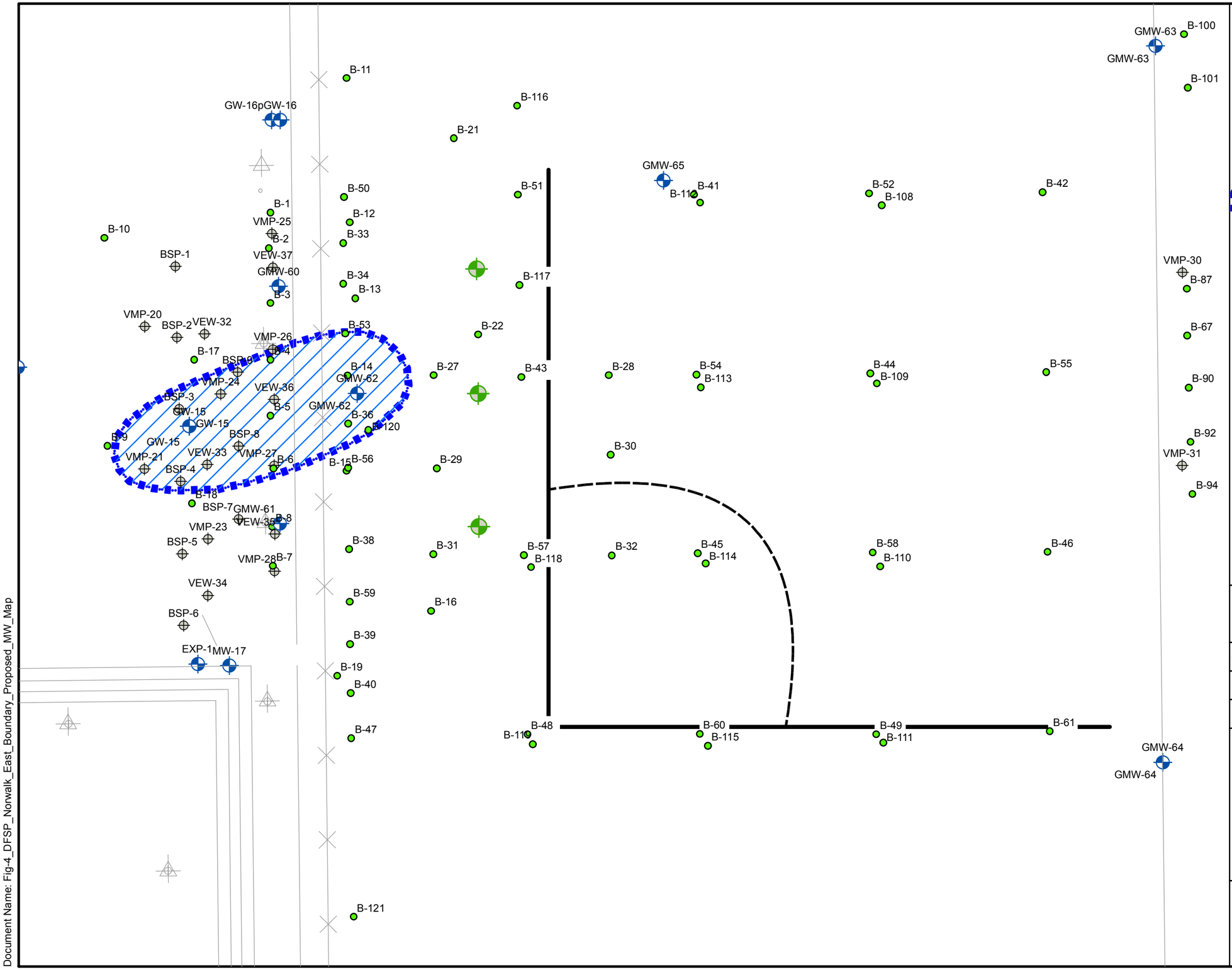
1962 Freeman Ave,
Signal Hill, California 90755
(562) 597-1055

