

Town of Windsor and Windsor Water District

Esposti Supply Well

Redevelopment, Pumping Test and Treatment Feasibility Study

October 3, 2017

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Redevelopment, Pumping Test, and
Treatment Feasibility Study

Project No. 11110001/10

Prepared for:
Town of Windsor and Windsor Water District
8400 Windsor Road, Bldg. 100
Windsor, CA 95492

Prepared by:





Kent O'Brien PG, CEG
Project Manager/Senior Hydrogeologist
Hazen and Sawyer





Ryan Crawford, PG
Project Hydrogeologist
GHD, Inc.

PROFESSIONAL CERTIFICATION

This report was prepared under the professional supervision of Kent O'Brien. The findings, recommendations, specifications, and / or professional opinions presented in this report were prepared in accordance with generally accepted professional geologic practice, and within the scope of the project.



Kent O'Brien, PG, CEG
CEG No. 2132
Senior Hydrogeologist
Hazen and Sawyer
(under contract to GHD, Inc.)

Executive Summary

The Town of Windsor and Windsor Water District (Town) installed the Esposti Supply Well in 2010. This investment was part of an effort by the Town to broaden the portfolio of water supply options in response to requirements from the Sonoma County Water Agency to obtain alternative supplies that are not reliant on withdrawals from the Russian River. The goal of the well installation project of 2010 included replacing both the Bluebird Well and the Esposti Irrigation Well with two new wells that would produce water of higher quality and production volume reliability.

In 2010, the Town installed pilot borings at both Esposti Park and the Bluebird Well site. Initial analytical testing of water samples collected from depth-specific aquifer zones from both of these pilot borings indicated acceptable water quality in select zones. Based on these data and the interpretation of acceptable water quality, the Town proceeded with new wells at both the Esposti Park (Esposti Supply Well) and Bluebird Well site.

The Esposti Supply Well is 10-inches in diameter with a depth of 670 feet below the ground surface (bgs). Shortly after installation in 2010, the well was developed and tested for production capacity and water quality. Results of this testing indicated that concentrations of both manganese and arsenic were much higher than expected and exceeded drinking water standards. Subsequently, the well sat idle because of a decrease in water demand due to a downturn in the economy and conservation efforts in addition to the elevated manganese and arsenic concentrations in the well.

The goals of the 2016 work were to redevelop the Esposti Supply Well, perform a pumping test, test water quality, and evaluate treatment options. The 2016 redevelopment work increased the production capacity by 27% and removed residual drilling mud remaining in the boring after construction of the well. The pumping test confirmed the water quality, established an understanding of the geochemistry, evaluated pumping yields, tested the sewer capacity, and provided a basis for performing a treatment pilot test. However, the findings of this work indicate that bringing the Esposti Supply Well into production as a potable supply well could be costly and require significant space for treatment equipment.

Esposti Supply Well Pumping Limits

The Esposti Supply Well's recommended pumping rate is 400 gallons per minute (gpm). Pumping at a rate of 800 gpm is possible, but is not sustainable for more than a day due to hydrogeologic limitations to aquifer permeability. The groundwater production from the Esposti Supply Well is from confined aquifer units located below 380 bgs. Pumping from the confined aquifer did not result in a significant effect on the overlying shallow groundwater. The production aquifer is a moderate to low permeable clay/silt/sand system. The aquifer is not a single unit but rather a series of sand layers interbedded with silts/clay layers. An aquifer transmissivity of 4,141 gallons per day per foot (gpd/ft) is most representative for long-term pumping. A storage coefficient was not calculated during this work. Hydraulic conductivity (permeability, K) at 47 gpd/ft^2 is most representative of the aquifer. The aquifer production characteristics are consistent with descriptions of the Glen Ellen Formation provided in Department of Water Resources (DWR) reports and are consistent with the previous aquifer testing reported shortly after well installation in 2010.

Water Quality

The Esposti Supply Well produces water that meets all of the requirements for drinking water with the exception of arsenic and manganese. The 2016 concentration of arsenic was 0.057 milligrams per liter (mg/L) [57 micrograms per liter (µg/L)] and manganese was 0.860 mg/L (860 µg/L). These concentrations are significantly above the drinking water standards of 0.010 mg/L and 0.050 mg/L, respectively. The 2016 testing also confirms that these elevated concentrations of arsenic and manganese are repeatable and consistent in the context of the Esposti Supply Well, screened across multiple aquifer zones. The concentration results for arsenic and manganese identified in 2016 are similar to concentrations in samples collected from the Esposti Supply Well in 2010 after installation and development. Our conclusion regarding the discrepancy in water quality results between the pilot boring and final Esposti Supply Well is that the groundwater samples collected from the pilot boring were not representative of actual groundwater quality due to sample collection techniques employed during drilling the pilot boring.

Testing of the layered aquifer zones identified a pattern where arsenic concentrations increase with increasing depth and that manganese concentrations decrease with increasing depth, although all concentrations exceed drinking water standards. Samples collected from the Esposti Irrigation Well, screened 100 to 300 ft bgs, indicated a concentration of arsenic at 0.013 mg/L (13 µg/L) and manganese at 1.5 mg/L (1,500 µg/L). During isolation testing of the 1st screen section of the Esposti Supply Well (384 to 420 ft bgs), arsenic was found at a concentration of 0.035 mg/L (35 µg/L) and manganese at a concentration of 0.910 mg/L (910 µg/L).

The temperature of the extracted groundwater also increases with continued pumping and this increasing temperature corresponds to an increasing concentration of arsenic. This trend and other trending parameters indicated that as pumping continues an increasing proportion of the extracted groundwater derives from deeper zones in the aquifer system.

Esposti Supply Well Treatment

The most feasible option for water treatment is a two-step process; the first step removes manganese through catalytic oxidation (greensand filtration) and the second step removes arsenic through media adsorption. An alternative treatment approach using iron coprecipitation with greensand filtration in a one-step process; however, requires a large backwash tank and management of waste iron flocculent. Both the backwash tank and management of iron flocculent waste present significant site challenges that reduce one-step process viability in comparison to the two-step process described above. Therefore, the one-step process approach is not recommended.

The minimum treatment compound size for the two-step process is 40 feet by 45 feet with a 12-foot maximum treatment vessel height. While the two-step process requires occasional backwashing at the maximum capacity rate and direct discharge to the Shiloh Road sewer branch, will avoid a backwash tank and on-site waste management. Locating the treatment system in the northwest corner of Esposti Park would provide the least impact on the park, but requires the longest underground piping connections. The northwest location was used in the cost analysis because it is the furthest from the well and has the longest piping runs. The estimated capital cost, including installation, for this system is $2,123,000 with an annual cost of $367,000 assuming a flow rate of 400 gpm and an annual production of 324 acre-ft/year (operating 24/7 for 6 months/year, dry season only).

Implementation Considerations

The sewer collection system can accept up to 800 gpm of short-term flow during dry weather. The maximum fill level of the sewer line immediately downgradient from the discharge location was 60% of pipe full. Treatment requires maximizing the discharge volume to the sewer and a permanent solution to preventing surcharge of sewer is required.

The Esposti Supply Well operation with treatment was described in both the Water Master Plan and the associated programmatic Environmental Impact Report (EIR). However, an initial study (IS) is recommended to identify which impact areas may need to be re-evaluated and the appropriate level of environmental documentation to be prepared. At a minimum, it is anticipated that aesthetics (visual), noise, and traffic impacts may be different for a treatment system constructed and operated as described herein (versus as described in the programmatic EIR). Assuming that no additional significant and unavoidable impacts are identified as part of the IS, a mitigated negative declaration (MND) will be sufficient for meeting the requirements of the California Environmental Quality Act (CEQA).

The potential for managed aquifer recharge utilizing the Esposti Supply Well is limited by the low hydraulic conductivity of the aquifer, poor native water quality, and the well design. Of these considerations, the first two are the most restrictive and expensive to overcome.

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1. Introduction

On behalf of the Town of Windsor (Town), GHD Inc. (GHD) in conjunction with Hazen and Sawyer (Hazen) and RMC Inc. (RMC) have prepared this *Esposti Supply Well Redevelopment, Pumping Test, and Treatment Feasibility Study* (Report). The Esposti Supply Well project site (Site) is located in Esposti Park, southeast of the Town Center, at the intersection of Shiloh Road and Old Redwood Highway. Figure 1 identifies the location of the Town of Windsor and Esposti Park. The Esposti Supply Well is separate from the Esposti Irrigation Well located 30 feet to the south.

The Esposti Irrigation Well is used to supply irrigation water to the park. Figure 2 provides an aerial photo illustrating the location of the Site in Esposti Park.

The Town installed the Esposti Supply Well in 2010. This investment was part of an effort by the Town to broaden the portfolio of water supply options in response to requirements from the Sonoma County Water Agency to obtain alternative supplies that are not reliant on withdrawals from the Russian River.

The Town's water supply options had also been constrained by the removal of the Town's Bluebird Well (Figure 1) from production due to elevated arsenic concentrations. While the Bluebird Well was operational, the concentration of arsenic in the water varied between 20 and 40 micrograms per liter (µg/L). In 2006, the State of California reduced the drinking water standard for arsenic from 50 µg/L to 10 µg/L. In response to this change, the Town removed the Bluebird Well from service and the 400 gallons per minute (gpm) of production capacity was no longer available to the Town. The Town also recognized that the existing Esposti Irrigation Well located in Esposti Park did not have the production capacity for reliance as an emergency or peak demand well. The goal of the well installation project of 2010 included replacing both the Bluebird Well and the Esposti Irrigation Well with two new wells that would produce water of higher quality and production volume reliability.

1.1 Background

In 2010, the Town installed pilot borings at both Esposti Park and the Bluebird Well site. Initial analytical testing of water samples collected from depth-specific aquifer zones from both of these pilot borings indicated acceptable water quality in select zones during the drilling phase. New wells were designed for both locations to target extraction from aquifers that had test results indicating acceptable water quality. Based on these data and the interpretation of acceptable water quality, the Town proceeded with new wells at both the Bluebird Well site and Esposti Park (Esposti Supply Well).

The Esposti Supply Well is 10-inches in diameter, constructed with 382 feet of low-carbon steel blank upper casing, and six well screen sections separated by various lengths of stainless steel blank casing. The Esposti Supply Well has a reported depth of 670 feet below the ground surface (bgs). Shortly after installation in 2010, the well was developed using a combination of airlifting and pump development. The maximum flow rate extracted from the well during this development was 500 gallons per minute (gpm). A constant-rate (24 hours in duration at 400 gpm) pumping test was then conducted on the well. Development and pump-test water was discharged into the Town's sanitary sewer system. During both the well development and pumping tests, the Esposti Supply

Well appeared to be productive, but the development and testing activities were cut short due to high spring rainfall and limited storage capacity at the Town's wastewater treatment facility. After construction, the Esposti Supply Well's groundwater contained higher than expected concentrations of arsenic and manganese. Subsequently, the well sat idle because of a decrease in water demand due to a downturn in the economy and conservation efforts in addition to the elevated arsenic concentration in the well.

In an effort to have a reliable off-river backup water source, the Town issued a Request for Proposals for the Esposti Water Supply Reliability Well Redevelopment and Treatment Feasibility Project (RFP, November 2015). The RFP included redeveloping and pump testing the Esposti Supply Well in order to improve performance and better understand the water quality and hydraulic properties of the well. In addition, the RFP included preparing a Feasibility Study to evaluate treatment and operational options for water production and completing a pilot test for the most feasible of proposed treatment methods to prepare for a future basis of design report and compliance with Division of Drinking Water loan funding requirements.

1.2 Purpose of this Report

This Report describes the redevelopment and pumping test of the Esposti Supply Well in addition to evaluating the cost of bringing the well into production. The redevelopment work increased the production capacity and removed residual drilling mud remaining in the boring after construction of the well. This residual drilling mud could hinder permeability and affect water sample results. The pumping test confirmed the water quality, established an understanding of the geochemistry, evaluated pumping yields, tested the sewer capacity for later engineering studies, and provided a basis for performing a treatment pilot test. However, the findings of this work indicate that bringing the Esposti Supply Well into production as a potable supply well could be costly and require significant space for treatment equipment. A treatment pilot test was not completed as part of this work until other feasible options could be evaluated. If it is determined that equipping the Esposti Supply Well for treatment is preferred over other options, then a pilot test will be pursued. This Study provides a screening level of potential treatment and operational options for the Town's consideration. These options provide the Town with a point of comparison to other water supply options such as recycled water or drilling a well in an alternative location.

1.3 Summary of Findings

Below is a summary of findings from the well redevelopment, pump testing activities, and key findings for developing production at the Esposti Supply Well Site. Each of these findings are addressed in detail in various sections of this Report.

1.3.1 Key findings of the well redevelopment and pumping test:

- Pumping the Esposti Supply Well at a flow rate of 800 gpm for 28 hours produced a drawdown of 195 feet (tested May 16-17, 2016).
- The measured specific capacity after 1, 4, 8, and 24 hours of pumping at 800 gpm were 5.5, 4.9, 4.7, and 4.3 gallons per minute per foot (gpm/ft) of drawdown, respectively.

- Transmissivity ranged from 4,141 gallons per day per foot (gpd/ft) to 7,822 gpd/ft. The lower of these values is most representative of the long-term pumping transmissivity. Storage coefficient was not calculated during this work.
- Hydraulic conductivity (permeability, K) ranged from 47 gpd/ft^2 to 89 gpd/ft^2. The lower of these two values is most representative of the aquifer.
- The Esposti Supply Well's recommended pumping rate is 400 gpm. Pumping at a rate of 800 gpm is possible but is not sustainable for more than a day due to hydrogeologic limitations to aquifer permeability.
- Pumping from the confined aquifer did not result in a significant effect on the overlying shallow groundwater system as measured at the Esposti Irrigation Well and the Mobile Home Estates Well. The production aquifer is a moderate to low permeable clay/silt/sand system, which stratified with interbedded clay layers (hydrogeologically confined). The aquifer is not a single unit but rather a series of sand layers interbedded with silts/clay layers.
- The aquifer production characteristics are consistent with descriptions of the Glen Ellen Formation provided in the California Department of Water Resources (DWR) reports and are described in Section 2.
- The sewer collection system can accept a significant volume of flow during dry weather. A flow of 800 gpm was discharged to the sewer for a period of 28 hours. The maximum fill level of the sewer line immediately downgradient from the discharge location was 60% of pipe full. During this test, a sewer plug was installed to prevent flow down the Old Redwood Highway branch of the sewer and all of the flow was sent down the Shiloh Road branch.
- The Esposti Supply Well produces water that meets all of the requirements for drinking water with the exception of arsenic and manganese. At the end of pumping the Esposti Supply Well at 800 gpm for 28 hours (28-hour pumping test), the concentration of arsenic was 0.057 milligrams per liter (mg/L) [57 micrograms per liter (µg/L)] and manganese was 0.860 mg/L (860 µg/L).
- On September 21, 2016, a zone-specific pumping test was performed (8-hour zone pumping test). This test consisted of pumping from only the uppermost (1st) well screen section (384 to 424 feet below top of casing). This test was performed using an inflatable packer between the 1st and 2nd well screen zones. The specific capacity of this uppermost (1st) well screen section (inclusive of flow bypassing the packer through the well filter pack) was calculated at 2.7, 2.5, and 2.4 gpm/ft measured after 1, 4, and 8 hours, respectively.
- An arsenic concentration of 0.035 mg/L (35 µg/L) and a manganese concentration of 0.910 mg/L (910 µg/L) were in groundwater samples collected at the end of the 8-hour zone pumping test.
- The maximum recommended pumping rate for the uppermost (1st) well screen interval is 250 gpm (inclusive of flow bypassing the packer). If flow bypassing the packer is removed

from the well capacity, the estimated maximum pumping rate is 175 gpm from the uppermost (1st) well screen. The sustainability of these pumping rates was not evaluated due to the short duration of the pumping test (8-Hour Zone Pumping Test).

- Samples collected from the Esposti Irrigation Well, screened 100 to 220 feet and 240 to 300 feet bgs, indicate a concentration of arsenic at 0.013 mg/L (13 µg/L) and manganese at 1.5 mg/L (1,500 µg/L).

1.3.2 Key findings for developing production at the Esposti Supply Well:

- As a potable water supply well, the most feasible flow rate for the Esposti Supply Well is 400 gpm. The 400 gpm flow rate is a function of well construction and aquifer limitations. Short-term (less than one day) pumping rates as high as 800 gpm are achievable but not sustainable due to aquifer limitations.
- The most feasible option for water treatment is a two-step process; the first step removes manganese through catalytic oxidation (greensand filtration) and the second step removes arsenic through media adsorption. An alternative treatment using iron coprecipitation is potentially feasible, but requires a large backwash tank and management of waste iron flocculent. Both the backwash tank and management of iron flocculent waste present significant site impact challenges.
- The minimum treatment compound size is 40 feet by 45 feet with a 12-foot maximum treatment vessel height for the most feasible option. The estimated capital cost, including installation, for this system is $2,123,000 with an annual cost of $367,000 assuming a flow rate of 400 gpm and an annual production of 324 acre-ft/year (operating 24/7 for 6 months/year).
- An alternative use of the Esposti Supply Well is as a replacement for the existing Esposti Irrigation Well or irrigation of nearby Town owned landscaping or fields.

1.4 Report Structure

This Report has seven sections, as described below:

Section 1 – Introduction: This section provides a summary of the background, purpose of this report, and a summary of findings.

Section 2 – Description of Project Area Hydrogeology: This section describes the regional and local hydrogeology.

Section 3 – Description of Project Site Infrastructure and Project Permits: This section describes the existing well site, power, and sewer capacity available. This section also describes the permits obtained as part of this project.

Section 4 – Esposti Supply Well Redevelopment Activites: This section describes the well redevelopment to remove clay and fine-grained material from the well. Also included here are the findings from the short-term testing of the pumping equipment prior to the aquifer pumping tests.

Section 5 – Pumping Tests: This section describes the setup for the Esposti Supply Well May 2016, 28-hour pumping test at 800 gpm and the September 2016, 8-hour zone pumping test at 300 gpm:

This section presents the results of the analysis of the water samples collected and hydraulic characteristics of the well.

Section 6 – Esposti Supply Well Treatment Feasibility: This section describes the screening level costs and site configuration requirements to bring the Esposti Supply Well into production as a potable supply well.

Section 7 – Scope and Limitations: This section references the scope of this investigation and outlines the expected uses and limitations of this Report.

2. Description of Project Area Hydrogeology

2.1 Hydrogeology of the Project Site

According to the DWR Bulletin 118, California's Groundwater (2003, updated in 2014), the groundwater basin underlying the Town is the Santa Rosa Plain, a sub-basin (DWR number 1-55.01) of the Santa Rosa Valley Basin (DWR, 2003). The Santa Rosa Plain drains toward the Russian River and is part of the North Coast Hydrologic Region. The Santa Rosa Plain Sub-basin is the largest basin in the County and underlies the most populated areas of the County. The Windsor hydrogeologic subarea is located in the northern portion of the Santa Rosa Plain and underlies the Town of Windsor (Windsor Subarea).

The Town of Windsor overlies the Windsor-Fulton unit, a sub-basin approximately 11,100 acres in size within the larger Santa Rosa Valley Groundwater Basin (Cardwell, 1958). The three most important geologic units for groundwater supplies within the Windsor-Fulton unit include the three Late Tertiary-Quaternary aged sedimentary deposits: Glen Ellen Formation, Petaluma Formation, and Wilson Grove Formation. Appendix A provides selected figures from publicly available geologic reports referenced in this section.

The basement rocks (Mesozoic age, up to 67 million years old), underlying the Santa Rosa Plain sediments, yield little to no groundwater (Herbst et al., 1982). Conversely, the relatively thick sequence of sediments and younger volcanic flows overlying bedrock do store and yield significant volumes of groundwater. However, the water bearing sediments of the Santa Rosa Plain have variable properties concerning how much water can be pumped from the wells completed in different areas of the watershed.

The Quaternary (the last 2.6 million years) Alluvium in the Windsor Subarea generally consists of eroded materials from the hills that flank the east and west sides of the valley. The majority of the sediments include clay, silt, sand, gravel, cobbles, and boulders. The Quaternary Alluvium ranges from a few feet thick along the edges of the valley and increases to at least 600 feet thick beneath portions of Town, at the valley center where Highway 101 passes through. Groundwater production in the Quaternary Alluvium generally ranges from 1 to 650 gpm due to wide range of clay, silt, and degree of compaction occurring within this formation.

Underlying Quaternary Alluvium is the Glen Ellen Formation, which in the Windsor hydrogeologic subarea ranges from approximately 100 to 150 feet thick. The Glen Ellen Formation generally consists of clay-rich creek and river deposits (silt, sand, and gravel) ranging in age from approximately 110,000 to 5.3 million years old. Although some minor intervals of the Glen Ellen Formation are relatively permeable and can yield high quantities of groundwater, this formation generally has limited production due to its clay-rich and relatively compacted and cemented properties. Therefore, the Glen Ellen Formation constructed wells generally yield in the tens to a few hundred gpm.

The Petaluma Formation (approximately 1.8 to 23 million years old) underlies the majority of the Glen Ellen at thicknesses ranging up to 3,000-feet in the Windsor hydrogeologic subarea. The

Petaluma Formation is principally comprised of weakly to moderately consolidated mudstone with minor lenses of sandstone. Due to the overall fine-grained nature of the Petaluma Formation, wells completed to this portion of the subsurface yield less than the Glen Ellen Formation and the Quaternary Alluvium.

The *Groundwater Well Installation and Testing Report*, prepared by RMC and E-PUR in 2010 (2010 Installation Report) for the Esposti and Blue Bird Supply Wells, determined that the sand and gravel units encountered in the Esposti Supply Well correlate well with the Glen Ellen Formation. The Glen Ellen Formation is a heterogeneous unit mixed with tuffaceous clay, mud, and boulders to pebbly gravel, and sand and silt deposits with interbedded conglomerates (Sweetkind et al., 2010). The 2010 Installation Report determined that the screened aquifer is confined or semi-confined, with a transmissivity of 6,600 gpd/ft, measured at a flow rate of 400 gpm. This is similar to the GHD findings where the screened aquifer (384 to 659 feet bgs, in six separate screen sections) has a confined aquifer transmissivity of 7,822 gpd/ft for short-term pumping and 4,141 gpd/ft for long-term pumping, measured at a flow rate of 800 gpm.

3. Description of Project Site Infrastructure and Project Permits

This section describes the existing well site, power, and available sewer capacity. This section also describes the permits obtained and the California Environmental Quality Act (CEQA) analysis performed in preparation for the fieldwork.

3.1 Esposti Supply Well Construction

The Esposti Supply Well was installed in 2010 after depth-specific water and soil sample collection from the pilot boring. After evaluation of the pilot boring analytical results the well screen was designed, the pilot boring was over-reamed, and the well installed. The well was constructed using 10-inch diameter casing and screen. The upper portion of the well was constructed using low-carbon steel casing (+3 to 380 feet bgs) while stainless steel screen (SS304 type) and stainless steel blank casing was used to screen six separate screen sections zones reportedly starting at 380 feet bgs and ending at 655 feet bgs. The well was constructed within a 20-inch diameter, mild steel conductor casing to 60 feet bgs. Appendix B provides well construction logs for the Esposti Supply Well, the Esposti Irrigation Well and the Bluebird Well. Videos performed during the current project observed the top of the screen at 384 feet and the bottom of visible screen at 656 feet as measured from the top of the casing. Taking into consideration the distance between ground surface and the top of the casing, the correlation between the reported construction and the observations from the video are good. As discussed later in this report, gravel fill obstructs the lower portion of the last screen section.

In 2010 after well development, groundwater samples collected from the Esposti Supply Well contained significantly higher concentrations of arsenic than depth-specific samples collected during the installation of the pilot boring prior to well construction. The arsenic concentration in the well after development ranged from 0.056 to 0.061 mg/L. This was unexpectedly high given that the depth-specific samples collected during well drilling at 400 and 600 feet bgs were 0.0021 and 0.0073 mg/L respectively. This nearly ten-fold discrepancy in sample results between the depth-specific pilot boring sampling (during drilling) and sampling after well construction is one of the reasons that the current project included aggressive redevelopment and extensive analysis of samples from the Esposti Supply Well.

A concrete pedestal protects the wellhead and a steel locking lid controls access to the inside of the well. There are no trees or overhead power lines that could interfere with maintenance equipment. The location of the Esposti Supply Well is approximate 40 feet east from Old Redwood Highway and 29 feet north from the Esposti Irrigation Well. The location of the well is adjacent to the parking lot, ball fields, and restroom facilities. It is also highly visible from both Old Redwood Highway and two nearby sidewalks. This central location and high visibility are addressed in the evaluation for treatment system location (Section 6).

3.2 Esposti Park Infrastructure

Described in this section are access to electrical power, sewer discharge capacity, and space availability.

3.2.1 Electrical Power

Power availability at the site is limited to 100-amp single phase 240 VAC. This is adequate to power the pump in the Esposti Irrigation Well, but was insufficient to run the 6-inch and 8-inch pumps used for the May and September 2016 pumping tests.

PG&E power is located on overhead poles across Old Redwood Highway. An electrical contractor was contacted by Weeks Drilling & Pump Co. (Weeks) of Sebastopol, California (contractor to GHD) to identify the level of effort required to bring higher load service power to the Esposti Supply Well location. Sufficient electric power to run the 6-inch and 8-inch pumps used for this project could not be brought in on a temporary basis using a typical construction power drop pole without incurring a delay to accommodate PG&E. Bringing higher load power into the Site would require a design evaluation inclusive of investigating the details of available power from the overhead lines. Estimated costs for designing and installing adequate electrical power have been included in the treatment feasibility study.

3.2.2 Sewer Discharge

Park staff identified cleanouts near the restroom and indicated that the size of the sewer lateral pipes were unlikely to accept the high flows from the well testing. GIS files provided by the Town indicate that the lateral running from the restroom to the sewer main in Shiloh Road is 6-inch. RMC identified the nearest high capacity drop inlet point as manhole S130A, located in Shiloh Road off of the southwest corner of Esposti Park (in the westbound Shiloh Road right hand turn lane). The invert at the bottom of manhole S130A in Shiloh Road is approximately eight (8) feet below street grade. Appendix C provides a copy of maps identifying the location of sewer manholes.

RMC collaborated with GHD to assess the sewer capacity and provide recommendations for well discharge testing. RMC provided the recommendation to use manhole S130A for the discharge of well test water. Appendix C provides copy of RMC's (Draft) April 29, 2016 Technical Memorandum. Appendix C also provides copies of field notes from sewer discharge observations taken by Town personnel during test discharges on May 9, 11, and 16, 2016.

Table 1 compares RMC's calculated pipe flow with the field observations. The observed percentage of full pipe was less than calculated. A portion of this discrepancy is attributed to the actual observed base flow that was less than the base flow built into the calculations. In general, the correlation between the calculated and observed pipe flow is good considering the qualitative nature of the observations and the variability in discharge volume from the well during these tests.

A key finding of an RMC sewer flow simulations was that during high flow conditions without the plug, flow partitioning would route some flow down the north-flowing Old Redwood Highway sewer main, potentially leading to exceedances in sewer capacity. The use of the Shiloh Road main sewer line for discharge of pumping test water was based on the simulation and recommendation for a

plug in the north-draining main of sewer manhole S130. This plug prevented discharge from flowing towards the north to the Old Redwood Highway sewer main.

On August 23, 2016, Town staff directly observed subsequent temporary discharges at manhole S130 without a plug installed in the north flowing sewer under Old Redwood Highway at this sewer manhole. At a discharge rate of 400 gpm into manhole S130A nearly 80% of the flow was observed to flow down Shiloh Road, while 20% appeared to flow north through the Old Redwood Highway sewer main. It appears that further increases in discharge volume would continue to partition, sending partial flows in through both sewer mains.

Table 1 Comparison of Calculated Sewer Flow with Observation

Flow Added	Total Flow	Velocity	Freeboard	d/D	Observed % Of Full Pipe		
gpm	*gpm*	*fps*	*inch*	*in/in* as %	**S374**	**S375**	**S376**
Baseline (0 gpm added)	132	2.29	9.36	22	small base flow observed at 10% to 15% full pipe		
50	182	2.52	8.88	26	-	-	-
100	232	2.71	8.46	29.5	-	-	-
200	332	2.99	7.74	35.5	-	-	20
300	Not Calculated				30	30	30
400	Not Calculated				45	-	-
500	632	3.54	5.94	50.5	40	-	35
600	732	3.67	5.34	55.5	50	-	40
700	Not Calculated				55	-	45
800	932	3.87	4.20	65	60	50	50
900	Not Calculated				65	-	60
1,000	1,132	3.99	3.00	75	-	-	-

Notes:

- Observed % of Full Pipe is relative and approximate due to judgement by field personnel. Data presented is compiled from different days and from different observers. Base flow on all days was low to very low.
- These calculations assume flow is routed down Shiloh Rd by placing a plug in the north-draining sewer main at manhole S130.

The key finding is that the hydraulic simulation had an apparent good correlation with observed sewer flow along Shiloh Road. However, when discharging flow into manhole S130A in excess of 400 gpm, direct observations at manholes S130 and S374 are recommended to assess partitioning of flow. Access to both of these manholes requires traffic control.

3.3 Permits Obtained for Pumping Test

Two permits where obtained during the performance of this work. In addition, RMC evaluated compliance with CEQA at the project level and for the pumping test. These permits are outlined below:

3.3.1 Sewer Discharge Permit

Appendix D provides a copy of the sewer discharge application prepared by GHD and the resulting sewer discharge permit issued by the Town.

3.3.2 Street Encroachment Permit

Appendix E provides a copy of the Town's Encroachment Permit prepared and received by Weeks.

3.4 Project CEQA Analysis

3.4.1 CEQA Analysis for Aquifer Pumping Tests

As part of the preparation for the aquifer pumping tests, RMC evaluated performance of the tests under CEQA. Based on this analysis, the pumping tests were found to be categorically exempt under CEQA. Per the CEQA handbook, a Class 6 Categorical Exemption "… consists of basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource. These may be strictly for information gathering purposes, or as part of a study leading to an action which a public agency has not yet approved, adopted, or funded." As such, this test was considered exempt.

3.4.2 Project Level CEQA for Esposti Supply Well

In September 2011, Horizon Water and Environment LLC, prepared a Water Master Plan Update Program Environmental Impact Report (EIR). This evaluation included a programmatic EIR for the Water Master Plan and a project level evaluation of the replacement of the Esposti Park Irrigation Well with the Esposti Supply Well operating at a minimum of 270 gpm to a maximum of 1,000 gpm. Section 6.7 provides analyses of specific aspects of CEQA that need to be addressed if the Esposti Supply Well is brought into production.

4. Esposti Supply Well Redevelopment Activities

Redevelopment of the Esposti Supply Well was performed to ensure the removal of all residual drilling mud from the well prior to the pumping tests. This was necessary to ensure that water quality samples collected were representative of aquifer water quality and accurate testing of hydraulic characteristics. The generation of large volumes of water during the redevelopment process also provided an opportunity to test the sewer for maximum capacity by direct field observations during discharges.

The following were performed during this redevelopment:

- Downhole videos,
- Passive spinner log survey,
- Double swab jetting/pumping of the screen sections,
- Bailing of the bottom material in the casing, and
- Short-term, progressively increasing-flow pumping tests.

Two well videos were performed. The first was performed in conjunction with a passive spinner log to document the condition of the well prior to development on April 18, 2016 (Appendix F). The second video was performed on May 4, 2016, after a wire-line sediment bailer became trapped in the well on May 2, 2016 (Appendix G). The results of these videos are discussed in Sections 4.2 and 4.3.1, respectively.

The discussion below summarizes the timeline for activities performed as part of the redevelopment of the Esposti Supply Well. Appendix H provides copies of field reports in date order. Appendix I provides copies of technical information and photos of equipment (i.e. downhole tools, pumps, and packer) used during well development and pumping tests.

4.1 Field Activities

This chronological summary of fieldwork during the well redevelopment activities includes the downhole videos, and short-term, progressively increasing flow tests. This section also discusses the findings and conclusions from these events.

- April 16, 2016, an inflatable sewer plug is inserted into manhole S130, by the Town to ensure no sewer flow from the project activities could go north through the Old Redwood Highway sewer main.
- April 18, 2016, West Coast Well Logging Services (West Coast) performed a high definition video log and static spinner log of the Esposti Supply Well,

- April 19 to 26, 2016, GHD identified manholes along Shiloh Road to assess sewer capacity and select monitoring points in preparation for discharging Esposti Supply Well development water and aquifer water to the sanitary sewer.
- April 20, 2016, GHD collects a grab water sample from the well using a disposable bailer and no purging.
- April 21, 2016, GHD installed transducers in the Bluebird Well, Esposti Irrigation Well, and the Mobile Home Estates Well (Figure 1 and Figure 2) to monitor groundwater elevations for the duration of the project.
- April 21 to 29, 2016, GHD oversaw Weeks single swab and dual swab (isolated airlift) tool cleaning of all six screen sections of the Esposti Supply Well. Water samples were collected on April 26, 28, and 29 as the dual swab with airlift development progressed from the upper screens down to the lower screens.
- May 2, 2016, Weeks used a 10-foot long, 8-inch diameter bailer with a bottom check flap to remove gravel material from the bottom of the well. This bailer became trapped in the sediment/gravel and the wire line attached to the bailer snapped. Unable to retrieve, the bailer remains in the well.
- May 4, 2016, West Coast confirmed by video that the bailer was trapped at the bottom of the well. The decision was made between the Town, Weeks, and GHD to leave the bailer at the bottom of the well.
- May 6, 2016, set transducers in Esposti Supply Well.
- May 9, 2016,
    - Sewer capacity test from 200 to 400 gpm.
    - Esposti Supply Well pumped at a consistent 400 gpm for 4 hours and 35 minutes.
    - Esposti Supply Well surged up to 1,000 gpm for brief periods.
    - Samples collected from Esposti Supply Well discharge at 10:50 (flow at 400 gpm) and at 15:35 (during surging between zero and 1,000 gpm).
- May 10, 2016, sewer capacity test from 400 to 800 gpm.
- May 11, 2016, sewer capacity test at 900 gpm.

4.2 Results of Pre-redevelopment Downhole Video and Static Spinner Log

The April 18, 2016, video of the Esposti Supply Well indicated that the original well construction as reported in 2010 was correct. However, the well construction was reported in 2010 with reference from the ground surface, and the well actually starts approximately 3 feet above the ground surface (with the concrete pad and blank casing). The well is constructed with 20-inch diameter, mild steel conductor casing to 60 feet bgs. Inside the conductor, a 10-inch diameter, low-carbon blank steel casing, was constructed down to the first screened interval starting at 384 feet below top of casing (BTOC). A dielectric insulator coupler was used between the low-carbon steel blank casing above and the stainless steel (SS304 type) screened and blank intervals below. Appendix F presents the video report of findings from West Coast.

The April 18, 2016, static spinner log identified a downward flow of groundwater at approximately 5 gpm moving between the 1st screened section (384-424 ft BTOC) and the 4th screened section (484-500 ft BTOC). Appendix F presents the Static Spinner Log report of findings from West Coast.

4.3 Results of Short-Term Pumping During Well Redevelopment

This section summarizes the redevelopment effort conducted on the well. Ten groundwater samples were collected during the redevelopment process to identify changes in water quality during redevelopment. Redevelopment consisted of surge pumping, air lifting water and suspended sediment, dual swab jetting/pumping the discrete screened intervals, and bailing the bottom sediment.

Table 2 below summarizes the groundwater analytical results from the Esposti Supply Well over time during redevelopment. Analytical reports are included in Appendix J.

Table 2 Analytical Results From Sampling During Well Development

Sample ID	Date	Iron Diss.[1]	Iron Total	Mn Diss.[1]	Mn Total	As Diss.[1]	As Total	Comments
		mg/L[2]						
ESW-4-20-08:23	4/20/2016	<0.10	---	1.0	---	0.0044	---	Sample by bailer of static water in well
ESW-4-26-11:50	4/26/2016	<0.10	---	0.64	---	0.003	---	Sample during development by swab
ESW-4-28-11:40	4/28/2016	<0.10	---	0.93	---	0.018	---	Sample during development by swab
ESW-4-29-11:45	4/29/2016	<0.10	---	0.89	---	0.016	---	Sample during development by swab
ESW-5-9-10:50	5/9/2016	<0.10	---	0.92	---	0.026	---	Sample during 400 gpm pumping
ESW-5-9-15:35	5/9/2016	<0.10	---	0.94	---	0.016	---	Sample during surging zero to 1,000 gpm
ESW-5-10-10:09	5/10/2016	<0.10	1.1	0.91	1.0	0.029	0.033	Sample at end of short 800 gpm run
ESW-5-11-10:44	5/11/2016	<0.10	---	1.0	---	0.028	---	Sample at 800 gpm
ESW-5-11-15:38	5/11/2016	<0.10	---	0.97	---	0.038	---	Sample at 900 gpm
ESW-5-11-16:42	5/11/2016	<0.10	0.29	0.99	1.0	0.041	0.041	Sample at end of 90 minutes at 900 gpm

Notes:
1 = Analyzed as Dissolved (filtered before adding acid preservative).
2 = Milligrams per Liter (parts per million)
<0.10 = Less than laboratory detection limit.
--- = not analyzed

4.3.1 Surge Pumping During Well Development

April 21 to 29, 2016, GHD oversaw Weeks single swab and dual swab (isolated airlift) tool cleaning of all six screened sections of the Esposti Supply Well. Groundwater samples were collected on April 26, 28, and 29, 2016, as the dual swab with airlift redevelopment progressed from the upper screens down to the lower screens. Analysis of these groundwater samples was performed to monitor changes in water quality during redevelopment. The screens were swabbed until clear water was observed returning (airlifted) to the surface. Development water was initially contained in

several 20,000-gallon storage tanks, then filtered and discharged to the sanitary sewer at 50 gpm. Suspended silt and fine sand were observed in the jetting tool discharge, no gravel pack materials were observed in the discharge. Redevelopment of each screen was considered complete when the discharge was observed to be free of silt and sand. The final screen cleaning depth was completed with a soft landing at 656 feet bgs (final depth measurement based on number of 21-foot pipe sections for the jetting tool).

As presented on Table 2 above, the groundwater samples were analyzed for arsenic, iron, and manganese. Concentrations of dissolved iron were not detected. However, concentrations of both dissolved arsenic and manganese were above drinking water standards when redevelopment efforts finished. Dissolved manganese remained near 1.0 mg/L to the end of redevelopment. Concentrations of dissolved arsenic were relatively low (0.0044 mg/L) upon initiation of redevelopment activities and increased a full order of magnitude in concentration at termination of redevelopment (0.041 mg/L). The lowest concentrations of arsenic were collected during development of the uppermost screen section. Later zone testing confirmed that the uppermost screen interval has lower concentrations of arsenic when compared to the deeper portions of the well. The above Table 2 summarizes the groundwater analytical results from the Esposti Supply Well over time during redevelopment. Analytical reports are included in Appendix J.

On May 2, 2016, GHD observed Weeks use a 10-foot long, 8-inch diameter check valve bailer, to remove gravel and sediment material from the bottom of the well. First retrieval was approximately 1.0 feet of soft sediment with ¼-inch filter pack underlying the sediment for a total of approximately 1.5 feet of fill removed. Subsequent retrievals 2 through 4 were nearly 100% ¼-inch filter pack for an approximate total of 4 feet of material removed. When bailer retrieval number five could not be retrieved with the single winch pulley, a second powered pulley was connected to assist in lifting the bailer. The wire to the bailer snapped and the line was retrieved without the bailer.

On May 4, 2016, GHD observed West Coast using a high definition down-hole camera and confirmed the total depth to the top of the material in the well to be 654 feet deep. GHD analyzed the video and did not see any damage to the well casing or a difference from the April 18, 2016, video completed before the bailer was used in the well. Additionally, Weeks' bailer, with approximately 77 feet of cable, was observed at the bottom of Esposti Supply Well. GHD recommended that the bailer be left in place rather than retrieve it and risk potential damage to the well casing. The West Coast video report is provided in Appendix G. The filter pack observed in the bottom of the well casing may be the result of adding ballast to straighten the well during construction and not removed during the initial well development activities or some other intentional event. The filter pack covers a portion of the lower screen, but does not appear to be the result of damage to the well casing or screen. However, the cause of the filter pack in the bottom of the well is unknown.

On May 6, 2016, GHD installed transducers and Weeks installed an 8-inch pump. Then on May 7, 2016, GHD along with the Town, started observing downgradient manhole numbers S374, S375, S375A, and S376 in Shiloh Road. After approximately 33 minutes of discharging to the Town's sewer manhole S130 at rates ramping up to 800 gpm, the pump shut off due to amperage exceedance tripping the circuit breaker. Weeks attempted a second pumping effort with surging flow rates up to 1,000 gpm discharged to the sewer with the same pump failure result. Weeks then subsequently reconfigured the pump wiring with larger current (amperage) capacity wire.

On May 8, 2016, GHD and the Town observed manholes for 90 minutes while pumping to sewer at initial discharge rates of 400 gpm. This rate was then ramped up to a maximum discharge rate of approximately 890-910 gpm for the majority of the observation period. This test confirmed that discharge to the Town's sewer at manhole S130A has a dry season capacity that roughly corresponds to the sewer model values.

Two short-term pumping tests were performed as part of well redevelopment to verify that the well was clear of sediment and verify that the pumping rate selected for the long duration pumping test (24 hours or longer) was as high as it could reasonably be and sustained at a constant rate for at least 24 hours. These short-term pumping tests are discussed below.

4.3.2 400 GPM Pumping For 4.5 Hours

On May 9, 2016, a short-term pumping test was conducted at a flow rate of 400 gpm to verify completion of well development and to provide a comparison with the 400 gpm pumping test performed in 2010. The 400-gpm flow was discharged to the storage tanks and the storage tanks discharged through a bag filter to sewer manhole S130 at a rate of 300 gpm. The bag filter needed cleaning upon initial discharge from the tanks to the filter. After cleaning the filters, the discharge from the tanks, through the filter, to the sewer resumed at 300 gpm (while continuing to pump the well at 400 gpm). Storage tank capacity was reached after 4.5 hours of pumping the Esposti Supply Well and the 400-gpm short-term pump test was terminated. After the 4.5 hours of pumping the Esposti Supply Well, total groundwater drawdown measured from static water level was 66.1 feet for a calculated specific capacity of 6.1 gpm/ft.