N

FIGURE 2


B-11
GW-16pGW-16
B-116
B-21
B-50
B-51
B-1
VMP-25
B-12
B-10
B-2
B-33
BSP-1
VEW-37
GMW-60
B-34
B-117
B-13
B-3
VMP-20
BSP-2
VEW-32
B-53
B-22
VMP-26
B-4
B-17
BSP-9
B-27
B-43
B-14
GMW-62
VMP-24
VEW-36
BSP-3
B-5
GMW-62
GW-15
B-36
B-120
GW-15
GW-15
BSP-8
B-9
VMP-21
VEW-33
VMP-27
B-6
B-15
B-56
B-29
BSP-4
B-18
BSP-7
GMW-61
VEW-35
B-8
VMP-23
BSP-5
B-38
B-31
B-57
B-118
B-32
B-45
B-114
VMP-28
B-7
VEW-34
B-59
B-16
BSP-6
B-39
EXP-1
MW-17
B-19
B-40
B-47
B-48
B-110
B-60
B-115
B-49
B-111
B-61
B-121
GMW-65
B-41
B-110
B-52
B-108
B-42
B-28
B-54
B-113
B-44
B-109
B-55
B-30
GMW-63
B-100
GMW-63
B-101
VMP-30
B-87
B-67
B-90
B-92
VMP-31
B-94
GMW-64
GMW-64
LEGEND
Monitoring Well Location
Holifield Park Boring Location
Northeast LNAPL Plume
N
15306 Norwalk Blvd.
Norwalk, California 90650
PROJECT NO.: 04-NDLA-001
DATE: 6/10/2014
DR.BY: C. BAKER
APP. BY: P. PARMENTIER
0 15 30 60 90 120 Feet
DFSP Norwalk-
Northeast Corner Map
THE SOURCE GROUP, INC.
1962 Freeman Ave,
Signal Hill, California 90755
(562) 597-1055
FIGURE
3
Document Name: Fig-3_DFSP_Norwalk_East_Boundary_Soil_Borings



LEGEND

- CPT Location
- Proposed MW Location
- Monitoring Well Location
- Holifield Park Boring Location
- Northeast LNAPL Plume

15306 Norwalk Blvd.
Norwalk, California 90650

PROJECT NO.:	DATE:	DR.BY:	APP. BY:
04-NDLA-001	6/10/2014	C. BAKER	P. PARMENTIER

0 15 30 60 90 120 Feet

Proposed Groundwater Monitoring Well Location Map

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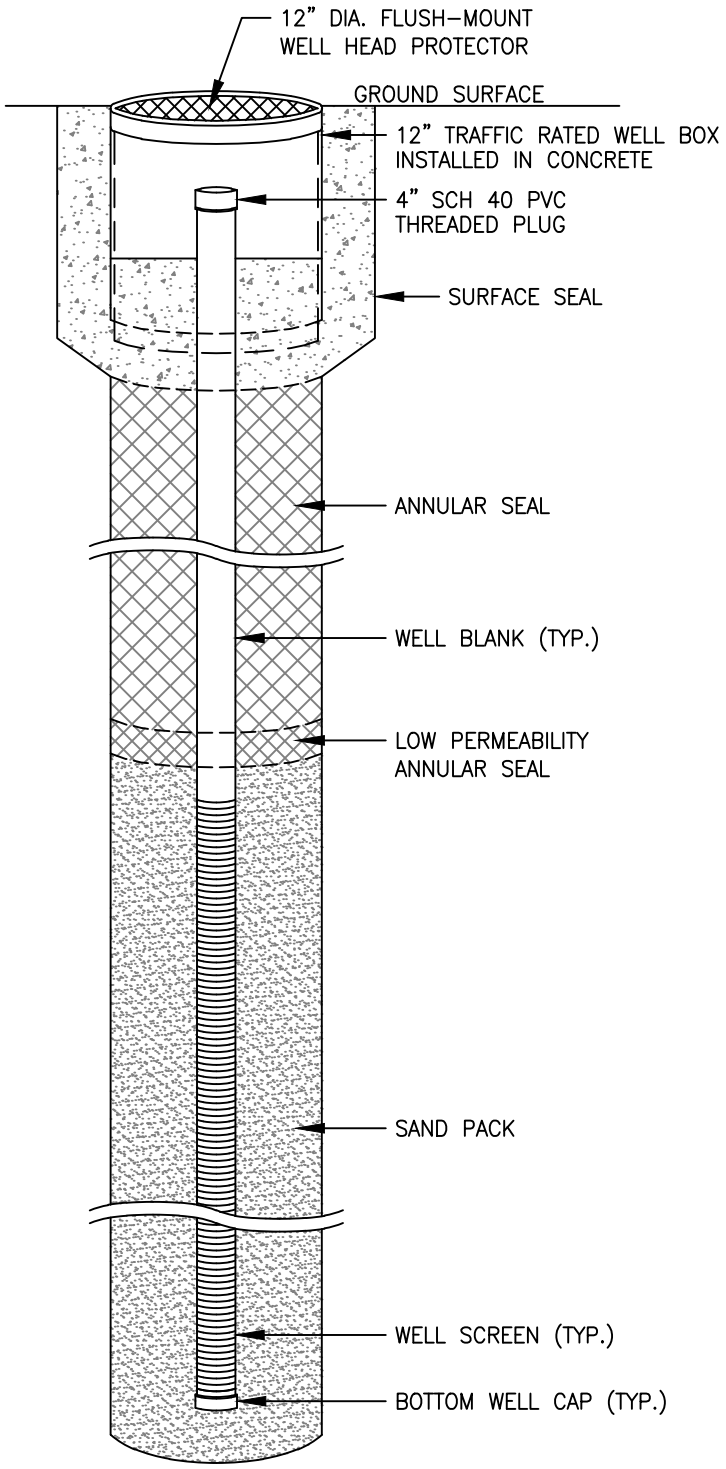
FIGURE 4