Samples of pumped groundwater were collected at the start of the 400-gpm test period. Samples were again collected at the end of the day after the completion of pumping at 400 gpm and additional surge pumping was performed by running the pump in quick bursts from 0 gpm to 1,000 gpm and back to 0 gpm.

Table 2 summarizes the groundwater analytical results from the Esposti Supply Well over time during redevelopment. Analytical reports are included in Appendix J.

4.3.3 900 GPM Pumping for 1.5 Hours

On May 10, 2016, GHD oversaw Weeks conduct a brief troubleshooting effort and test pumping at rates of 400-800 gpm, while GHD collected a groundwater sample. Analytical results of dissolved arsenic, iron, and manganese from May 10 were comparable to results of samples collected the day prior. The field measured indicator parameters of temperature and pH both were generally increasing over time, while electrical conductivity (EC) and total dissolved solids (TDS) were generally stable after the first well casing water was purged. These indicator parameter data suggest that warmer and slightly higher pH water moves up through the well casing from the lower formation through the associated lower well screens over time while pumping.

On May 11, 2016, GHD oversaw Weeks perform pumping for approximately 3.5 hours at pump rates ranging from 400 to 910 gpm in order to determine the maximum pump rate test the Esposti Supply Well could feasibly sustain for the planned 24 hour test. After approximately 90 minutes of pumping at 900 gpm, the pump flow rate began to decrease while total drawdown also continued to

increase (223+ feet); therefore, it was determined that the 24-hour pump test flow rate should be 800 gpm, not 900 gpm or 1,000 gpm.

Groundwater analytical results of dissolved arsenic, iron, and manganese concentrations from May 11, 2016, were compared to prior analytical results and found that the concentration of arsenic and manganese were generally increasing as the pumping and redevelopment progressed. The field indicator parameters were comparable to that of days prior.

Table 2 summarizes the groundwater analytical results from the Esposti Supply Well over time during redevelopment. Analytical reports are included in Appendix J.

5. Pumping Tests

Two pumping tests were performed on the Esposti Supply Well during this investigation. The first was a 28-hour pumping test performed at a flow rate of 800 gpm. The second test isolated the upper most screen zone for pumping at a rate of 300 gpm for a period of eight (8) hours.

5.1 Pumping Test Field Activities

The chronological summary of fieldwork is provided below for ease of reference. Findings and conclusions from the different events are discussed in later sections of this Report.

- May 16-17, 2016, 800 gpm pumping test starts at 6:05 AM on May 16, 2016, and ends at 10:05 AM on May 17, 2016. This test is referred to as the "28-hour pumping test" (Sections 5.2 through 5.6).
- August 23, 2016, active spinner log while pumping at 400 gpm (Section 5.7).
- August 26, 2016, 8 hours of pumping at 400 gpm with top of packer at 436 BTOC (incorrectly placed within second screen zone; therefore, resulting data is not presented in this Report and pumping test was repeated on September 21, 2016).
- September 21, 2016, 8 hours of pumping at 300 gpm with top of packer at 425 feet BTOC (between 1st and 2nd screen zones). This test is referred to as the "8-hour zone pumping test" (Sections 5.8 through 5.12).

The Esposti Supply Well 28-hour pumping test was performed to comply with the requirements of both the State Water Resources Control Board and the Division of Drinking Water Programs for obtaining a permit to operate the Esposti Supply Well as part of a municipal water supply system. The goals of the pumping test were to evaluate the effect of pumping on the confined production aquifer and the overlying unconfined shallow groundwater. This pumping test was performed at a constant pumping rate of 800 gpm for a period of 28 hours (drawdown testing) and the recovery period was monitored for approximately one and a half additional days. During the drawdown test and the recovery period, pressure transducers were used to monitor the water elevation in a total of four wells. These wells consisted of the Esposti Supply Well, Esposti Irrigation Well, Bluebird Well, and the Mobile Home Estates Well. The Church Well was not used because of its current congested well casing (recently relined) and the risk of entangling the water level measuring equipment.

5.2 28-Hour Pumping Test Setup

This section describes setting up the pumping well and observation wells with water level monitoring equipment and compiling of site-specific data needed to perform the analysis of the data collected during the 28-hour pumping test (800 gpm). The 28-hour pumping test extracted from the entire well without the use of zone isolating packers. The purpose of this test was to induce the maximum flow given the well construction constraints and the constraints on the groundwater discharge to the sewer. For the purpose of this test, the limiting factor for selecting 800 gpm as the test flow rate was the expected well drawdown and pump capacity. Based on previous short-term

pumping, a pumping rate of 900 gpm quickly results in drawdowns in excess of 200 feet. The dry weather sewer capacity was not the primary limiting factor, although by coincidence 800 gpm is near the limit of dry weather capacity for the sewer line.

5.2.1 28-Hour Pumping Test - Water Handling Equipment

The pump used to facilitate the 28-hour pumping test was a Grundfos 8-inch 100-hp submersible pump. Appendix I provides a copy of the pump curve. The intake of the pump was set at 360 feet below the top of the casing, which is 24 feet above the top of the upper-most screen and approximately 320 feet below the elevation of static water level.

Two 20,000-gallon temporary tanks where on site and previously used during redevelopment for groundwater containment. Two additional tanks were brought on site to handle the higher flow rates of the pumping tests. Water processing prior to discharge consisted of four (4) 20,000-gallon temporary tanks provided by Rain-for-Rent to remove sediment and provide buffering storage for high flow testing. These tanks were followed by a diesel operated transfer pump and a bag filter assembly to remove remaining fine silt and clay.

A sample port was located at the wellhead after the flow meter and consisted of a ¼-inch diameter brass tube operated by a ball valve. Photographs of the tanks and wellhead assembly are provided in Appendix I.

5.2.2 28-Hour Pumping Test - Observation Wells

The aquifer test was performed by pumping the Esposti Supply Well and monitoring the three wells to which the Town had access. The locations of the wells associated with the aquifer test are shown on Figure 1 (Bluebird, Esposti Supply Well, Esposti Irrigation Well, and Mobile Home Estates). Figure 2 provides and aerial view of the Esposti Park area. The Bluebird Well is completed from 695 to 745 bgs and is representative of the confined aquifer system. The Esposti Irrigation Well and the Mobile Home Estates Well are both completed in aquifer zones shallower than those screened by the Esposti Supply Well. Well logs for the Esposti Supply Well, Bluebird Well (Replacement 2010), and the Esposti Irrigation Well are provided in Appendix B. A drawing comparing the construction of the Esposti Supply Well and the Esposti Irrigation Well is also provided in Appendix B.

Pumping from the Esposti Irrigation Well was temporarily halted during Esposti Supply Well test pumping periods. The Mobile Home Estates Well operated under their normal operating schedule and pumped water as demands required. Neither wells could be shut down for the duration of the project due to the associated water supply demands. The Bluebird Well is not operational and does not have a pump installed in it.

There is a well at the church located south of the Esposti Park on Old Redwood Highway (see Figure 2). This well was inspected prior to the test but could not be used because the well casing was too crowded with power wires serving the submersible pump. The vineyard across Shiloh Road to the south of Esposti Park has a well for irrigation; however, due to lack of access it was not monitored during this project.

5.2.3 28-Hour Pumping Test - Well Construction Summary

Copies of the available DWR 188 well logs (Bluebird Well, Esposti Supply Well, and Esposti Irrigation Well) are provided in Appendix B. No well log is available for the Mobile Home Estates Well; therefore, the construction details including pump setting, total depth, and screen interval are unknown. A summary of the construction of the monitored wells used in this test are provided in Table 3.

Table 3 Well Construction Summary

Well ID	Measuring Point Elevation (feet above mean sea level)	Well Diameter, Casing Thickness, and Slot Size	Top and Bottom of Perforation Intervals (feet) and Measured Depth (feet)	Sand/Gravel Pack Interval and Grade Sizing (inches or Sieve Size)	Seal Interval (feet)
Esposti Supply Well	140.93 Wellhead Slab Surface to NAVD 88	10-inch Diameter, #304 Stainless Steel Casing, 0.125-inch Slots	384-424 434-453 464-473 484-513 549-569 620-659	371-670	Cement 0-370 Bentonite 370-371
Installed March 27, 2010			TD = 654	¼-inch Gravel Pack	
Esposti Irrigation Well	140.0 Portal near ground Surface Estimated From Google Earth	8-inch Diameter, 200 Gauge Steel Casing, 0.032-inch Slots	100-220 240-300	55-300	Cement 0-50 Bentonite 50-55
Installed August 23, 1989			TD=300	8-16 Sieve	
Bluebird Well	118.34 Wellhead Slab Surface to NAVD 88	10-inch Diameter, 1/4-inch Low Carbon Steel Casing, 0.125-inch Slots	695-745	675-765	0-665
Installed, May 5, 2010			TD=765	¼-inch Gravel Pack	
Mobile Home Estates Well	135.0 Top of Casing Near Ground Surface Estimated From Google Earth	6-inch Diameter, Steel Casing (thickness unknown), Slot Size Unknown	Unknown	Unknown	Unknown
Unknown			TD = initially 175 (Verbal)	Unknown	

Notes:
TD = Reference point for well total depth in this column is ground surface

5.2.4 28-Hour Pumping Test - Flow Rates and Discharge Location

The aquifer test was performed at a constant flow rate of 800 gpm for 28 hours. The flow rate of 800 gpm was selected because this is the maximum sustainable flow rate by the 8-inch pump and higher flow rates resulted in too much drawdown. Based on review of available pumps, the pump used for this test is representative of the largest capacity pump that would fit into the well casing and operate over the range of expected hydraulic heads. During well redevelopment, pumping was conducted at flow rates of 200, 300, 400, 800, 900, and 1,000 gpm. Although these pumping rates were conducted over a period of days, the information was used to verify that 800 gpm was the highest sustainable pumping rate at a reasonable drawdown for the test. Short term testing at 900 and 1,000 gpm resulted in an unsustainable groundwater drawdown observed in the well. These high flow rates resulted in pump shut-off due to too much power draw.

5.2.5 28-Hour Pumping Test - Setup for Observation Wells

Seven pressure transducers were used during the Esposti Supply Well aquifer-pumping test to record the water elevation changes in the wells monitored. Three of these transducers were installed in the Esposti Supply well, a single transducer was installed in each of the three observation wells, and one barometric pressure transducer was on site for the duration of the project to correct water level data from atmospheric pressure changes. Table 4 below identifies the transducers used to monitor water levels in each well.

Table 4 Water Level Measurement Equipment in Each Well 28-Hour Pumping Test

Well	Function of Well During Test	Transducer Used Serial #	Frequency of Data Record (minutes)
Esposti Supply Well	Pumping Well (Malfunctioned prior to Pump Test)	In-Situ vented Troll 700 431953	1
Esposti Supply Well	Pumping Well (Replacement Unit for Malfunctioned unit# 431953)	In-Situ vented Troll 700 337530	1
Esposti Supply Well	Pumping Well (Backup unit)	Solinst non-vented F650 82060899	1
Esposti Irrigation Well	Observation Well Confined Aquifer	Solinst non-vented F65 20371	1
Bluebird Well	Observation Well Confined Aquifer	Solinst non-vented F15 19828	1
Mobile Home Estates Well	Observation Well Assumed Unconfined Aquifer	Solinst non-vented F30 20188	1
Barometer (Barologger)	Barometric correction data to apply to non-vented transducer data sets.	Solinst non-vented 19657	1

5.2.6 28-Hour Pumping Test - Measured Elevations and Distance to Pumping Well

During the data analysis, the recorded pressure head by the transducer was converted to water elevation by adding the recorded pressure head to the elevation of the transducer set into the well casing. All wells were monitored manually during the test using an electronic depth-to-water meter to verify that the transducers were correctly measuring groundwater elevations. Pressure head data was also corrected to account for atmospheric affects by subtracting recorded barometric pressure from each of the recorded pressure head measurements; except for the In-Situ transducers, which are "vented" and automatically corrected to account for atmospheric pressure. A summary of the wells used to observe groundwater elevation changes during the test and the distances between each observation well and the Esposti Supply Well is provided in Table 5.

Table 5 Elevation and Distance of Monitoring Points 28-Hour Pumping Test

Well	Date of Trans-ducer Install	Estimated Elevation of Ground Surface (feet msl) [1]	Elevation of Measuring Reference Point (feet msl) [1]	Depth of Transducer Installation Below Reference Point (feet)	Trans-ducer Elevation (feet msl) [1]	Pressure Head Above Transducer Prior to Start of Aquifer Test (feet) [3]	Elevation of Ground-water Prior to Start of Aquifer Test	Distance to Esposti Supply Well (feet)
Esposti Supply Well	5/6/ 2016	140	143 (Top of Casing)	330	-187	287.7	102.1	0
Esposti Irrigation Well	4/22/ 2016	140	140 (Port in Casing Side)	75	65	37.8	102.8	29.5 (Measured)
Bluebird Well	4/21/ 2016	117	120 (Top of Casing)	38.5	81.5	10.1	91.6	7,767 (Estimated)
Mobile Home Estates Well	4/28/ 2016	135	135 (Top of Casing Near Ground Level)	45	90	22.4	112.7	1,715 (Estimated)
Barometer [2] (Baro-logger)	4/21/ 2016	141	141	0	141	2.6	Not Applicable	32 (Estimated)

Notes:
1 = Survey was not conducted prior to project activities, however, Esposti Supply Well and Bluebird Well concrete footings were surveyed by Winzler & Kelly, July 2010, and that data used to estimate those associated top of casing elevations. All other wellhead elevations are estimates based on Google Earth Professional Software.
2 = Barometer was secured adjacent to Esposti Irrigation Well in an open top safety cone.
3 = For the transducers in wells, this value presented here is barometrically corrected.

5.3 28-Hour Pumping Test Operation

The pump test on the Esposti Supply Well was conducted for 28 hours to evaluate the effect of pumping the aquifer. The adjacent Esposti Irrigation Well was shut off on the day prior to the start of the pump test. Once the pump test started it ran continuously for 28 hours, and at the end of the

test the groundwater was allowed to recover continuously without turning on the Esposti Irrigation Well. Groundwater elevation data for all wells is graphed on Figure 4. Below is a summary of the start-up and running conditions of the test:

Pre-Test Preparation

1. Installed the pump into the Esposti Supply Well, June 15, 2015.
2. Installed the transducers in the three observation wells and Esposti Supply Well between the dates of April 21, 2016 and May 12, 2016.
3. All transducers were synchronized and recording in the wells by 12:21 PM on May 12, 2016.

Start/End of 28-Hour Pumping Period

1. Pumping of the Esposti Supply Well started at 6:05 AM, May 16, 2016 at 800 gpm.
2. Sampling and parameter monitoring during the test was kept at a steady 800 gpm by manually operating the flow control valve at least once every hour.
3. End of pumping at 10:05 AM May 17, 2016.

Groundwater Recovery Period

1. Start of recovery period 10:05 AM May 17, 2016.
2. End of recovery period and data record at 8:50 AM May 19, 2016.

5.4 28-Hour Pumping Test Analytical Results and Analysis

Samples were collected on intervals as summarized in this section. All laboratory analysis was performed through Alpha Analytical, a California Certified Laboratory. Field measurement of water quality parameters of temperature, pH, oxidation-reduction potential (ORP), EC, and TDS were made frequently using a Myron Ultrameter™. In addition, visual observations were noted on the daily field and data sheets. This information is provided in daily work sheets and data collection forms, which are provided in Appendix H.

5.4.1 28-Hour Pumping Test - Results of Water Sample Analysis During Test

Water samples were collected during the aquifer test to monitor changes in water quality. These samples were analyzed for arsenic, iron, and manganese (Table 6). Field parameters were collected frequently at start-up and during sustained pumping.

Table 6 Analytical Results From 28-Hour Pumping Test

Sample ID	Date	Iron Diss.[1]	Iron Total	Mn Diss.[1]	Mn Total	As Diss.[1]	As Total	Sample time after start
		mg/L[2]						
ESW-5-16-06:06	5/16/2016	<0.10	6.60	0.97	1.0	0.0095	0.016	1 min
ESW-5-16-06:07	5/16/2016	<0.10	4.10	1.0	1.0	0.0081	0.013	2 min
ESW-5-16-06:12	5/16/2016	<0.10	0.98	1.0	1.0	0.018	0.020	7 min
ESW-5-16-13:00	5/16/2016	---	0.10	---	0.88	---	0.044	415 min
ESW-5-16-18:00	5/16/2016	---	<0.10	---	0.87	---	0.049	715 min
ESW-5-16-24:00	5/16/2016	---	0.11	---	0.85	---	0.052	1,075 min
ESW-5-17-04:00	5/17/2016	---	<0.10	---	0.88	---	0.053	1,315 min
ESW-5-17-10:00	5/17/2016	---	<0.10	---	0.86	---	0.057	1,675 min
MCL in mg/L[2]			**0.300**		**0.050**		**0.010**	

Notes:
1 = Analyzed as Dissolved.
2 = Milligrams per Liter (parts per million)
<0.10 = Less than laboratory detection limit.
--- = not analyzed

5.4.2 28-Hour Pumping Test - Water Sample Analysis at End of Pumping

Groundwater samples were collected immediately prior to shut down. These samples are representative of the groundwater extracted from the aquifer under normal operating conditions and analyzed for Title 22 constituents and other compounds that can affect treatability. Table 7 is a summary of key analytical results. A comparative summary is provided in Table A presented in Appendix K. As shown in Table 7 the water meets all of the analytical standards for drinking water under Title 22 with the important exceptions of arsenic and manganese. Extracted groundwater would require treatment for arsenic and manganese prior to distribution. The analytical reports related to sampling of the Esposti Supply Well are provided in Appendix J.

Table 7 Analytical Results From Final Sample 28-Hour Pumping Test May 17, 2016 at 10:00 AM

Constituent	Analytical Method	Entire Well Pumping at 800 gpm for 28 Hours (mg/L[1])	State MCL Drinking Water Standard Units in mg/L (Unless Otherwise Noted)
Aluminum	EPA 200.8	<0.050	1.0
Antimony	EPA 200.8	<0.006	0.006
Arsenic	EPA 200.8	**0.057**	0.010
Barium	EPA 200.8	0.150	1.0
Beryllium	EPA 200.8	<0.001	0.004
Cadmium	EPA 200.8	<0.001	0.005
Calcium	EPA 200.7	22	
Chromium (Total)	EPA 200.8	<0.010	0.05
Chromium (Hexavalent)	EPA 200	<0.001	0.01
Copper	EPA 200.8	<0.050	1.0 (SMCL)
Iron	EPA 200.7	<0.100	0.3 (SMCL)
Lead	EPA 200.7	<0.005	0.015
Magnesium	EPA 200.7	16	
Manganese	EPA 200.8	**0.860**	0.05 (SMCL)
Mercury	EPA 245.1	<0.001	0.002
Nickel	EPA 200.8	<0.010	0.1
Selenium	EPA 200.8	<0.005	0.05
Silver	EPA 200.8	<0.010	0.1 (SMCL)
Sodium	EPA 200.7	53	
Thallium	EPA 200.8	<0.001	0.002
Uranium	EPA 200.8	<1.0 pCi/L	20 pCi/L
Vanadium	EPA 200.8	<0.003	0.05 (NL)
Zinc	EPA 200.8	<0.050	5.0 (SMCL)
Aggressive Index	AWWA	11.68 NU	
Ammonia as NH_3	SM4500/H3N	<0.50	
Bicarbonate	SM2320B	270	
Carbonate	SM2320B	<5.0	
Color	SM2120B	<5.0 CU	15 Units (SMCL)
Cyanide (Total)	10-204-001X	<0.10	0.2
Hydroxide	SM2320B	<5.0	
MBAS, calculated as LAS, mw 340	SM5540C	<0.050	0.5 (SMCL)
Odor	EPA 140.1	<1.0 T.O.N.	
Perchlorate	EPA 314.0	<0.004	0.006
pH	SM4500-H+B	7.60 pH Units	
Phosphate (Total)	SM4500-PE	1.4	
Specific Conductance (EC)	SM2510B	520 uS/cm	900 uS/cm (SMCL)

Constituent	Analytical Method	Entire Well Pumping at 800 gpm for 28 Hours (mg/L[1])	State MCL Drinking Water Standard Units in mg/L (Unless Otherwise Noted)
Sulfide	SM4500SD	<0.10	
Silica	SM4500-SiO2 C	50	
Total Dissolved Solids	SM2540C	350	500 (SMCL)
Turbidity	SM2130B	0.26 NTU	5 NTU (SMCL)
Total Alkalinity as $CaCO_3$	SM2320B	220	
Hardness, Total	SM2340B	120	
Chloride	EPA 300.0	21	250 (SMCL)
Fluoride	EPA 300.0	**0.15**	
Nitrate as N	EPA 300.0	<0.40	10
Nitrite as N	EPA 300.0	<0.40	1.0
Sulfate as SO_4	EPA 300.0	14	250 (SMCL)
Volatile Organic Compounds	EPA 524.2	<0.0005 to <0.010	
Nitrogen- and Phosphorus-Pesticides	EPA 507	<0.0005 to <0.002	
1,2-Dibromo-3-chloropropane	EPA 504.1	<1E-05	
1,2-Dibromoethane (EDB)	EPA 504.1	<2E-05	
Chlorinated Acids	EPA 515.1	<0.0002 to <0.010	
Semivolatile Organic Compounds	EPA 525.2	<0.0001 to <0.005	
Glphosate	EPA 547	<0.025	0.7
Diquat	EPA 549.2	<0.004	0.02

Notes:
1 = Some analytical results are reported in units of µg/L these have been converted to mg/L for ease of comparison with water quality standards
NA = Not analyzed
MCL = Maximum Contaminant Level
SMCL = Secondary Maximum Contaminant Level
NL = Notification Level

5.4.3 28-Hour Pumping Test - Results of Field Parameter Monitoring

Parameters of temperature, pH, ORP, EC, and TDS were monitored frequently during the test. The monitoring was more frequent during pumping startup and parameters were always measured and recorded concurrent with sample collection. The raw data is available along with site visit reports in Appendix H. Review of the data indicates that ORP and temperature changed with the increasing duration of pumping. In particular, temperature increases as pumping progresses. Multiple starts and stops of the pump during this test indicate that the initial water temperature is cooler than water temperature after a few minutes of pumping. This trend is shown on Figure 5 providing a plot of both temperature and drawdown with increasing time. This change in temperature implies that the water from the upper screened zone is cooler than the water originating from deeper screens in the well.

The average of the last five field parameter measurements collected at the end of the 28-hour pumping test was calculated. These average values are presented in Table 8. The values for pH

and TDS are very similar to laboratory results. Laboratory analysis for temperature and conductivity were not requested.

Table 8 Average of Last Five Field Parameter Measurements Near End of the 28-Hour Pumping Test

Well	Temp[1] (ºF)	pH	Cond. (µS)	TDS (ppm)
Esposti Supply Well	**77.2/80.3**	**7.65**	**533**	**352**

Note:
1 = Temperature measured at wellhead / temperature in well by transducer, respectively
ºF = Degrees Fahrenheit
µS/cm = microsiemens per centimeter
mg/L = milligrams per liter

5.5 28-Hour Pumping Test Drawdown Results and Analysis

Using the data collected during the test, the hydraulic aquifer property of transmissivity (T) was calculated. Transmissivity is directly related to the permeability of the aquifer material and will be useful in future studies of aquifer sustainability and recharge.

5.5.1 Calculation of Transmissivity

Transmissivity (T) was calculated using the data from the pumping results from the aquifer test from May 16 to 17, 2016, and analysis using the time-drawdown method. The pump test drawdown and time data for the Esposti Well is graphed in Figure 5 on semi-log scale along the time axis.

As shown in Figure 5, the slope of the line drawn through the data up until a pumping time of 660 minutes (11 hours of pumping) is represented by Line A. At 660 minutes, the line changes slope indicating a sharp decrease in the transmissivity (i.e., more drawdown for the same pumping rate). The line representing this slope is identified as Line B. The calculations determining transmissivity are calculated for both lines because the data suggest that the transmissivity near the well is higher than further away from the well. This change in slope of the drawdown rate during pumping is interpreted here to be a hydrogeologic boundary. Hydrogeologic boundaries are distinct areas within the aquifer when abrupt changes in the overall aquifer properties occur. In this case the hydrogeologic boundary is a decrease in transmissivity. Because of this, long duration pumping will cause more drawdown in the well.

The calculations and analysis were performed using modified non-equilibrium equations derived from Cooper and Jacob (1946) as described by Driscoll (1986).

Transmissivity (T) was calculated using time-drawdown data from the Esposti Supply Well plotted on a semi-log scale (Figure 5) using the equation:

$$T = \frac{264Q}{\Delta s} \text{ for } T \text{ in units of gallons per day per foot (gpd/ft)}$$

Where:

Q = pumping rate in gpm (800 gpm)

Δs = change in drawdown over distance (one log cycle on semi-log graph = 27 feet)

T = transmissivity in gpd/ft

For Line A, which represents the aquifer prior to 660 minutes (11 hours) of pumping, using the Δs value of 27 feet, the transmissivity (T) was calculated at a value of 7,822 gpd/ft.

For Line B, which represents the aquifer after 660 minutes (11 hours) of pumping, using the Δs value of 51 feet, the transmissivity (T) was calculated at a value of 4,141 gpd/ft.

For comparison, the transmissivity that was calculated in the RMS's 2010 Installation Report was 6,600 gpd/ft. The 2010 transmissivity was calculated after pumping for 24 hours at a flow rate of 400 gpm. This flow rate of 400 gpm did not extract enough water to test the transmissivity of the aquifer further away from the Esposti Supply Well. For planning purposes in this report the lower value of transmissivity at 4,141 gpd/ft is used because it is more representative of longer duration pumping that is likely under operational conditions.

5.5.2 Calculation of Hydraulic Conductivity (Permeability, K)

Hydraulic conductivity (also known as permeability or K) is calculated from the transmissivity if the thickness of the aquifer is known or estimated. In this case, the aquifer is highly stratified and clay layers restrict vertical flow. Therefore, flow towards the Esposti Supply Well is dominantly horizontal and through the layers that are screened. As described in Section 5.7 the flow from the well is derived from approximately 88 feet of screen rather than the entire 160 feet of screen available in the well. The calculation of hydraulic conductivity (permeability or K) is provided below:

$$K = \frac{T}{b} \text{ in units of gpd/ft}^2$$

Where:

Transmissivity (T) = ranges from 4,141 gpd/ft to 7,822 gpd/ft

Aquifer Thickness (b) = Assumed to be the water transmitting portion of the screen or 88 feet of relatively permeable aquifer material

This results in a hydraulic conductivity that ranges from 47 gpd/ft^2 to 89 gpd/ft^2. According to Driscoll, 1986, these values for hydraulic conductivity (permeability or K) are typical of fine sands and silts. These low hydraulic conductivity values do not correlate to the Unified Soil Classification System (USCS) soil descriptions (well-graded gravel and well-graded sand) provided in the RMC's 2010 Installation Report. However, these low hydraulic conductivity values do correlate to the

resistivity log (E-log) provided in RMC's 2010 Installation Report. A copy of the log for the Esposti Supply Well is provided in Appendix B

5.5.3 Calculation of Storage Coefficient

Storage coefficient is calculated from data collected at an observation well that is constructed within the same aquifer unit. The Bluebird Well is completed in the deeper aquifer only. There was no measured effect at the Bluebird Well during the pumping test. Therefore, no Storage coefficient has been calculated.

5.5.4 Calculation of Specific Capacity

Specific capacity as described by Driscoll (1986) is calculated by dividing the flow rate by the measured drawdown:

$$Sc = \frac{Q}{s} \text{ in units of gpm/ft}$$

Where:

Sc = Specific capacity
Q = pumping flow rate in gpm (800 gpm)
s = drawdown, change in elevation of pressure head in the pumping well

Specific capacity is time dependent because the pressure head in the pumping well will continue to decline as long as the well is in operation. Specific capacity is also flow rate dependent because higher flow rates have a larger head loss due to turbulent flow. Because of these factors, Specific capacity requires context of both the flow rate and duration of pumping in order to make a meaningful comparison.

Table 9 Calculations of Specific Capacity Esposti Supply Well

Year of Test	Duration of Pumping (hours)	Flow Rate (gpm)	Drawdown (feet)	Specific Capacity (gpm/ft)	Notes
2010	4.5	400	83	4.8	27% improvement by redevelopment
2016	4.5	400	66	6.1	
2016	1	800	146	5.5	
2016	4	800	163	4.9	
2016	8	800	169	4.7	
2016	24	800	187	4.3	
2016	28	800	192	4.2	Recommended value for long-term planning regardless of pumping flow rate because of aquifer limitations

From a practical standpoint, the drawdown is measured after a relatively short duration of pumping, such as one hour. This allows for measuring Specific capacity throughout the life of the well to evaluate for the rate of well plugging. Table 10 below provides a summary of the commonly used hydraulic aquifer and well properties.

Table 10 Summary of Aquifer Properties

Transmissivity in gpd/ft	Estimated Storage Coefficient (dimensionless)	Specific Capacity gpm/ft
4,141	Not Calculated	5.5 at 1 hour
		4.3 at 24 hours

5.6 28-Hour Pumping Test – Analysis of Pumping Rate Limits

GHD has evaluated the upper limit of well pumping rate based on the construction of the well and aquifer properties. This section provides an analysis of the maximum efficient pumping rate. If a well is pumped at too high of a flow rate, the excessive turbulence can cause premature well failure and add to the pumping cost. Flow rate limiting factors related to the Esposti Supply Well consist of the effects of high velocity water moving into and through the casing and the effects of lowering (dewatering) the water table in the vicinity of the well. High velocity flow leads to an increase in turbulence, which in turn causes additional pressure head losses as the water converges towards the well. Thus, four evaluations were performed:

1. Entrance velocity limitation;
2. Up-hole velocity limitation;
3. Dewatering limitation; and
4. Annular space velocity limitation.

5.6.1 Entrance Velocity Limitation

Well screen entrance velocity is the speed at which water is entering the casing. If the entrance velocity is too high, excessive encrustation may result. Based on recommendations presented by Driscoll (1986), the maximum entrance velocity through the screen is 0.1 feet per second (ft/sec). The calculation below provides the maximum flow rate from the well before the average entrance velocity exceeds the recommended 0.1 ft/sec:

$$Q = VA$$

Where:

V = entrance velocity equal to 0.1 ft/sec (maximum)

A = open area of the entire length of screen (29 ft^2) Note

Q = maximum pumping rate in (ft^3/sec) without exceeding entrance velocity (result of calculation is 2.9 ft^3/sec)

Note: The well log indicates a 10-inch diameter well with a 160-foot screen interval, well screen slots are 0.125 inches at 34% open area = 29 ft^2 of open area.

Using the equation above, the maximum pumping rate before exceeding the 0.1 ft/sec entrance velocity limit is 1,301 gpm. However, as discussed below the active spinner log data indicates that approximately 45% of the available screen is not producing significant water. This implies that only 55% of the 1,301 gpm is realistically available. Therefore, this criterion is set at 55% of 1,301 gpm or 715 gpm.

5.6.2 Up-hole Velocity Limitation

Up-hole velocity is the speed of the water in the well casing as it moves into the pump. It is desirable to keep the up-hole velocity below 5 ft/sec because of turbulence in the flow causes pressure head loss. The cross sectional area of the 10-inch diameter casing of the Esposti Supply Well is 0.545 ft^2. The maximum desirable flow rate is calculated by multiplying the cross sectional area by 5 ft/sec.

$$Q = VA$$

Where:

V = entrance velocity equal to 5 ft/sec (maximum)

A = open area of the entire length of the casing (0.545 ft^2)

Q = maximum pumping rate in (ft^3/sec) without exceeding up-hole velocity (result of calculation is 2.7 ft^3/sec)

Using the equation above, the maximum pumping rate before exceeding the 5 ft/sec up-hole velocity limit is 1,211 gpm.

5.6.3 Dewatering Limitation

The rate of the Esposti Supply Well should be limited such that the aquifer near the well does not dewater by more than 80% of the saturated thickness. This criterion is more relevant to shallow unconfined aquifers and is not applicable to the Esposti Supply Well. If the aquifer is dewatered more than 80% of the saturated aquifer thickness, there could be in increase in turbulent flow within the aquifer and a reduction in the effective transmissivity. The limit to flow rate based on these criteria can be calculated by using the aquifer properties calculated above together with estimates of the expected duration of continuous operation of the well. The top of the screen is at 383 feet BTOC and static groundwater is at approximately 40 feet bgs. Pumping the water down to the top of the screen would require 343 feet of drawdown, which is far in excess of the capacity of pumps that are available for this size casing. In addition, this would put excessive compression stress on the casing and incur a high risk of casing collapse.

5.6.4 Annular Space Velocity Limitation

The water velocity in the annular space between the motor of a submersible pump and the well casing can be analyzed in a manner similar to the up-hole velocity discussed above. In this case, the maximum desirable velocity of 5 ft/sec is used here because of turbulence in the flow causes pressure head loss. The cross sectional area of the 10-inch diameter casing of the Esposti Supply Well is 0.545 ft^2. The diameter of the largest pump and motor is 7.5 inches which results in a cross sectional area of 0.310 ft^2. Subtracting these two areas results in the cross sectional area through

which the groundwater flows around the motor and up into the intake of the pump (0.235 ft^2). The maximum desirable flow rate is calculated by multiplying the cross sectional area by 5 ft/sec.

$$Q = VA$$

Where:

V = entrance velocity equal to 5 ft/sec (maximum)

A = open area between the submersible motor and casing (0.235 ft^2)

Q = maximum pumping rate in (ft^3/sec) without exceeding a velocity of 5 ft/sec in the annular space (result of calculation is 1.175 ft^3/sec)

Using the equation above, the maximum pumping rate before exceeding the 5 ft/sec annular space velocity limit is 527 gpm (1.175 ft^3/sec). Based on this calculation the diameter of the pump relative to the diameter of the casing may be a limiting factor in the theoretical maximum flow rate.

5.6.5 Summary of Well Flow Rate Limitations and Pumping Rate Recommendation

The pumping rate limits are summarized in the table below:

Table 11 Summary of Pumping Rate Limiting Factors Espoisti Supply Well

Limitation	Flow Rate in gpm
Entrance Velocity	715
Up-hole Velocity	1,211
Dewatering Limitation	Not Applicable
Annular Space Velocity Limit – cross section area between the submersible motor and the well casing. Less of a problem if a turbine pump is used.	527

Note:
A long-term (>24 hours) flow rate of 400 gpm (75% of 527) is appropriate given the flow rate limiting factors, reductions in well efficiency that will occur with age, and the hydrogeologic boundary that reduces Transmissivity.

An appropriate design flow rate is taken as 75% of the most restrictive of the rate limiting factors. This provides a design safety factor of 25% to account for reduced well efficiency over time or hydrogeologic limitations that become apparent after long duration pumping. Therefore, the flow rate for design purposes for the Esposti Supply Well is 400 gpm (75% of 527 gpm).

5.7 Results of Active Spinner Log

As discussed in Section 4.2, the April 2016 static spinner log (no pumping) identified approximately 5 gpm of downward groundwater flow between 1st screened zone (384-423 ft BTOC) and the 4th screened section (484-510 ft BTOC). This downward flow may be the result of spring recharge increasing groundwater elevations in the shallow aquifer. The natural flow of water between these zones may change direction seasonally due to summer pumping in the shallow aquifer. This natural movement of groundwater indicates that the 1st and 4th screen zones are separate hydrogeological units.

The purpose of the active spinner log was to identify the relative contribution to well production from each of the separate screen zones. On August 23, 2016, GHD oversaw West Coast perform an active spinner log (active pumping) during an almost 4 hour, 400 gpm pumping period. A 6-inch pump extracted groundwater while the spinner tool was lowered into the well. The rate of spin of the spinner tool impeller is proportional to the velocity of water in the well casing. This data is used to calculate the flow contribution of each of the screen zones.

The results of this spinner log are provided in Figure 6. The active spinner log indicates significant flow contribution to the total well yield through the 1st screen interval (36% of total flow), the 4th screen (22% of total flow) interval, and 5th screen (28% of total flow) interval. The 2nd, 3rd, and 6th screened sections were collectively 11% of the total flow from the screens, this means that approximately 45% of the screened aquifer is not transmitting water into the well casing. This appears to be a result of low permeability aquifer material within the 2nd, 3rd, and 6th screened sections rather than a well development problem. Appendix F presents the Static and Active Spinner Log reports of findings from West Coast.

5.8 8-Hour Zone Pumping Test Field Setup

The 8-hour, 300 gpm pumping test extracted groundwater from the 1st screened interval of the well using a zone-isolating packer installed in the underlying blank section of screen at approximately 425 feet BTOC to the top of the packer. The purpose of this test was to induce the maximum sustained flow from this upper well screen section and collect representative water quality samples from this zone of the aquifer.

5.8.1 8-Hour Zone Pumping Test - Water Handling Equipment

The pump used to operate the 8-hour zone pumping test was a Grundfos 6-inch 50-hp submersible pump. Appendix I provides a copy of the pump curve. The intake of the pump was set at 342 feet BTOC, which is 42 feet above the top of the upper-most screen and approximately 300 feet below the elevation of static water level.

GHD did not collect or evaluate observation well data for the 8-hour zone pumping test because distance drawdown calculations were evaluated during the 28-hour 800 gpm pumping test, and those previous results indicated no effects on observation wells from the Esposti Supply Well pumping. However, GHD did install transducers in the Esposti Supply Well above and below the packer to measure pressure changes caused by hydraulic communication through the gravel pack between the 1st screened interval and the underlying screened intervals.

Pumped water was discharged to manhole S130 without the use of storage tanks or filtration. The water was clear and turbidity free. Groundwater samples were collected from the sample port, which consisted of a ¼-inch diameter brass tube operated by a ball valve located at the wellhead after the flow meter.

5.9 8-Hour First Screen Zone Pumping Test Operation

The 8-hour zone pumping test was conducted to evaluate the water quality and flow rate of the 1st screen section where lower concentrations of arsenic were found during zone sampling in 2010. The Esposti Irrigation Well was shut off the day before the 8-hour zone pumping test. Once the test

started it ran continuously for 8 hours, and at the end of the test, the groundwater was allowed to recover continuously (Figure 7). A summary of the start-up and running conditions of the test is provided below:

Pre-Test Preparation

1. Installed the pump into the Esposti Supply Well, August 19, 2016.
2. Installed the transducers in the Esposti Supply Well on August 19 and 20, 2016.
3. All transducers were actively recording synchronously in the well by 11:30 AM on August 19, 2016.
4. On August 20, 2016, GHD and Weeks ran a preliminary pump test for 20 minutes to confirm that the zone-test flow rate and direct discharge were appropriate. The pump produced a maximum flow rate of 375 gpm with the discharge pipe flow valve wide open and a gradual decline below 375 gpm was noted. GHD concluded that the 8-hour zone test would be conducted at 300 gpm.

Start/End of 8-Hour First Screen Zone Test

1. Pumping of the Esposti Supply Well started at 7:00 AM, August 21, 2016 at 300 gpm.
2. The pumping rate was held at a steady 300 gpm by manually operating the flow control valve at least once every hour.
3. Sampling and parameter monitoring was conducted frequently during the first hour of pumping, then every ½ hour thereafter.
4. End of Pumping at 3:00 PM August 21, 2016.

Groundwater Recovery Monitoring

1. Start of the groundwater recovery period began at 3:00 PM August 21, 2016, depth-to-water values were manually collected for one hour by Weeks, and groundwater recovery transducer data was collected.
2. End of recovery period and data record at 9:30 AM August 22, 2016.

5.10 8-Hour First Screen Zone Pumping Test Analytical Results and Analysis

Sample results are summarized in this section. All laboratory analysis was performed through Alpha Analytical. Field measurements of water quality parameters of temperature, pH, ORP, EC, and TDS were made frequently using an Myron Ultrameter™. In addition, visual observations were noted on the field sheets. This information is provided in daily work sheets and data collection forms, which are provided in Appendix H.

5.10.1 8-Hour First Screen Zone Pumping Test - Results of Sample Analysis During Test

Water samples were collected during the 8-hour zone test to monitor changes in water quality over time after continuous pumping. These samples were analyzed for arsenic, manganese, and iron in addition to frequent analysis of field parameters at start-up and during sustained pumping (Table 12). The 8-hour zone test total arsenic concentration and time data for the Esposti Supply Well are graphed in Figure 8 on semi-log scale along the time axis. As Figure 8 indicates, arsenic

concentrations decline linearly when plotted on semi-log scale. This implies that the water recovered during this test is a mixture of high-arsenic water and low-arsenic water. First water extracted is actually high-arsenic water that upwelled into the 1st zone from deeper in the well when the well was not pumping. As the 1st zone pumping continued, water high in arsenic, was cleared out and water more representative of 1st zone (low in arsenic) increased. The 1st zone pumping did not continue long enough to reach a final concentration of arsenic, but GHD's estimation is that arsenic in the first zone could be expected to range between 0.010 and 0.020 mg/L.

Table 12 8-Hour Zone Pumping Test Results of Samples During Test (September 21, 2016)

Sample ID	Date	Iron Diss.[1]	Iron Total	Mn Diss.[1]	Mn Total	As Diss.[1]	As Total	Sample time after start
		mg/L[2]						
ESW-9-21-07:01	9/21/2016	---	1.70	---	0.86	---	0.058	1 min
ESW-9-21-07:05	9/21/2016	---	3.40	---	1.10	---	0.052	4 min
ESW-9-21-08:00	9/21/2016	---	0.26	---	0.86	---	0.043	59 min
ESW-9-21-11:00	9/21/2016	---	0.19	---	0.91	---	0.038	239 min
ESW-9-21-15:00	9/21/2016	---	0.14	---	0.91	---	0.035	479 min
MCL mg/L			**0.300**		**0.050**		**0.010**	

Notes:
1 = No samples were analyzed as dissolved (filter before adding acid preservative).
2 = Milligrams per Liter (parts per million)
NA = Not applicable
<0.10 = Less than laboratory detection limit.
--- = Not analyzed

5.10.2 8-Hour First Screen Zone Pumping Test - Water Sample Analysis at End of Pumping

Samples of extracted groundwater were collected immediately prior to shut down. These samples represent a mixture of water from the 1st screen zone and the rest of the underlying well screens. The key results are summarized below in Table 13. Table A (Appendix K) provides a comparison of analytical results. As shown in Table 13 the water does not meet the drinking water standard for arsenic and manganese. Additionally, it is notable that silica was relatively high (86 mg/L). High silica concentrations complicate the treatment of arsenic by adsorptive media. Analytical results are included in Appendix J.