Document Name: Fig-4_DFSP_Norwalk_East_Boundary_Proposed_MW_Map



SURFACE SEAL INTERVAL	0 – 1.5 FEET
TYPE OF SURFACE SEAL	CONCRETE
ANNULAR SEAL INTERVAL	1.5 – 11.0 FEET
TYPE OF ANNULAR SEAL	CEMENT-BENTONITE GROUT
INTERVAL OF LOW PERMEABLE ANNULAR SEAL	11 – 13 FEET
TYPE OF LOW PERMEABILITY SEAL	HYDRATED BENTONITE CHIP
DIAMETER OF WELL CASING	4 INCH
TYPE OF WELL CASING	PVC SCH 40
SAND PACK INTERVAL	13 – 45 FEET
TYPE OF SAND PACK	NO. 2/16
SCREEN INTERVAL	15 – 45 FEET
DESCRIPTION OF SCREEN	PVC SCH 40 0.020 INCH SLOTTED
DEPTH OF WELL	45 FEET
DIAMETER OF BOREHOLE	~10 INCH
DEPTH OF BOREHOLE	45 FEET
DEPTH TO GROUNDWATER	~25' FT BGS

NOT TO SCALE

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Signal Hill, CA 90755
(562) 597-1055

FOR: HOLIFIELD PARK
NORWALK, CALIFORNIA

GROUNDWATER MONITORING WELL CONSTRUCTION DETAIL GMW-67, 68, 69

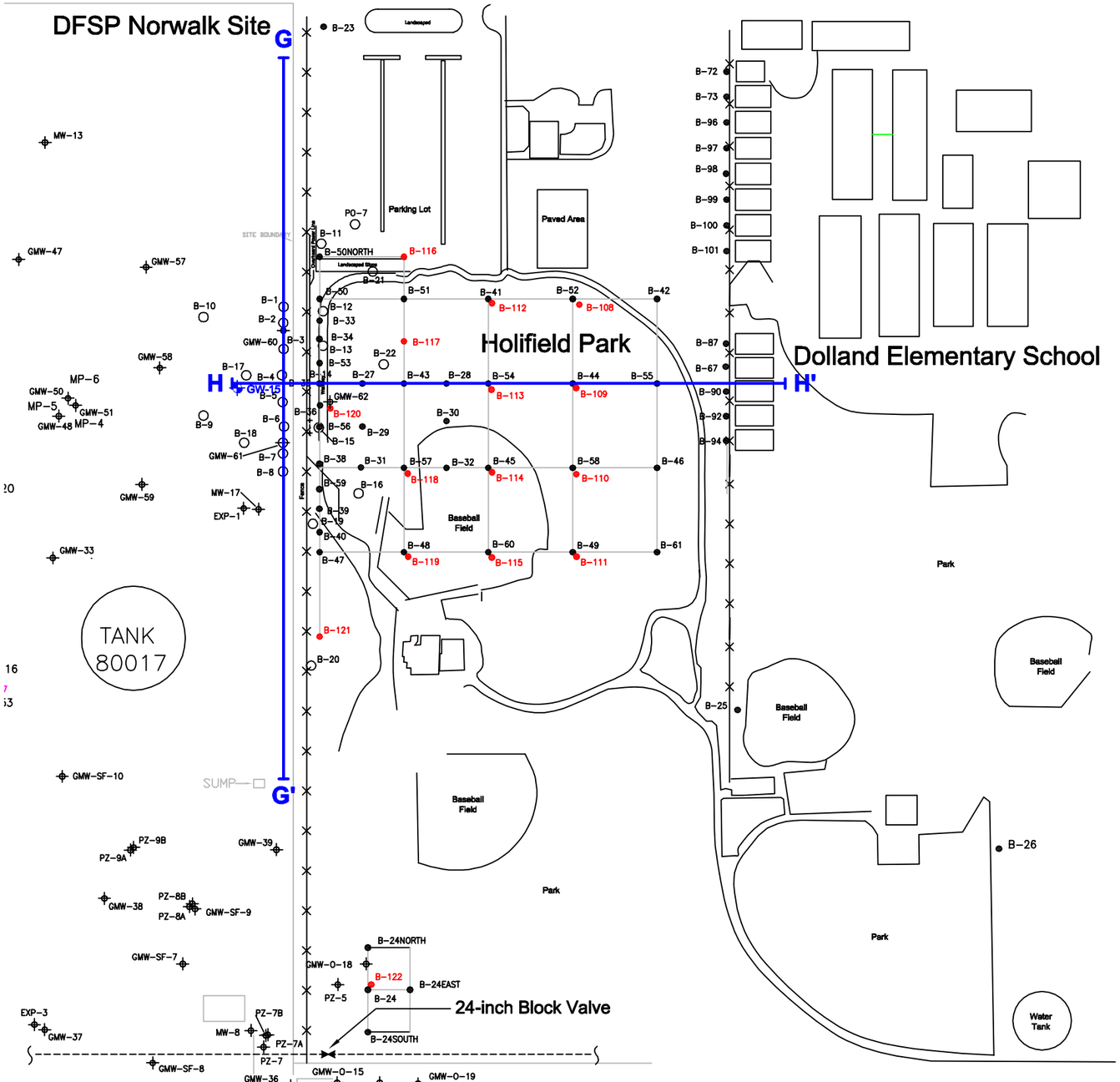
FIGURE: **5**

PROJECT NO:	DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:
04-NDLA-002	CCSI	KEW	KEW	10/14

Z:\TSG.SIGNAL HILL\NORFOLK\WELL_CONST_DIAGRAMS\SGI NORWALK GMW-67, 68 & 69 WC.DIA.1014.DWG

APPENDIX A

SELECTED FIGURES FROM PAST INVESTIGATIONS



LEGEND

- Phase 1 and Phase 2 Soil & Soil Gas Sample Locations
- Phase 2 DPT Soil/CPT Groundwater Sample Locations
- B–10 Boring Locations