Table 13 Analytical Results From Final Sample 8-Hour Zone Pumping Test (September 21, 2016 at 3:00 pm)

Constituent	Analytical Method	Upper Zone Pumping at 300 gpm for 8 Hours (mg/L[1])	State MCL Drinking Water Standard Units in mg/L (Unless Otherwise Noted)
Arsenic	EPA 200.8	**0.035**	0.010
Calcium	EPA 200.7	23	
Chromium (Total)	EPA 200.8	<0.008	0.05
Chromium (Hexavalent)	EPA 200	<0.001	0.01
Iron	EPA 200.7	0.140	0.3 (SMCL)
Magnesium	EPA 200.7	18	
Manganese	EPA 200.8	**0.910**	0.05 (SMCL)
Potassium	EPA 200.7	14	
Sodium	EPA 200.7	52	
Phosphate (Total)	SM4500-PE	1.2	
Silica	SM4500-SiO2 C	86	
Total Alkalinity as $CaCO_3$	SM2320B	220	
Chloride	EPA 300.0	22	250 (SMCL)
Nitrate as N	EPA 300.0	<0.20	10
Nitrite as N	EPA 300.0	<0.20	1.0
Total Nitrogen	SM4500-N	<1.0	
Total Kjeldahl Nitrogen	SM4500-NorgB	<1.0	
Sulfate as SO_4	EPA 300.0	14	250 (SMCL)
Tannins & Lignins	SM5550B	<0.50	
Total Suspended Solids	SM2540D	3.5	
Total Organic Carbon	SM5310C	<0.300	

Notes:
1 = Some analytical results are reported in units of µg/L these have been converted to mg/L for ease of comparison with water quality standards
NA = Not analyzed
MCL = Maximum Contaminant Level
SMCL = Secondary Maximum Contaminant Level
NL = Notification Level

5.10.3 8-Hour First Screen Zone Pumping Test - Results of Field Parameter Monitoring

Parameters of temperature, pH, EC, TDS, and ORP were monitored frequently during the test. The monitoring was more frequent during pumping test startup and parameters were measured concurrent with sample collection. The raw data is available along with site visit reports in Appendix H. Review of the data indicates that temperature increases with increasing duration of pumping. This trend is shown on Figure 9 that provides a plot of temperature above and below the packer with increasing time. This change in temperature implies that the water from the formation associated with the 1st screen is cooler than the water from deeper in the well. It also implies that

the extracted water is a mixture with a significant contribution of water bypassing the packer through the filter pack. Table 14 below presents an average of the last 5 measurements collected for parameters during the 8-hour zone test. ORP was not stable enough to provide a single value to represent extracted groundwater.

Table 14 Average of Last Five Measurements Near the End of the 8-Hour Pumping Test For Each Field Parameter

Well	Temp (ºF)	pH	EC (µS/cm)	TDS (mg/L)
Esposti Supply Well	**79**	**7.28**	**532**	**365**

Notes:
ºF= Degrees Fahrenheit
µS/cm = microsiemens
mg/L = milligrams per liter

5.11 8-Hour First Screen Zone Pumping Test Drawdown Results and Analysis

Figure 7 shows the pressure head drawdown associated with groundwater above and groundwater below the packer. The occurrence of a pressure change below the packer indicates that there was a hydraulic connection between the 1st screen zone and the lower parts of the well through the filter pack. This likely resulted in some flow of groundwater through the filter pack from the lower part of the well and into the 1st screen zone during pumping. The hydraulic aquifer property of Transmissivity was not calculated because the volume of water bypassing the packer through the filter pack can only be estimated and this would affect the calculated value. Storage coefficient can only be calculated from data collected using data from an observation well that is constructed within the same aquifer unit. There was no observation well available during this test. Therefore, no Storage coefficient was calculated.

5.11.1 Calculation of Specific Capacity

Specific capacity, as described by Driscoll (1986) and discussed above in Section 5.5.4, is calculated by dividing the flow rate by the measured drawdown. The 300 gpm zone test specific capacity after 1, 4, and 8 hours was 2.7, 2.5, and 2.4 gpm/ft, respectively. This value represents what the 1st screened interval with flow bypassing the packer can produce in gpm for every foot of groundwater drawdown. Therefore, the final specific capacity value of 2.4 gpm/ft in the Esposti Supply Well with the packer set between the 1st and 2nd screen intervals is likely an over estimate if applied to only the 1st screen zone.

5.12 8-Hour First Screen Zone Pumping Test Rate Analysis

Similar to that previously discussed in Section 5.6 and subsections, GHD has evaluated the pumping rate limit for the 1st screen zone with a packer in place. This analysis is useful for evaluating the feasibility of pumping from only the 1st screen or constructing a new well in the

Esposti Park area with a screen restricted to the interval of 384 to 424 feet bgs. Flow rate limiting factors related to this analysis consist of the effects of high velocity water moving through the screen and the casing. Equation details and thorough definitions of pump rate analysis are included in Section 5.6 and briefly below. Four evaluations were performed:

1. Entrance velocity limitation;
2. Up-hole velocity limitation;
3. Dewatering limitation; and
4. Annular space velocity limitation.

5.12.1 Entrance Velocity Limitation

Well screen entrance velocity is the speed at which water is entering the casing, where the maximum entrance velocity through the screen is 0.1 feet per second (ft/sec). The flow rate from the well that can be extracted before the average entrance velocity exceeds the recommended 0.1 ft/sec is calculated using the equation below:

$$Q = VA$$

Where:

V = entrance velocity equal to 0.1 ft/sec (maximum)

A = open area of the entire length of screen (7.3 ft^2) Note

Q = maximum pumping rate in (ft^3/sec) without exceeding entrance velocity (result of calculation is 0.73 ft^3/sec)

Note: The well log indicates a 10-inch diameter well with a 40-foot 1st screen interval, well screen slots were 0.125 inches at 34% open area = 7.3 ft^2 of open area.

Using the equation above, the maximum rate at which the well could be pumped before exceeding the 0.1 ft/sec entrance velocity limit is 0.73 ft^3/sec = 328 gpm.

5.12.2 Up-hole Velocity Limitation

It is desirable to keep the up-hole velocity below 5 ft/sec because of turbulence in the flow causes pressure head loss. The cross sectional area of the 10-inch diameter casing of the Esposti Supply Well is 0.545 ft^2. The maximum desirable flow rate is calculated by multiplying the cross sectional area by 5 ft/sec.

$$Q = VA$$

Where:

V = entrance velocity equal to 5 ft/sec (maximum)

A = open area of the entire length of the casing (0.545 ft^2)

Q = maximum pumping rate in (ft^3/sec) without exceeding up-hole velocity (result of calculation is 2.7 ft^3/sec)

Using the equation above, the maximum rate at which the well could be pumped before exceeding the 5 ft/sec up-hole velocity limit is 1,211 gpm.

5.12.3 Dewatering Limitation

Pumping the water down to the top of the screen would require 343 feet of drawdown, which puts the well at risk of casing collapse. This limit does not apply.

5.12.4 Annular Space Velocity Limitation

The water velocity in the annular space between the motor of a submersible pump and the well casing can be analyzed in a manner similar to the up-hole velocity discussed above. In this case, the maximum desirable velocity of 5 ft/sec will be used because of turbulence in the flow causes pressure head loss. The cross sectional area of the 10-inch diameter casing of the Esposti Supply Well is 0.545 ft^2. The diameter of the 8-hour zone test pump and motor is 6 inches, which results in a cross sectional area of 0.0.196 ft^2. Subtracting these two areas results in the cross sectional area through which the groundwater flows around the motor and up into the intake of the pump (0.349 ft^2). The maximum desirable flow rate is calculated by multiplying the cross sectional area by 5 ft/sec.

$$Q = VA$$

Where:

V = entrance velocity equal to 5 ft/sec (maximum)

A = open area between the submersible 6- inch motor and casing (0.349 ft^2)

Q = maximum pumping rate in (ft^3/sec) without exceeding a velocity of 5 ft/sec in the annular space (result of calculation is 1.75 ft^3/sec)

Using the equation above, the maximum rate at which the well could be pumped before exceeding the 5 ft/sec annular space velocity limit is 783 gpm (1.75 ft^3/sec). Based on this calculation the diameter of the 6-inch pump relative to the diameter of the casing will not be a limiting factor in flow rate.

5.12.5 Summary of Well Flow Rate Limitations and Pumping Rate Recommendation

The pumping rate limits are summarized in the table below:

Table 15 Summary of Pumping Rate Limiting Factors 1st Screen Zone Esposti Supply Well

Limitation	Flow Rate in gpm
Entrance Velocity	328
Up-hole Velocity	1,211
Dewatering Limitation	Not Applicable
Annular Space Velocity Limit – cross section area between the submersible motor and the well casing. Less of a problem if a turbine pump is used.	783

Note:
A long-term (>24 hours) flow rate of 250 gpm (75% of 328) is appropriate given the flow rate limiting factors, reductions in well efficiency that will occur with age, and the hydrogeologic boundary that reduces Transmissivity for the Esposti Supply Well with a 1st zone isolation packer.

An appropriate design flow rate is taken as 75% of the most restrictive of the rate limiting factors. This provides a design safety factor to account for reduced well efficiency over time or hydrogeologic limitations that become apparent after long duration pumping. Therefore, the flow

rate for design purposes for the 1st screen zone when using a packer is 250 gpm (75% of 328 gpm). The contribution to flow due to packer bypass is difficult to estimate. However, considering the large increase in temperature above the packer under pumping conditions (Figure 9) packer bypass could be half of the flow. Therefore, it is estimated that the 1st screen zone can produce no more than 175 gpm (half of 250 gpm).

5.13 Esposti Irrigation Well Sampling

The Esposti Irrigation Well analytical results provide data for comparison to the analytical results from pumping the entire the Esposti Supply Well or just the upper screen of the Esposti Supply Well. The Esposti Irrigation Well operates during the spring, summer, and fall to supply irrigation water to the park. The well operates with very frequent start and stop cycles. The Esposti Irrigation Well is not metered and flow rate and total volume pumped data was not available during this test. Depth-to-water measurements were difficult to collect because of wellhead obstacles. The transducer was not placed deep enough in the well to monitor the large swings in water level caused by pump operation. When the well is pumping, the water elevation in the well drops below the elevation of the transducer.

5.13.1 Esposti Irrigation Well Water Quality

The Esposti Irrigation Well is located approximately 29 feet south of the Esposti Supply Well with two screened intervals from 100 to 220 and 240 to 300 feet bgs (Figure 2). GHD sampled the Esposti Irrigation Well and analyzed for selected Title 22 water quality parameters as a comparison with the Esposti Supply Well 8-hour pumping zone test (1st zone , 383 feet to 423 feet BTOC) and the results of the 28-hour pumping test. The Esposti Irrigation Well was running normally and the Esposti Supply Well was not pumped at the time of sample collection. The results of sampling of the Esposti Irrigation Well are summarized below in Table 16 and the lab reports are included in Appendix J. As shown in Table 16 the water meets all of the analytical standards for drinking water under Title 22 with the exception of arsenic and manganese. A comparison between the Esposti Supply Well and the Esposti Irrigation Well is available in Table A provided in Appendix K.

Table 16 Analytical Results from Sample of Esposti Irrigation Well September 6, 2016 at 10:45 AM

Constituent	Analytical Method	Esposti Irrigation Well (mg/L[1])	State MCL Drinking Water Standard Units in mg/L (Unless Otherwise Noted)
Arsenic	EPA 200.8	**0.013**	0.010
Cadmium	EPA 200.8	<0.001	0.005
Calcium	EPA 200.7	**19**	
Chromium (Total)	EPA 200.8	<0.010	0.05
Chromium (Hexavalent)	EPA 200	<0.001	0.01
Iron	EPA 200.7	<0.1	0.3 (SMCL)
Magnesium	EPA 200.7	**19**	
Manganese	EPA 200.8	**1.5**	0.05 (SMCL)
Potassium	EPA 200.7	**7.1**	
Sodium	EPA 200.7	**31**	
Vanadium	EPA 200.8	<0.003	0.05 (NL)
Phosphate (Total)	SM4500-PE	**0.95**	
Silica	SM4500-SiO2 C	**85**	
Total Alkalinity as $CaCO_3$	SM2320B	**150**	
Chloride	EPA 300.0	**27**	250 (SMCL)
Nitrate as N	EPA 300.0	<0.20	10
Nitrite as N	EPA 300.0	<0.20	1.0
Total Nitrogen	SM4500-N	<1.0	
Total Kjeldahl Nitrogen	SM4500-NorgB	<1.0	
Sulfate as SO_4	EPA 300.0	**9.2**	250 (SMCL)

Notes:
1 = Some analytical results are reported in units of µg/L these have been converted to mg/L for ease of comparison with water quality standards
NA = Not analyzed
MCL = Maximum Contaminant Level
SMCL = Secondary Maximum Contaminant Level
NL = Notification Level

5.13.2 Esposti Irrigation Well Water Quality Discussion

The results of the Esposti Irrigation Well sampling represent shallow water quality from the subsurface at depths from approximately 100 to 300 feet bgs. This is 80+ feet shallower than the Esposti Supply Well's 1st screen interval. An arsenic concentration of 0.013 mg/L and high manganese concentration of 1.5 mg/L would require treatment if considered for potable use. The flow rate limitations and age of the Esposti Irrigation Well make it unsuitable as a municipal supply well.

5.14 Esposti Park Area – Summary of Aquifer Pumping Rate and Water Quality Expectations

During meetings with the Town, the concept of installing multiple new shallow wells in the Esposti Park area was considered as an alternative to bringing the Esposti Supply Well online. These concepts were discussed based on the lower concentration of arsenic in the shallower aquifer system. Although analyzing the option of new wells was not part of the scope of work of this project, much of the data presented in this Report is usable for addressing new well concepts with respect to the pumping rate and water quality. Three of these new well concepts are outlined below:

1) A new well completed with a screened interval from 100 to 300 feet bgs (similar to existing Esposti Irrigation Well). This well would be expected to yield up to 200 gpm with arsenic up to 0.015 mg/L and manganese up to 1.5 mg/L. Treatment for both would be required.

2) A new well completed with one screened interval from 385 to 425 feet bgs (similar to existing Esposti Supply Well 1st screen interval). This well would be expected to yield up to 175 gpm with arsenic up to 0.035 mg/L and manganese up to 1.0 mg/L. Treatment for both would be required.

3) A new well completed with screens within the interval from 100 to 425 feet bgs (similar to combining the existing screen of the Esposti Irrigation Well together with the 1st screen interval of Esposti Supply Well). This well would be expected to yield up to 300 gpm with arsenic up to 0.025 mg/L and manganese of up to 1.25 mg/L. Treatment for both would be required.

These concepts are provided here to capture the results of analysis from this project and may be useful as a starting point for other groundwater related projects. The three concepts presented above are not provided as recommended alternative projects but for discussion purposes only.

5.15 Esposti Park Area Managed Aquifer Recharge Potential

The potential for managed aquifer recharge in the Esposti Park area utilizing the Esposti Supply Well is limited by the low hydraulic conductivity of the aquifer, poor native water quality, and physical attributes of the Esposti Supply Well as it was constructed. The hydraulic conductivity of the aquifer is relatively low because it consists of a high percentage of silts and clays. The small pore size of silt and clay aquifers make them very susceptible to clogging during the injection of water. The hydraulic conductivity for the Esposti Supply Well varies between 47 gpd/ft^2 to 89 gpd/ft^2. The lowest hydraulic conductivity referenced in Payne 2005 (Aquifer Storage and Recovery, second edition) is 40 gpd/ft^2. Payne identified this test well as having very rapid clogging when compared to other wells in aquifers with higher hydraulic conductivities. When operating an aquifer recharge system, frequent back flushing of the well is required to remove clogging material. Back flushing is completed by pumping the well at twice the injection rate and discharging this water to waste. Therefore, if injection is performed at a rate of 400 gpm then back flushing at a rate of 800 gpm could be expected.

Poor native water quality is a significant economic barrier to recharge by well injection. Injected water must be treated to a very high standard to remove bacteria, organics, and suspended matter. When it is recovered, it will contain both arsenic and manganese and will require treatment before use. The Esposti Supply Well was not constructed as an injection well, which is a limiting factor for its use for injecting water. While the cement well seal meets the requirements of a drinking water well it is unlikely to maintain a tight seal under injection pressures. Concrete seals tend to shrink away from the boring wall leaving a small gap or weak separation that can form a conduit for high-pressure water to migrate back up to the surface. A modern injection well has a seal design that minimizes seal bypass by high-pressure injected water. In summary, cost effective application of managed aquifer recharge in the Esposti Park area is unlikely to be successful.

6. Esposti Supply Well Treatment Feasibility

6.1 Esposti Supply Well Treatment Feasibility Overview

The goal of this treatment feasibility analysis is to identify key constraints and establish a planning level cost for implementing treatment for the Esposti Supply Well. This evaluation of treatment feasibility consists of a seven-step process summarized below:

- Develop a treatment system operating concept that considers water quality, flow rate, annualized operation pumping volumes, site use restrictions, and existing infrastructure limitations.
- Evaluate potential treatment options at a concept level relative to cost and fatal flaws. Summarize a short list of viable treatment alternatives.
- Evaluate and compare viable treatment alternatives for cost and application constants.
- Develop a concept level configuration of the most likely treatment option.
- Evaluate alternatives for siting this treatment system and configuration at Esposti Park.
- Develop a desktop cost analysis of the most likely treatment alternative and siting at Esposti Park.
- Compare the most viable treatment system alternative with the CEQA evaluations prepared in 2010.

6.2 Treatment System Operating Parameter Concept

The treatment system operating parameter concept developed here is based on the 28-hour pumping test, the 2010 Installation Report prepared by RMC, and discussions with the Town regarding likely operational preferences. Table 17 summarizes the key design parameters used in this evaluation. This table summarizes the most likely operational and water quality parameters of the Esposti Supply Well based on the results of this test. If the Town chooses to advance the Esposti Supply Well to the predesign stage, the parameters provided in Table 17 should be provided to the treatment equipment manufacturers for evaluation prior to pilot testing.

Table 17 Esposti Supply Well Characteristics and Design Parameters

System Operation & Parameters	
Longer-term (>24 hours) Steady State Flow Capacity (for use in pre-design)	400 gpm
Transmissivity	4,141 gpd/ft
Specific Capacity	4.2 gpm/ft
High Season Runtime	100% (24/7 during high demand months)
Annual Well Utilization	50% (Off during low demand months)
Disinfection	
Disinfectant	Sodium Hypochlorite
Discharge Point	Distribution
Well Pump	
Operation Type	On or off, non-variable flow rate, full flow only
Pressure at System Input	120 psig
Wastewater Handling	
Backwash Discharge Available?	Yes
Discharge Point	Sewer
Zero Discharge Required?	No
Treatment Options	
Bypass/Blend OK?	Yes
Spare Capacity Required?	No
Use of CO_2, HCl, H_2SO_4 or NaOH OK?	Only CO_2
Process Control	
System Automation	Yes
SCADA Interface	Yes
Notes	
Summary of Water Quality	
pH	7.60
Temperature	up to 80° F
ORP (EMF)	variable
Conductivity (EC)	520 µS/cm
Tannins-Lignans	<0.50 mg/L
TDS	350 mg/L
TSS	3.5 mg/L
Turbidity	0.26 NTU

Cations	
Hardness	120 mg/L $CaCO_3$
Ammonia	<0.50 mg/L NH_3
Calcium	22 mg/L
Magnesium	16 mg/L
Sodium	53 mg/L
Anions	
Alkalinity	220 mg/L $CaCO_3$
Bicarbonate	270 mg/L $CaCO_3$
Carbonate	<5.0 mg/L $CaCO_3$
Chloride	21 mg/L
Fluoride	0.15 mg/L
Nitrate	<0.40 mg/L NO_3
Phosphate	1.4 mg/L
Silica	50 mg/L SiO_2
Sulfate	14 mg/L SO_4
Metals	
Antimony	<6.0 µg/L
Total Arsenic	57 µg/L
Copper	<50 µg/L
Iron	<100 µg/L
Lead	<5.0 µg/L
Manganese	860 µg/L
Mercury	<1.0 µg/L
Selenium	<5.0 µg/L
Vanadium	<0.003 µg/L

6.3 Potential Treatment Option Concepts

A desktop analysis of water treatment processes for the removal of both manganese and arsenic was performed. This analysis identified six treatment concepts that remove manganese and/or arsenic. Some of these processes are usually used to remove other contaminants such as high salinity. However, manganese and arsenic are non-target compounds and are removed efficiently only when in relatively low concentrations. The processes included in Table 18 removes manganese and/or arsenic in specific water treatment applications. Each treatment processes varies in complexity, cost, and operational constraints.

All of the processes listed in Table 18 remove manganese and arsenic to some degree. However, the first three listed have significant operational constraints for treating high concentrations of

manganese and arsenic. These constraints and system costs make them a poor choice for the Esposti Supply Well. The last three are all proven technologies that have relevance to potential treatment of the Esposti Supply Well. Concept applications were developed for the most relevant three processes specific to the Esposti Supply Well site with all of the constraints in infrastructure and operations. For ease of comparison, Table 18 provides only the system capital cost. The cost of site preparation and water handling appurtenances is similar for each of the treatment alternatives. Operation cost is a variable between these treatment options. However, fatal flaws in three of the six treatment options remove them from detailed consideration. The operational cost among the three that are relevant is similar so that operational cost is not a decision factor. However, operation cost is included for the most viable option (Section 6.6).

Table 18 Esposti Supply Well Summary of Potential Treatment Options

Process and Relevance to Esposti Supply Well	Relative Cap. System Cost [1]	Viability Rating
Biological – This is a new technology primarily targeting multi-constituent treatment of nitrate, metals, and / or organic solvents. This process relies on living bacteria to degrade or mineralize soluble contaminants to non-soluble forms. This technology is in the early stage of development making capital cost high with fewer vendors to support installations. Operation requires attentiveness to the heath of the bacterial population such that continuous operation is preferred. Technology is unproven for manganese removal.	Moderate capital ($0.9 M) cost, moderate operation cost, new technology, limited competition.	Poor – May require separate treatment for manganese. Instability of suppliers and operational complexity do not align with project goals.
Membranes – Membrane treatment can remove manganese, arsenic and multiple contaminants, including emerging contaminants. However, oxides of manganese and arsenic will rapidly foul the membranes requiring frequent cleaning and backwash. Membranes cannot be shut down easily or remain inactive for long periods, process incurs a 20% water loss to brine discharge and has a very high power demand. The treated water often needs additives to reduce corrosivity.	High capital cost ($1.4 M), high operation cost due to power demand and frequent maintenance.	Poor – high cost, waste brine management and operational complexity do not align with project goals.
Resin Media – Resins can remove arsenic and provides simple on-off cycling with infrequent backwash. Resin regeneration can be performed on site but generates a brine, which must be managed. Resins are also sensitive to adsorption of non-target compounds that can reduce efficiency. Resins have a sharp breakthrough curve that requires frequent sampling and a conservative resin-loading target before regeneration is required. Resins are not cost-effective for manganese because of the low loading efficiency and lack of suppliers. Removal of manganese would be required before treating the arsenic with resin.	Moderate capital ($0.7 M) cost, high operation cost. Cost is directly proportional to arsenic loading rate. A second treatment process is required for manganese.	Poor – requires removal of manganese before treatment of arsenic. Resin systems have a high cost related to the brine management requirement. Cost and complexity do not align with project goals.
Iron Coprecipitation – Removes manganese and arsenic. Well known technology where FeCl or similar iron salt is added to provide soluble iron. Oxidation of the iron produces a flocculent that binds arsenic. The flocculent is filtered out and pumped to waste. Manganese is removed if greensand is used as a filtering media. Waste sludge handling required. Large reclaim/settling tank or direct sewer discharge is required.	Low/Moderate capital ($0.5 M) cost, moderate operation cost. Multiple manufacturers. Sludge management can be a significate operational cost.	Moderate – a cost effective and proven method. At high concentrations of arsenic, the process may not completely remove the arsenic. Sludge management is key to viability.

Process and Relevance to Esposti Supply Well	Relative Cap. System Cost [1]	Viability Rating
Catalytic Oxidation (Greensand) – Removes manganese by oxidation with chlorine or permanganate then filtration by greensand. This is an effective treatment for manganese but results in only partial treatment of arsenic. Backwash is required weekly depending on flow rate and discharged to the sewer or reclaimed. System can be idled with a pump-to-waste cycle at start up. Second treatment process required for arsenic removal.	Low capital ($0.4 M) cost, moderate operation cost. Multiple manufacturers keep market competitive.	Good – simple and well known technology for removal of manganese.
Media Adsorption – Arsenic is removed by filtering the water through media consisting of oxides and/or hydroxides of Fe, Ti, or Al. Removes arsenic with simple on/off cycling and infrequent backwashing is required. Gentle breakthrough curve allows for reduced sampling frequency. Pilot testing is required to determine adsorption capacity. Cost of treatment is proportional to use. Media is not good for multiple contaminants including manganese. Subject to competing adsorption by non-target compounds.	Moderate capital ($0.4M) cost, moderate operation cost. Operation cost is proportional to actual production.	Good – simple technology to operate but media use and disposal is a significant cost item.

Notes:
1 = Relative capital system cost. This cost includes only the treatment plant. It does not include the site work or appurtenances needed for all of the treatment options. Site work and appurtenances costs are relatively similar among the options. Capital costs were obtained from phone discussions with suppliers of equipment.

6.4 Comparison of Viable Treatment Options

The review summarized in Table 18 identified three treatment methods that are relevant to the Esposti Supply Well. Two of these methods treat either arsenic or manganese, not both. Because of this, these two treatment processes are combined into a two-step process to address the water quality issues for the Esposti Supply Well. The resulting treatment concepts for the Esposti Supply Well are provided below:

- One-Step Treatment – Iron Coprecipitation (Figure 10)
  Iron coprecipitation completes treatment of both manganese and arsenic using an addition of ferric chloride ($FeCl_2$) and oxidizer to the water to form a flocculent. The formation of flocculent captures the arsenic. The flocculent is filtered out using greensand filtration such that the manganese is oxidized and retained on the greensand. This flocculent (containing arsenic) and manganese oxide is then backwashed off the filter media and sent to a backwash storage tank or direct to sewer. The concept has two potential configurations; “A” configuration that includes a backwash tank to reclaim of the backwash water (Figure 10) and “B” configuration with backwash to sewer without a backwash tank (not shown in Figure 10).
- Two-Step Treatment – Combining Catalytic Oxidation with Media Adsorption (Figure 10):
  - Catalytic Oxidation (greensand) for treatment of manganese – With this process an oxidizing chemical such as chlorine or permanganate is added to the raw water and then filtered over a bed of greensand. The oxidized manganese forms a loose chemical bond with the greensand and is removed from the water. The system is backwashed to remove the manganese and the greensand is continuously reactivated through the addition of oxidizing chemicals. There is no need to replace

the greensand except on a long-term basis (5 to 7 years) after the backwashing process physically breaks down the greensand. The cost of greensand replacement is minor.

- Media adsorption for treatment of arsenic – There are a variety of media on the market for the removal of arsenic. Treatment modeling of the specific water chemistry is required to narrow down the various media options. On-site pilot testing or testing using rapid small-scale column testing follows treatment modeling. Determining the exact media appropriate for the Esposti Supply Well is not critical to the cost analysis at this concept level evaluation.

The two treatment concepts are summarized in Table 19. For this evaluation, iron coprecipitation is considered a one-step process which removes both manganese and arsenic in a single treatment process. As an alternative, catalytic oxidation and media adsorption are combined in a two-step process to remove manganese and arsenic, respectively. The number and size of treatment vessels, backwash frequency, and cost of consumables are calculated from information provided by manufacturers of the respective equipment. Concept configurations of the two different treatment concepts is provided on Figure 10. For comparison, the configuration of the Esposti Supply Well if used as an irrigation well is provided in Figure 10.

Table 19 Comparison Between Viable Treatment Options

Process		Number of Vessels	Backwash Frequency	Consumable $/Acre-Ft [1]	Notes
One Step Process[2,3]					
Iron Coprecipitation (One step Manganese and arsenic removal) with two possible configurations A and B Vessels in parallel	A -System configuration with low flow rate sewer discharge (backwash tank)	Two 10-foot diameter vessels @ 200 gpm each	Every two days @ 1,245 gpm for each vessel for 10 min. each	$510	Backwash at 1,245 gpm is in excess of sewer capacity, which requires a backwash tank of 35,000-gallons.
	B - System configuration with high flow rate sewer discharge	Three 8-foot diameter vessels @ 133 gpm each	Every two days @ 850 gpm for each vessel for 10 min. each	$510	Backwash at 850 gpm direct to sewer discharge is near limit for dry weather sewer capacity.
Two Step Process[4]					
Greensand (Step 1 - Manganese removal)	Vessels in series	One 10-foot diameter vessel @ 400 gpm	Every three days @ 900 gpm for 10 min.	$NA[5]	Backwash at 900 gpm direct to sewer discharge is near limit for dry weather sewer capacity.
Adsorptive Media (Step 2 - Arsenic removal)		One 9-foot diameter vessel @ 400 gpm	Twice a month@700 gpm for 10 min.	$652[6]	Backwash at 700 gpm only to reduce compaction within bed.

Notes:
1 = Non chlorine consumable cost includes Ferric chloride, adsorptive media, and pH control. Chlorine costs are not included because of the variables in chlorine source cost require additional analysis.
2 = Hydraulic loading during filtration 2.4 gpm/ft^2, hydraulic loading during backwash 15 gpm/ft^2
3 = Ferric chloride cost $900/ton of 40% solution, 7 mg/L dosing concentration. Cost for chlorine feed at 6.7 mg/L Cl_2 not included in consumable calculation
4 = Hydraulic loading during filtration 5.3 gpm/ft^2, hydraulic loading during backwash 11.9 gpm/ft^2
5 = Cost for chlorine feed at 2.3 mg/L Cl_2 not included in consumable calculation
6 = Cost for chlorine feed at 0.5 mg/L Cl_2 not included in consumable calculation
- Sewer has been tested in dry weather up to 900 gpm and flows at 65% of full pipe (dry weather)
- Backwash discharge in excess of sewer capacity requires backwash tank of 35,000-gallon capacity for all backwash inputs with 30% freeboard and slope bottom (20-foot base X 18 feet high). Sludge discharged to sewer at flow rate below sewer capacity over two-day period.

6.4.1 Selection of Treatment Option

The one-step treatment concept using iron coprecipitation requires a significant input of $FeCl_2$ with a resulting high volume of waste flocculent to manage. This results in either an unacceptably large backwash tank or frequent high-flow backwashing to the sanitary sewer with high iron loading to the water reclamation plant. A large backwash tank is unacceptable at Esposti Park due to significant visual impacts and site constraints. Three smaller vessels are required to reduce the backwash flow rate for the iron coprecipitation configuration B concept. Smaller tanks can be backwashed at a lower flow rate that is within the capacity of the sanitary sewer (850 gpm). However, this increases operational complexity and extends the duration of backwash operations. Backwashing with the

configuration B concept is very frequent and if the sewer were temporarily unavailable (i.e., sewer infiltration by rainfall) then water treatment would cease. For these reasons, both the configuration A and configuration B of the iron coprecipitation concept are undesirable alternatives compared with the two-step process.

The two-step treatment concept has a higher system capital cost because two tanks are needed in addition to piping and controls linking two separate systems. However, each system is less complex to operate and backwash frequency is less of a critical operational necessity. The two-step treatment alternative is the most viable option for addressing the high concentrations of both manganese and arsenic with the operational parameters desired by the Town.

6.5 Treatment System Siting Options

During various meetings with the Town, areas of Esposti Park were identified as potential locations for the installation of a treatment system. These locations are very preliminary and have not been vetted for functionality relative to the location of the well, power supply, water connection, vehicular access, and sewer disposal. They have also not been vetted relative to impacts to the residences or park operations. These locations are also not the only possibilities for a system location.

Esposti Park is a high-use facility for the Town and minimizing the impact of a treatment system is key to siting the treatment facility. Three location options are presented in this report as example locations; 1) northwest location option (Figure 11), 2) southeast location option (Figure 12), and 3) well location option (Figure 13). All three of these locations require connections to water, sewer, and power. The well location option has the highest visual impact on the park because of the central location. The southeast location option is less visible from the road but is in a highly used area near the parking lot and main ballfields. The northwest location option is the least impactful on the park but requires the longest underground piping connections. The northwest location is used in the cost analysis because it is the furthest from the well and has the longest piping runs. However, the location of the compound is not expected to significantly affect the overall project cost.

6.6 Treatment Cost

This cost evaluation considers the two-step treatment process located in the northwest corner of the park. Other system configurations and locations are possible but the cost of the overall project is unlikely to change significantly unless one or more primary design options such as flow rate (400 gpm) or end use (potable) are revised.

6.6.1 Treatment Cost – Capital Investment

Table 20 provides a summary of the line item costs associated with design and construction of a treatment system for the Esposti Supply Well.

Table 20 Esposti Supply Well Treatment Capital Cost

Esposti Supply Well Capital Cost For Two-Step Treatment				
Catalytic Oxidation (Mn) With Adsorptive Media (As) Conceptual Estimate for System Installation				
DESCRIPTION	**QUANTITY**		**ESTIMATE**	
	NUMBER	**UNIT**	**UNIT COST**	**TOTAL**
Preliminary Design				
Location selection, survey, geotech, visual and noise impact assessments	1	LS	$60,000	$60,000
Preliminary CEQA analysis, assume MND with traffic, GHG models, tribal consultation	1	LS	$50,000	$50,000
Preliminary DoDW application and meetings	1	LS	$12,000	$12,000
Evaluation of specific vendor designs and requirements	1	LS	$4,000	$4,000
Evaluation of power connection for site	1	LS	$4,000	$4,000
Install permanent pump for 400 gpm system and power[1]	1	LS	$25,000	$25,000
Sewer capacity evaluation, field verification, permit application[2]	1	LS	$15,000	$15,000
Pilot testing of Cat. Oxidation (Mn) - field trailer and well pumping @ 400 gpm	1	LS	$30,000	$30,000
Rapid small scale column tests (RSSCT) of 3 media (As)[3]	3	EA	$7,000	$21,000
Preliminary Design subtotal				**$221,000**
Basis of Design Report				
Report to compile predesign results and finalize treatment process	1	LS	$18,000	$18,000
Basis of Design Report subtotal				**$18,000**
Detailed System Design and Bid Package				
Prefabricated treatment plant design coordination with manufacturer[4]	1	EA	$3,500	$3,500
Site Design (site, power, and piping connections) 15% of contractor site work subtotal[5]	1	LS	$69,107	$69,107
Bid package and engineering bid support	1	LS	$8,000	$8,000
Design subtotal				**$80,607**
Permitting Final Documents				
CDPH Negotiations and Meetings due to SRF Loan	1	EA	$5,000	$5,000
CEQA Mitigated. Neg. Dec. with visual impact map and construction mitigation plan	1	EA	$22,000	$22,000
Sewer discharge permit application	1	EA	$4,000	$4,000
Permitting Document subtotal				**$31,000**

Esposti Supply Well Capital Cost For Two-Step Treatment

Catalytic Oxidation (Mn) With Adsorptive Media (As) Conceptual Estimate for System Installation

DESCRIPTION	QUANTITY		ESTIMATE	
	NUMBER	UNIT	UNIT COST	TOTAL
Prefabricated Treatment Plant				
- Filter tanks (two 10-foot diameter vessels)				incl.
- Tank internal distributors				incl.
- Initial filter media				incl.
- Headers and interconnection piping				incl.
- Filter flow sensors				incl.
- Filter control panel				incl.
- Backwash controls and booster pump (no sludge handling or backwash tank)				incl.
Prefabricated Treatment Plant with shipping	1	LS	$450,000	$450,000
Sales tax at 8.25% of total				$37,125
Treatment Plant subtotal				**$487,125**
Site work and installation of prefabricated treatment plant				
Markup on purchase of prefabricated treatment plant (10%)				$48,713
Grade and soil support for treatment plant	1	LS	$30,000	$30,000
Cement pad for treatment plant and gravel access	1	LS	$12,000	$12,000
Unit Install	1	LS	$12,000	$12,000
Chemical metering and Delivery System	1	EA	$16,000	$16,000
Chemical System Install inside small prefabricated enclosure	1	LS	$11,000	$11,000
pH adjustment system (assume CO2)	1	LS	$35,000	$35,000
Process Piping inside treatment plant compound	1	LS	$55,000	$55,000
Pump booster for backwash water to sewer	1	LS	$10,000	$10,000
Backflow prevention	1	LS	$6,000	$6,000
Site Electrical Design Modifications	1	LS	$24,000	$24,000
Process Controls and Integration	1	LS	$12,000	$12,000
Fence and visual screening of treatment tank (redwood panel)	1	LS	$12,000	$12,000
Power connection (overhead, new lines)	300	FT	$100	$30,000
Raw water well to treatment plant buried in road (4-inch)	400	FT	$150	$60,000
Treated water to distribution with backflow prevention buried in road (4-Inch)	100	FT	$150	$15,000
Sewer line connection backwash tank to S130 buried in road (4-inch force)	600	FT	$120	$72,000
Contractor Site Work subtotal				**$460,713**
Contractor Site Work and Prefabricated Treatment Plant subtotal				**$947,838**
General Conditions (8%)				$75,827
Bond / Insurance (2%)				$18,957
O&P (18%)				$170,611

Esposti Supply Well Capital Cost For Two-Step Treatment				
Catalytic Oxidation (Mn) With Adsorptive Media (As) Conceptual Estimate for System Installation				
DESCRIPTION	**QUANTITY**		**ESTIMATE**	
	NUMBER	**UNIT**	**UNIT COST**	**TOTAL**
Contractor site work with prefabricated treatment plant subtotal				**$1,213,232**
Construction Management (15% contractor site work subtotal)				**$69,107**
Subtotal				$1,632,946
Predesign-Level Estimating Contingency (30%)				$489,884
Predesign-Level Project Budget Estimate (2016 Dollars)				**$2,122,829**

1 - Installation of the well pump is required for pilot testing and sewer flow confirmation. The cost and use of a temporary pump is high.

2 - A detailed sewer evaluation is required to verify that the sewer capacity is available under all backwash conditions. Backwash events may be restricted to times when capacity is available.

3 - Many equipment vendors offer field pilot test services for catalytic oxidation (greensand filtration) for removal of manganese (Step 1). During the field pilot test, three-200 gallon samples of the treated water are collected and sent to UC Davis for Rapid Small Scale Column Test of media for removal of arsenic (Step 2).

4 - Design services are for the purpose of specifying the performance of the equipment package. The treatment system manufacturer will provide process and equipment design specific to their systems.

5 - Design services are for the required site work to connect the prefabricated treatment plant to the Town's distribution system. Owner/Consultant designs raw and treated water connections, waste handling, reagent storage, and dosing systems and pH control.

6.6.2 Treatment Cost – Annual Operation

Table 21 provides a summary of the line item costs associated with operation and maintenance of a two-step treatment system for the Esposti Supply Well.

Table 21 Esposti Supply Well Operation Cost

Esposti Supply Well Two-Step Treatment				
Catalytic Oxidation (Mn) With Adsorptive Media (As) Conceptual Estimate for O&M				
DESCRIPTION	**QUANTITY[1]**		**ESTIMATE**	
	NUMBER	**UNIT**	**UNIT COST**	**TOTAL ANNUAL**
Monthly Costs				
Monthly non-disinfection consumable (media replacement)	6	Month	$34,575	$207,450
Monthly power due to well pump and treatment system (150hp total @ $0.15/KWhr)	6	Month	$12,150	$72,900
Disinfection	6	Month	$2,500	$15,000
Compliance reporting	6	Month	$2,500	$15,000
Labor	6	Month	$3,200	$19,200
Sampling and analysis	6	Month	$2,000	$12,000
Additional training and/or operator license	6	Month	$1,000	$6,000
Long-Term Maintenance Costs				
Catalytic oxidation (greensand plus) replacement (Mn)	0.2	Year	$35,000	$7,000
Non-routine analysis	6	Est	$500	$3,000
Equipment repair and replacement average annual	6	Month	$1,500	$9,000
Predesign-Level Annual Operation Budget Estimate			Annual Cost	**$366,550**
Assuming 324 Acre-ft./Year production [1]			$/acre-ft.	**$1,131**

1 - Assume system operation at 400 gpm 24 hours/day for 183 days/year, amortization of capital cost not included

6.7 CEQA Analysis

Replacement of the Town's existing Esposti Irrigation Well was considered as Project W-2 in both the Water Master Plan and the associated programmatic EIR. This project was proposed in the Water Master Plan to provide a renewed water supply to meet existing and future demands and evaluated at a project-level in the associated EIR.

As described in the EIR, the Esposti Supply Well was the well installed in the spring of 2010 with an anticipated production capacity between 270 and 1,000 gpm. At the time of well construction, preliminary examinations of the groundwater in the vicinity of the well indicated that water extracted from this site may require treatment to reduce naturally-occurring concentrations of manganese, iron and/or arsenic in groundwater. As such, construction and operation of a new disinfection and treatment facility at the Esposti Park site, including space for chemical storage, was anticipated and evaluated in the EIR. The treatment system and chemicals evaluated would utilize a wellhead treatment system for manganese, arsenic, and potentially iron, as well as an updated chlorination

system. The treatment system would include a horizontal treatment tank approximately 4 feet in diameter and 6 feet long. The type and quantity of treatment chemicals, and the size of chemical storage tanks, would be determined after additional testing. However, use of ferric chloride (flocculation), sodium hypochlorite (disinfection), and sodium hydroxide (pH adjustment) would likely be required. The treatment system would be housed in a new pump and water treatment building constructed of concrete masonry unit with a metal roof, between 1,000 and 2,500 square feet (sq. ft.) in size and similar in appearance to the existing restroom facilities at the park. The roof would be removable so that the pump can be removed for maintenance, and the building would have an exterior designed to blend in with the park and surrounding structures. The total footprint of the replacement well and facilities at this site would not extend beyond the parcel boundary of the park.