- Groundwater Monitoring Well Location
- GW-15 Groundwater Extraction Well
- G G' Cross Section Line
- Santa Fe Pacific Pipeline

Note:

Base map for the Dolland Elemantary School zone and Holifield Park was created from a image obtained from Google Earth.

N

75 0 150

Scale in Feet

PARSONS

DEFENSE FUEL SUPPORT POINT

15306 Norwalk Boulevard,

NORWALK, CALIFORNIA

FIGURE 2

DETAILED SITE MAP

Supplemental Investigation and Groundwater Remediation Work Plan for Holifield Park Norwalk, California

k:\depts\dept48\desc\norwalk\oco-0031\Phase 3 Supplemental GW WP & remediation WP\Figure 2 Detailed Site Map.dwg

E 20000.00

℄ EXCELSIOR DRIVE

℄ NORWALK BLVD

SERVICE ROAD

SERVICE ROAD

TANK 80001

TANK 80002

TANK 80004

TANK 80005

TANK 80006

TANK 80007

TANK 80008

TANK 80009

TANK 80013

TANK 55003

TANK 55004

TANK 80017

UV-15

UV-8

UV-9/UVB-9

UV-7

UV-11

UV-12

UV-6

UV-10

UV-14

UV-1

UV-13

UV-5

UV-2/UVB-2

UV-3

UV-4

OIL-WATER SEPARATOR

ADMINISTRATION BUILDING

LABORATORY BUILDING

TANK

TANK

SUMP

Truck Fill Stands

Manifold Pit

KMEP LEASE AREA

El Toro (Navy) Pumphouse

Main (Air Force) Pumphouse

Holifield Park

℄ CHESHIRE STREET

Legend

UV-1: Ultra-Violet Optical Screening Tool (UVOST) /Cone Penetration Testing (CPT) Location

N

0 80 160 320 Feet

1 in = 160 feet

FIGURE 1-2

UVOST Location Map

DEFENSE FUEL SUPPORT POINT

Norwalk, California

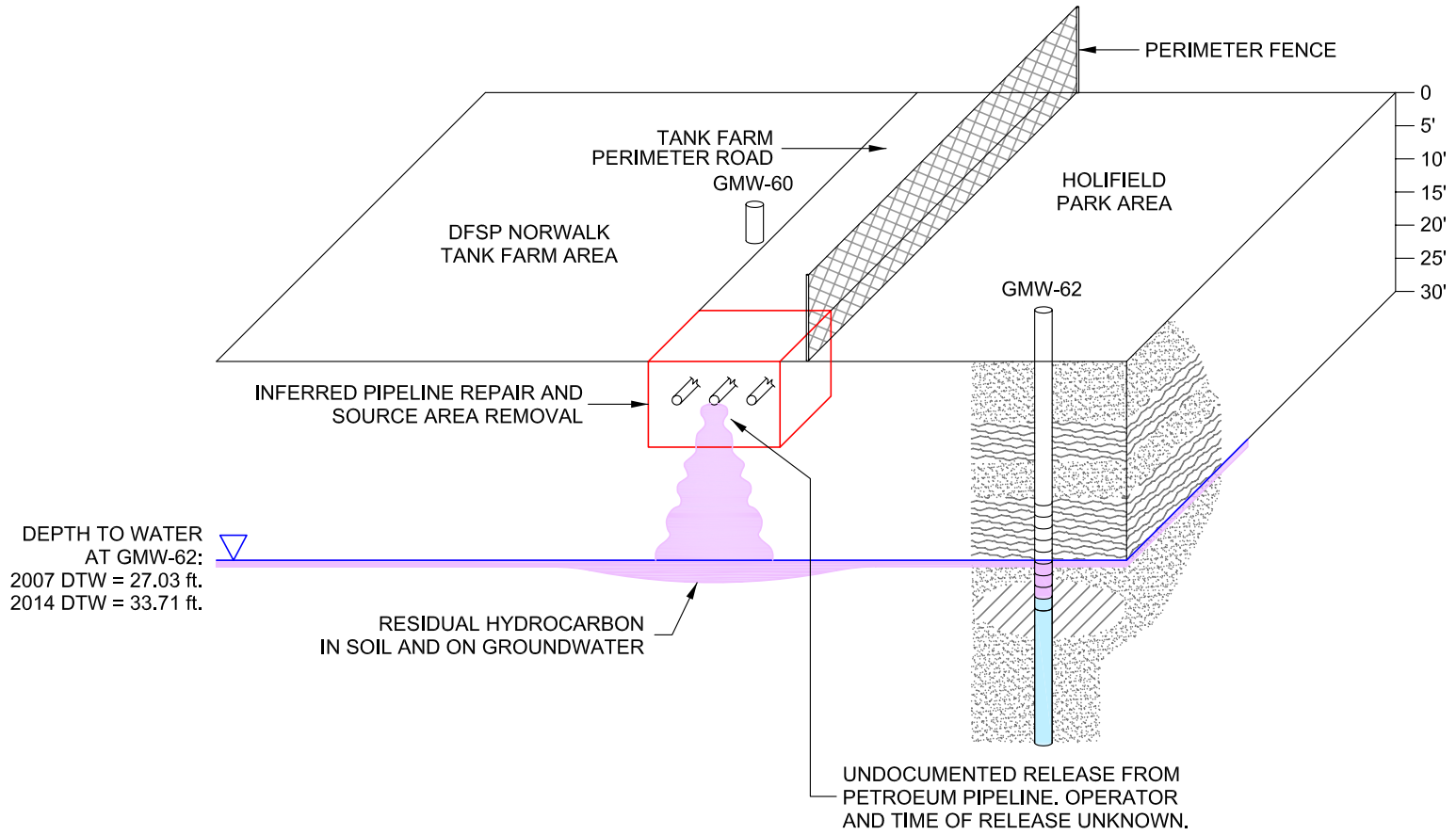
PARSONS

Pasadena, California

S:\ES\Remed\DFSP\Norwalk\GIS\dQ11\UVOST_VMP_Locations_11x17_r1.mxd lxh 1/10/2012

APPENDIX B

CONCEPTUAL SITE MODEL



LEGEND:

- GROUNDWATER TABLE
- LNAPL IN SOIL OR IN GROUNDWATER
- PREDOMINATELY SAND/SILTY SAND
- SILT
- CLAY

NOT TO SCALE

SGI environmental

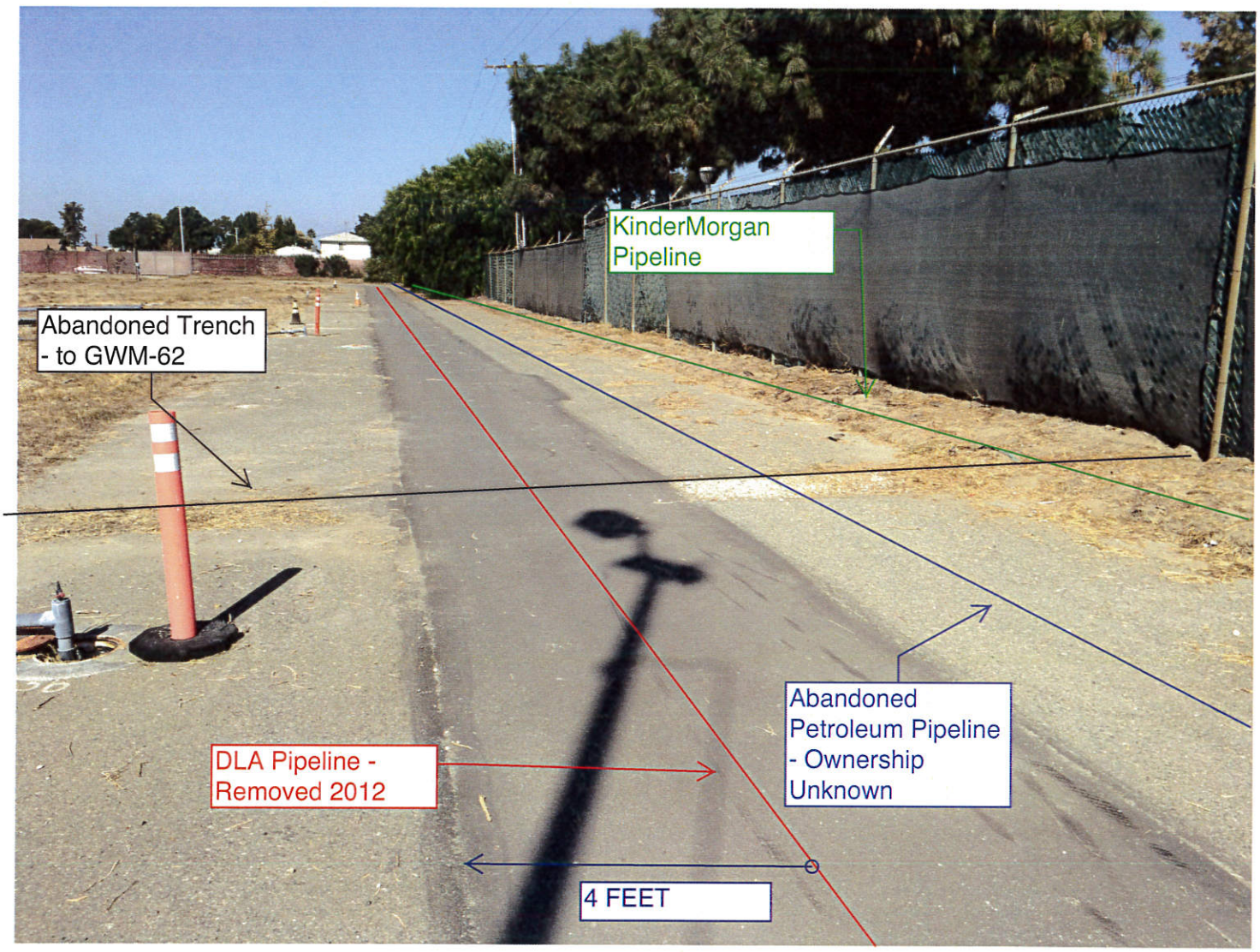
THE SOURCE GROUP, INC.

FILE NAME:	DATE:
DFSPN-SCH-2	10/2014
SOURCE:	

CONCEPTUAL SITE MODEL
GMW-62 LNAPL OCCURENCE
DFSP NORWALK
NORWALK, CALIFORNIA

FIGURE
1

Pipeline Easement and Pipeline Locations - Eastern Perimeter of DFSP Norwalk



APPENDIX B
FIGURE 2

GMW-62
Groundwater Elevation and Apparent Product Thickness
DFSP Norwalk, 15306 Norwalk Blvd., Norwalk, CA