The Esposti Park project (Project W-2), as evaluated in the EIR, assumed that during periods of maximum production the well pump would run 24 hours per day. Motor noise would be negligible at the site because pump motors would be installed below ground (submersible pump type) or within the pump and treatment building (top set motor with turbine bowls). Lighting on the exterior of the buildings would be limited to standard door lights that would be set on timers or remain off at night.

To evaluate CEQA requirements on the current work conducted for this feasibility study and described herein, a long-term production rate of 400 gpm is recommended for the Esposti Supply Well. Groundwater produced from the well contains arsenic at concentrations of approximately 0.060 mg/L and manganese at concentrations around 1.0 mg/L. These concentrations are above the drinking water standards; therefore, treatment will be required prior to use as a potable supply. Testing has indicated that a two-stage treatment process is appropriate for the site, consisting of green sand to remove manganese followed by media treatment to remove arsenic. A treatment system sized for a production rate of 400 gpm would consist of two vertical tanks, approximately 12 feet in height, for the greensand and media treatment, and one horizontal tank, approximately 9 feet in height, for a contact tank. These tanks could fit within a space approximately 40 feet by 45 feet (or approximately 1,800 sq. ft.), along with a disinfection and oxidation building and the well connection. This treatment system could be located at one of three locations within Esposti Park (as sited depending on proximity to both the drinking water distribution and sanitary collection system pipelines) in the northeast corner of the park, in the southeast corner of the park, or immediately adjacent to the Esposti Supply Well (Figures 11, 12 and 13, respectively).

As configured herein, the treatment system fits within the size parameters evaluated within the programmatic EIR; the treatment system requires 1,800 sq. ft. of space, less than the maximum 2,500 ft^2 evaluated in the EIR. However, the 12-foot tall tanks require a much larger building if the system is to be enclosed inside a structure. The size of the treatment tanks assumed in the EIR was much smaller than those needed based on the recent testing. The site locations described herein assume a fenced enclosure for the treatment system (instead of a treatment building) because access for maintenance is available from outside of the fence line within the 20-foot easement (Figure 10). This change in facility size and design was not evaluated in the programmatic EIR. If these options are to be considered, it is recommended that an initial study (IS) be conducted to identify which impact areas may need to be re-evaluated and the appropriate level of environmental documentation to be prepared. At a minimum, it is anticipated that aesthetics (visual), noise, and traffic impacts may be different for a treatment system constructed and operated

as described herein (versus in the programmatic EIR). For planning purposes and assuming that no additional significant unavoidable impacts are identified as part of the IS, it is assumed that a Mitigated Negative Declaration (MND) will be sufficient for meeting the requirements of CEQA. Additionally since the completion of the program-level EIR, AB52 has gone into effect. AB52 requires consultation with interested Native American Tribes. Therefore, AB52 consultation should also be initiated as part of the CEQA process.

7. Scope and Limitations

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Figures

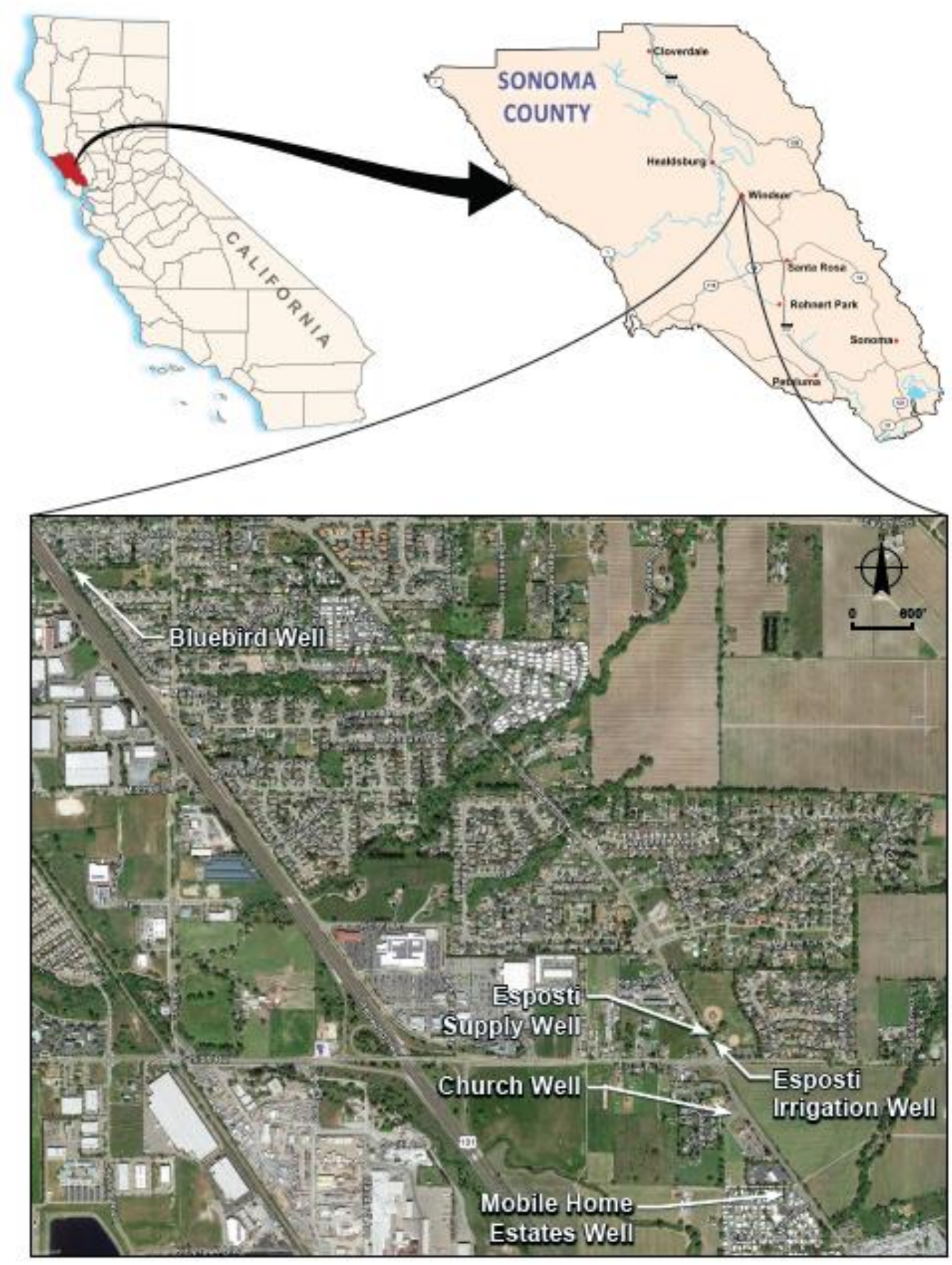


Figure 1 Site Location



Figure 2 Aerial Location Map



Figure 3 Esposti Supply Well With Camera Tool

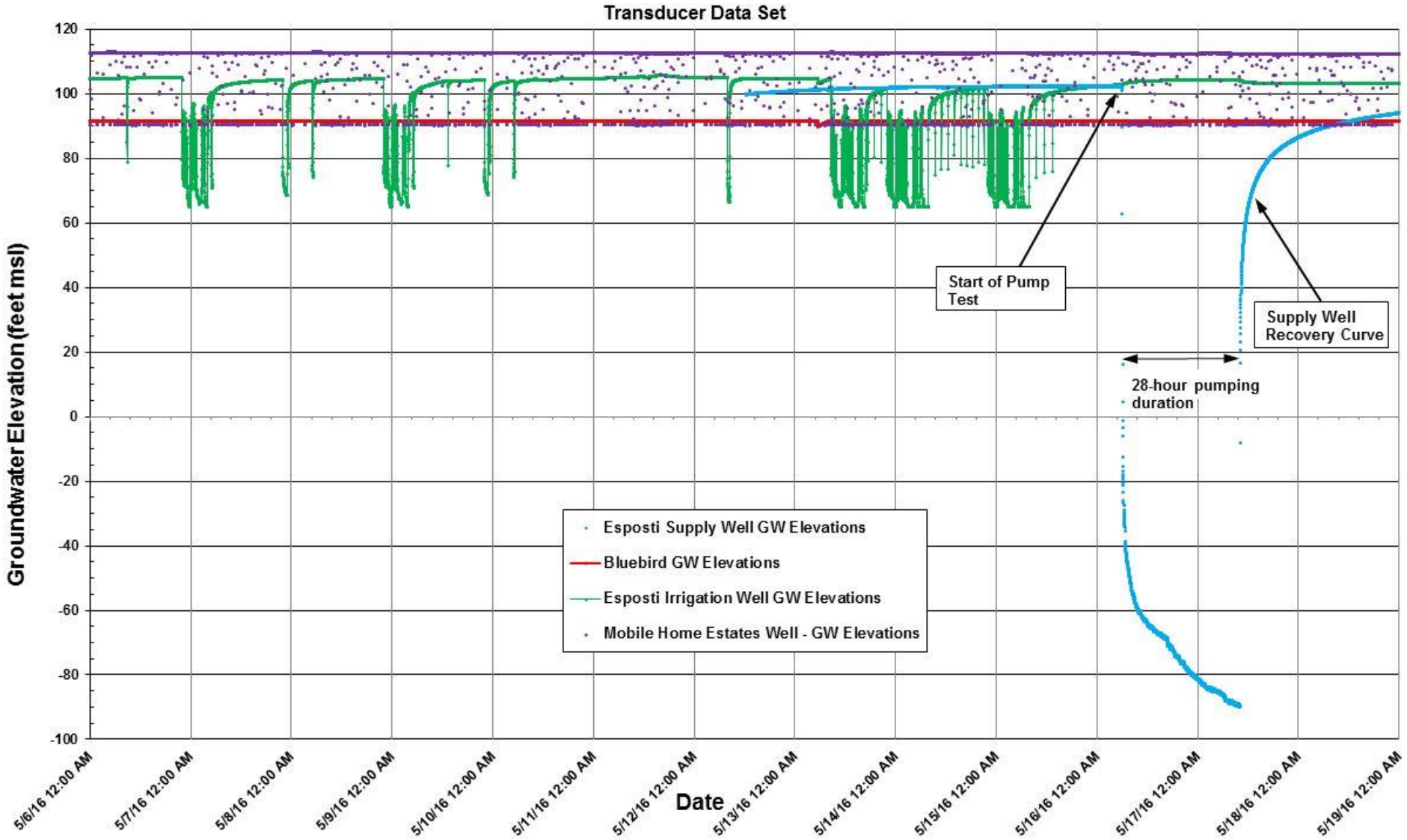


Figure 4 28-Hour Pumping Test All Wells

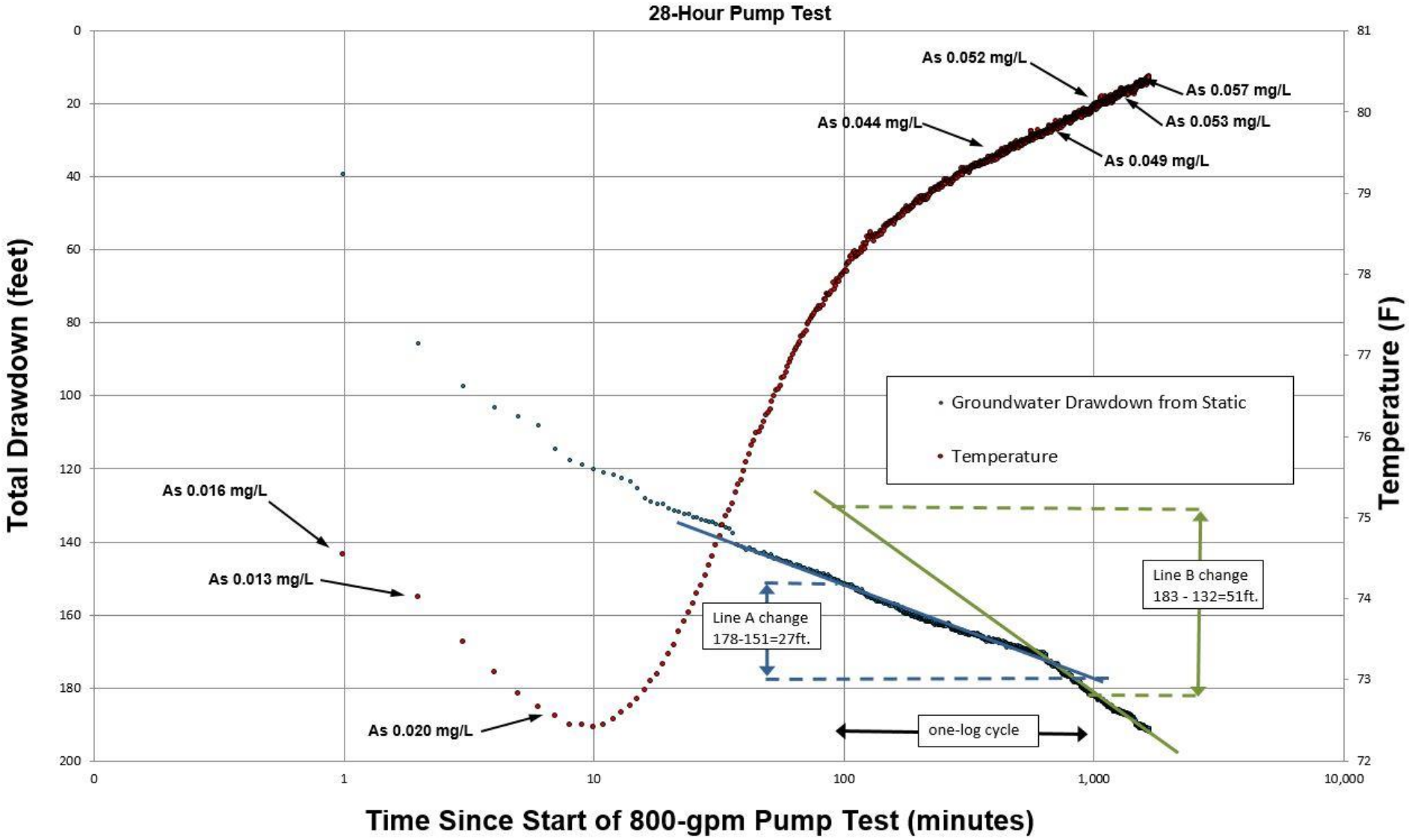


Figure 5 28-Hour Pumping Test Semi-Log Plot

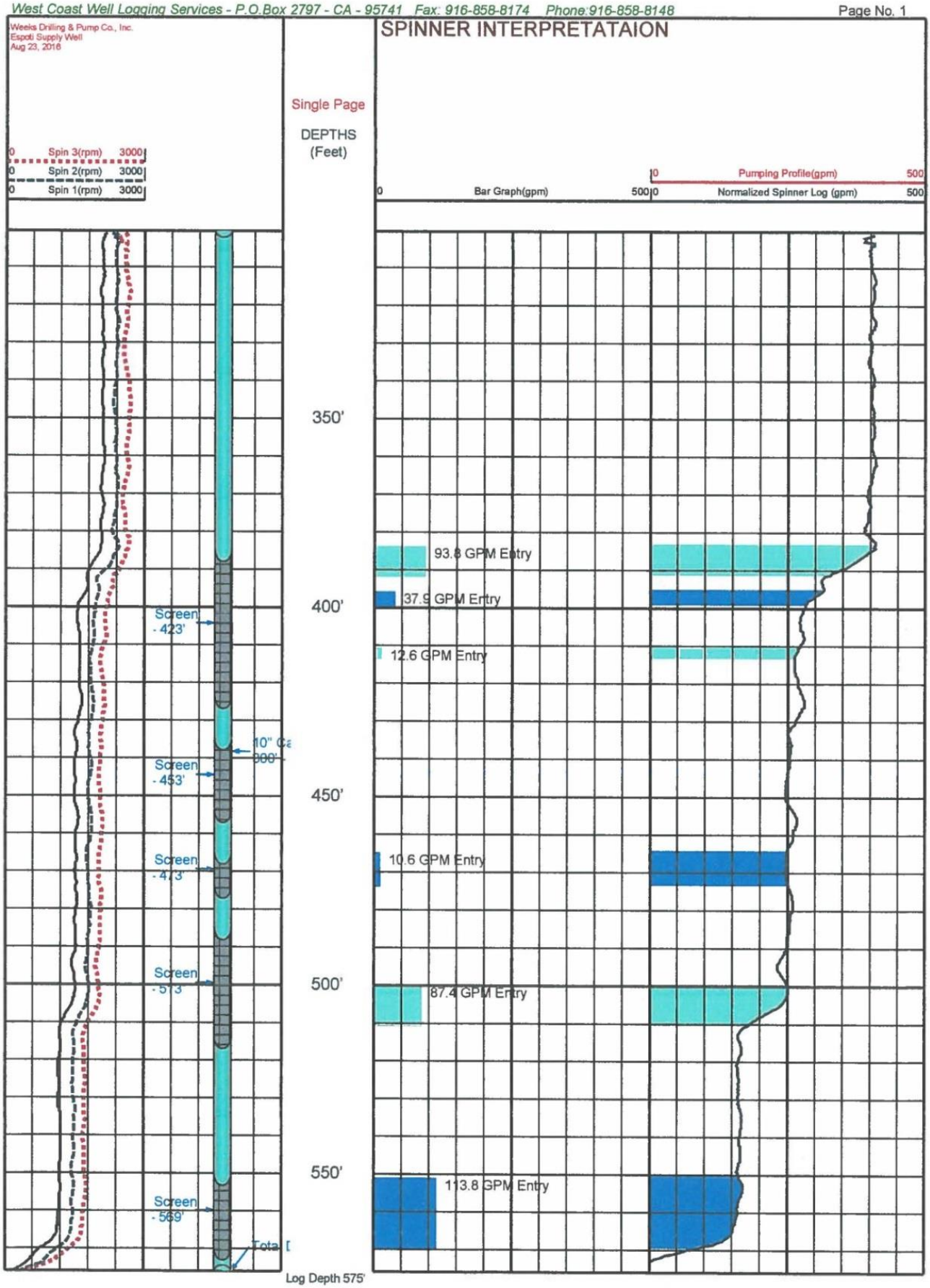


Figure 6 Active Spinner Log 400 gpm Pumping Rate

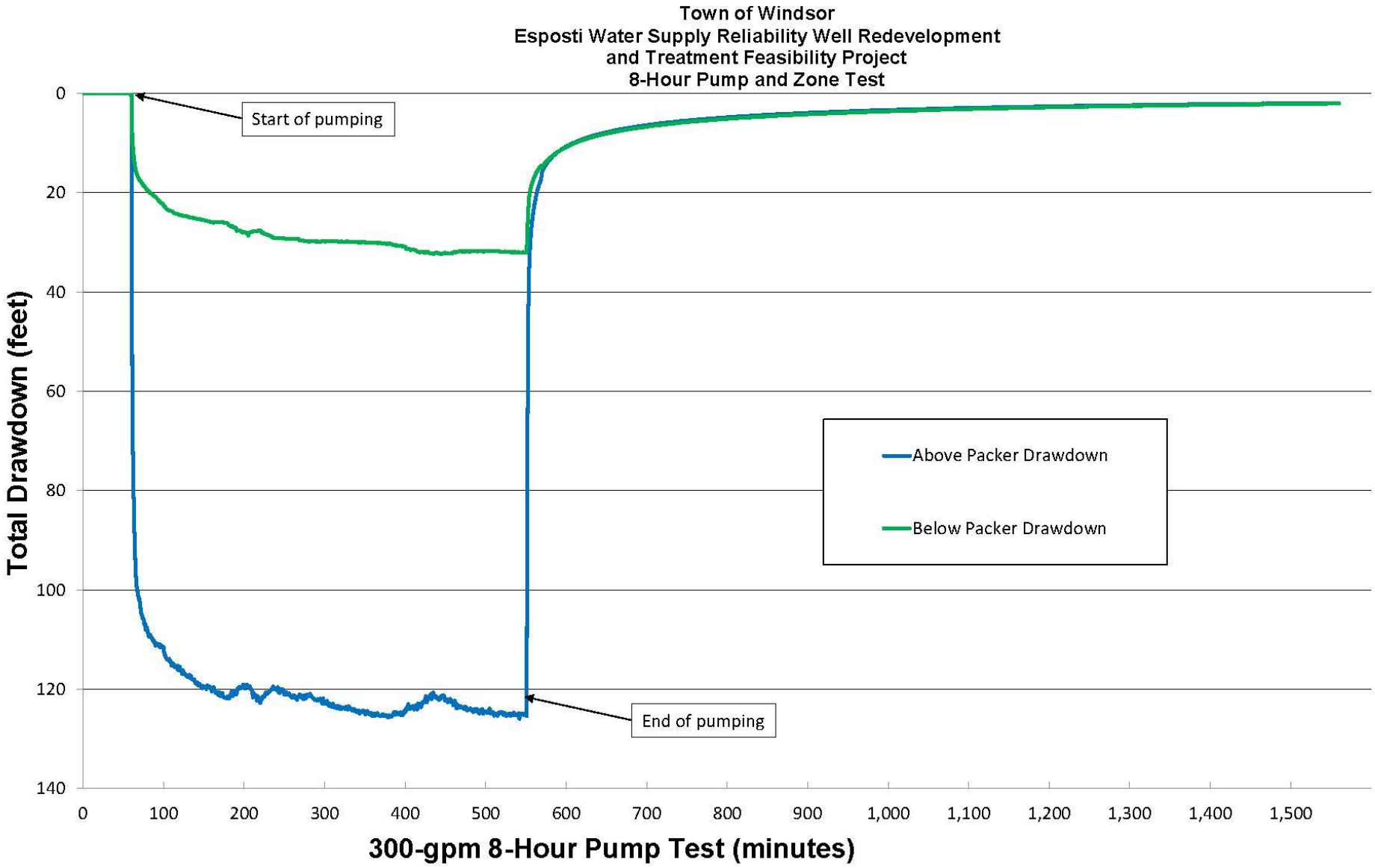


Figure 7 8-Hour First Screen Zone Test Above and Below Packer Groundwater Drawdown

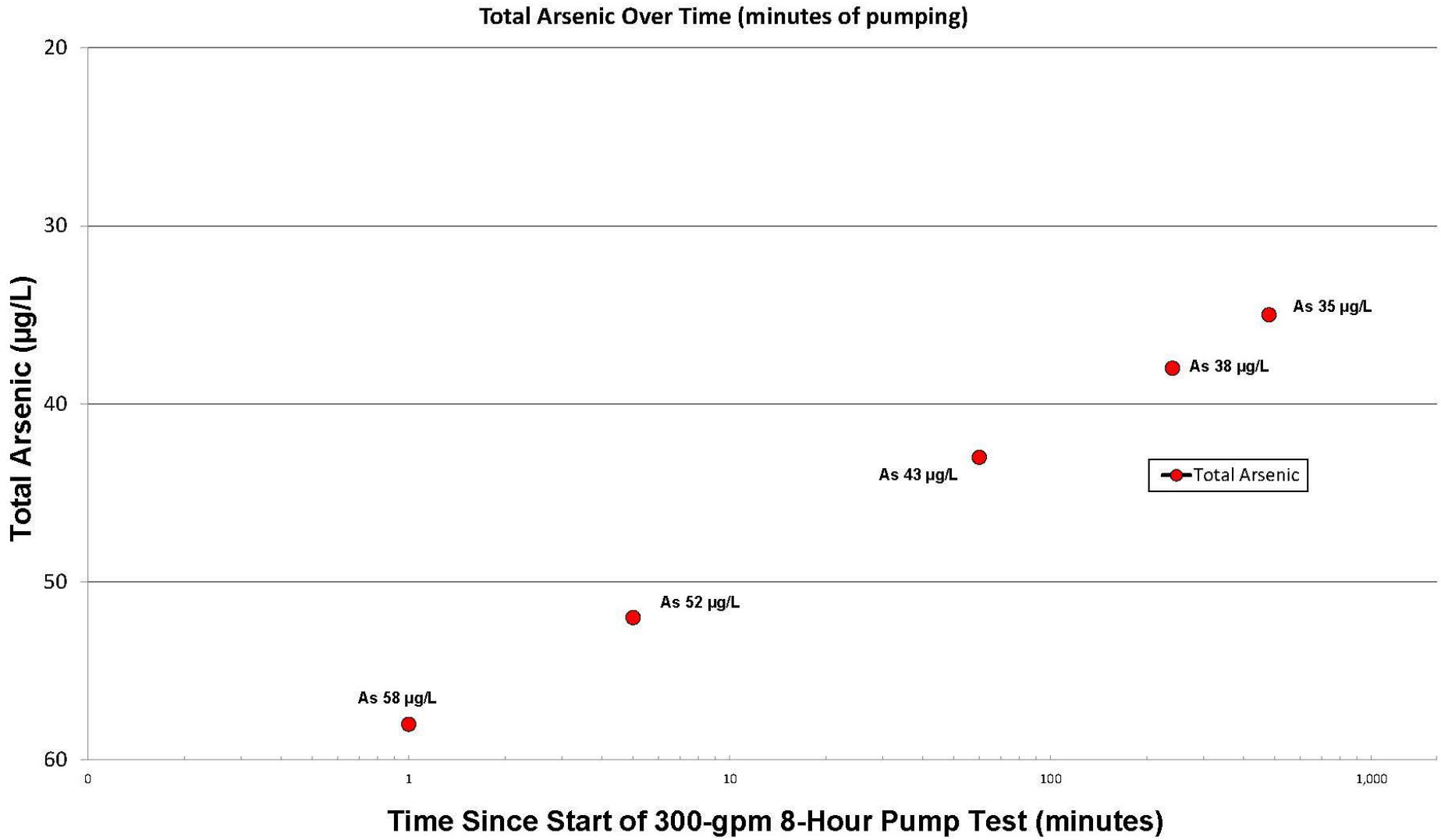


Figure 8 8-Hour First Screen Zone Test Arsenic Concentrations

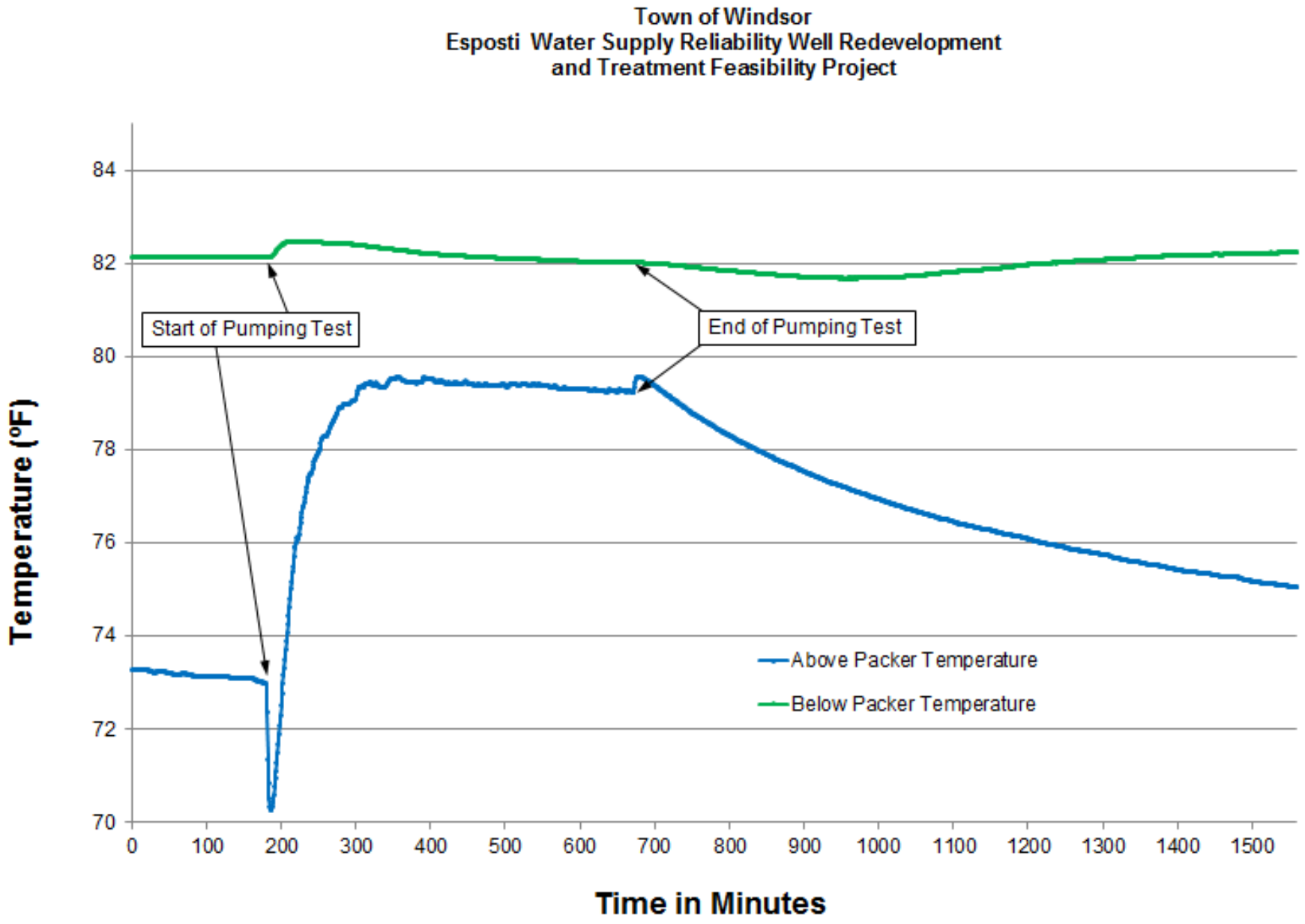


Figure 9 8-Hour First Screen Zone Test Temperature Above and Below Packer Groundwater Drawdown

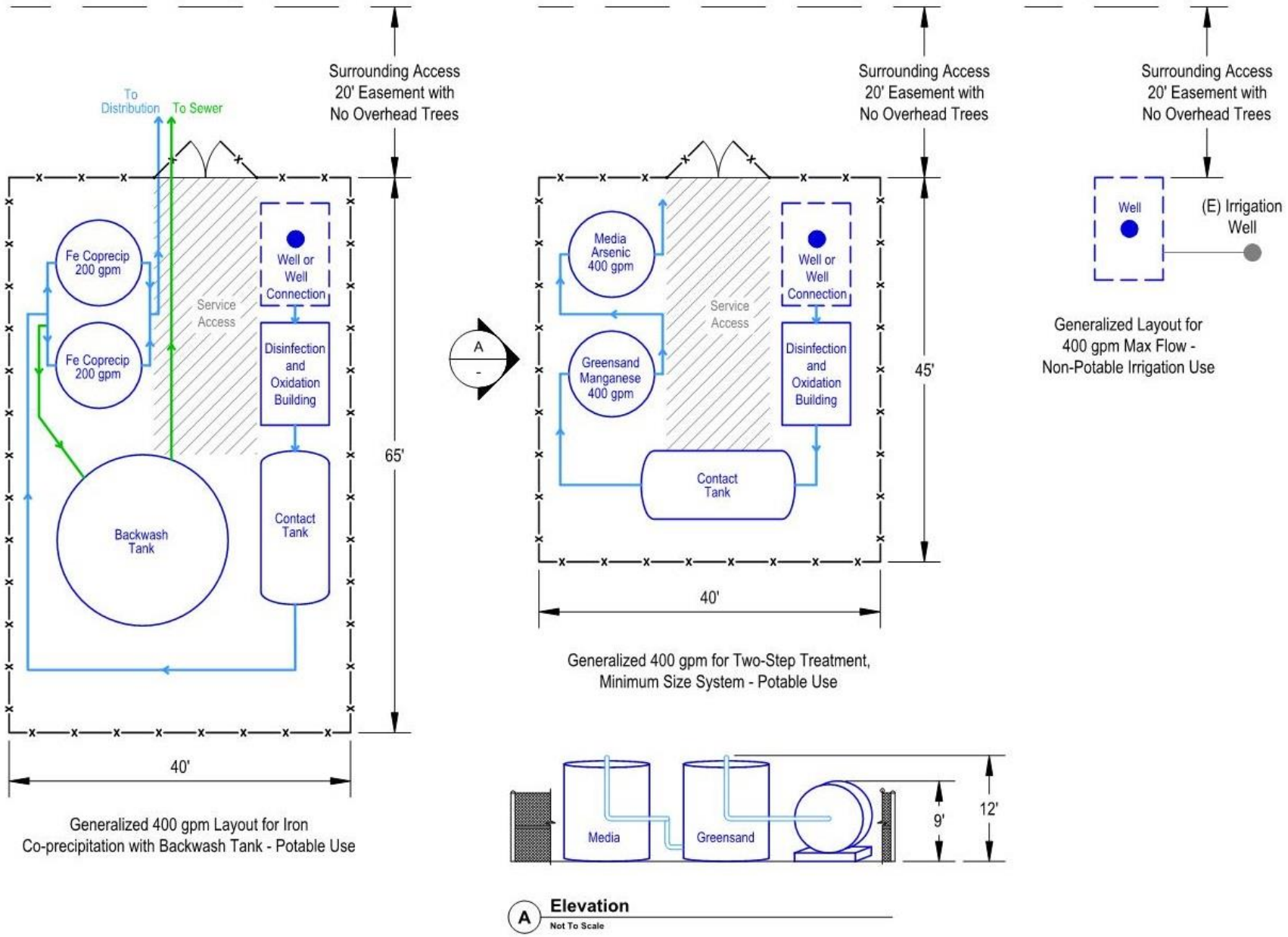


Figure 10 Compound Options

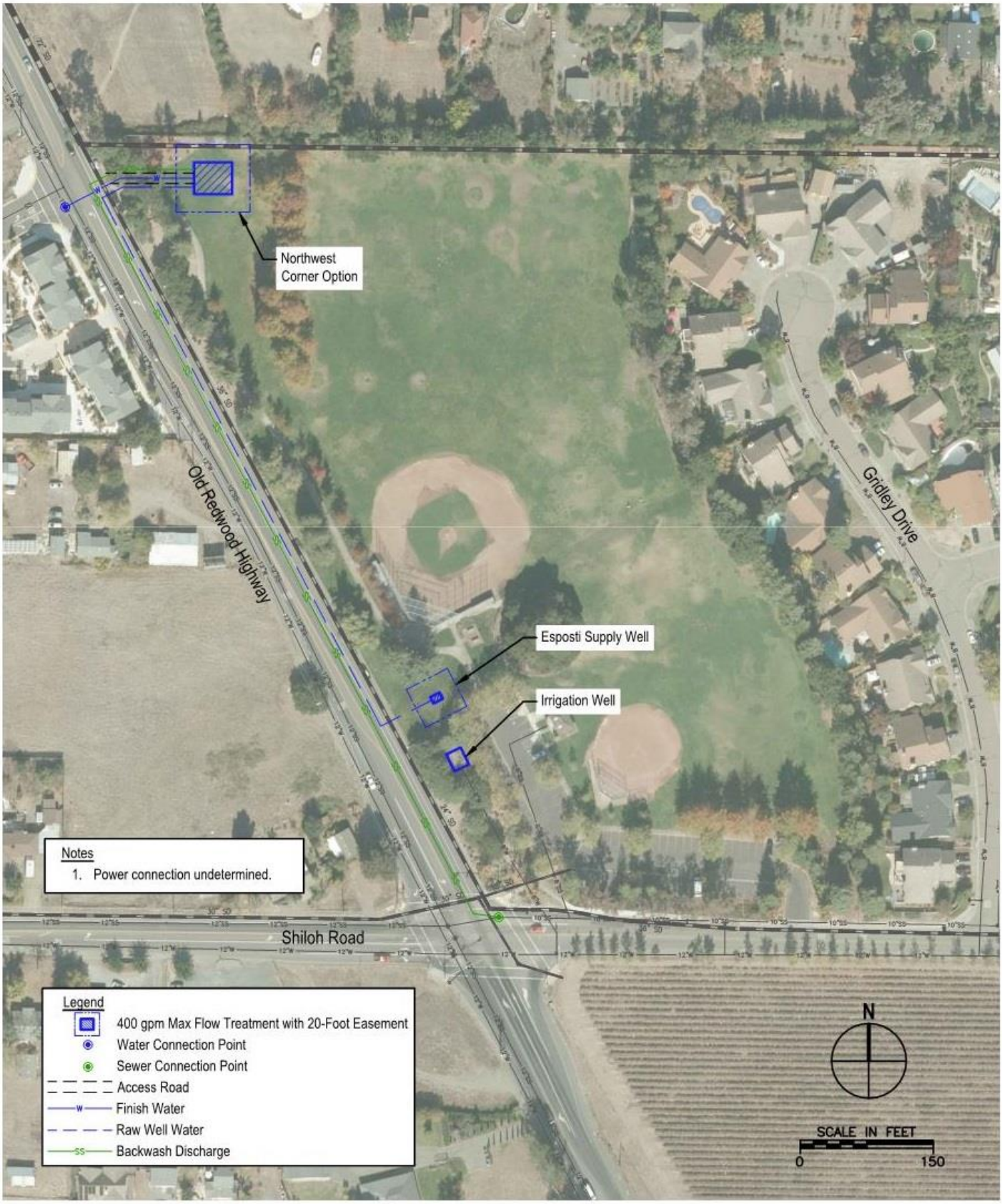


Figure 11 System Location, Northwest Option

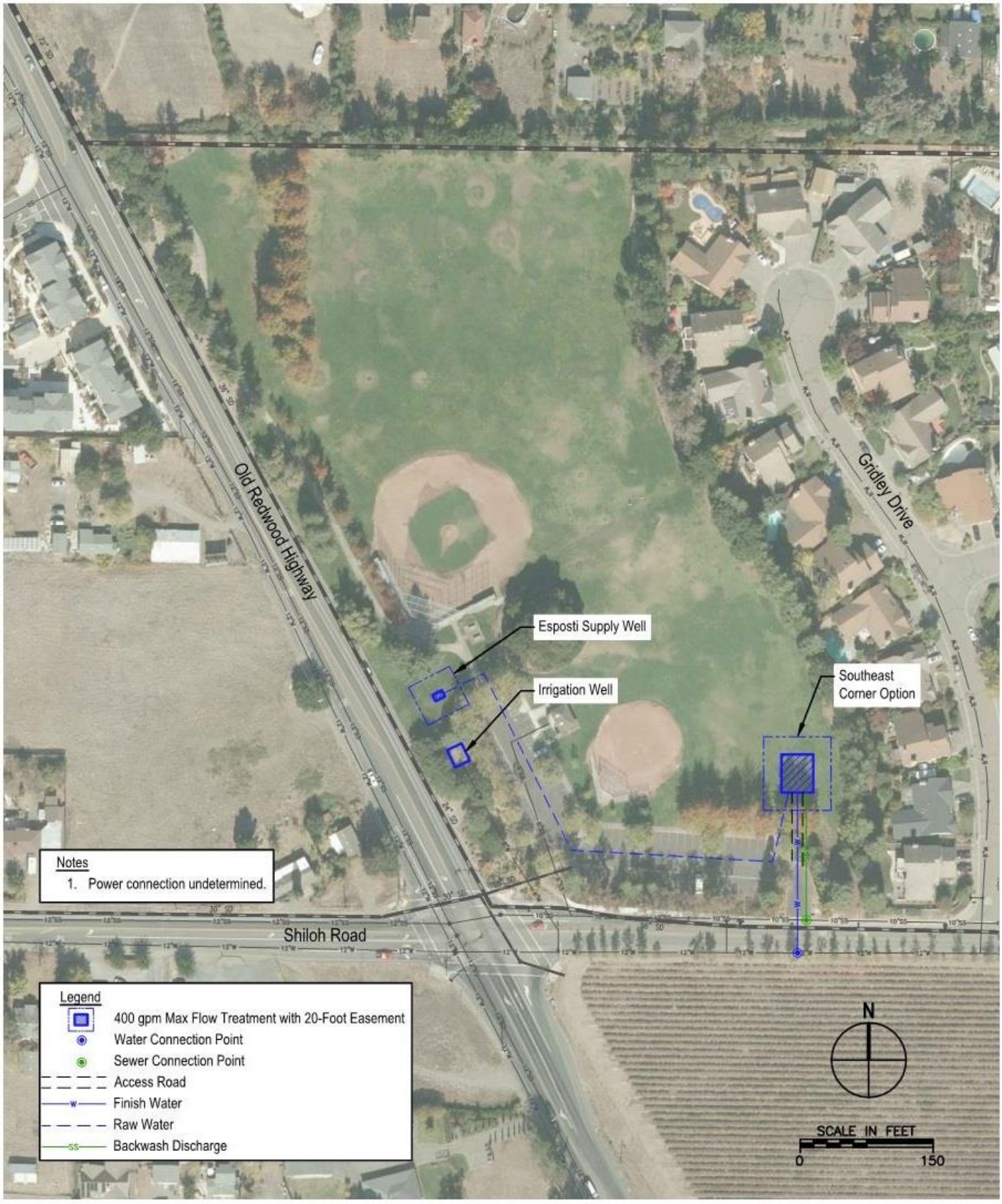


Figure 12 System Location, Southeast Option



Figure 13 System Location, Well Option

Appendices

Appendix A – Figures from Governmental Agencies Related to Esposti Well Hydrogeology

USGS
science for a changing world

Prepared in cooperation with the Sonoma County Water Agency

Hydrologic and Geochemical Characterization of the Santa Rosa Plain Watershed, Sonoma County, California



Scientific Investigations Report 2013–5118

U.S. Department of the Interior
U.S. Geological Survey

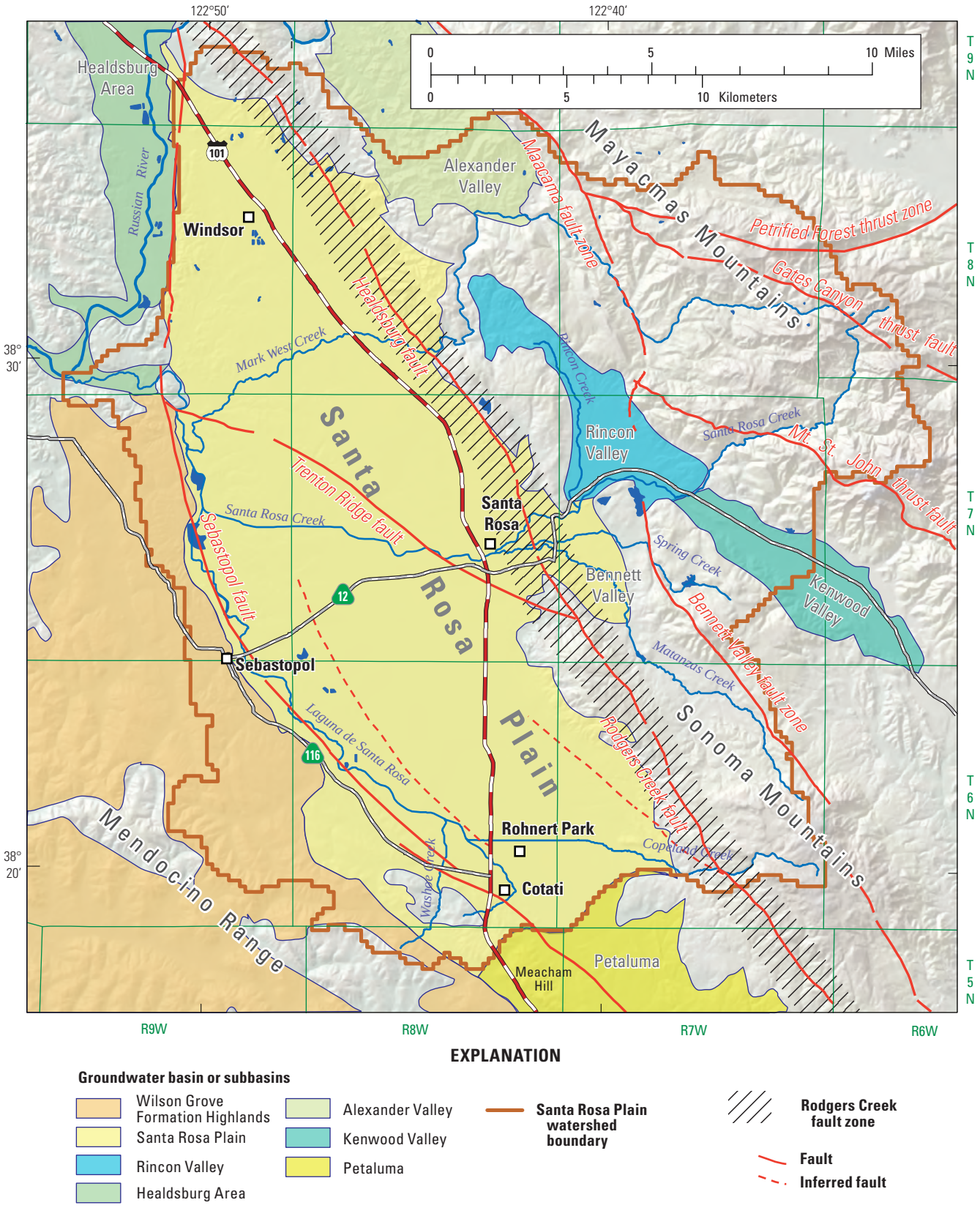


Figure 3. Santa Rosa Plain watershed boundary with groundwater subbasins, Sonoma County, California.

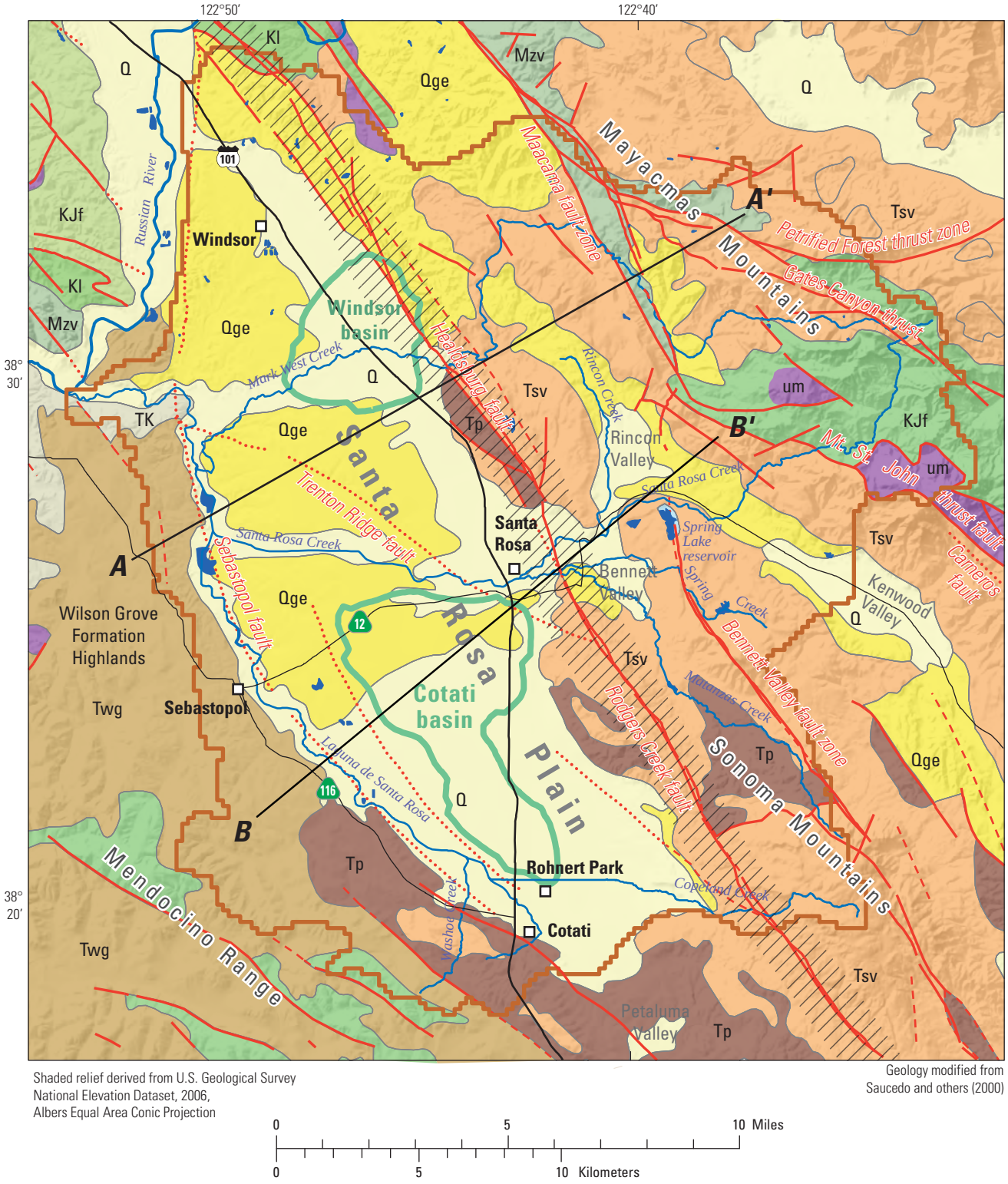


Figure 1. Santa Rosa Plain watershed, Sonoma County, California.

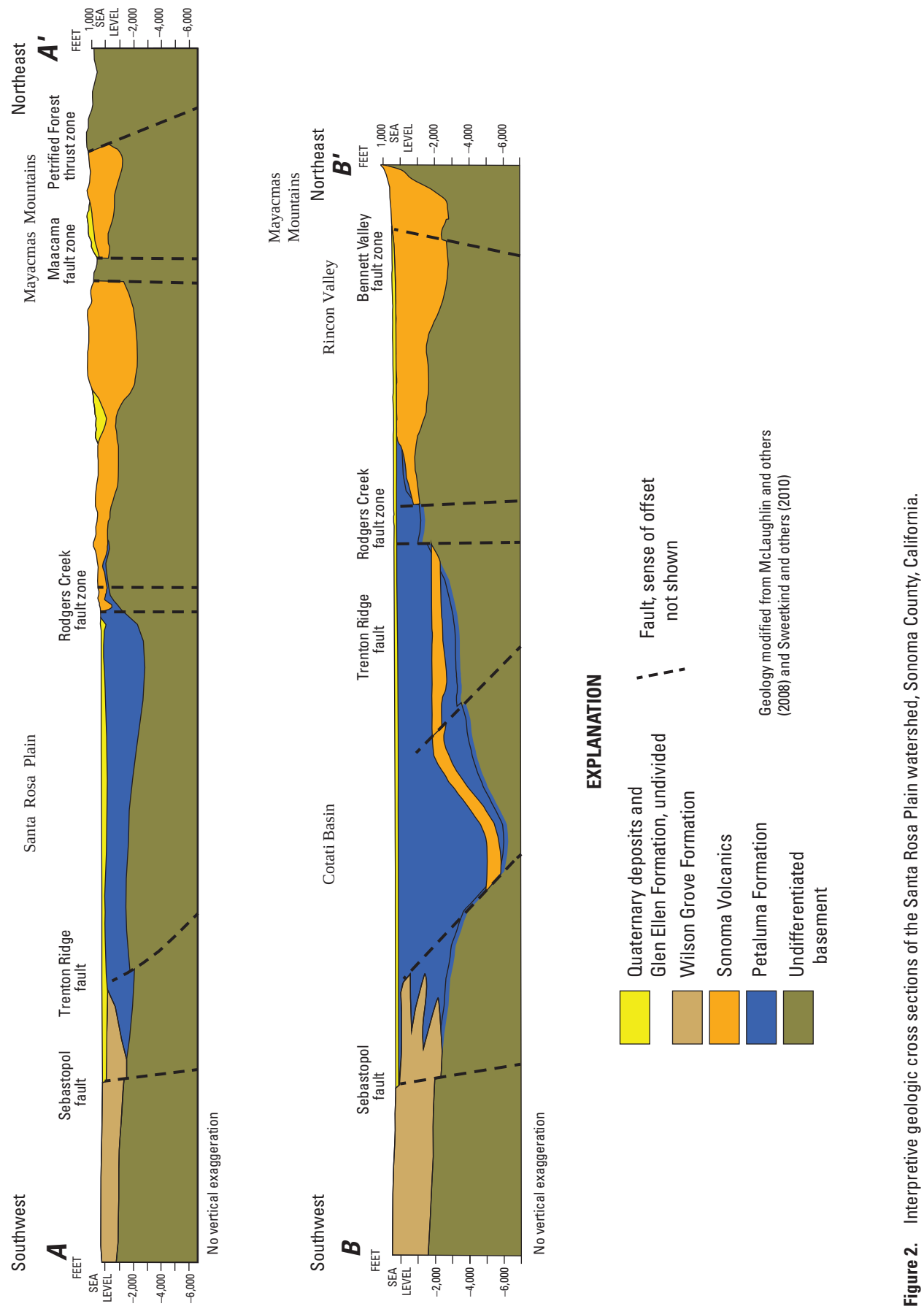


Figure 2. Interpretive geologic cross sections of the Santa Rosa Plain watershed, Sonoma County, California.

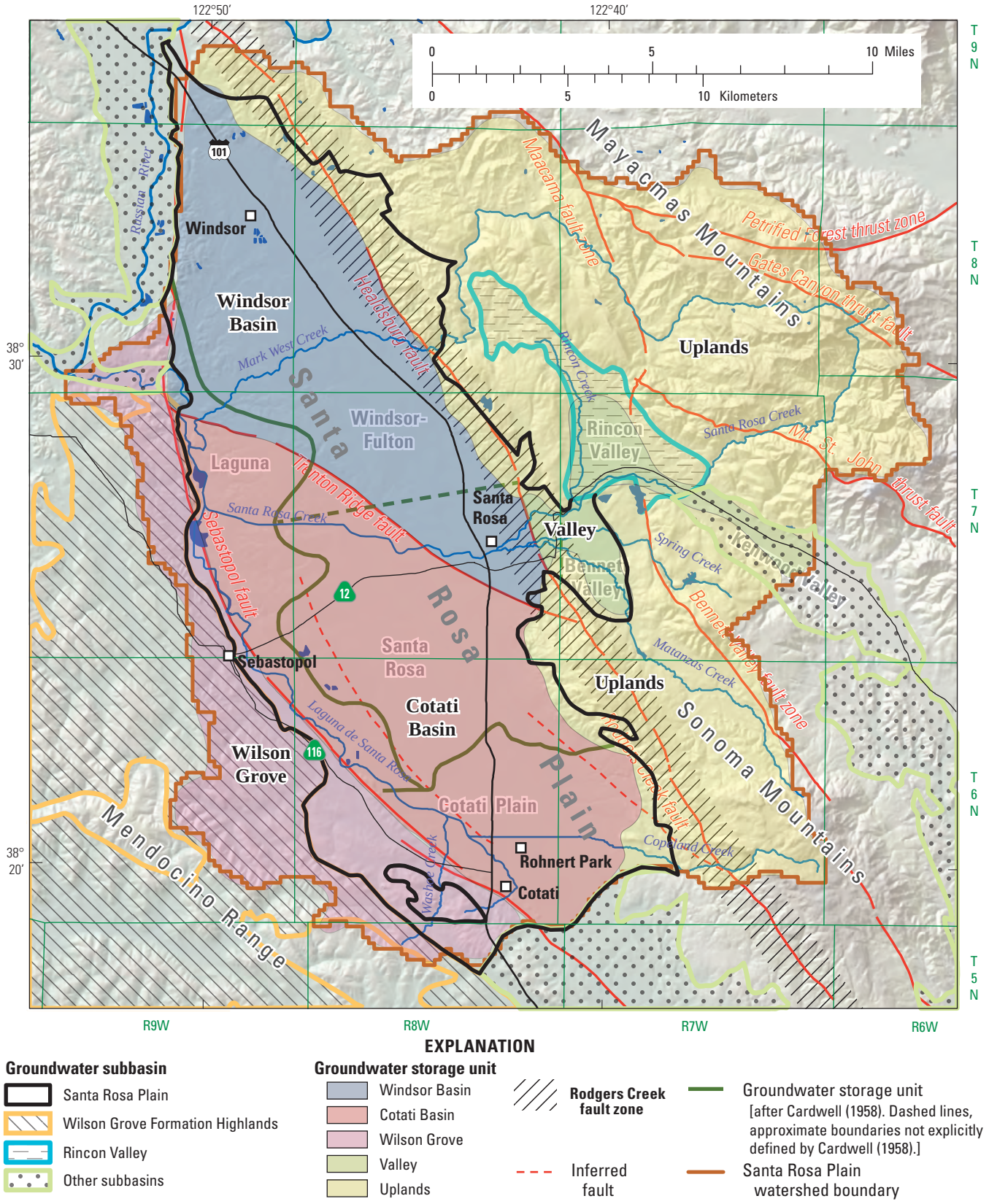


Figure 24. Groundwater basins, subbasins, and storage units in the Santa Rosa Plain watershed, Sonoma County, California.

Appendix B – Well Installation Well Logs: Esposti Supply Well, Esposti Irrigation Well and Bluebird Well

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0113306

Page 3 of 3

Owner's Well Number Esposti Park #1

Date Work Began 02/24/2010 Date Work Ended 3/27/2010

Local Permit Agency Sonoma County Permit and Resource Management Dept.

Permit Number WEL 09-0438 Permit Date 1/20/10

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N W

Latitude Longitude

APN/TRS/Other

Geologic Log

Orientation ◉ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Mud Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description Describe material, grain size, color, etc
		SEE ATTACHED

Total Depth of Boring 1040 Feet

Total Depth of Completed Well 670 Feet

Well Owner

Name Town of Windsor

Mailing Address 9290 Old Redwood Hwy

City Windsor State CA Zip 95492

Well Location

Address 6000 Old Redwood Hwy

City Windsor County Sonoma

Latitude 38 Deg 31 Min. 35 Sec. N Longitude 122 Deg 46 Min. 46 Sec. W

Datum Decimal Lat. Decimal Long.

APN Book 163 Page 172 Parcel 018

Township Range Section

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West East

See Attached

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. **Please be accurate and complete**

Activity

◉ New Well

○ Modification/Repair

○ Deepen ○ Other

○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

◉ Water Supply

☐ Domestic ☑ Public ☐ Irrigation ☐ Industrial

○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
○ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other

Water Level and Yield of Completed Well

Depth to first water 21 (Feet below surface)

Depth to Static Water Level 43 (Feet) Date Measured 04/10/2010

Estimated Yield * 400 (GPM) Test Type Constant Rate

Test Length 12.0 (Hours) Total Drawdown 79 (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
655	670	17	Blank	304 Stainless Steel		10		
670	1,040			Cement				

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	370	Cement	
370	371	Bentonite	
371	670	Filter Pack	1/4

Attachments

☑ Geologic Log

☑ Well Construction Diagram

☐ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☑ Other Site Map

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Tom Moreland for WDC Exploration and Wells

Person, Firm or Corporation

9580 County Road 93 B Zamora CA 95695

Address City State Zip

Signed [signature] 7-23-10

C-57 Licensed Water Well Contractor Date Signed

283326

C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

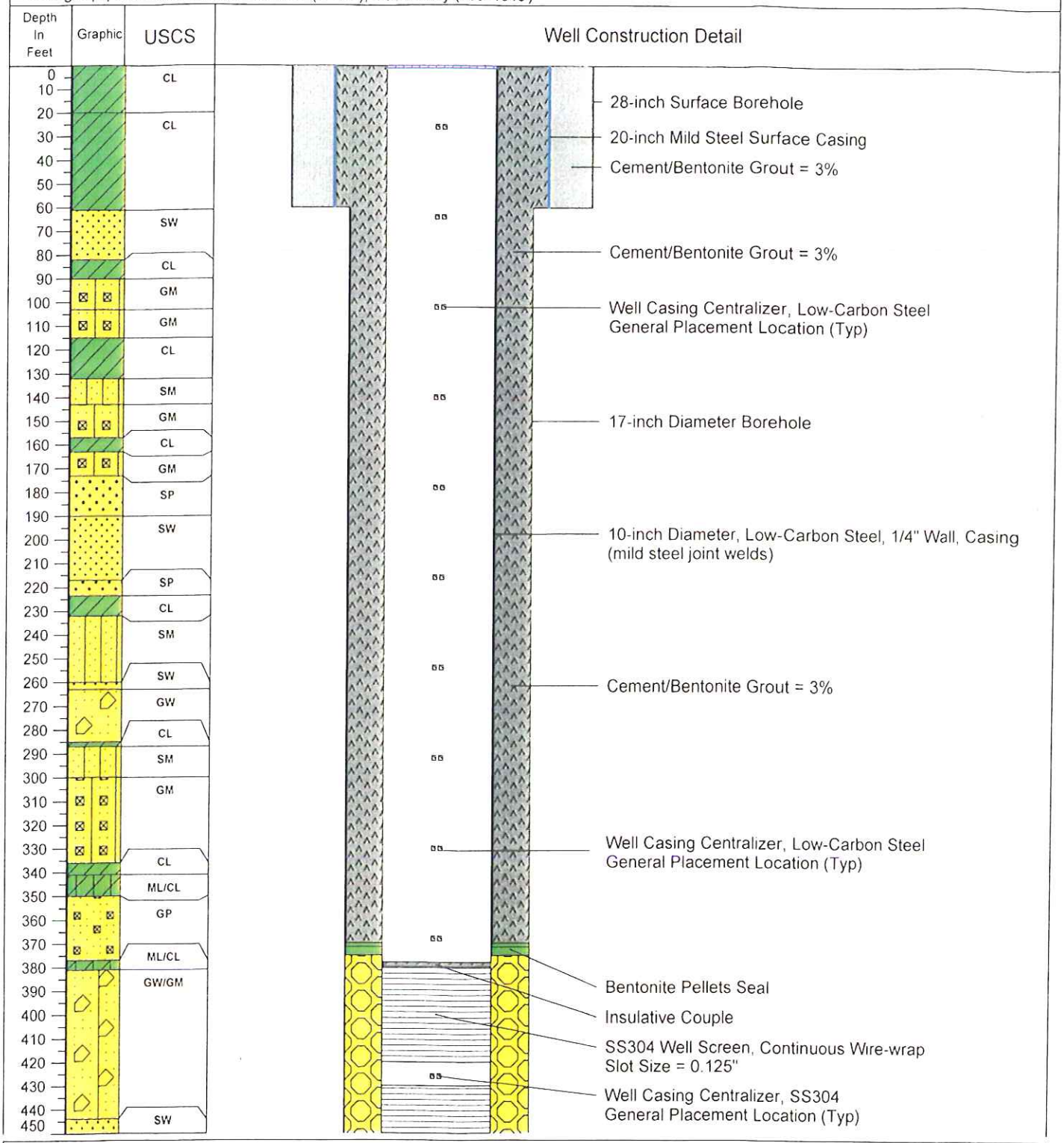
E-PUR, llc

Project	Well Installation
Location:	Windsor, CA
E-PUR PN:	E102-001-01, Task 200
Logged by:	B. Gulbranson, J. Buchowski, G. Moore
Surface Conditions:	Grass Covered
Sampler Type:	Grab from Cyclone

WELL CONSTRUCTION DIAGRAM
Esposti Park Test Hole

Start Date:	2/24/2010
End Date:	3/27/2010
Latitude:	N 38° 31' 35.4"
Longitude:	W 122° 46' 46.5"

Drilling Company: WDC Exploration and Wells
Driller: Gary Eldred, Greg Gallio, John Chaves
Drilling Equipment: Reverse Circulation Air (0'-965'), Mud Rotary (965'-1040')



Sanitary Seal:	Cement/Bentonite Grout	0 to 60	feet bgs	Surface Casing:	0 to 60	feet bgs
Annular Seal:	Cement/Bentonite Grout	0 to 370	feet bgs	Screened Interval:	380-420, 430-450, 460-470, 480-510, 545-565, 615-655	feet bgs
Filter Pack:	SRI 1/4 inch Gravel	375 to 670	feet bgs	Casing Diameter:	10.0 inches	
Monument Type:	Concrete Pedestal w/ Temp. Locking Steel Cap			Total Well Depth:	670.0 feet	

E-PUR, llc

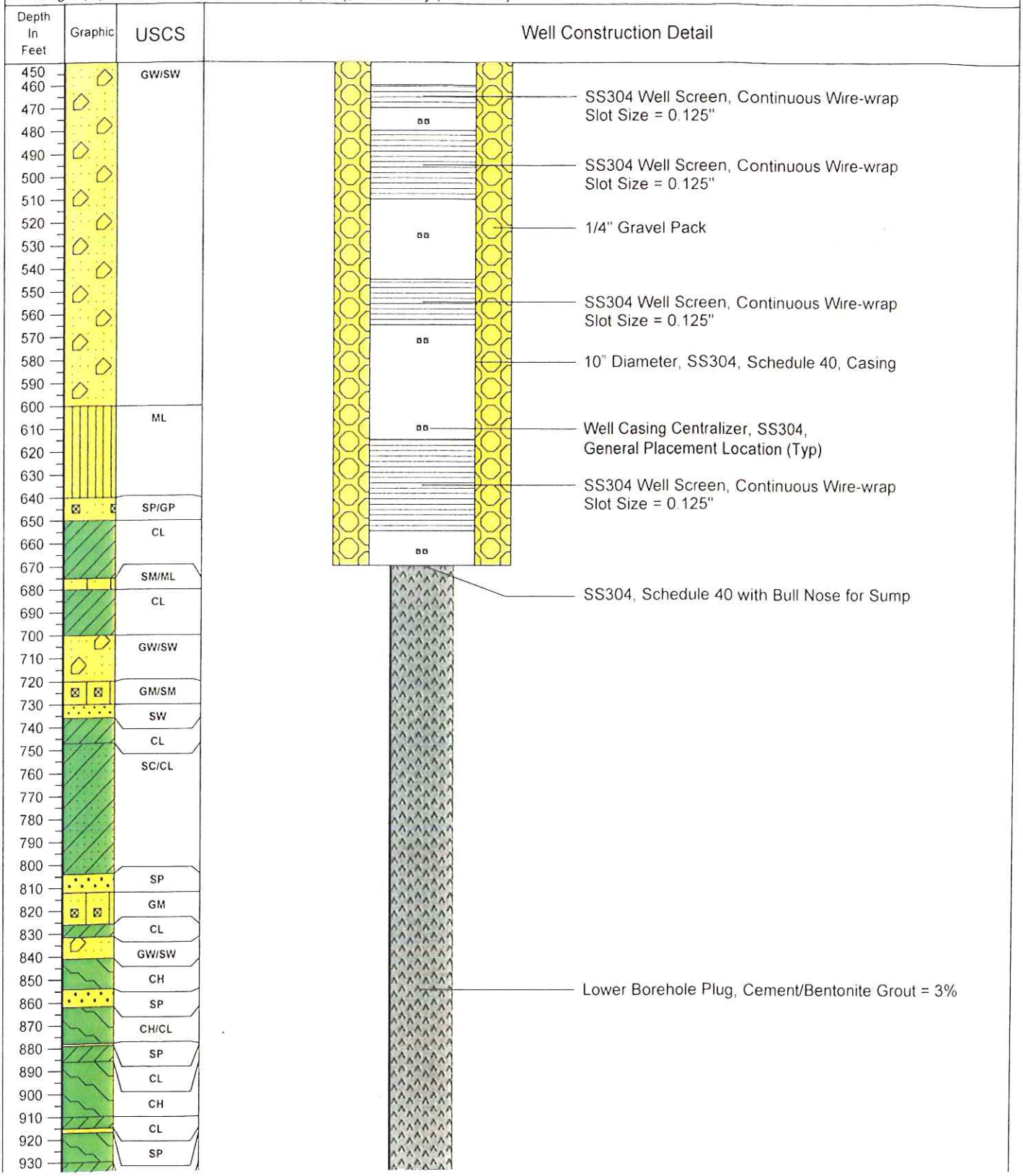
Project	Well Installation
Location:	Windsor, CA
E-PUR PN:	E102-001-01, Task 200
Logged by:	B. Gulbranson, J. Buchowski, G. Moore
Surface Conditions:	Grass Covered
Sampler Type:	Grab from Cyclone

WELL CONSTRUCTION DIAGRAM

Esposti Park Test Hole

Start Date:	2/24/2010
End Date:	3/27/2010
Latitude:	N 38° 31' 35.4"
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Drilling Company: WDC Exploration and Wells
Driller: Gary Eldred, Greg Gallio, John Chaves
Drilling Equipment: Reverse Circulation Air (0'-965'), Mud Rotary (965'-1040')



E/PUR,llc

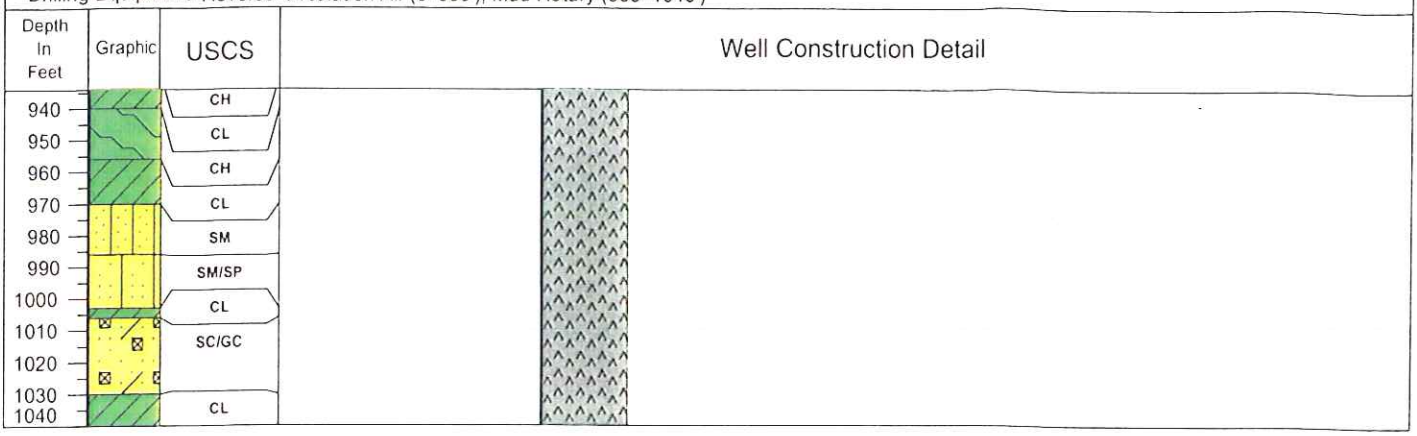
Project	Well Installation
Location:	Windsor, CA
E-PUR PN:	E102-001-01, Task 200
Logged by:	B. Gulbranson, J. Buchowski, G. Moore
Surface Conditions:	Grass Covered
Sampler Type:	Grab from Cyclone

WELL CONSTRUCTION DIAGRAM

Esposti Park Test Hole

Start Date:	2/24/2010
End Date:	3/27/2010
Latitude:	N 38° 31' 35.4"
Longitude:	W 122° 46' 46.5"

Drilling Company: WDC Exploration and Wells
Driller: Gary Eldred, Greg Gallio, John Chaves
Drilling Equipment: Reverse Circulation Air (0'-965'), Mud Rotary (965'-1040')



BORING LOG: Esposti Park

Esposti Park Well Test Hole

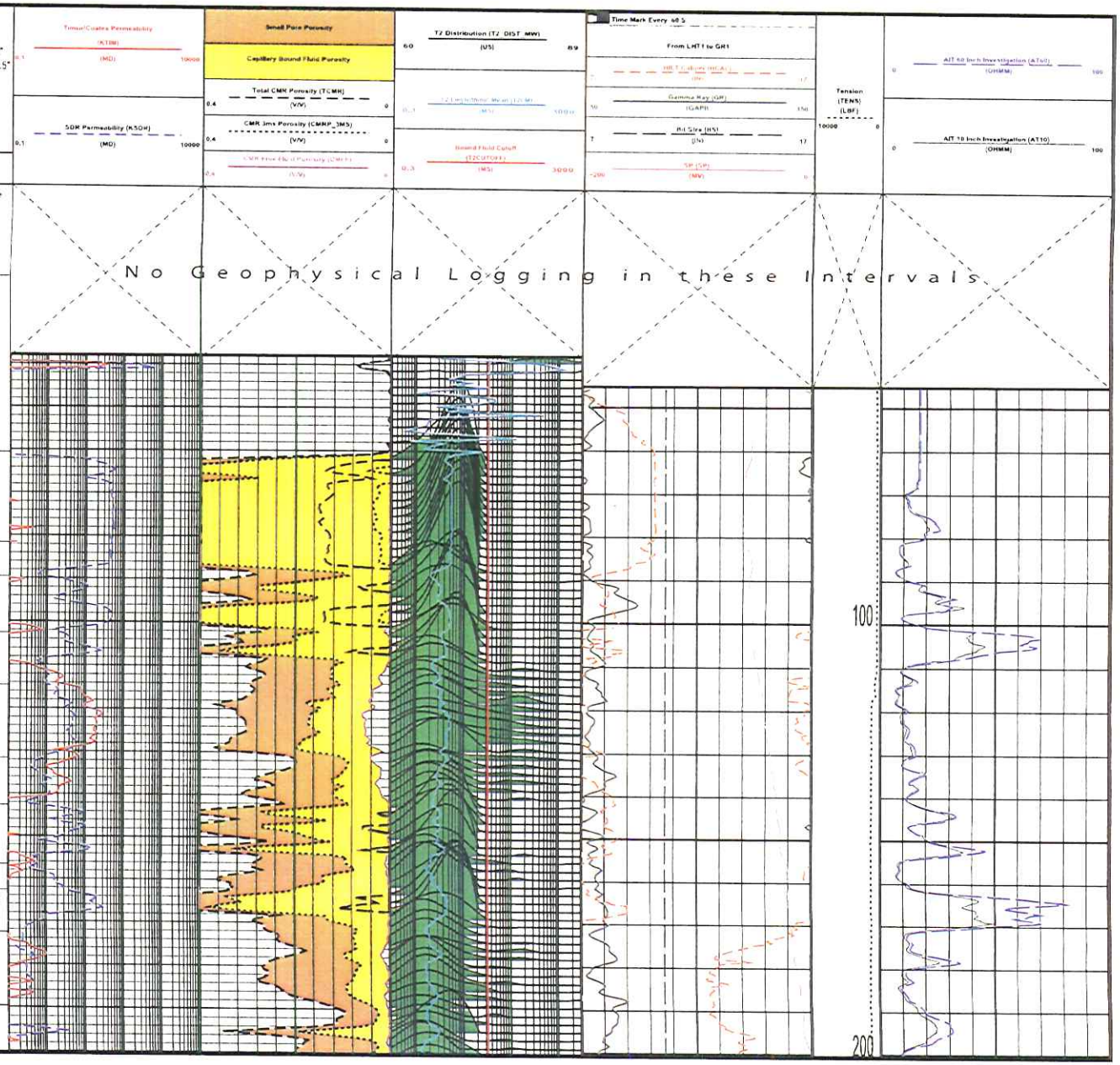
E-PUR.llc

Drilling Company: WDC Exploration and Wells
Driller: Gary Eldred, Greg Gallio, John Chaves
Drilling Equipment: Reverse Circulation
Air (0'-795'), Mud Rotary (795'-867')

Start Date: 2/24/2010
End Date: 3/3/2010
Latitude: N 38° 31' 35.4"
Longitude: W 122° 46' 46.5"

Project: Well Installation
Location: Windsor, CA
E-PUR PN: E102-001-01, Task 200
Logged by: B. Gulbranson, J. Buchowski, G. Moore
Surface Conditions: Grass Covered
Sampler Type: Grab

Depth (feet)	Graphic	USCS	Description
0		CL	Sandy CLAY (CL) - medium to light brown, soft, plastic clay; varicolored, poorly sorted, fine to coarse, subangular to angular sand; poorly sorted, rounded fine to coarse gravel
20		CL	Gravelly CLAY (CL) and Sandy CLAY (CL) - light brown, very fine to coarse grained sand, subangular to angular; gravel units, fine to coarse, subangular to subrounded.
60		SW	SAND (SW) - varicolored, poorly sorted, fine to coarse, subrounded to subangular sand with silty sand and silty gravel 70-71 feet; some metamorphosed quartz and feldspars.
90		CL	Sandy CLAY (CL) - light gray clay with sand
100		GM	Gravelly SAND (GM) - varicolored, poorly sorted, fine to medium, angular to subrounded sand; some, varicolored, poorly sorted, fine to coarse, angular to subrounded gravel; little silt. Gravel clasts metasedimentary sandstone to quartzite
110		GM	Sandy GRAVEL (GM) - varicolored changing to green/gray, poorly sorted, fine to medium, rounded to subangular gravel; some sand; little silt. Green fine grained basalt clasts
120		CL	Silty CLAY (CL) - dark gray/green, plastic clay; with silt and fine sand
140		SM	Silty SAND (SM) - gray/green, poorly sorted, rounded to subrounded, fine sand; fine, subangular to subrounded gravel; with rare cobble
150		GM	Silty GRAVEL (GM) - as above with fine gravel to coarse sand, varicolored
160		CL	Sandy CLAY (CL) - light brown, clay; sand
170		GM	Silty GRAVEL (GM) - varicolored, unsorted to poorly sorted, fine, subangular to subrounded gravel; with rare cobble; units of silty sand, fine to medium grained, angular to subrounded.
180		SP	SAND (SP) - varicolored, subrounded to rounded, fine to medium sand, abundant well rounded and frosted quartz
190		SW	Sand (SW) - fine to coarse sand, well graded, similar in angularity and color to above.
200			



E.PUR.llc

Drilling Company: WDC Exploration and Wells
Driller: Gary Eldred, Greg Gallio, John Chaves
Drilling Equipment: Reverse Circulation
Air (0'-795'), Mud Rotary (795'-867')

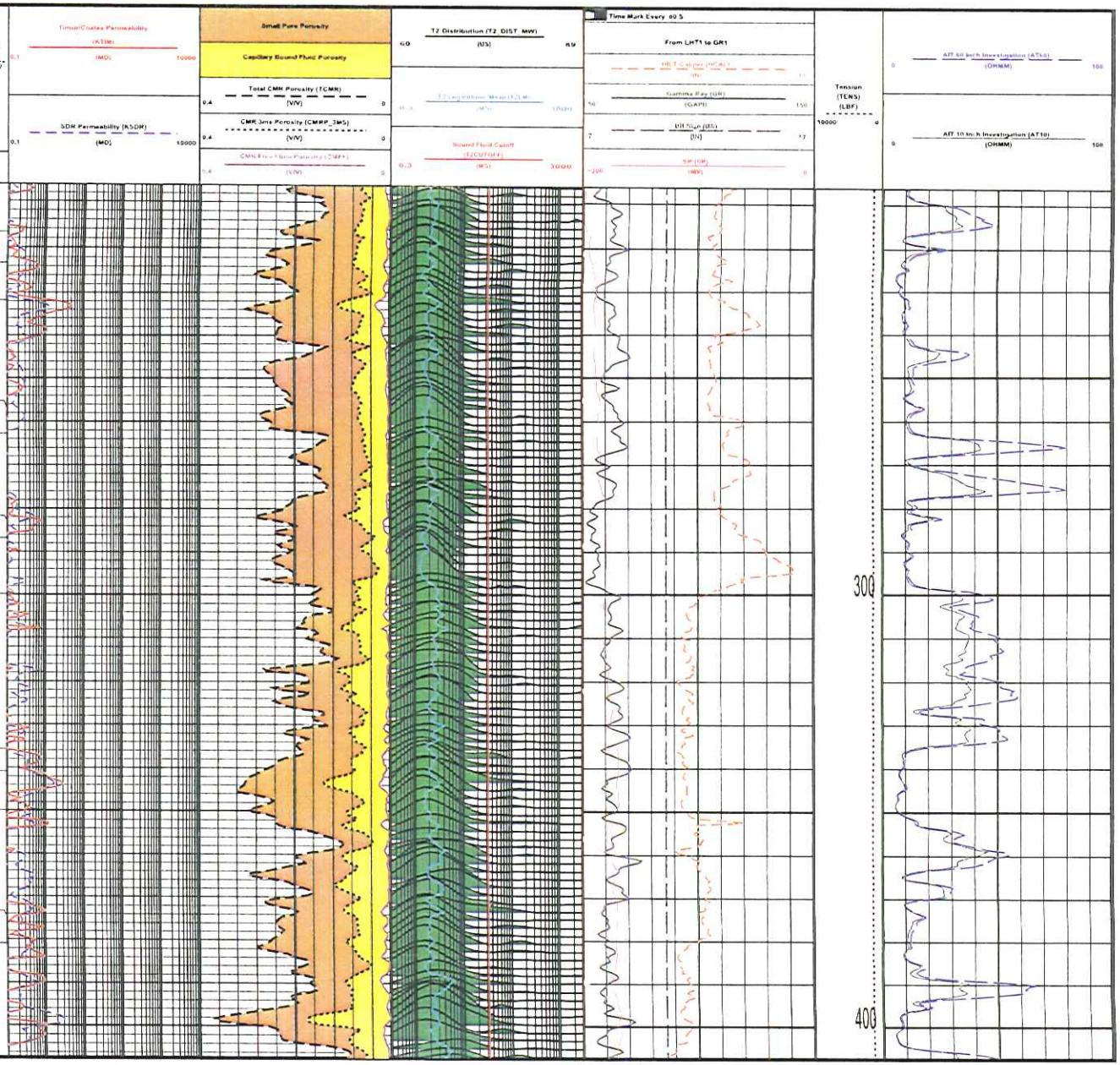
BORING LOG: Esposti Park

Esposti Park Well Test Hole

Start Date: 2/24/2010
End Date: 3/3/2010
Latitude: N 38° 31' 35.4"
Longitude: W 122° 46' 46.5"

Project: Well Installation
Location: Windsor, CA
E-PUR PN: E102-001-01, Task 200
Logged by: B. Gulbranson, J. Buchowski, G. Moore
Surface Conditions: Grass Covered
Sampler Type: Grab

Depth (feet)	USCS	Description
210		
220	SP	Sand (SP) - varicolored, fine to medium, poorly graded sand
230	CL	Silty CLAY (CL) - light gray clay; with silt
240	SM	Silty SAND (SM) - varicolored, poorly sorted, rounded to subrounded to subangular sand; few to little silt (ash); some gravel units
250		
260	SW	Sand (SW) - varicolored, poorly sorted, fine to coarse grained, subrounded to subangular sand
270	GW	GRAVEL (GW) - red stained gravel with sand, poorly sorted, subrounded to subangular, few obsidian clasts
280	CL	Sandy CLAY (CL) - light gray clay; fine sand
290	SM	Silty SAND (SM) - gray, rounded to subrounded, fine sand, abundant milky frosted quartz; abundant rhyolite with red staining on some grains; increasing coarseness to gravel with depth
300	GM	Silty GRAVEL (GM) - as above with fine gravel and some sand
310		
320		
330		
340	CL	Sandy CLAY (CL) - light gray clay; sand
	ML/CL	SILT and CLAY (ML/CL) - light brown, tan/buff, friable, fine ash; trace fine gravel
350	GP	GRAVEL with SAND (GP) - varicolored, subrounded to rounded to subangular, fine to medium gravel, moderately well sorted, fine to coarse, subangular to subrounded sand
360		
370		
380	ML/CL	SILT and CLAY (ML/CL) - light green gray, ash, some clear to frosted sand, pale green fine sand
	GW/GM	GRAVEL with SAND (GW/GM) - varicolored, moderately well sorted, fine to coarse, subrounded gravel; some angular to subangular sand
390		
400		Abundant volcanics at 400 feet



BORING LOG: Esposti Park

Esposti Park Well Test Hole

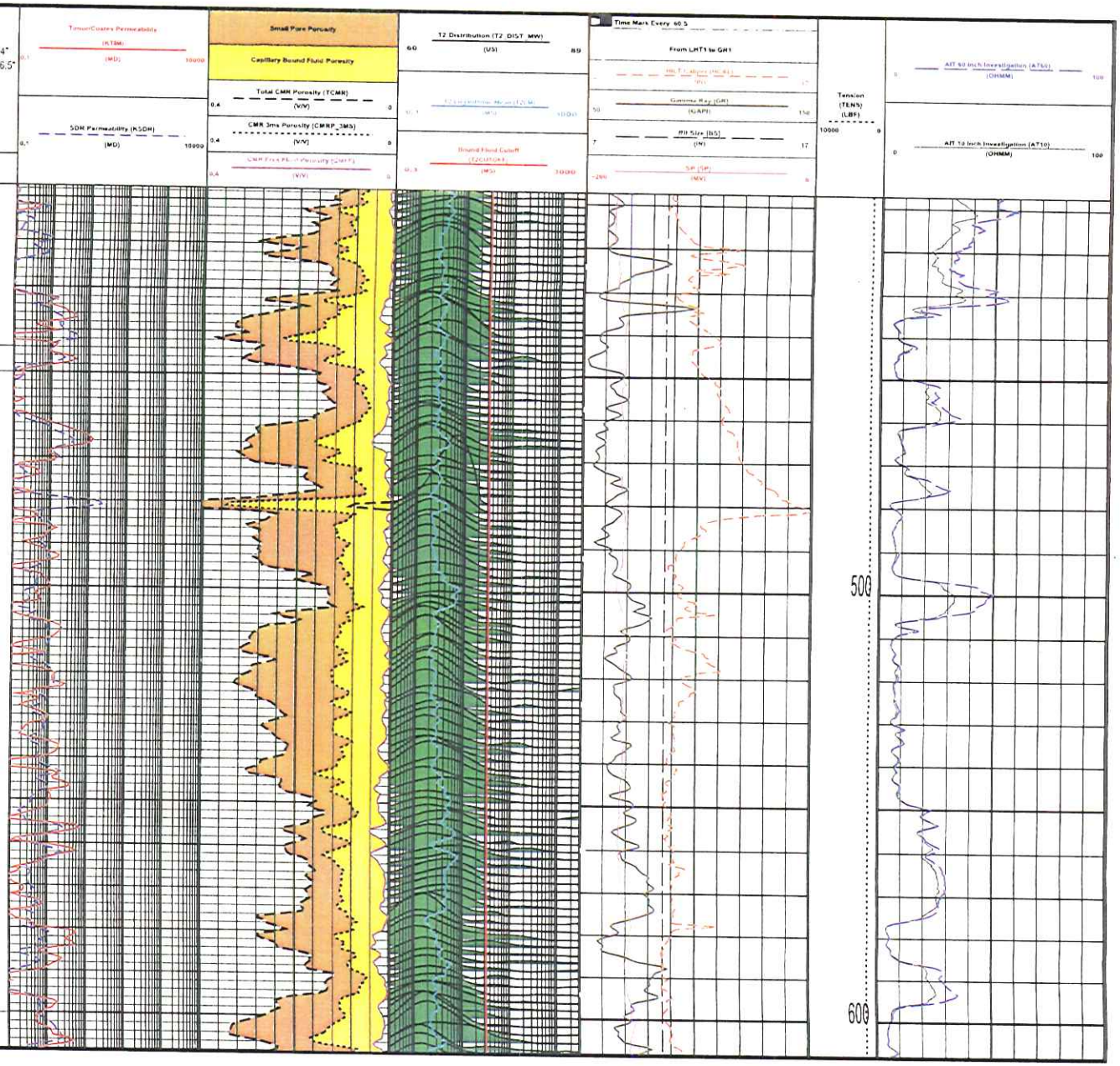
E-PUR, llc

Drilling Company: WDC Exploration and Wells
Driller: Gary Eldred, Greg Gallio, John Chaves
Drilling Equipment: Reverse Circulation
Air (0'-795'), Mud Rotary (795'-867')

Start Date: 2/24/2010
End Date: 3/3/2010
Latitude: N 38° 31' 35.4"
Longitude: W 122° 46' 46.5"

Project: Well Installation
Location: Windsor, CA
E-PUR PN: E102-001-01, Task 200
Logged by: B. Gulbranson, J. Buchowski, G. Moore
Surface Conditions: Grass Covered
Sampler Type: Grab

Depth (feet)	Graphic	USCS	Description
410			
420			
430			
440			
450		SW	SAND (SW) - well graded sand, with little ash; stringer of clay at 450 feet
460		GW/SW	Sandy GRAVEL (GW) to Gravelly SAND (SW) - varicolored, fine to coarse grained sand and gravel
			Stringer of clay at 465 feet
470			
480			Trace of clay at 480 feet
490			
500			
510			Interbedded clay unit with sand and gravel at 510 to 513 feet
520			Trace obsidian at 520 feet
530			
540			
550			Lost circulation at 545 feet
560			
570			
580			Trace of clay at 580 feet;
590			
600		ML	Sandy SILT (ML) - gray, friable, silt (ash); light gray, angular to subrounded, medium sand



BORING LOG: Esposti Park

Esposti Park Well Test Hole

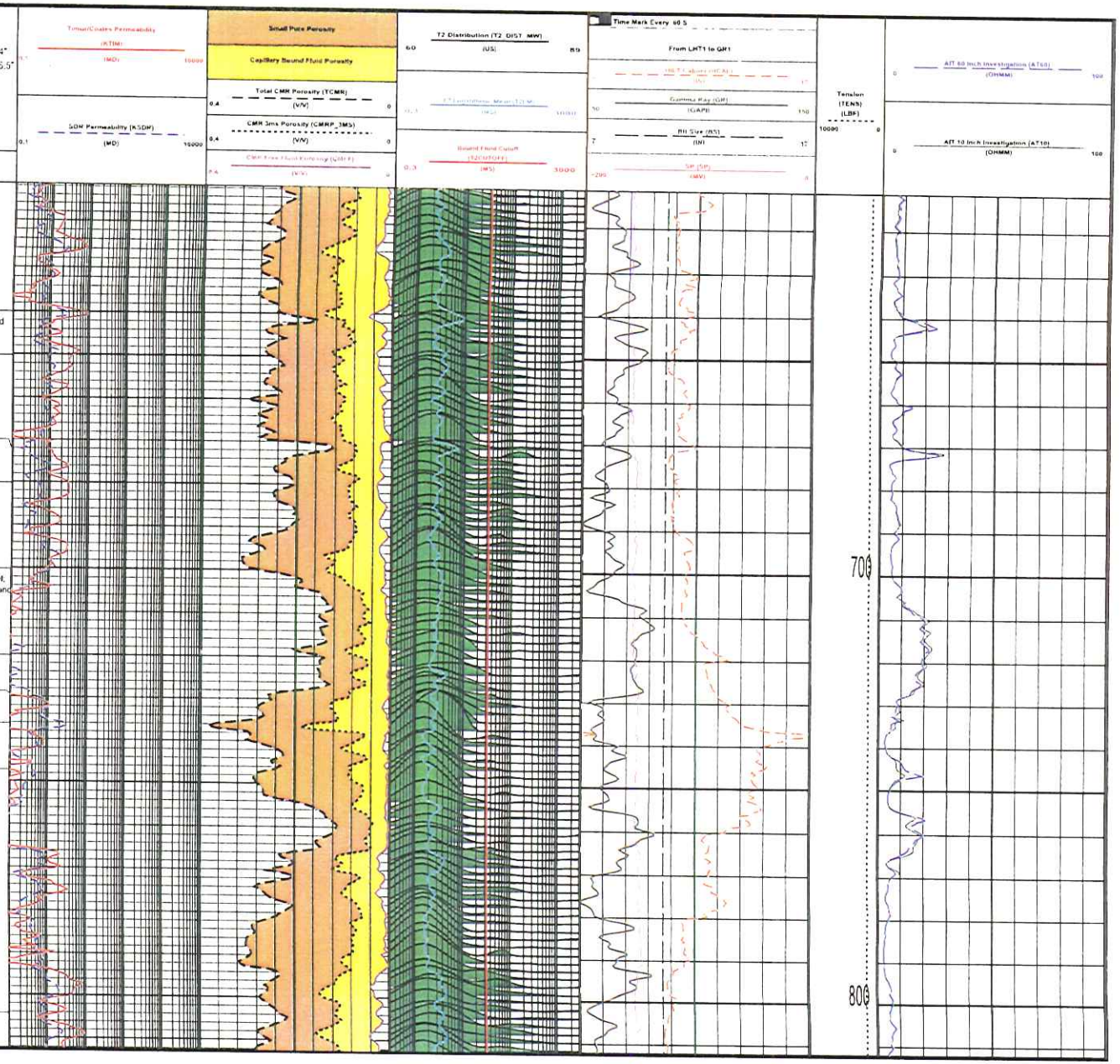
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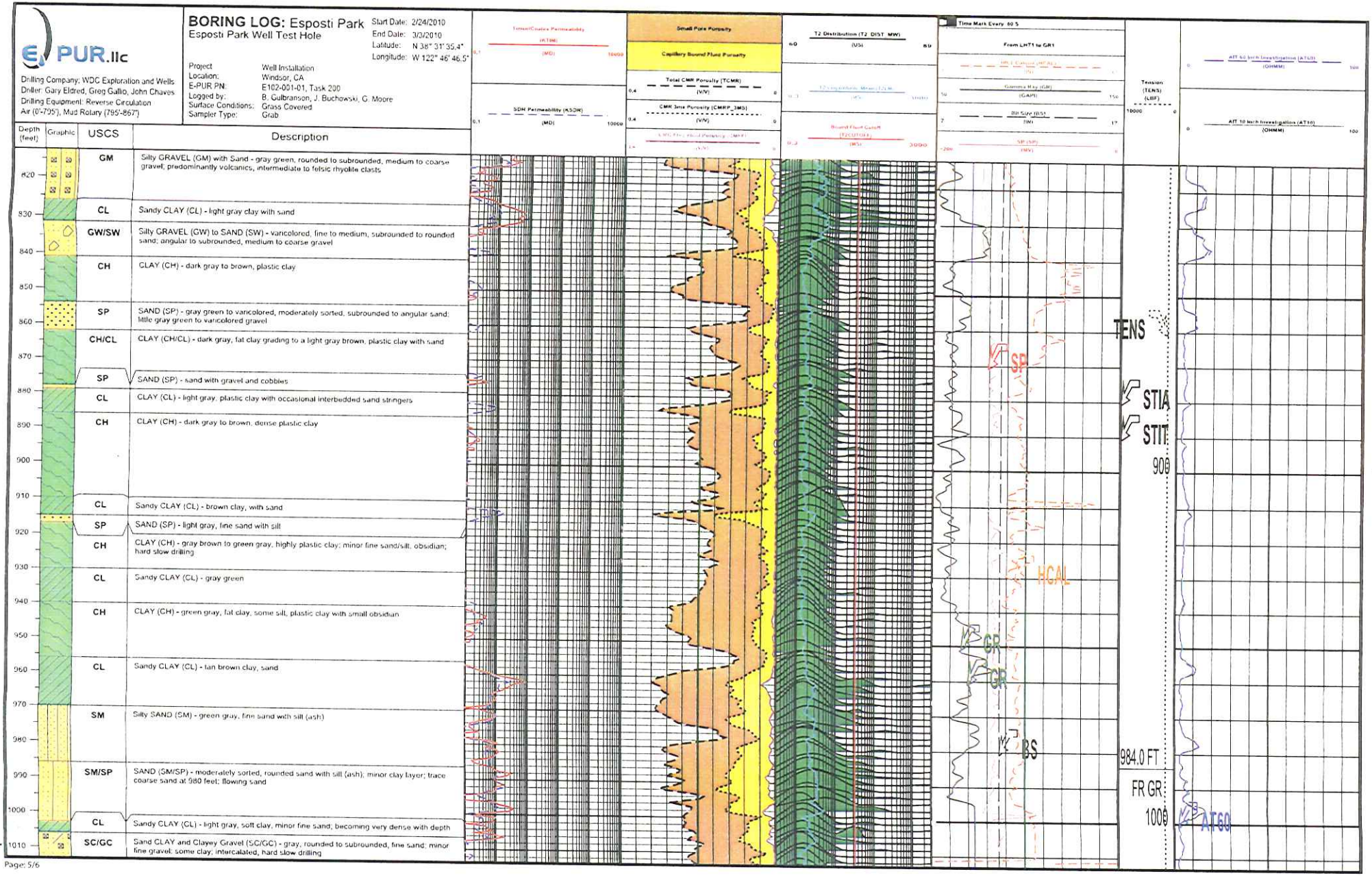
Drilling Company: WDC Exploration and Wells
Driller: Gary Eldred, Greg Gallio, John Chaves
Drilling Equipment: Reverse Circulation
Air (0'-795'), Mud Rotary (795'-867')

Start Date: 2/24/2010
End Date: 3/3/2010
Latitude: N 38° 31' 35.4"
Longitude: W 122° 46' 46.5"

Project: Well Installation
Location: Windsor, CA
E-PUR PN: E102-001-01, Task 200
Logged by: B. Gulbranson, J. Buchowski, C. Moore
Surface Conditions: Grass Covered
Sampler Type: Grab

Depth (feet)	Graphic	USCS	Description
620			
630			
640		SP/GP	SAND and GRAVEL (SP/GP) - varicolored, moderately sorted, fine to medium, subrounded to subangular sand; some varicolored, subrounded, fine to medium gravel; interbedded gray, soft clay
650		CL	Silty CLAY (CL) - light gray clay and silt (ash) with interbedded gray, soft clay; some fine sand
660			
670		SM/ML	Silty SAND/Sandy SILT (SM/ML) - gray to varicolored, fine to coarse, subrounded to subangular sand; abundant gray to varicolored silt (ash), red and yellow, fine to medium gravel; no clay
680		CL	CLAY (CL) - light tan, soft, occasionally stiff clay; abundant fine sand
690			
700		GW/SW	GRAVEL to SAND (GW/SW) - dark gray to varicolored, subrounded, medium to large gravel; varicolored, moderately poorly sorted, subrounded to subangular, medium to coarse with some fine sand
710			
720		GM/SM	Silty GRAVEL (GM) to Silty SAND (SM) - color and texture as above
730		SW	SAND (SW) - dark green gray, very fine to medium grained sand, rounded to subrounded, poorly sorted; few gravel
740		CL	Silty CLAY (CL) - dark gray, soft clay; with micaceous silt
750		SC/CL	Clayey SAND (SC/CL) - gray green, poorly sorted, rounded to subangular, fine to medium sand; alternating light gray clay/silt (ash) and sand with gravel beds; yellow to orange staining abundant
760			
770			
780			
790			
800			
810		SP	SAND (SP) - gray green, rounded to subrounded, moderately sorted sand; abundant silt (ash)




E-PUR.llc
Drilling Company: WDC Exploration and Wells
Driller: Gary Eldred, Greg Gallio, John Chaves
Drilling Equipment: Reverse Circulation
Air (0'-795'), Mud Rotary (795'-867')
BORING LOG: Esposti Park
Esposti Park Well Test Hole
Start Date: 2/24/2010
End Date: 3/3/2010
Latitude: N 38° 31' 35.4"
Longitude: W 122° 46' 46.5"
Project: Well Installation
Location: Windsor, CA
E-PUR PN: E102-001-01, Task 200
Logged by: B. Gulbranson, J. Buchowski, G. Moore
Surface Conditions: Grass Covered
Sampler Type: Grab
Depth (feet)
Graphic
USCS
Description
GM
Silty GRAVEL (GM) with Sand - gray green, rounded to subrounded, medium to coarse gravel; predominantly volcanics, intermediate to felsic rhyolite clasts
CL
Sandy CLAY (CL) - light gray clay with sand
GW/SW
Silty GRAVEL (GW) to SAND (SW) - varicolored, fine to medium, subrounded to rounded sand; angular to subrounded, medium to coarse gravel
CH
CLAY (CH) - dark gray to brown, plastic clay
SP
SAND (SP) - gray green to varicolored, moderately sorted, subrounded to angular sand; little gray green to varicolored gravel
CH/CL
CLAY (CH/CL) - dark gray, fat clay grading to a light gray brown, plastic clay with sand
SP
SAND (SP) - sand with gravel and cobbles
CL
CLAY (CL) - light gray, plastic clay with occasional interbedded sand stringers
CH
CLAY (CH) - dark gray to brown, dense plastic clay
CL
Sandy CLAY (CL) - brown clay, with sand
SP
SAND (SP) - light gray, fine sand with silt
CH
CLAY (CH) - gray brown to green gray, highly plastic clay; minor fine sand/silt, obsidian; hard slow drilling
CL
Sandy CLAY (CL) - gray green
CH
CLAY (CH) - green gray, fat clay, some silt, plastic clay with small obsidian
CL
Sandy CLAY (CL) - tan brown clay, sand
SM
Silty SAND (SM) - green gray, fine sand with silt (ash)
SM/SP
SAND (SM/SP) - moderately sorted, rounded sand with silt (ash); minor clay layer; trace coarse sand at 980 feet; flowing sand
CL
Sandy CLAY (CL) - light gray, soft clay, minor fine sand; becoming very dense with depth
SC/GC
Sand CLAY and Clayey Gravel (SC/GC) - gray, rounded to subrounded, fine sand; minor fine gravel; some clay; intercalated, hard slow drilling
820
830
840
850
860
870
880
890
900
910
920
930
940
950
960
970
980
990
1000
1010
Small Pore Porosity
Capillary Bound Fluid Porosity
Total CMR Porosity (TCMR)
CMR 3ms Porosity (CMRP_3MS)
SDH Permeability (KSDH)
T2 Distribution (T2_DIST_MW)
Bound Fluid Cutoff (T2CUTOFF)
Time Mark Every 60 S
From LHT1 to GR1
Gamma Ray (GR)
Bit Size (BS)
SP (SP)
Tension (TENS) (LBF)
AIT 60 Inch Investigation (AT60)
AIT 10 Inch Investigation (AT10)
TENS
SP
STIA
STIT
900
HCAL
GR
GR
BS
984.0 FT
FR GR
1000
AT60

E-PUR.llc

Drilling Company: WDC Exploration and Wells
Driller: Gary Eldred, Greg Gullio, John Chaves
Drilling Equipment: Reverse Circulation
Air (0'-795'), Mud Rotary (795'-867')

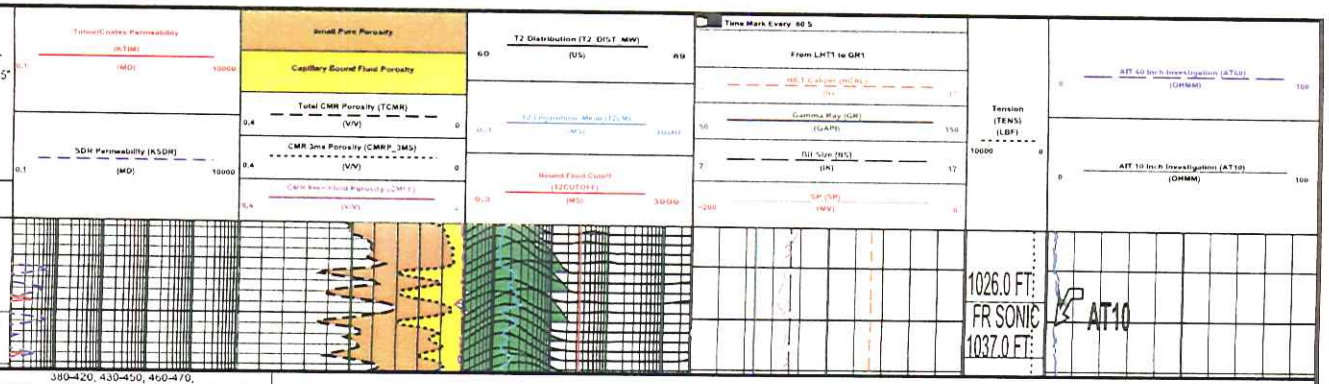
BORING LOG: Esposti Park

Esposti Park Well Test Hole

Start Date: 2/24/2010
End Date: 3/3/2010
Latitude: N 38° 31' 35.4"
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Project: Well Installation
Location: Windsor, CA
E-PUR PN: E102-001-01, Task 200
Logged by: B. Gulbranson, J. Buchowski, G. Moore
Surface Conditions: Grass Covered
Sampler Type: Grab

Depth (feet)	Graphic	USCS	Description
1020			
1030		CL	Sandy CLAY (CL) - soft clay; some sand; intercalated, hard slow drilling; Bottom of Boring
1040			



Page 6/6

Surface Seal:	Sanitary Seal (Grout)	0 to 60	feet bgs	Screened Interval:	380-420, 430-450, 460-470, 480-510, 545-565, 615-655 feet bgs
Annulous Seal:	Grout	0 to 370	feet bgs	Casing Diameter:	10.0 inches
Filter Pack:	SRI 1/4 inch Gravel	375 to 670	feet bgs	Total Boring Depth:	1040.0 feet
Monument Type:	Temporary well cap	to	feet bgs	Total Well Depth:	670.0 feet

Geophysical Log Notes:
Geophysical logging by Schlumberger (Bakersfield, CA)
CMR - Combinable Magnetic Resonance Tool
SP - Spontaneous Potential

Lithologic Log Notes:
UCS Unified Soil Classification System (Visual-Manual Method)



38 31' 35.316839" N 122 46' 45.948870" W

WINZLER & KELLY

Ref: 02520-09001
(RMC# 143.012B)

July 7, 2010

Craig Scott
Town of Windsor
P.O. Box 100
Windsor, CA 95492

Re: Windsor Well Installation –Well Locations-Bluebird Site and Esposti Park Site

Dear Mr. Scott:

As requested, Winzler & Kelly performed a field survey utilizing GPS equipment on June 28, 2010 to establish the locations of two new wells. This field survey established a benchmark at each pump pedestal of the new wells, one located at the Bluebird Site and one located at the Esposti Park Site.

The basis for the survey of the positions is the map titled "CONTROL SURVEY 1996 A.R.M. MONITORING PROGRAM FOR THE RUSSIAN RIVER" filed August 28, 1996 in Book 554 of Maps, at Pages 28-32, Sonoma County Records. Point E coordinate values and elevation were held for the survey. Listed benchmark elevations are NAVD '88. Coordinate values are California State Plane Coordinates Zone 2 (NAD '83).

Bluebird Site Well
Chiseled square at N'ly corner well head slab.
N 1959115.4041 E 6332436.6130 Elev. = 118.34
Lat = 38° 32' 20.306185" N Long = 122° 48' 05.144352" W

Esposti Park Site Well
Chiseled square at N'ly corner well head slab.
N 1954509.6739 E 6338689.6507 Elev. = 140.93
Lat = 38° 31' 35.316839" N Long = 122° 46' 45.948870" W

Winzler & Kelly appreciates the opportunity to provide surveying services for the Town of Windsor for this project and we look forward to serving the Town in the future..

Sincerely,
WINZLER & KELLY

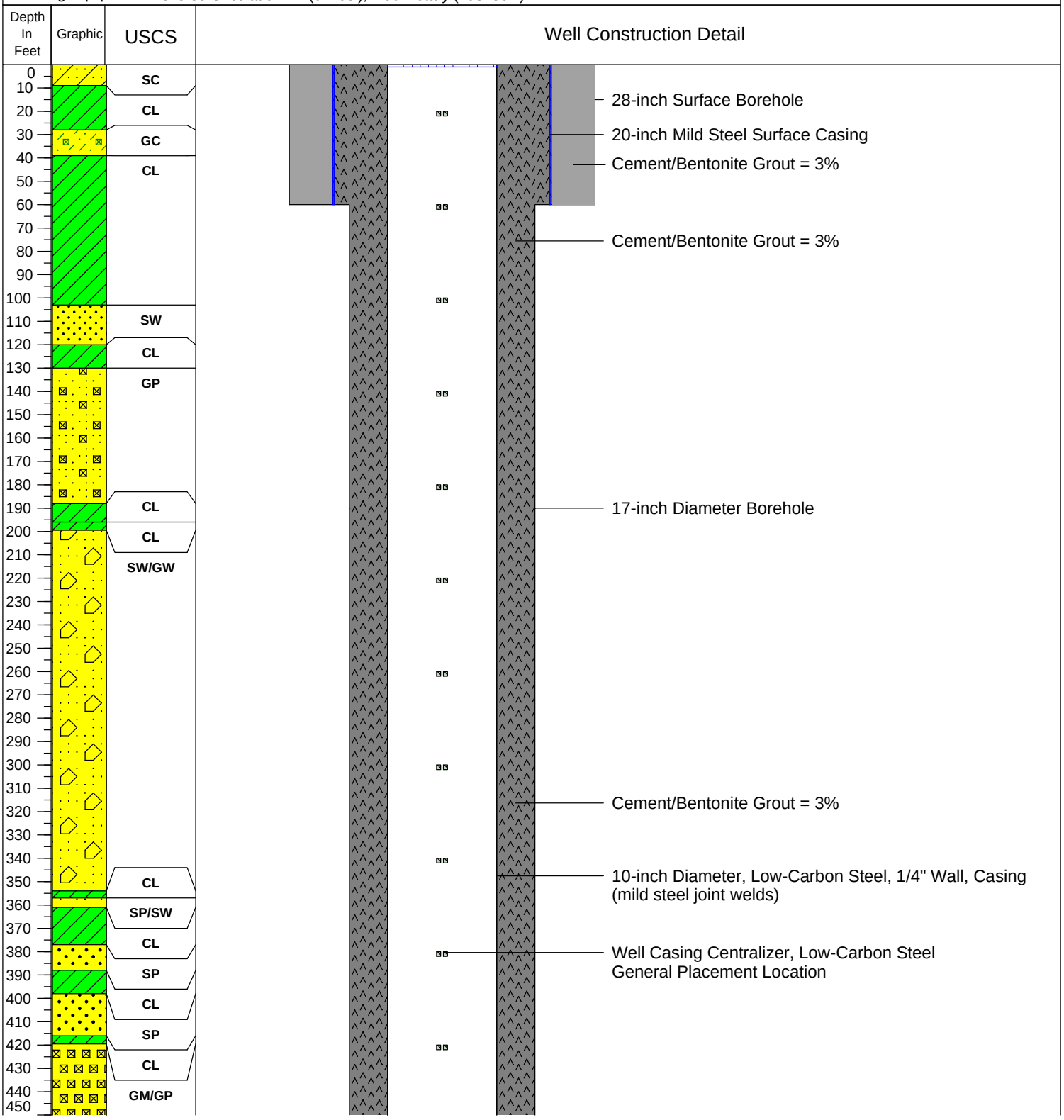
Richard Maddock, PLS 8131

♦ 495 Tesconi Circle, Santa Rosa, CA 95401-4696 ♦
tel 707.523.1010 fax 707.527.8679
www.w-and-k.com
♦

FIGURE 3:WELL CONSTRUCTION DIAGRAM
Bluebird Replacement Well Test Hole

Project	Well Installation
Location:	Windsor, CA
E-PUR PN:	E102-001-01, Task 200
Logged by:	B. Gulbranson, J. Buchowski, G. Moore
Surface Conditions:	Grass Covered
Sampler Type:	Grab from Cyclone
Start Date:	2/6/2010
End Date:	5/5/2010
Latitude:	N 38° 53' 91"
Longitude:	W 122° 80' 13"

Drilling Company: WDC Exploration and Wells
Driller: Gary Eldred, Greg Gallio, John Chaves
Drilling Equipment: Reverse Circulation Air (0'-795'), Mud Rotary (795'-867')

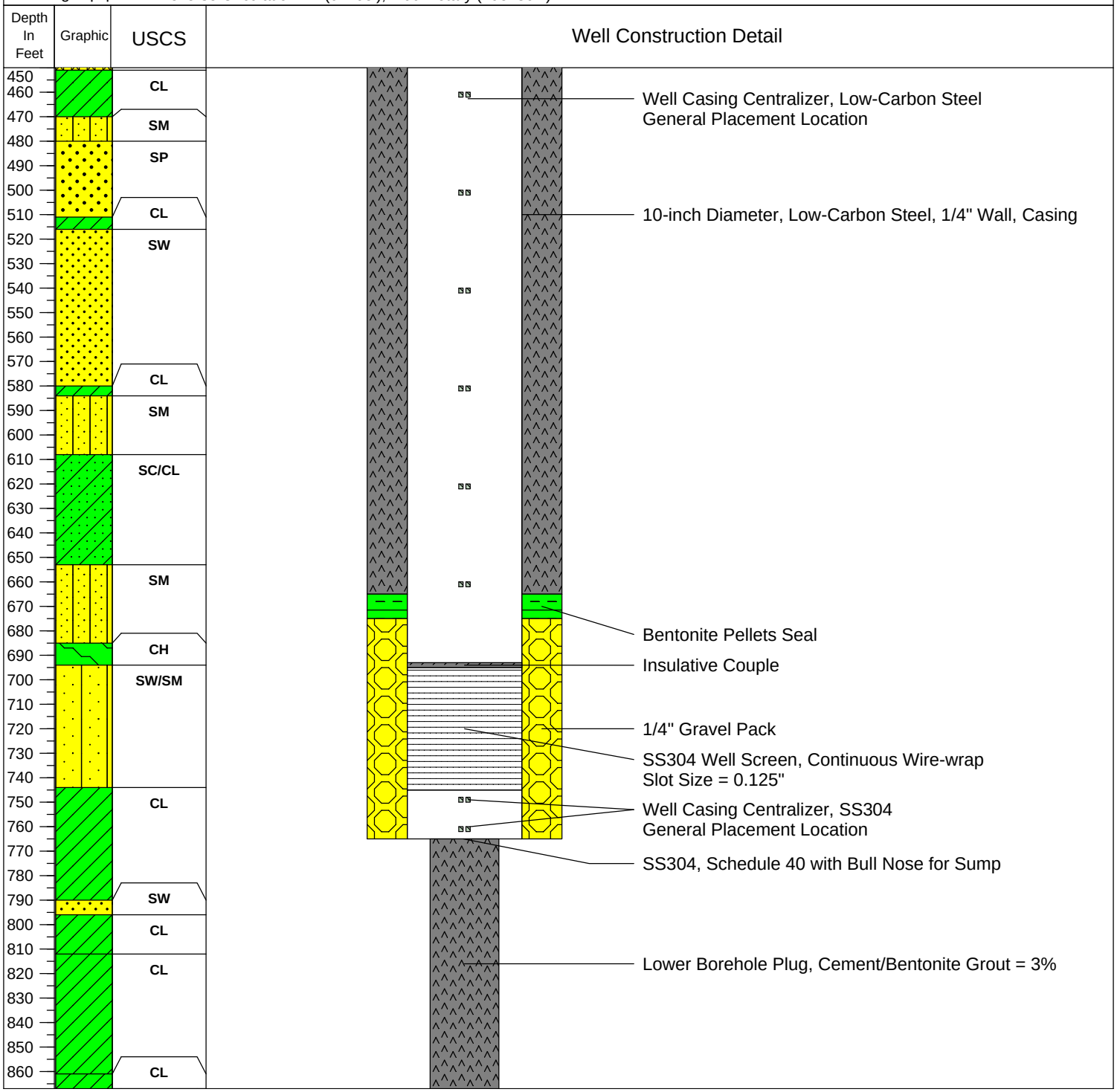


Sanitary Seal:	Cement/Bentonite Grout	0 to 60	feet bgs	Surface Casing:	20-inch Steel	0 to 60	feet bgs
Annular Seal:	Cement/Bentonite Grout	0 to 665	feet bgs	Screened Interval:	695 to 745		feet bgs
Filter Pack:	SRI 1/4" Gravel	675 to 765	feet bgs	Casing Diameter:	10.0 inches		
Monument Type:	Concrete Pedestal with Steel Well Cap			Total Well Depth:	765.0 feet		

Project	Well Installation		
Location:	Windsor, CA		
E-PUR PN:	E102-001-01, Task 200		
Logged by:	B. Gulbranson, J. Buchowski, G. Moore		
Surface Conditions:	Grass Covered	Start Date:	2/6/2010
Sampler Type:	Grab from Cyclone	End Date:	5/5/2010
		Latitude:	N 38° 53' 91"
		Longitude:	W 122° 80' 13"

FIGURE 3: WELL CONSTRUCTION DIAGRAM
Bluebird Replacement Well Test Hole

Drilling Company: WDC Exploration and Wells
Driller: Gary Eldred, Greg Gallio, John Chaves
Drilling Equipment: Reverse Circulation Air (0'-795'), Mud Rotary (795'-867')



STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in
No. 291794

ORIGINAL
File with DWR

Notice of Intent No. _____ State Well No. _____
Local Permit No. or Date A.P.#65-222-20 Other Well No. _____

(1) OWNER: Name County of Sonoma (Parks)
Address 2403 Professional Dr.
City Santa Rosa, Ca. ZIP

(2) LOCATION OF WELL (See instructions):
County Sonoma Owner's Well Number
Well address if different from above ~~6000 Shiloh Rd.~~
Township ~~Santa Rosa~~, Range Section
Distance from cities, roads, railroads, fences, etc.

(3) TYPE OF WORK:
New Well XX ☐ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation XX ☐
Industrial ☐
Test Well ☐
Municipal ☐
Other ☐ (Describe)

WELL LOCATION SKETCH

(5) EQUIPMENT:
Rotary XX ☐ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes XX No ☐ Size 8 x 16
Diameter of bore
Packed from 55 ft. to 300 ft.

(7) CASING INSTALLED:
Steel ☐ Plastic XX Concrete ☐

From ft.	To ft.	Dia in.	Gage or Wall
0	300	8	#200

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Slot Size
100	220	.032 Screen
240	300	.032 Screen

(9) WELL SEAL:
Was surface sanitary seal provided? Yes XX No ☐ If yes, to depth 55 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing ready mix

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion 5-5-1 ft.

(11) WELL TESTS:
Was well test made? Yes XX No ☐ If yes, by whom?
Type of test: Pump XX Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test 135 ft.
Discharge 230 gal./min. after hours Water temperature
Chemical analysis made? Yes ☐ No ☐ If yes, by whom?
Was electric log made Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 300 ft. Completed depth ft.

From ft.	To ft.	Formation (Describe by color, character, size or material)
0	-5	top soil
5	-17	brown clay
17	-20	brown clay and gravel
20	-34	brown cemented gravel
34	-50	sandy brown clay
50	-54	fine gravel
54	-70	brown clay/gravel streaks
70	-79	brown clay
79	-93	blue clay
93	-100	brown clay
100	-111	blue gravel
111	-135	blue clay and gravel
135	-147	fine blue gravel
147	-163	brown clay and gravel
163	-195	gravel
195	-215	brown clay and gravl strk
215	-243	" " "
243	-280	gravel
283	-300	Sandy brown clay/grvl str

Work started 8/17/89 19 Completed 8/23/89 19

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed John Jepsen (Well Driller)
NAME LES PETERSEN DRILLING & PUMP, INC. (Person, firm, or corporation) (Typed or printed)
Address 5434 Old Redwood Highway
City Santa Rosa, Ca. 95403 ZIP
License No 261084 Date of this report 9/12/89

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

DWR 188 (REV. 12-06) 86 94155

STATE OF CALIFORNIA
DEPARTMENT OF HEALTH SERVICES

WELL DATA

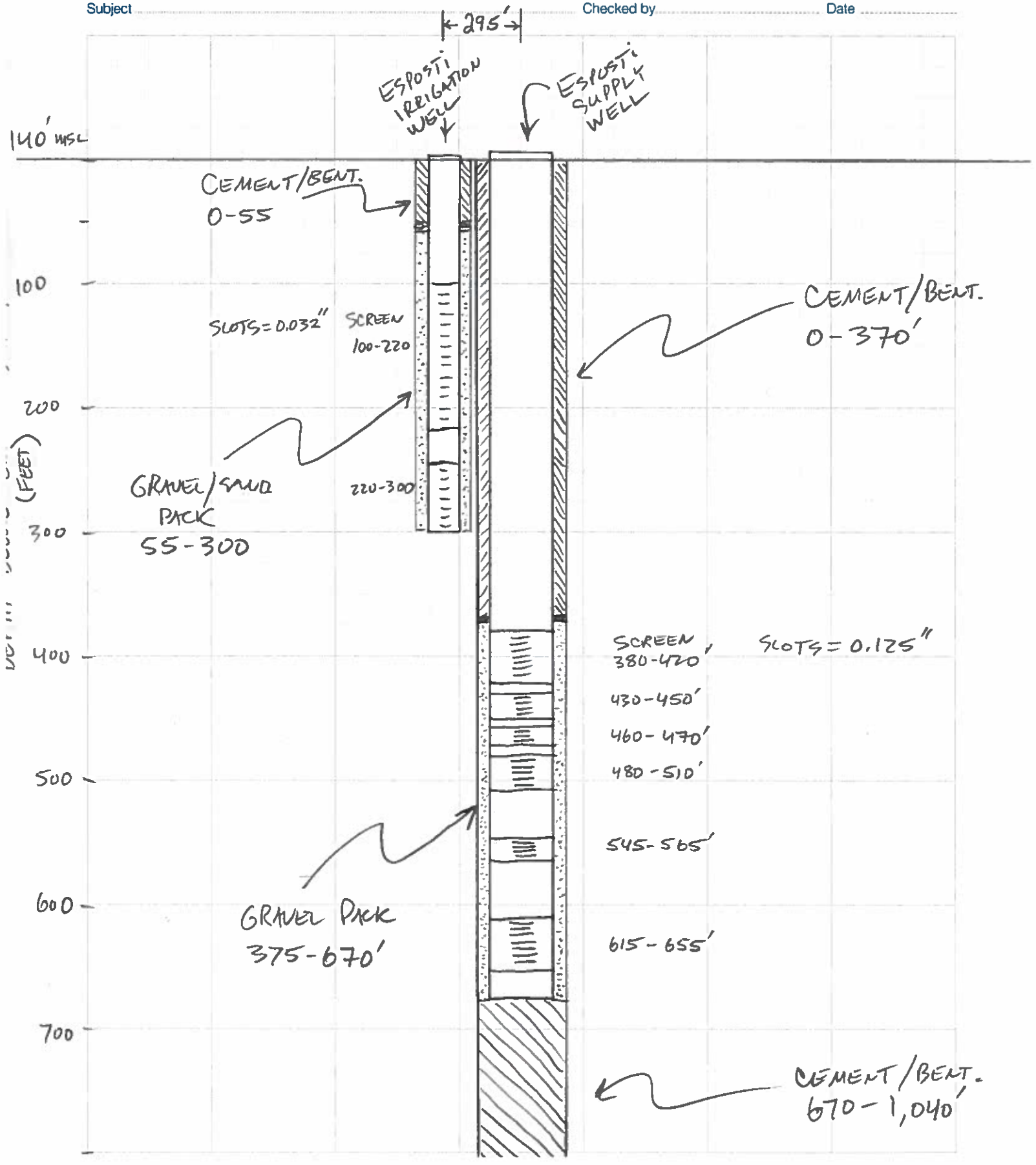
(1) System Name: Town of Windsor System Number: 49-017

(2) Source of Information: Town of Windsor

Collected by: Michael L. Cave Jr. Date:

(3) Number or Name	Esposti Well
Date drilled	8-17-89 to 8-23-89
(4) Location: Neighborhood	6000 Old Redwood Hwy, Windsor, CA 95492
Distance to: Sewer	
Sewage disposal	
Abandoned well	NA
Nearest property line	
Plot plan on file?	Yes
(5) Housing: Type	NA
Condition	
Pit depth (if any)	
Floor (material)	
Drainage	
(6) Well Depth	300 FT
(7) Casing: Depth	300 FT
Diameter	8 inch
Type	PVC 200
Height above floor	0
Distance to highest perforations	100 FT
Sanitary sealed (yes or no)	Yes
Sanitary surface seal(yes or no)	Yes
Gravel pack (yes or no)	Yes 8 x 16
Second casing depth	NA
Second casing diameter	NA
Annular seal (depth)	
(8) Impervious Strata: Thickness	NA
Depth to	NA
(9) Water Levels: Static	55 FT
When pumping	135 FT
(10) Pump: Make	Goulds
Type	Submersible
Capacity, g.p.m.	260 GPM at 60 PSIG
Lubrication	Product
Power	230 VAC, 3 Phase
Auxiliary power	
Controlled by	Manual HOA Switchs & Irrigation Timer System
Discharge to	Distribution System Irrigation Park
(11) Frequency of Use	Irrigation & Emergency stand-by
(12) Flood Hazard	No
(13) Well log on file?	Attached
(14) Remarks and Defects (Use other side if necessary)	

Client | Job Number | Sheet of
Project | Sheets by | Date
Subject | Checked by | Date



E/PUR, llc

Drilling Company: WDC Exploration and Wells
Driller: Gary Eldred, Greg Gallio, John Chaves
Drilling Equipment: Reverse Circulation
Air (0'-795'), Mud Rotary (795'-867')

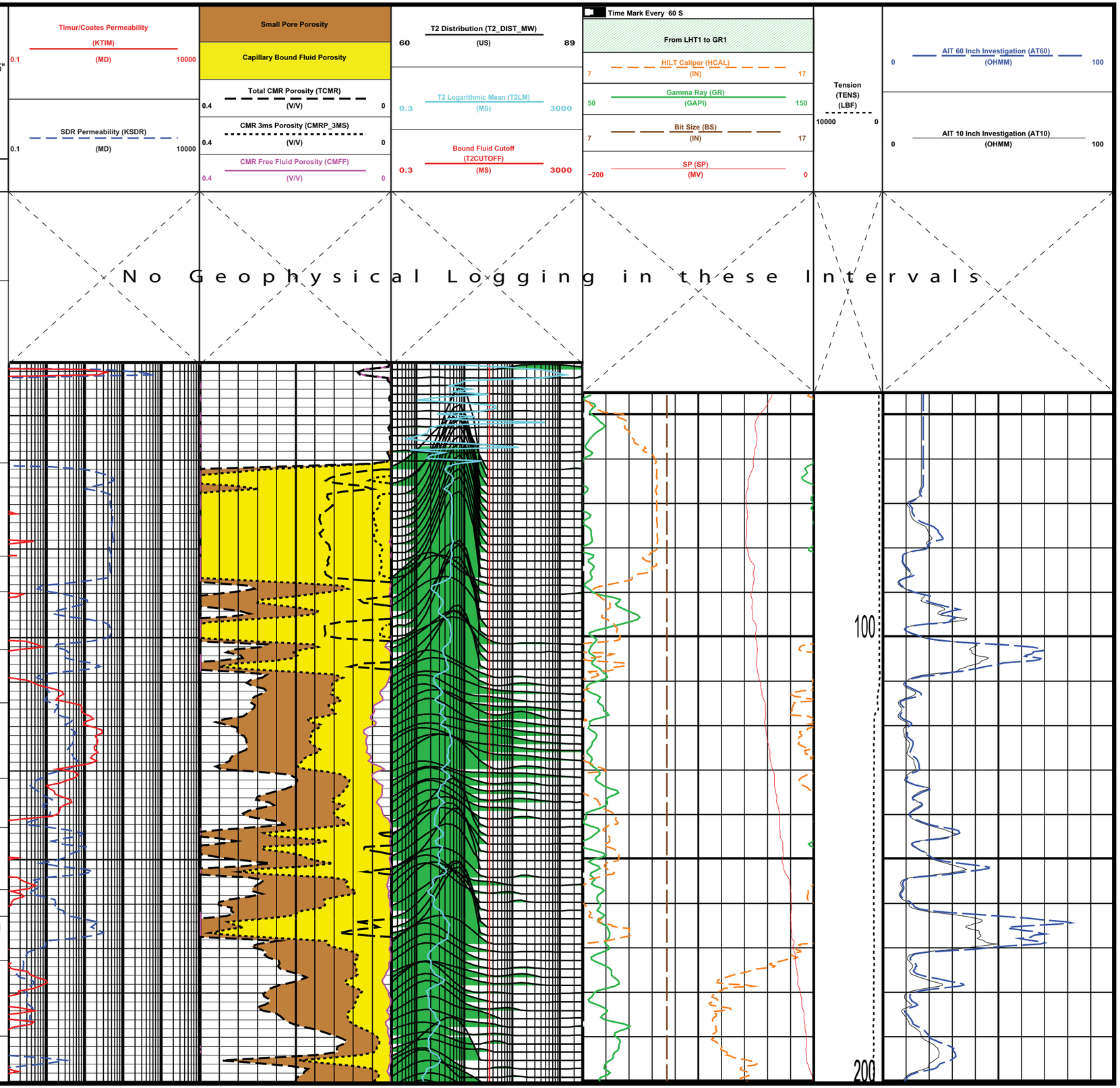
BORING LOG: Esposti Park

Esposti Park Well Test Hole

Start Date: 2/24/2010
End Date: 3/3/2010
Latitude: N 38° 31' 35.4"
Longitude: W 122° 46' 46.5"

Project	Well Installation
Location:	Windsor, CA
E-PUR PN:	E102-001-01, Task 200
Logged by:	B. Gulbranson, J. Buchowski, G. Moore
Surface Conditions:	Grass Covered
Sampler Type:	Grab

Depth (feet)	Graphic	USCS	Description
0		CL	Sandy CLAY (CL) - medium to light brown, soft, plastic clay; varicolored, poorly sorted, fine to coarse, subangular to angular sand; poorly sorted, rounded fine to coarse gravel
20		CL	Gravelly CLAY (CL) and Sandy CLAY (CL) - light brown, very fine to coarse grained sand, subangular to angular; gravel units, fine to coarse, subangular to subrounded.
60		SW	SAND (SW) - varicolored, poorly sorted, fine to coarse, subrounded to subangular sand with silty sand and silty gravel 70-71 feet; some metamorphosed quartz and feldspars.
80		CL	Sandy CLAY (CL) - light gray clay with sand
90		GM	Gravelly SAND (GM) - varicolored, poorly sorted, fine to medium, angular to subrounded sand; some, varicolored, poorly sorted, fine to coarse, angular to subrounded gravel; little silt. Gravel clasts metasedimentary sandstone to quartzite
100		GM	Sandy GRAVEL (GM) - varicolored changing to green/gray, poorly sorted, fine to medium, rounded to subangular gravel; some sand; little silt. Green fine grained basalt clasts
110		CL	Silty CLAY (CL) - dark gray/green, plastic clay; with silt and fine sand
120		SM	Silty SAND (SM) - gray/green, poorly sorted, rounded to subrounded, fine sand; fine, subangular to subrounded gravel; with rare cobble
130		GM	Silty GRAVEL (GM) - as above with fine gravel to coarse sand, varicolored
140		CL	Sandy CLAY (CL) - light brown, clay; sand
150		GM	Silty GRAVEL (GM) - varicolored, unsorted to poorly sorted, fine, subangular to subrounded gravel; with rare cobble; units of silty sand, fine to medium grained, angular to subrounded.
160		SP	SAND (SP) - varicolored, subrounded to rounded, fine to medium sand; abundant well rounded and frosted quartz
170		SW	Sand (SW) - fine to coarse sand, well graded, similar in angularity and color to above.
180			
190			
200			



E-PUR, llc

Drilling Company: WDC Exploration and Wells
Driller: Gary Eldred, Greg Gallio, John Chaves
Drilling Equipment: Reverse Circulation
Air (0'-795'), Mud Rotary (795'-867')

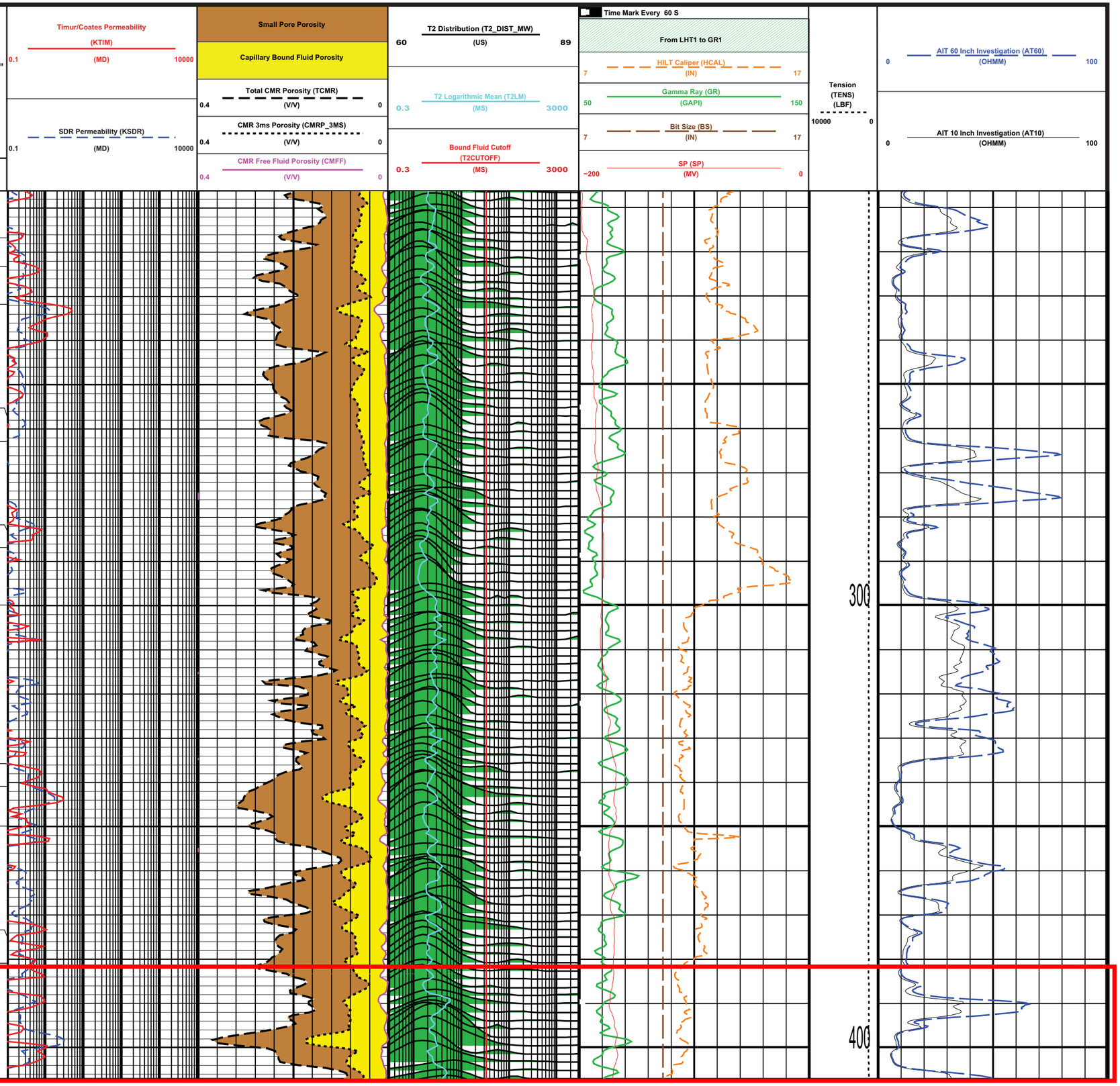
BORING LOG: Esposti Park

Esposti Park Well Test Hole

Start Date: 2/24/2010
End Date: 3/3/2010
Latitude: N 38° 31' 35.4"
Longitude: W 122° 46' 46.5"

Project	Well Installation
Location:	Windsor, CA
E-PUR PN:	E102-001-01, Task 200
Logged by:	B. Gulbranson, J. Buchowski, G. Moore
Surface Conditions:	Grass Covered
Sampler Type:	Grab

Depth (feet)	Graphic	USCS	Description
210			
220		SP	Sand (SP) - varicolored, fine to medium, poorly graded sand
230		CL	Silty CLAY (CL) - light gray clay; with silt
240		SM	Silty SAND (SM) - varicolored, poorly sorted, rounded to subrounded to subangular sand; few to little silt (ash); some gravel units
250			
260		SW	Sand (SW) - varicolored, poorly sorted, fine to coarse grained, subrounded to subangular sand
270		GW	GRAVEL (GW) - red stained gravel with sand, poorly sorted, subrounded to subangular, few obsidian clasts
280		CL	Sandy CLAY (CL) - light gray clay; fine sand
290		SM	Silty SAND (SM) - gray, rounded to subrounded, fine sand, abundant milky frosted quartz; abundant rhyolite with red staining on some grains; increasing coarseness to gravel with depth
300		GM	Silty GRAVEL (GM) - as above with fine gravel and some sand
310			
320			
330			
340		CL	Sandy CLAY (CL) - light gray clay; sand
350		ML/CL	SILT and CLAY (ML/CL) - light brown, tan/buff, friable, fine ash; trace fine gravel
360		GP	GRAVEL with SAND (GP) - varicolored, subrounded to rounded to subangular, fine to medium gravel; moderately well sorted, fine to coarse, subangular to subrounded sand
370			
380		ML/CL	SILT and CLAY (ML/CL) - light green gray, ash, some clear to frosted sand, pale green fine sand
390		GW/GM	GRAVEL with SAND (GW/GM) - varicolored, moderately well sorted, fine to coarse, subrounded gravel; some angular to subangular sand
400			Abundant volcanics at 400 feet



E-PUR, llc

Drilling Company: WDC Exploration and Wells
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Drilling Equipment: Reverse Circulation
Air (0'-795'), Mud Rotary (795'-867')

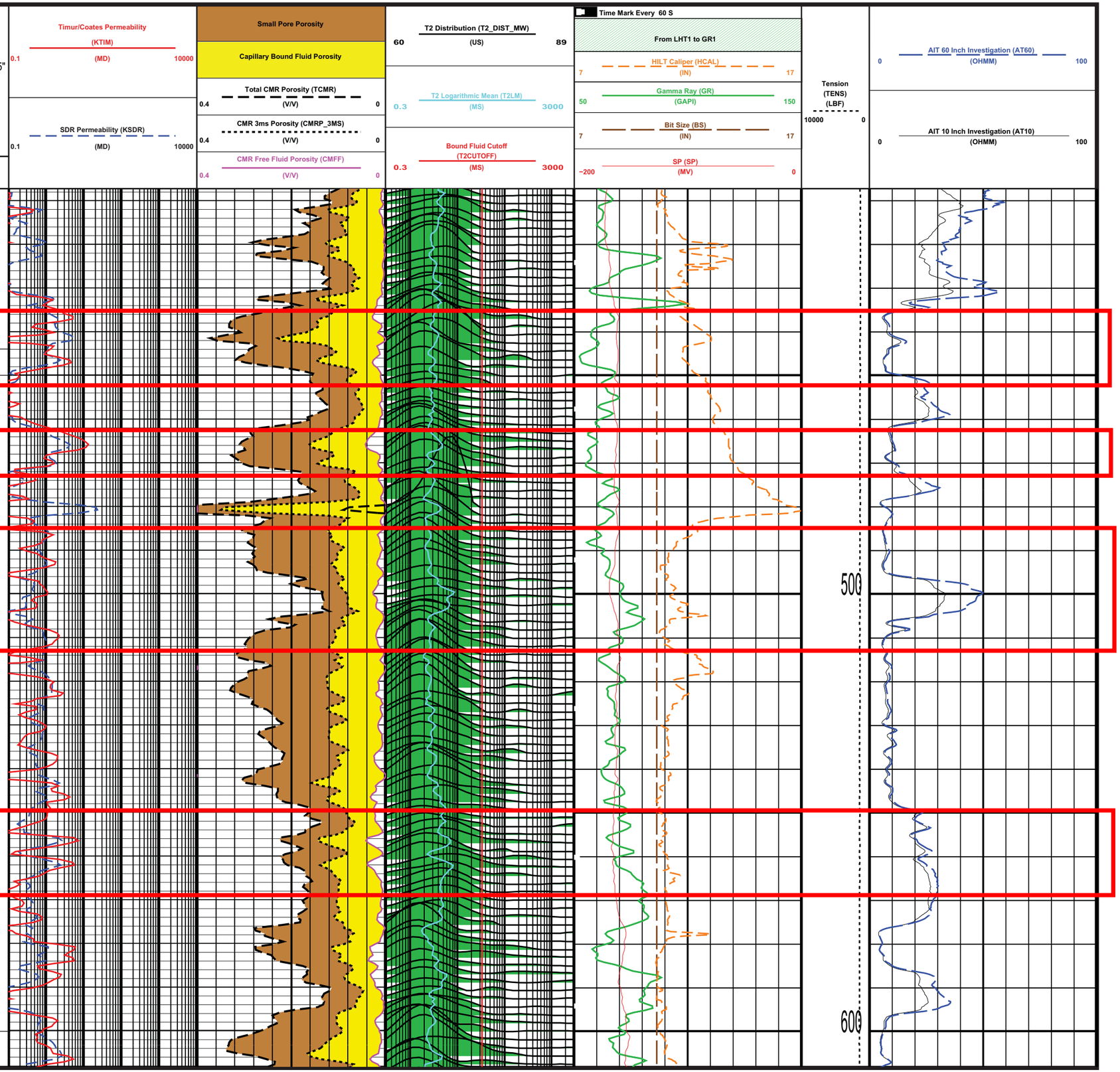
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Location:	Windsor, CA
E-PUR PN:	E102-001-01, Task 200
Logged by:	B. Gulbranson, J. Buchowski, G. Moore
Surface Conditions:	Grass Covered
Sampler Type:	Grab

Depth (feet)	Graphic	USCS	Description
410			
420			
430			
440			
450		SW	SAND (SW) - well graded sand, with little ash; stringer of clay at 450 feet
460		GW/SW	Sandy GRAVEL (GW) to Gravelly SAND (SW) - varicolored, fine to coarse grained sand and gravel
470			Stringer of clay at 465 feet
480			Trace of clay at 480 feet
490			
500			
510			Interbedded clay unit with sand and gravel at 510 to 513 feet
520			Trace obsidian at 520 feet
530			
540			Lost circulation at 545 feet
560			
570			
580			Trace of clay at 580 feet;
590			
600		ML	Sandy SILT (ML) - gray, friable, silt (ash); light gray, angular to subrounded, medium sand



E-PUR, llc

Drilling Company: WDC Exploration and Wells
Driller: Gary Eldred, Greg Gallio, John Chaves
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Air (0'-795'), Mud Rotary (795'-867')

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Logged by:	B. Gulbranson, J. Buchowski, G. Moore
Surface Conditions:	Grass Covered
Sampler Type:	Grab

Depth (feet)	Graphic	USCS	Description
620			
630			
640		SP/GP	SAND and GRAVEL (SP/GP) - varicolored, moderately sorted, fine to medium, subrounded to subangular sand; some varicolored, subrounded, fine to medium gravel; interbedded gray, soft clay
650		CL	Silty CLAY (CL) - light gray clay and silt (ash) with interbedded gray, soft clay; some fine sand
660			
670		SM/ML	Silty SAND/Sandy SILT (SM/ML) - gray to varicolored, fine to coarse, subrounded to subangular sand; abundant gray to varicolored silt (ash); red and yellow, fine to medium gravel; no clay
680		CL	CLAY (CL) - light tan, soft, occasionally stiff clay; abundant fine sand
690			
700		GW/SW	GRAVEL to SAND (GW/SW) - dark gray to varicolored, subrounded, medium to large gravel; varicolored, moderately poorly sorted, subrounded to subangular, medium to coarse with some fine sand
710			
720		GM/SM	Silty GRAVEL (GM) to Silty SAND (SM) - color and texture as above
730		SW	SAND (SW) - dark green gray, very fine to medium grained sand, rounded to subrounded, poorly sorted; few gravel
740		CL	Silty CLAY (CL) - dark gray, soft clay; with micaceous silt
750		SC/CL	Clayey SAND (SC/CL) - gray green, poorly sorted, rounded to subangular, fine to medium sand; alternating light gray clay/silt (ash) and sand with gravel beds; yellow to orange staining abundant
760			
770			
780			
790			
800			
810		SP	SAND (SP) - gray green, rounded to subrounded, moderately sorted sand; abundant silt (ash)

Timur/Coates Permeability (KTIM) 0.1 (MD) 10000
SDR Permeability (KSDR) 0.1 (MD) 10000

Small Pore Porosity
Capillary Bound Fluid Porosity
Total CMR Porosity (TCMR) 0.4 (V/V) 0
CMR 3ms Porosity (CMRP_3MS) 0.4 (V/V) 0
CMR Free Fluid Porosity (CMFF) 0.4 (V/V) 0

T2 Distribution (T2_DIST_MW) 60 (US) 89
T2 Logarithmic Mean (T2LM) 0.3 (MS) 3000
Bound Fluid Cutoff (T2CUTOFF) 0.3 (MS) 3000

Time Mark Every 60 S
From LHT1 to GR1
HILT Caliper (HCAL) 7 (IN) 17
Gamma Ray (GR) 50 (GAPI) 150
Bit Size (BS) 7 (IN) 17
SP (SP) −200 (MV) 0

Tension (TENS) (LBF) 10000 0

AIT 60 Inch Investigation (AT60) 0 (OHMM) 100
AIT 10 Inch Investigation (AT10) 0 (OHMM) 100

E-PUR, llc

Drilling Company: WDC Exploration and Wells
Driller: Gary Eldred, Greg Gallio, John Chaves
Drilling Equipment: Reverse Circulation
Air (0'-795'), Mud Rotary (795'-867')

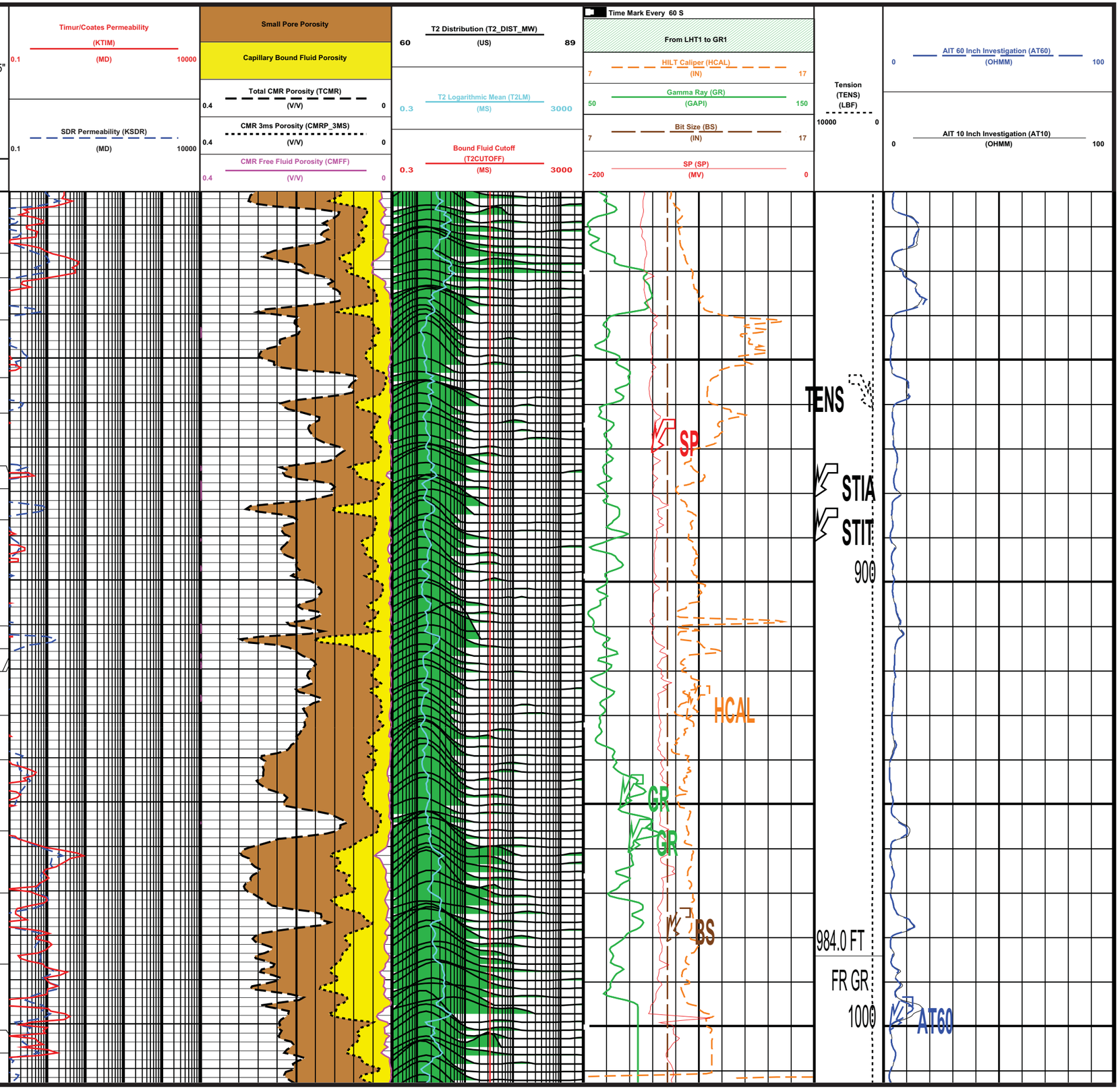
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Project	Well Installation
Location:	Windsor, CA
E-PUR PN:	E102-001-01, Task 200
Logged by:	B. Gulbranson, J. Buchowski, G. Moore
Surface Conditions:	Grass Covered
Sampler Type:	Grab

Depth (feet)	Graphic	USCS	Description
820		GM	Silty GRAVEL (GM) with Sand - gray green, rounded to subrounded, medium to coarse gravel; predominantly volcanics, intermediate to felsic rhyolite clasts
830		CL	Sandy CLAY (CL) - light gray clay with sand
840		GW/SW	Silty GRAVEL (GW) to SAND (SW) - varicolored, fine to medium, subrounded to rounded sand; angular to subrounded, medium to coarse gravel
850		CH	CLAY (CH) - dark gray to brown, plastic clay
860		SP	SAND (SP) - gray green to varicolored, moderately sorted, subrounded to angular sand; little gray green to varicolored gravel
870		CH/CL	CLAY (CH/CL) - dark gray, fat clay grading to a light gray brown, plastic clay with sand
880		SP	SAND (SP) - sand with gravel and cobbles
890		CL	CLAY (CL) - light gray, plastic clay with occasional interbedded sand stringers
900		CH	CLAY (CH) - dark gray to brown, dense plastic clay
910		CL	Sandy CLAY (CL) - brown clay, with sand
920		SP	SAND (SP) - light gray, fine sand with silt
930		CH	CLAY (CH) - gray brown to green gray, highly plastic clay; minor fine sand/silt, obsidian; hard slow drilling
940		CL	Sandy CLAY (CL) - gray green
950		CH	CLAY (CH) - green gray, fat clay, some silt, plastic clay with small obsidian
960		CL	Sandy CLAY (CL) - tan brown clay, sand
970		SM	Silty SAND (SM) - green gray, fine sand with silt (ash)
980		SM/SP	SAND (SM/SP) - moderately sorted, rounded sand with silt (ash); minor clay layer; trace coarse sand at 980 feet; flowing sand
990		CL	Sandy CLAY (CL) - light gray, soft clay, minor fine sand; becoming very dense with depth
1000		SC/GC	Sand CLAY and Clayey Gravel (SC/GC) - gray, rounded to subrounded, fine sand; minor fine gravel; some clay; intercalated, hard slow drilling
1010			



E-PUR, llc

Drilling Company: WDC Exploration and Wells
Driller: Gary Eldred, Greg Gallio, John Chaves
Drilling Equipment: Reverse Circulation
Air (0'-795'), Mud Rotary (795'-867')

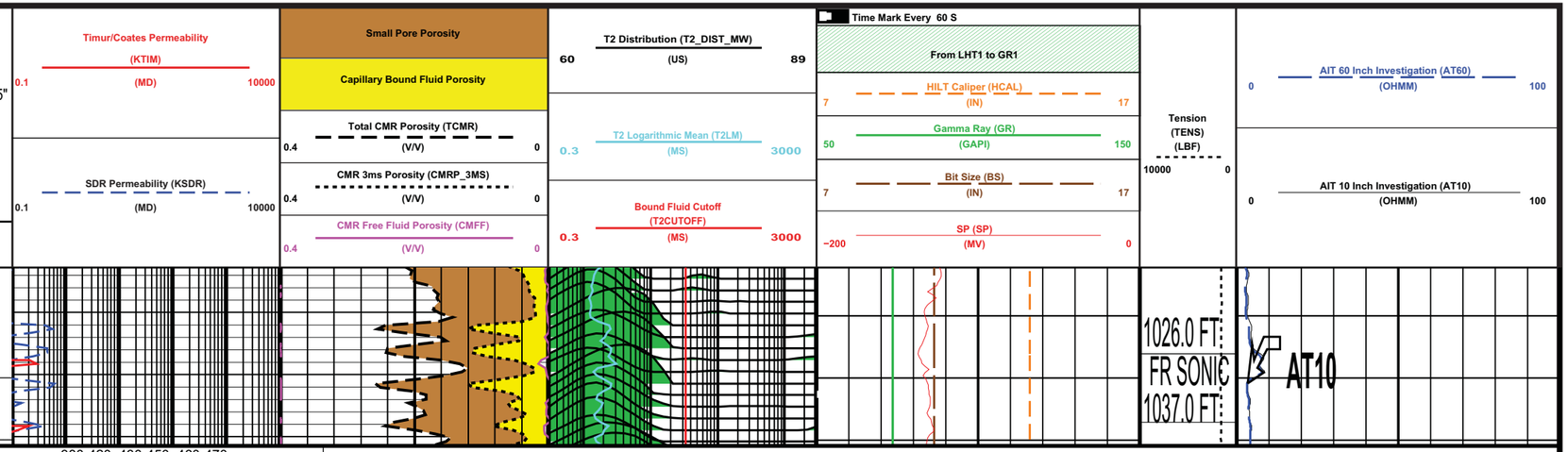
BORING LOG: Esposti Park

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Start Date: 2/24/2010
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Latitude: N 38° 31' 35.4"
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Project	Well Installation
Location:	Windsor, CA
E-PUR PN:	E102-001-01, Task 200
Logged by:	B. Gulbranson, J. Buchowski, G. Moore
Surface Conditions:	Grass Covered
Sampler Type:	Grab

Depth (feet)	Graphic	USCS	Description
1020			
1030		CL	Sandy CLAY (CL) - soft clay; some sand; intercalated, hard slow drilling; Bottom of Boring
1040			



Page 6/6

Surface Seal:	Sanitary Seal (Grout)	0 to 60	feet bgs
Annulous Seal:	Grout	0 to 370	feet bgs
Filter Pack:	SRI 1/4 inch Gravel	375 to 670	feet bgs
Monument Type:	Temporary well cap	to	feet bgs

Screened Interval:	380-420, 430-450, 460-470, 480-510, 545-565, 615-655 feet bgs
Casing Diameter:	10.0 inches
Total Boring Depth:	1040.0 feet
Total Well Depth:	670.0 feet

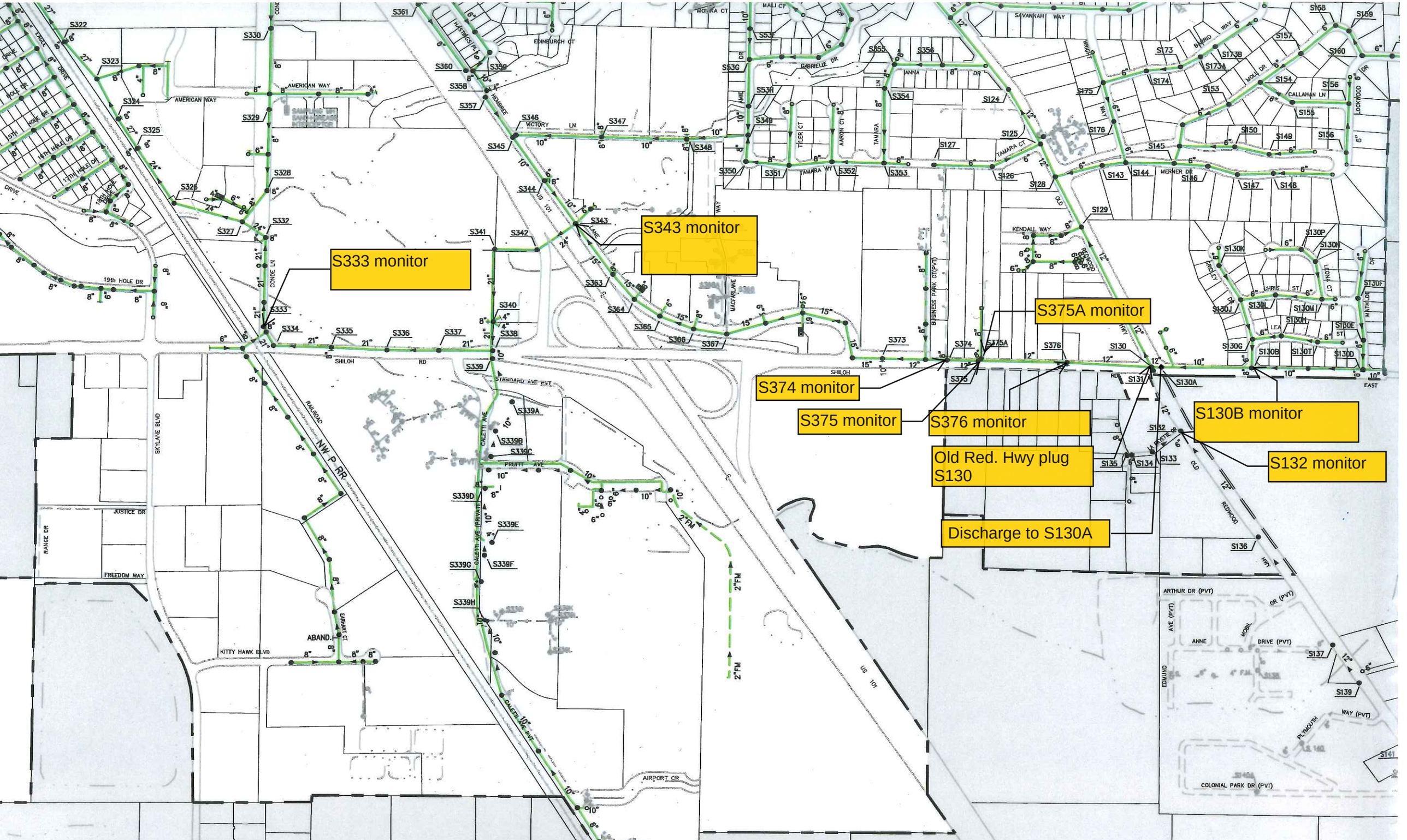
Geophysical Log Notes:

Geophysical logging by Schlumberger (Bakersfield, CA)
CMR - Combinable Magnetic Resonance Tool
SP - Spontaneous Potential

Lithologic Log Notes:

UCS Unified Soil Classification System (Visual-Manual Method)

Appendix C – Sewer Capacity Memo and Flow Test Observation Records


S343 monitor
S333 monitor
S375A monitor
S374 monitor
S375 monitor
S376 monitor
S130B monitor
Old Red. Hwy plug
S130
S132 monitor
Discharge to S130A
S322
S323
S324
S325
S326
S327
S328
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S339G
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S173A
S173B
S174
S175
S176
EDINBURGH CT
HAMMOND PL
HEMBREE
VICTORY LN
AMERICAN WAY
GABRIELE DR
ANNA DR
TYLER CT
AARON CT
TAMARA WY
TAMARA CT
MERNER DR
SAVANNAH WAY
WRIGHT WAY
BIRDIE WAY
MOLLI DR
CALLAHAN LN
LOCKWOOD DR
KENDALL WAY
REDWOOD HWY
BUSINESS PARK CT(PVT)
CHRIS ST
LEA ST
LYDIA CT
MATHLOR DR
SHILOH RD
CONDE LN
19th HOLE DR
18th HOLE DR
17th HOLE DR
15th HOLE DR
14th HOLE DR
DRIVE
STANDARD AVE EXT
PRUITT AVE
CALETTI AVE
CALETTI AVE (PRIVATE)
CALETTI AVE PVT
MACFARLANE
LANE
US 101
NW P RR
RAILROAD
SKYLANE BLVD
JUSTICE DR
RANGE DR
FREEDOM WAY
EARHART CT
KITTY HAWK BLVD
ABAND.
AIRPORT CIR
2"FM
OLD REDWOOD HWY
ARTHUR DR (PVT)
ANNE AVE (PVT)
MOBIL DRIVE (PVT)
EDMUND
PLYMOUTH WAY (PVT)
COLONIAL PARK DR (PVT)

Town of Windsor, Esposti Well Project

Sewer Manhole S375A



S375A on private drive, 10-ft north of Shiloh Rd, Windsor, CA



S375A on private driveway, looking north off Shiloh Rd, Windsor, Ca



6.5 ft from rim to bottom, 8-inch sewer lateral



S375 on Shiloh Rd, Windsor, Ca.



S130B on Gridley Drive, Windsor, Ca



S130B Looking Inside, 12-ft from rim to bottom, 8-inch sewer



S130B on Gridley Dr Windsor, Ca, Looking North



S130B on Gridley Dr, Looking west on Shiloh Rd, Windsor, Ca

DATE: 5/9/2016	LOCATION: ESPOSTI PARK, WINDSOR
PROJECT NAME: ESPOSTI REHAB.	EVENT: SEWER DISCHARGE MONITORING & SPECIFIC CAPACITY TEST

5/9 SEWER DISCHARGE MONITORING SITE SAFETY W/ TOWN OSE, JORDAN

0855- ESW DTW = 40.55 TOC

0910 - TURN ON ESW TO CONFIRM GP. & P.

* @ 0940 START PUMPING 200 GPM TO S130

* @ 0945 START PUMPING FROM RFR TANKS, BUT FILTERS CLOGGED (?) AND ONLY DOES 100GPM! CLEAN OUT BAGS-FILTERS ✓ GOOD FOR HIGHER FLOW

1105 - START DISCHARGING @ 200 GPM TO S130

DTW @ 1235 = 104.22 HEAD = 270 - 104

LOST COMMUNICATION W/ IN-SITU 700 @ 1235

1255 - DISCHARGING @ 300 GPM FROM FILTER PUMP

1330 - ESW DTW = 106.68, @ 1340 DTW = 106.69

1345 - ESW PUMP OFF - NO CAPACITY. 400 GPM 0910-1345

1425 - START DISCHARGE @ 400 GPM

1515 - STOP MONITORING & NOW DISCHARGING @ 200 GPM

S/S.40 - DTW @ 241 PM 221.42 head

1600 - STOP SURGE/PURGE - TANKS FULL

1620 - RC/WEEKS OFFSITE

* FINAL NOTES PUMPED ESW @ 400 GPM FOR 4.5 HOURS & DRAWDOWN BEGAN TO FLATTEN OUT @ 65'. TOTAL DRAWDOWN WAS 66.14'

FIELD REPORT

DATE: 5/9/2016	LOCATION: Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Well	JOB NO: 11110001.20
EVENT: Sewer Flow Test and Observations	WEATHER/TEMP: Cloudy ° at am 1000 Sunny ° at pm 1440
PRESENT AT SITE: Jourdan (Town of Windsor)	

DATE: dd/mm/yr 05 / 09 / 16

Time: use 24 hour time record at 15 min intervals or more freq.	Manhole number/description	Observed flow as a % of full pipe	Other observations
0936	S 375	15%	Initail
1000	S375	20%	5% increase w/1000gpm
1100	S374	15%	
1105	S375	15%	
1111	S374	15%	
1113	S375	15%	
1121	S374	30%	
1123	S375	30%	
1140	S374	30%	
1147	S375	30%	
1238	S333	25%	
1252	S374	30%	
1305	S374	30%	
1311	S374	30%	
1331	S374	30%	
1341	S374	30%	
1423	S374	30%	
1430	S374	35-40%	400 gpm
1440	S374	40-45%	400 gpm
1453	S374	45%	
1506	S374	30%	

Jose + Jordan

Jose Jordan

FIELD REPORT

DATE: 5/9/2016	LOCATION: Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Well	JOB NO: 11110001.20
EVENT: Sewer Flow Test and Observations	WEATHER/TEMP: 930 ° at am Overcast 60° ° at pm
PRESENT AT SITE: 9am Weeks (2), Town(3), GHD (1)	

DATE: dd/mm/yr 5 / 9 / 16

Time: use 24 hour time record at 15 min intervals or more freq.	Manhole number/description	Observed flow as a % of full pipe	Other observations
0933	S374	~15%	Fairly open flow
0940 - 0942			Side flow coming in 5%
0954		~15-20% apparent	increase in flow - faster
1000		~15-20%	Same

FIELD REPORT

DATE: 5/9/2016	LOCATION: Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Well	JOB NO: 11110001.20
EVENT: Sewer Flow Test and Observations	WEATHER/TEMP: ° at am ° at pm
PRESENT AT SITE: Weeks GHD	

DATE: dd/mm/yr 5/9/16

Time: use 24 hour time record at 15 min intervals or more freq.	Manhole number/description	Observed flow as a % of full pipe	Other observations
09:44 AM	S376	15%	15% open flow ~~Get Grease~~ 17 GPM
09:53 AM	S376	25%	10% increase
[redacted]1000 AM	" "	Same	at 100 GPM
1100[redacted] AM	" "	15%	open flow 200
1115 [redacted]5 AM	" "	20%	5% increase GPM
1122 [redacted] AM	" "	Same	
11[redacted]45 AM	" "	25%	5% increase in flow
12[redacted]9 PM	" "	25% Same	10% increase in flow
12:49 PM	" "	30%	5% increase in flow 30
1310 PM	" "	30% same	Same increase in flow GPM
1325 PM	" "	Same	" " "
1339 PM	"	30% Same	5% increase flow 40
1425 PM	" "	35%	5% increase in flow GPM
1440 PM	" "	35% Same	" " "
11[redacted]55 PM	" "	35% Same	" " "
1510 PM	" "	30%	5% Decrease in flow

Special notes regarding: traffic during test, trucks, buses. Pedestrians, kids in the area, homeless. Is location appropriate for night monitoring. Photograph location and inside of manhole. Consider appropriateness of manhole as a permanent monitoring station with automatic measuring for final system.

on 5/19/16 Light traffic on Shiloh Rd at 5376 from 9:30AM to 1:40pm heavier traffic after 3:00pm & one or two pedestrians walking bye.

FIELD REPORT

DATE: 5/16/2016	LOCATION: Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Well	JOB NO: 11110001.20
EVENT: Sewer Flow Test and Observations	WEATHER/TEMP: 9 ° at (am) ° at pm Sunny
PRESENT AT SITE: Rich Ramos - 800 GPM	

DATE: dd/mm/yr 5 / 16 / 16

Time: use 24 hour time record at 15 min intervals or more freq.	Manhole number/description	Observed flow as a % of full pipe	Other observations
8:46AM	374	50%	GOOD FLOW/CLEAR WATER
8:41 AM	375	50%	GOOD FLOW/CLEAR WATER
8:51 AM	343	50%	27"@1/3 - 10" @ 50% → GOOD FLOW/CLEAR WATER
9:06 AM	327	50%	→ GOOD FLOW/CLEAR WATER

Kent O'Brien 707-478-9559 cell and text

FIELD REPORT

DATE: 5/11/2016	LOCATION: Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Well	JOB NO: 11110001.20
EVENT: Sewer Flow Test and Observations	WEATHER/TEMP: ° at am ° at pm
PRESENT AT SITE: WEEKS	JOSE BANUELOS

DATE: dd/mm/yr 5/11/16

Time: use 24 hour time record at 15 min intervals or more freq.	Manhole number/description	Observed flow as a % of full pipe	Other observations
1313	S376	10%	increase flow 400 GPM
1315	S376	35%	20% increase in flow
1325	S376	Same	Same in flow
1332	S376	35%	Same in flow 400 to 500 GPM
1344	S376	40%	5% increase in flow 600 GPM
1359	S376	Same 40%	Same " " 600 GPM
1414	S376	Same 40%	Same " " "
1424	S376	45%	5% increase in flow 700 GPM
~~1444~~ "	"	"	AT 700 water starts to trickling into Lateral on the Southside. but it's fi
"	"	"	
"	"	"	
1439	S376	45% Same	Same at 700 GPM is flo
1450	S376	50%	5% increase in flow to 80 GP
1458	S376	55%	5% increase in flow to 80 GP
1506	S376	60%	5% increase flow 800 GPM
1521	S376	Same 60%	Same " "
1535	S376	Same 60%	Same " " "
1550	S376	Same 60%	Same " " " 800 GPM
1525	checked S#130B	and flow look good	
~~1600~~ 1605	S376	Same 60%	Same " " " " 800 GPM
1620	S376	Same 60%	Same " " " " at 800 GPM
1635	S376	Same 60%	Same " " " "
1653	S376	40%	Drop 20%

5/11/2016

Special notes regarding: traffic during test, trucks, buses. Pedestrians, kids in the area, homeless. Is location appropriate for night monitoring. Photograph location and inside of manhole. Consider appropriateness of manhole as a permanent monitoring station with automatic measuring for final system.

on 5/11/16 A little more people walking than 5/10/16 flow it's nice and clear & Heavy traffic manhole is on the bike lane.

Kent O'Brien 707-478-9559 cell and text

FIELD REPORT

DATE: 5/11/2016	LOCATION: Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Well	JOB NO: 11110001.20
EVENT: Sewer Flow Test and Observations	WEATHER/TEMP: ° at am 1:13 ° at pm Sunny
PRESENT AT SITE: Jourdan (Town of Windsor)	

DATE: dd/mm/yr 5 / 11 / 16

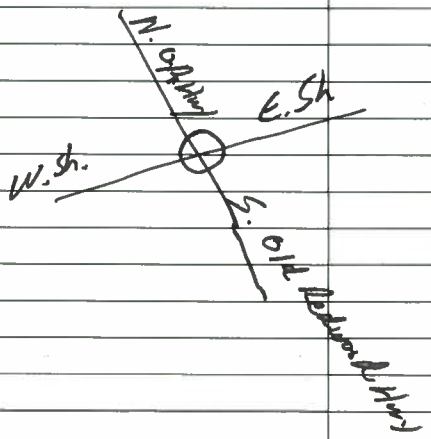
Time: use 24 hour time record at 15 min intervals or more freq.	Manhole number/description	Observed flow as a % of full pipe	Other observations
1310	S374 (Shiloh)	10%	Inital inspection
1320	S374	40%	Clear water/400 gpm
1328	S374	40%	
1338	S374	40-45%	at 500 gpm
1349	S374	45-50%	at 600 gpm
1356	S374	50%	
1403	~~S344~~ S343 (Hembree)	50%	Looks good
1413	S327 (Conde)	25-30%	plenty of capacity
1429	S374	50-55%	at 700 gpm
1440	S374	50-55%	at 700 gpm
1455	S374	50-60%	at 800 gpm
1504	S374	60%	at 900 gpm
1511	S374	60-65%	at 900 gpm
1522	~~S21~~ S343 (Hembree)	50~~%~~%	at 900 gpm
1526	S366	40-50%	at 900 gpm
1536	S374	60-65%	at 900 gpm
1556	S374	60-65%	
1617	S374	60-65%	
1625	S374	60-65%	
1654	S374	40%	End of run

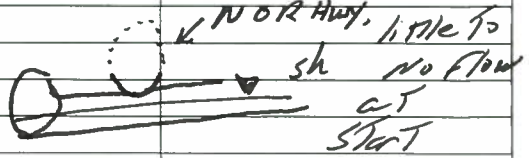
FIELD REPORT

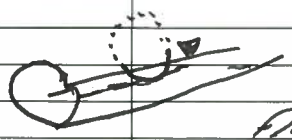
DATE: 8/23/2016	LOCATION: Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Well	JOB NO: 11110001.20
EVENT: Sewer Flow Test and Observations	WEATHER/TEMP: ° at am ° at pm
PRESENT AT SITE: Kent O'Brien	

DATE: ~~dd/mm/yr~~ Aug 23 2016

Time: use 24 hour time record at 15 min intervals or more freq.	Manhole number/description	Observed flow as a % of full pipe	Other observations
1115	S130	10% 0 spm pump	
1122	S130	45% 400 spm	20% going ORH
1132	S130	50% 400 spm	
Pump Start: 11:20			
by KOB!			







20% of total flow going down N. OR. Hwy

DRAFT Technical Memorandum

Esposti Park Groundwater Disposal Plan

Subject: **Esposti Park Sewer Discharge Analysis**

Prepared For: Kent O'Brien/GHD

Prepared by: Ian Jaffe, RMC

Reviewed by: Leslie Dumas, RMC

Date: April 29, 2016

1 Background

The Town of Windsor's (Town's) Esposti Park Supply Well is currently undergoing redevelopment and testing as part of a program to bring this well on-line as a water supply source for the Town. Groundwater produced from the well will be discharged to the Town's sanitary sewer during the well redevelopment and testing events. Specifically, waters generated during well development and testing will be discharged to the sanitary sewer in Shiloh Road, with a plug installed at the intersection of Shiloh Road and Old Redwood Highway to direct discharged waters and prevent these waters from entering the Old Redwood Highway trunk line as that pipeline is nearing capacity. This analysis was conducted to estimate the expected increase in sewer flow depth and the time to flow concentration at three potential monitoring sites in the Shiloh Road sanitary sewer as a result of the proposed groundwater discharges.

2 Analysis

Initial data for the sewer line in question were collected from a map of the Town's sewer system (as provided by the Town) and from a technical memorandum describing a sewer model for the Town that was utilized for evaluating groundwater discharges to the same sewer line in 2010. The sewer the diameter and length of the pipe segments were obtained from the map, and the expected peak dry weather flow in the sewer line receiving the discharge, as well as the pipe slope, was obtained from the modeling memorandum. These initial data are presented in **Table 1**.

Table 1: Information for Pipeline from Discharge Point (S130) to Potential Monitoring Locations

Manhole	S374	S375	S376
Length (ft)	1294	1106	563
Diameter (in)	12	12	12
Slope (ft/ft)	0.006	0.006	0.006
Manning's "n" (assumed)	0.013	0.013	0.013
PDWF (gpm)	132	132	132

Note: gpm – gallons per minute; ft - feet

Using Manning's equation for open channel flow in a circular channel, an iterative process was used to determine the initial (baseline) flow depth in the pipeline of interest assuming a baseline flow rate of approximately 2 feet per second (fps). Next, the iterative process was repeated for the seven discharge flow

scenarios (e.g. anticipated discharge rates to the sewer) to determine the depth of flow and velocity of flow in the sewer at the monitoring locations. Using the distance to the observation points and the calculated velocity, the time to flow observation was estimated. The freeboard (depth of unfilled pipe) was also calculated. It was assumed that the depth of flow at each of the potential observation locations was equal as the pipe diameter and slope is assumed to be uniform from the discharge point to all three observation manholes (as noted in the modeling memo). The results of the iterative process are presented in **Table 2**.

Table 2: Flow Depth and Time to Flow Observations

Flow Added	Total Flow	d/D	Flow	Freeboard	Time to observation point (min)		
gpm	*gpm*	*in/in*	*fps*	*inch*	S374	S375	S376
Baseline (0 gpm added)	132	0.220	2.29	9.36	9.42	8.05	4.09
50	182	0.26	2.52	8.88	8.56	7.32	3.72
100	232	0.295	2.71	8.46	7.96	6.80	3.46
200	332	0.355	2.99	7.74	7.21	6.17	3.14
500	632	0.505	3.54	5.94	6.09	5.21	2.65
600	732	0.555	3.67	5.34	5.88	5.02	2.55
800	932	0.650	3.87	4.20	5.57	4.76	2.42
1,000	1132	0.750	3.99	3.00	5.40	4.62	2.35

Appendix D – Temporary Sewer Discharge Application and Permit

TOWN OF WINDSOR

WASTEWATER DISCHARGE PERMIT APPLICATION
TEMPORARY DISCHARGE

PART A – APPLICATION / PERMITTEE INFORMATION

A1. **Applicant Business Name** Town of Windsor

A2. **Physical Address of Facility or Location Discharging Wastewater** Esposti Park, Old Redwood Hwy @ Shiloh Road

City Windsor State CA Zip 95492

Phone (707) 838-5385 - Elizabeth Cargay

A3. **Mailing Address** 8400 Windsor Road, Bldg. 100

City Windsor State CA Zip 95492

A4. **Chief Executive Officer** Ted Whiton

a. Title Principal / Senior Civil Engineer

b. Mailing Address 2235 Mercury Way Suite 150

City Santa Rosa State CA Zip 95407

A5. **Environmental Consultant** Kent O'Brien

a. Title Senior Hydrogeologist

b. Mailing Address 2235 Mercury Way, Suite 150

City Santa Rosa State CA Zip 95407

c. Phone (707) 523-1010

A6. **Primary Contact Person** David J. Vossler

Title Senior Geologist

Day Phone (707) 523-1010 Night/Emergency Phone (707) 477-1283

TOWN OF WINDSOR

WASTEWATER DISCHARGE PERMIT APPLICATION
TEMPORARY DISCHARGE

PART B – SITE INFORMATION & TREATMENT

Purpose: *The Site Information Section is primarily used to determine the substances which may enter into the wastewater discharge from the business activity and the intention of how it will be treated.*

B1. Site History

Summarize the business activities and/or manufacturing processes responsible for the wastewater. Provide the name and contact information of the current property owner: _____

Previously install Town well, Esposti Well, requires additional development and Testing. Discharge will be of extracted groundwater to sanitary sewer via settling tanks and discharge flow controls.

B2. Describe the nature of the site contamination (if any): _____

Naturally occurring Manganese, and total Arsenic.

B3. Identify the contaminants of concern in the wastewater discharge (eg. Hydrocarbons, BTEX, PAHs, Metals, Suspended Solids, etc.) Include supporting analytical data for the wastewater :

Manganese and Total Arsenic.
Attachment 1 - Memorandum, April 7, 2016 - Summarizes the analytical finding from the Esposti Well.

B4. Describe the proposed treatment system(s) and sampling location(s) and attach a schematic: _____

Groundwater extracted will be routed through 2 - 20,000 gal settling tanks. If required to further reduce the turbidity, inline bag filter will be used. Discharged via pump and gravity flow to sanitary sewer at S130A. Monitoring flow will be at S130A, CT4, CT5.
Attachment 2 - Site Map - Groundwater containment and discharge location Map.

TOWN OF WINDSOR

WASTEWATER DISCHARGE PERMIT APPLICATION
TEMPORARY DISCHARGE

PART B – SITE INFORMATION & TREATMENT CONTINUED

B5. **Operating Period & Discharge Flow** See Attachment 3

Specify the proposed operating period for the activities (i.e. the period during which wastewater is discharged to the sanitary sewer)

Two Discharge Events.

Hours/Day: 24 Days/Week: 5 Weeks/Year: 3

Specify the typical number of hours of discharge to the sanitary sewer during the following periods:
08:00 to 16:00: 8 hours 16:00 to 24:00: 8 hours 0:00 to 08:00: 8 hours.

Expected maximum flow rate of discharge: 500 gpm 100 gpm April 18 – April 22, 2016 May 4 – May 12, 2016

Expected average flow rate of discharge: 350 gpm 50 gpm April 18 – April 22, 2016 May 4 – May 12, 2016

Maximum volume of treated wastewater to be discharged to the sanitary sewer: 2M gallons

Anticipated start date for project: April 18, 2016

Anticipated end date for project: September 22, 2016

TOWN OF WINDSOR

WASTEWATER DISCHARGE PERMIT APPLICATION
TEMPORARY DISCHARGE

PART C – CERTIFICATION STATEMENT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

I, the undersigned, and Engineer/Consultant (where applicable), certify that this firm's operation and its resultant wastewater discharge will achieve consistent compliance with the Town of Windsor's Municipal Code and Ordinances, permit requirements (as detailed herein), and applicable Federal and State discharge regulations and requirements. If the wastewater discharge does not meet all the applicable regulations, my firm is responsible for immediately halting the flow causing non-compliance, installing wastewater pretreatment equipment, or performing whatever is necessary to meet the waste discharge requirements. I am aware that there are significant penalties for violation of the regulations, requirements and conditions of this permit, the Town of Windsor's Municipal Code and Ordinances, and the State and Federal Government discharge regulations and requirements, including the possibility of fine and imprisonment.

Signature: _____

Title: Senior Geologist

Date: 4-15-2016

This document must be signed by the most responsible person of the organization applying for the discharge permit. This includes the owner, president, corporate officer, or any other representative of the organization in an authorized decision-making capacity. The person signing this document is legally responsible for all information contained herein, and becomes liable for any and all future enforcement actions.

Attachment 1

Memorandum

07 April 2016

To	Frank Caligiuri		
Copy to	James Tamburini, Chuck Ward		
From	Kent O'Brien	Tel	415.296.2043
Subject	Preliminary Design Basis Esposti Well	Job no.	111/10001/

The project is located in the Town of Windsor, CA. The information listed below is a summary of well and groundwater information for the site that is pertinent to the preliminary design for the Esposti Park Well contaminant removal system. Information was obtained from knowledge of the site as well as from the September 2010 Groundwater Well Installation and Testing Project Summary Report prepared by RMC.

This information is provided for developing a laboratory bench test program to be conducted in May of 2016. GHD believes that there could be a benefit to bench testing Greensand Plus with various oxidizers. The removal of arsenic would be completed as a second process. By bench testing oxidizers for manganese removal, we would reduce the number of variables that needed to be evaluated during field Pilot Testing to be performed in August/September of 2016.

System Operation & Parameters

o Flow Capacity:	800 gpm
o Annual Well Utilization:	50% of Time
Disinfection	
o Disinfectant:	Sodium Hypochlorite
o Discharge Point:	Distribution
Well Pump	
o Operation Type	Intermittent, full flow
o Well Pressure	120 psig
Wastewater Handling	
o Backwash Discharge Available?	Yes
o Discharge Point	Sewer
o Zero Discharge Required?	No
Treatment Options	
o Bypass/Blend OK?	Yes
o Spare Capacity Required?	No
o Use of CO_2, HCl, H_2SO_4 or NaOH OK?	Only CO_2
Process Control	
o System Automation	Yes

GHD Inc.
2235 Mercury Way Suite 150 Santa Rosa CA 95407 USA
T 1 707 523 1010 **F** 1 707 527 8679 **E** santarosa@ghd.com **W** www.ghd.com

- SCADA Interface — Yes
- Notes

Summary of Water Quality Assumptions*

- pH** — 6.67
- Temperature** — 66 °F
- ORP (EMF)** — 4 mV
- Conductivity** — 458 µS/cm
- TDS** — 300 mg/L
- Turbidity** — 354 NTU

Cations

- Hardness — 120 mg/L $CaCO_3$
- Ammonia*** — 0.3 mg/L NH_3
- Calcium — 22 mg/L
- Magnesium — 15 mg/L
- Sodium — 54 mg/L

Anions

- Alkalinity — 230 mg/L $CaCO_3$
- Bicarbonate — 280 mg/L $CaCO_3$
- Carbonate — <1.0 mg/L $CaCO_3$
- Chloride — 17 mg/L
- Fluoride — 0.37 mg/L
- Nitrate — <2.0 mg/L NO_3
- Phosphate — (Unknown)
- Silica*** — 87 mg/L SiO_2
- Sulfate — 12 mg/L SO_4

Metals

- Antimony — <6.0 µg/L
- Total Arsenic — 56 µg/L
- Copper — <50 µg/L
- Iron — <100 µg/L
- Lead — <5.0 µg/L
- Manganese — 750 µg/L
- Mercury — <1.0 µg/L
- Selenium — <5.0 µg/L
- Vanadium — (Uknown)

Notes:

* Water Quality data from Composite 1 of May 2010 sampling event with noted exceptions

** From Borehole at depth of 200 feet bgs

*** From Depth-specific results between 380-420 feet bgs

Attachment 2



Attachment 3

Groundwater Discharge Plan – Esposti Well

Phase of Project	Event	Approx. Date of Sampling	Event Notes
Setup	Video/non-pump spinner	4/18/2016	
Well Redevelopment	Prior to redevelopment	4/18/2016	Assume no sewer sample
	Start of redevelopment	4/19/2016	High turbidity samples
	Mid redevelopment	4/20/2016	High turbidity samples
	End of redevelopment	4/22/2016	Low terbidity samples
	End of redevelopment	4/22/2016	Soil samples of sediment
	Video/non-pump spinner	4/22/2016	
	Notification to Town	4/22/2016	Well condition summary by emai
Well Packer Testing	Full Well Pumping	5/3/2016	Pump 3 hours with spinner log
	Select well segments	5/4/2016	Install packer lower pump
	Lower pump at 200 gpm	5/4/2016	2 hours
	Lower pump at 350 gpm	5/4/2016	2 hours
	Lower pump at 500 gpm	5/5-6/2016	24 hours
	Move packer	5/9/2016	Install packer upper pump
	pump at 200 gpm	5/9/2016	2 hours
	pump at 350 gpm	5/9/2016	2 hours
	pump at 500 gpm	5/9-10/2016	24 hours
	Remove packer	5/9/2016	Prep for pumping full well
	Pump at 800 gpm	5/11/2016	6+ hours
Pilot Test	Setup	8/23-25/2016	
	Pilot testing	9/6-17/2016	

Non-Residential
One-Time Discharge Permit

Permittee:
Town of Windsor
8400 Windsor Road
Windsor, CA 95492

Discharge Located At:
Esposti Park
Old Redwood Highway @ Shiloh Road
Windsor, CA 95492

PERMIT#: TD-04152016

EFFECTIVE DATE: 04/15/2016

EXPIRATION DATE: 12/31/2016

The above discharger is authorized to discharge non-contaminated, non-sediment laden groundwater and/or well water generated from the project at Esposti Park, Old Redwood Highway at Shiloh Road to the Town of Windsor's sewer collection system. This discharge shall be in accordance with the Town's current Sewer Code and/or Ordinances, and all applicable provisions of federal or state law or regulation, and in accordance with discharge point(s), effluent limitations, monitoring requirements, and other terms and conditions set forth herein.

PART I - SPECIAL CONDITIONS

1. The discharge rate to the sanitary sewer shall be at a discharge rate that will not result in any spillage or surcharging of the sewer system. At no time shall the flow rate of the discharge exceed 800 gpm. Permittee must contact the Town of Windsor's Wastewater Treatment Facility prior to discharging flow rates exceeding 500 gpm.

2. Sediment must be removed prior to any discharge to the sanitary sewer.

3. The Town reserves the right to require water quality sampling and testing at any time. Should any of the sample results indicate that pollutant concentrations are beyond the treatment capabilities of the wastewater treatment plant, the Town reserves the right to revoke this permit and prohibit further discharge.

4. All discharge volumes shall be reported to this office by a Town approved method which may include, metering, storage tank volumes, and/or pumping flow rates to determine the permit discharge fees. **Note: Monthly discharge volumes shall be reported within 15 days of the end of each month, and the total discharge volume shall be reported to this office within 30 days of the completion of this project.**

5. Permittee shall notify this office 48 hours in advance of the commencement of the discharge so that a member of the Industrial Waste Group may be on site at the beginning of the operations to verify the discharge point to the sanitary sewer.

6. The Permittee shall be responsible for all liability imposed by law for personal injury or property damage caused by work done by Permittee under this permit, including work beyond the scope of this permit. If any claim of such liability is made against the Town, its officers or employees, Permittee shall defend, indemnify and hold them, and each of them, harmless from such claim and liability insofar as permitted by law.

CERTIFICATION: I agree to comply with all terms and provisions of this permit and all other regulations set forth within the Town's current Sewer Code and/or Ordinances in the Town of Windsor, or any applicable provisions of federal or state law or regulation.

PLEASE SIGN AND PRINT NAME BELOW

Owner/Manager _____ Title Project Manager Date 4/18/2016

Inspected by: _____ Title Env. Program Manager Date 4/18/16

Approved by: _____ Title Acting Pub Dir / Town Engr Date 4/18/16

Appendix E – Street Encroachment Permit

ALLOW 2-3 WEEKS TO PROCESS

TOWN OF WINDSOR

Town of Windsor
Engineering Division
8400 Windsor Road, Bldg. 100
P.O. Box 100
Windsor, CA 95492-0100
Office Hours: Mon – Thurs 7:00am – 6:00pm
(Form A)

ENCROACHMENT PERMIT

PERMIT NO. 2016-16

(For office use only)	(Date / Initials)
USA Number:	NA
Performance Bond #:	Town Project
Maintenance Bond #:	
Expiration Date:	
Permit Fee:	0
Permit Issue Date:	4-7-16
Permit Expiration Date:	9-28-16
Date Permit Finaled:	

APPLICANT TO COMPLETE THIS PART
(Please Print or Fill out electronically)

☒ **Type of Activity**

- ☐ Utility: Water, Sewer, Recycled
- ☐ PG&E, ATT, Comcast
- ☐ Sidewalk / Curb / Gutter / Pavement
- ☒ Maintenance
- ☐ Driveway: New / Replace / Repair
- ☐ Debris Box
- ☐ Equipment: Crane, scaffold
- ☐ Outside Water
- ☐ Other: ____
- ☐ Drainage

Check One: Project General Contractor ☒ Project Subcontractor ☐

Permittee: Weeks Drilling
Address: 6100 Hwy 12
Sebastopol CA 95473
Contact: Joshua Moore
E-mail: Joshua@weeksdrilling.com

Phone Number: 707-823-3184
Fax Number: 707-823-4258
Cell/Emergency: 707-583-1822
Business Registration #: 005460
Contractor's License #: 177681
Contractor's Class: C61/D21, C57/C36

Attention: General Contractors & Subcontractors – List all subcontractors working for your company on this project on page 2

Project Name: Esposti Well Development
Work Site Address:
Anticipated Start Date of Construction: 4/13/16
Construction End Date (Estimated): 9/22/16

Scope of work: Develope 10" Well to reduce Arsenic contamination. Developed & Pumped water will be Flushed to ball field & Sewer

Excavation in Public Right-of-way? ☒ No | ☐ Yes
If "yes" provide U.S.A. Ticket Number*:
Regarding property being served:
* *Permit will not be issued without applicant providing USA ticket number.*
Is there an existing water well? ☐ No | ☒ Yes | ☐ N/A
Is there an existing septic system? ☐ No | ☐ Yes | ☒ N/A

PERMITEE TO READ AND SIGN BELOW:
Permittee agrees to accept all responsibility for loss and/or damage to any person or entity and to indemnify, hold harmless, defend and release the Town of Windsor, its agents and employees, from and against any and all liability actions, claims, damages, costs, or expenses which may be asserted by any person or entity including Permittee arising out of or in connection with the willful act or negligence of Permittee performing the work associated with the Encroachment Permit, whether or not there is concurrent negligence on the part of the Town of Windsor, but excluding liability due to the sole active negligence or sole willful misconduct of the Town of Windsor.
The indemnification obligation is not limited in any way by any limitation on the amount or type of damages or compensation payable by or for Permittee under Worker's Compensation, disability or other employee benefit acts or the terms, applicability or limitations of any insurance held or provided by Permittee and shall continue to bind the parties after termination/completion of this permit. Permittee shall comply with all Encroachment Permit requirements and procedures, attached hereto as Exhibit A. including but not limited to the procurement and maintenance of insurance and bonding requirements set forth therein.
THE UNDERSIGNED AGREES THAT THE WORK WILL BE DONE IN ACCORDANCE WITH AND SUBJECT TO THIS PERMIT'S TERMS AND CONDITIONS, THE STATE VEHICLE CODE, STATE STREETS AND HIGHWAYS CODE, AND IS SUBJECT TO INSPECTION AND APPROVAL.

Date: 04/07/2016 **Permittee Signature:** Joshua Moore
Print Name: Joshua Moore

(When Encroachment Permit is issued for a special event involving a street closure a copy shall be forwarded to Police and Fire)

SUBCONTRACTORS: Provide business name, contact name, address, phone number and e-mail.
1. unknown @ this time
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.

1. **Each subcontractor shall obtain an encroachment permit for the portion of the proposed work they are responsible for.**

2. **If the subcontractor is not covered under the Prime Contractors insurance, then the subcontractor must have their own insurance as required by the Town of Windsor and submit the required insurance documents for review and approval.**

To be Completed by Town Staff Only

IF THIS ENCROACHMENT PERMIT IS ASSOCIATED WITH A CAPITAL IMPROVEMENT PROJECT, A LAND DEVELOPMENT PROJECT OR A MAINTENANCE OR REPAIR CONTRACT, THE PUBLIC WORKS PROJECT MANAGER OR PUBLIC WORKS SUPERVISOR RESPONSIBLE FOR THE PROJECT SHALL INITIAL THIS APPLICATION VERIFYING THE PROJECT IS READY TO BE ISSUED AN ENCROACHMENT PERMIT:

_____ *PROJECT MANAGER SIGNATURE/ INITIALS*

_____ *Date*

Town of Windsor
Engineering Division
8400 Windsor Road, Bldg 100
P.O. Box 100
Windsor, CA 95492-0100
(707) 838-5340, Fax (707) 838-5300

Project Ready to Issue an Encroachment Permit

Project Number: 25-1310

Project Manager Name: Elizabeth Cargay

Project Name: Esposti Water Supply Reliability Project

Brief Project Description: Municipal well redevelopment, Pump Test and Treatment Pilot Testing

I, E. Cargay, as the Project Manager for the aforementioned project has verified that the following items have been completed, reviewed and approved by myself or authorized agent and that the project is ready to be issued an Encroachment Permit as required by the Town of Windsor Municipal Code.

The following items have been approved:

The following Items must be approved prior to issuing an Encroachment Permit. Engineering staff to mark Required Items	Project Manager to check off which are approved	The following checked items have been approved by Project Manager	Comments
☐	☑	Completed Encr. Permit Application	Attached
☐	☒	USA number (if required)	N/A
☐	☑	Plans	Attached
☐	☑	Cost Estimates	submitted as part of Contract
☐	☑	Contractor/Subcontractor's License	177681
☐	☒	Contractor/Sub Business License	n/a 005460
☐	☑	Insurance Documentation	See attachd
☐	☒	Bonds or other type of Security	n/a
☐	☑	Traffic Control Plan	see attachd
☐	☑	Tree concerns have been satisfied	n/a
☐	☑	Existing Wells and Septic concerns have been satisfied	n/a

The terms, conditions and restrictions for the Encroachment work are part of the contract documents. No additional terms, conditions and restrictions are required.

Date: 4-7-16

Nina Abrahim
Print Engineering Tech Name processing the Encroachment Permit Application

Elizabeth A Cargay
Project Manager's Signature

Elizabeth Cargay
Print Project Manager's Name

TOWN OF WINDSOR

Town of Windsor
Public Works Department
8400 Windsor Road, Bldg. 100
P.O. Box 100
Windsor, CA 95492-0100
(707) 838-5340, Fax: (707) 838-5300

FORM 'C'

ENCROACHMENT PERMIT TERMS, CONDITIONS & RESTRICTIONS

- OFFICIAL USE ONLY - OFFICIAL USE ONLY - OFFICIAL USE ONLY - OFFICIAL USE ONLY - OFFICIAL USE ONLY - OFFICIAL USE ONLY -

Encroachment Permit #: 2016-16

Location: 6000 Old Redwood Highway - Esposti Park

Scope of Work: Develop 10" well: flush well, pump, test and treatment pilot testing

TERMS, CONDITIONS & RESTRICTIONS:

This Encroachment Permit is to be strictly adhered to and no work other than that specifically mentioned in the Scope of Work above is hereby authorized. If the Town Engineer determines persons performing encroachment work are in non-compliance with the provisions of this permit, the Town Engineer may revoke this permit.

Subject to all the **terms, conditions & restrictions** written hereon or attached hereto, permission is hereby granted for Permittee to:

Specific Project

•

General

1. Follow all of the latest issue of the **Town of Windsor Design and Construction Standards**. Visit the Town's web site for the latest copy of the Design and Construction Standards
2. Follow the approved **Traffic Control Plan,** all traffic control shall comply with the Town of Windsor Construction Traffic Control Procedures on Town Streets Manual.
3. Perform work stated in the Scope of Work and **Return the work site** as required by the Public Works (PW) Inspector.
4. **All work shall be inspected,** failure by the contractor to call for inspection may delay/stop the project.
5. If concrete work is involved, then **all forms for concrete work shall be inspected** prior to pour.
6. The Public Works Inspector to be **notified 24 hours** prior to start of work. Inspector's phone number is 707-838-1230.
7. The Primary Contractor shall **include all Subcontractors** as insureds under the Primary Contractors policies, or the Primary Contractor shall furnish **separate insurance certificates and endorsements for each Subcontractor**. All coverages for subcontractors shall be subject to all of the requirements stated herein.
8. Independent of this Encroachment Permit, if the subcontractors are performing work permitted under this Encroachment Permit the said **Subcontractors shall obtain their own respective Encroachment Permits.**
9. Notify the Public Works Inspector **upon completion of work.**
10. **Water tie-ins** are not permitted on Friday or days preceding a holiday.
11. **Compaction Reports**: The applicant shall retain a licensed Geotechnical Engineer to perform compaction tests. The compaction test results shall be submitted to Town Public Works department prior to final trench paving or restoration.
12. Contractor's may **not turn water valves**. Contact the PW Inspector if there are water valves to be adjusted.
13. All **USA markings** are to be water scrubbed off of concrete sidewalks and drives prior to calling the PW Inspector upon completion of work.

See reverse side for any additional Terms, Conditions or Restrictions

DATE: 4-7-16 **APPROVED:** Mona Ibrahim

Town of Windsor Signature

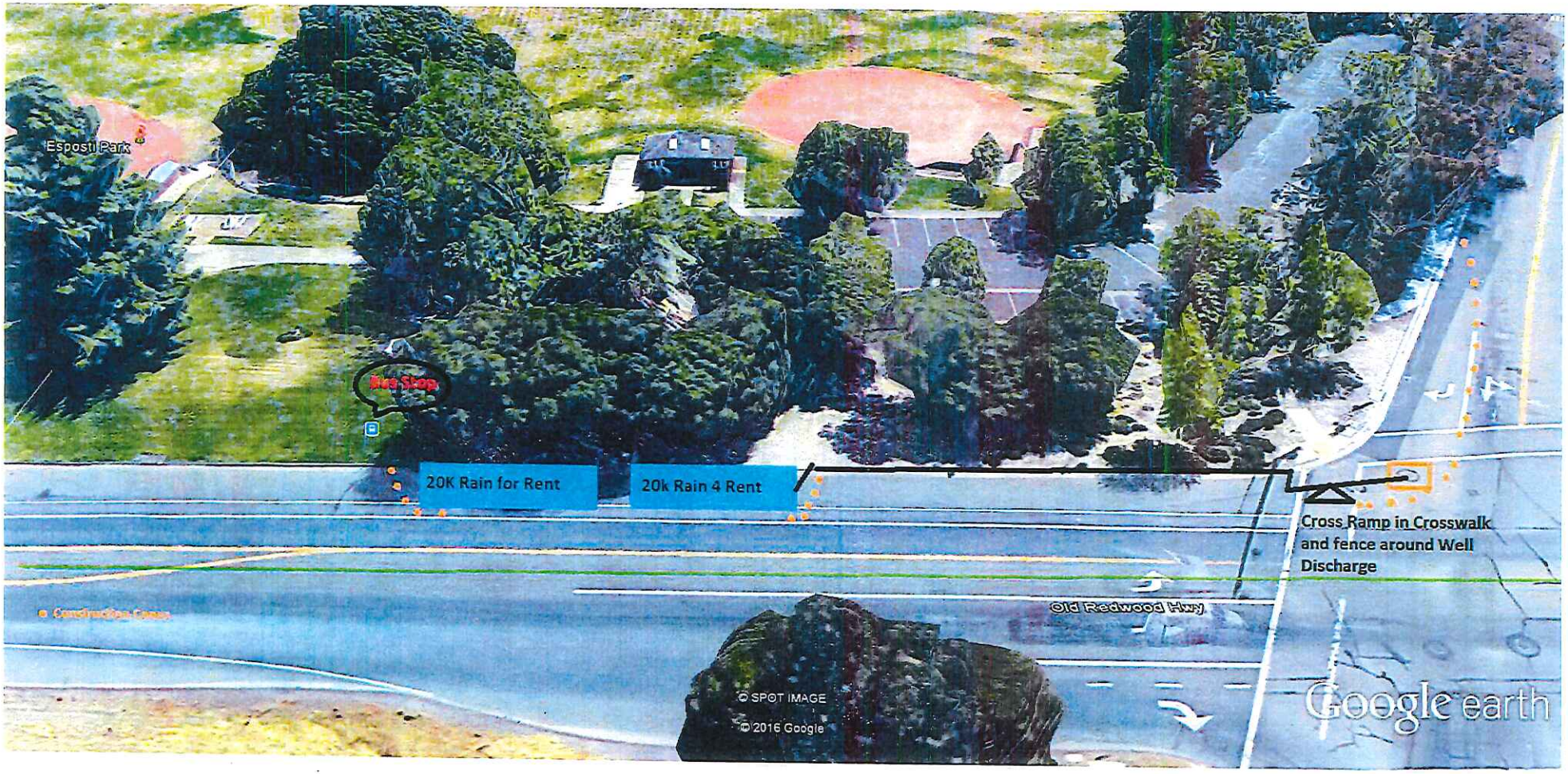
MONA IBRAHIM, ENG. TECH

Print Name and Title

A COPY OF THIS ENCROACHMENT PERMIT SHALL BE ON THE JOB SITE

Inspections: The Public Works Inspector can be reached at: **707-838-1230**, leave message if phone not answered
Monday through Friday: 7:30 am through 4:30 pm

Field Inspection Hours: Monday through Friday 8:00 am –4:00 pm


Esposti Park
Bus Stop
20K Rain for Rent
20k Rain 4 Rent
Cross Ramp in Crosswalk and fence around Well Discharge
Old Redwood Hwy
© SPOT IMAGE
© 2016 Google
Google earth

TOWN OF WINDSOR
Town of Windsor
Engineering Division
8400 Windsor Road, Bldg 100
P.O. Box 100
Windsor, CA 95492-0100
(707) 838-5340, Fax (707) 838-5300

EXHIBIT B

ENCROACHMENT PERMIT STANDARD CONDITIONS

Construction within the Town of Windsor Public Right-of-Way: Streets, Properties, and Easements

A. **Definitions:**

1. **Encroachment:** The term 'Encroachment' is used in this permit as defined in §1450, Sub.(b) and §1460 of the Streets & Highways Code and Section 5885(c)(1) of the Public Utilities Code of the State of California, Town of Windsor Code Title XV §4-105-d. This permit is issued in accordance with and subject to the provisions of the Town of Windsor Municipal Code, Title X, Chapter 2 article 1 and 2.
2. **Town Engineer:** The person holding the position of "Town Engineer" for the Town of Windsor. The Town Engineer may assign duly authorized representatives to discharge the responsibilities of the Town Engineer. The duly authorized representatives may include inspectors, maintenance staff, engineers, technicians or otherwise, to be known in this document as Town staff.

B. **Ownership of Lands under Town of Windsor Public Rights-of-Ways:**

1. **Easements:** In some instances, the Town does not own the land in which its right-of-ways traverse, the Town's interest being limited to the easement only. Therefore, this permit covers surface operations at all locations where the Town has no subsurface rights and in such cases does not purport to authorize any excavation, laying of pipe lines, setting of poles, or other operations below the surface of the easement. In such cases, it is the responsibility of the Permittee to obtain the consent of the subsurface owner(s) before undertaking any of the below-surface operations.
2. **In Fee (Simple):** The Town of Windsor owns the underlying land.

C. **General**

1. **Acceptance of Provisions:** It is understood and agreed by the Permittee that the performance of any work under this permit shall constitute an acceptance of these provisions.
2. **Start of Work:** This permit is void unless the proper notification is given 24 hours prior to starting work. Notification shall be by calling the Town of Windsor Public Works Inspector @ 707-838-1230.
3. **Permit Documentation on Site:** The following documents are required to be kept at the work site(s) at all times and must be shown to Town staff upon request.
   a. Encroachment Permit, Encroachment Permit "Terms, Conditions and Restrictions" and the Encroachment Permit Standard Conditions,
   b. Traffic Control Plan,
   c. Project Storm Water Pollution Prevention Plan (SWPPP) & Rain Event Action Plan (REAP), as applicable, and
   d. Town approved project plans.
4. **Superintendence:** The Permittee shall have an authorized representative at the project site at all times, in accordance with the latest adopted State of California Department of Transportation Standard Specifications.
5. **Character of Workers**: Contractors and workers employed by the Permittee shall be subject to "Character of Workers" as required in the latest adopted State of California Department of Transportation Standard Specifications.

6. **Control of Work:** All work performed and all materials furnished under this permit shall be subject to the inspection and approval by the Town Engineer or duly authorized representatives. Such inspection and approval of work and materials shall not relieve the Permittee of any of their obligations to complete the work as specified using materials as specified.

7. **Access to Work Area:** Town Staff shall have access to the work area at all times in order to ascertain that the methods, materials, and workmanship are in accordance with the requirements and intent of this Encroachment Permit.

8. **Standards:** Work shall comply with the latest edition of the Town of Windsor Design and Construction Standards, the latest edition of Standard Specifications of the State of California Department of Transportation and with the Terms, Conditions and Restrictions attached to the Encroachment Permit. Terms, Conditions and Restrictions that are part of the contract package for Capital Improvement Projects or Land Development Projects take precedence.

9. **Inspections:** It will be necessary to obtain approval from Town staff for the work completed at each of the following stages below. Approval must be obtained prior to commencing work on subsequent stages. Town staff may require additional approvals beyond what is listed below. For any work, including excavations, undertaken without proper inspections, Town staff may request the work to be removed, repeated, opened or altered so proper inspections can be performed. The cost of the added work shall be the responsibility of the Permittee.

   Stage 1 Compaction and preparation of embankments, excavations and subgrade.

   Stage 2 Excavation

   a. Construction of forms for all concrete structures, including curbs and gutters.
   b. For storm drains, culverts, and utilities

   Stage 3 Placing

   a. Concrete in structures.
   b. Bedding materials, and bedding material over pipes.
   c. Water pipes, recycled water pipes, sewer lines, storm drains and culvert pipes.

   Stage 4 Backfilling for structures, pipes, and utilities.

   Stage 5 Construction of roadside ditches and other drainage ways.

   Stage 6 Base

   a. Placing and compacting of base material.
   b. If more than one course or type of base or subbase is to be used, approval shall be necessary for each course and/or type.

   Stage 7 Placing of pavement or surfacing.

   Stage 8 Final clean-up.

10. **Rejecting Work:** The Permittee, or authorized agent, shall be in charge of all phases of work. The Permittee will comply with the request to repair, replace or remove defective work that is rejected by Town staff at the Permittee's expense.

11. **Storage of Material:** No materials shall be stored in the street or within eight (8) feet from the edge of the traveled way, unless allowed by Town staff. Materials in the right-of-way may be removed by Town staff at the Permittee's expense.

12. **Maintenance:** The Permittee agrees to exercise reasonable care to maintain the public right-of-way in the area of work. Any damage to public right-of-way; including: street, curb, gutter, sidewalk, landscaping, irrigation, etc caused by work as permitted under the Encroachment Permit shall be repaired, replaced or removed to the satisfaction of the Town Staff at the Permittee's expense.

13. **Damage to Public Right-of-Way due to work performed or failure to perform work under the Encroachment Permit:** The Permittee is liable for all property damage to the Town public right-of-way which may arise out of work performed as permitted under the Encroachment Permit, or which may arise out of failure, on the Permittee's part, to perform their obligations under this Encroachment Permit.

    If the Permittee does not repair, replace or remove damage to the Town's public right-of-way because of work performed or for failure to perform work under the Encroachment Permit, as directed to do so by the Town Inspector and under the specified time period the Town Inspector has requested, then the Town may perform the required repair, replacement or removal of the damaged or incompleted work at the cost incurred by the Town including 100 percent of the administrative and overhead costs associated with such work. This cost shall be paid by the Permittee within 30 days of Permittee's receipt of the invoice for said repair, replacement or removal of damaged or incomplete work to Town property.

14. **Revocation of Encroachment Permit:** This Encroachment Permit may be immediately revoked by Town staff for reasons that are in the best interest of the Town for violation of permit conditions or for the creation of a nuisance. Upon notice given of such revocation, the applicant shall immediately cease all operations and restore Town right-of-way as directed by Town staff. After notification, the Town of Windsor may take full possession of the area. The permittee shall pay the cost incurred by the Town, including 100 percent of administrative and overhead costs, associated in restoration, repair and/or removal of materials to return the public right-of-way to original condition as approved by Town staff. This cost shall be paid by the Permittee within 30 days of Permittee's receipt for the invoice of said work.

15. **Repair of Town Facilities:** Resources must be available on the project site to repair any breaks or damage that may occur to existing Town utility facilities (sewer, water, recycled water and storm drains) during the term of this project.

16. **Clean Up Public Right-of-Way:** Upon completion of the work, debris and material shall be entirely removed and the public right-of-way cleaned and shall be left in as a presentable condition as before work started. The Town Inspector shall approve clean up before accepting the work as complete.

17. **Conflicting Construction:** When construction permitted under this Encroachment Permit falls within the limits of a Town of Windsor construction project, the Town of Windsor construction project has precedence. Work on this encroachment shall be coordinated with the Town of Windsor construction project so as not to create any conflict with the said project or this permit will be revoked.

18. **Disposal of Excavated Materials:** A haul route may be required by Town staff for disposal of excavated materials. If the disposal site is within the Town Boundary then a disposal site agreement shall be approved by Town staff. If the disposal is outside of Town Boundary then only a haul route may be required by Town staff.

D. Traffic Control

1. **Traffic Control:** Permittee shall furnish and install all traffic and warning signs, barricades, etc., in accordance with the latest edition of the "Town of Windsor: Construction Traffic Control Procedures on Town Streets" manual.

2. **Signing:** No work shall commence until traffic control signing has been installed in accordance with the approved traffic control plan.

3. **Sign Encroachment Permits:** Permittee shall obtain any State or County Encroachment Permits, and/or public utility or private property permission for the placement of signs, as applicable.

4. **Detour Plan:** Detour plan(s) shall be submitted to the Town staff for review and approval. No

detours shall be conducted without prior written approval from the Town.

5. **Sign Posting:** All signs shall be post mounted unless Town staff approves otherwise. Attaching signs to existing Town signs, posts, light poles, or traffic signals is not permitted.
6. **Additional Signs:** Town staff may require the Permittee to install additional signs as required for public safety.
7. **Existing Public Signs:** Relocation or removal of existing public signs shall not occur until approval has been obtained from the Town staff.
8. **Special Conditions:** Special Conditions may be imposed at specific locations during peak hour traffic as noted on the Encroachment Permit.

E. **Boring, Excavation, Backfill and Pavement**

1. **Pavement Cuts:** Pavement cuts shall be performed per STD 115 of the Town of Windsor Design and Construction Standards latest edition.
2. **Trenchless technology (boring):** Town staff shall require the use of boring if it is in the best interest of the Town, it is technically, commercially, and economically feasible; and it is not in violation of federal or state regulations or industry safety standards.
    a. Prior to construction, all existing underground public facilities within five feet of the boring shall be physically located (pot holed).
    b. Construction shall be made in such a manner that will minimize interference with vehicular traffic. Unless otherwise approved by Town staff, the location of the boring pits shall be a minimum of three feet from the roadway to prevent undermining of the curb, gutter, or shoulder section and the pit shall be dug to a depth sufficient to maintain a minimum boring depth of 42 inches below the traffic surface. Jetting types of boring equipment are not allowed.
    c. Bore pits or trenches shall be secured adequately to protect the public while left open. All overcutting shall be remedied by pressure grouting the entire length of the installation.
    d. The pits or trenches excavated to facilitate boring shall be backfilled and compacted immediately after work is completed.
    e. The contractor shall have the ability to locate the bore head upon request by Town staff.
3. **Pothole Restoration:** Potholes to be sawcut around the entire failing area, excavated, and base repaired using fresh base. Then proper placement of the asphalt. Base and Asphalt per Town of Windsor design specifications.
4. **Crossing Roadway:** Service and other small diameter pipes shall be jacked or otherwise forced underneath pavement without disturbing the pavement. Pavement or roadway shall not be cut unless specifically permitted by Town staff. Service pipes will not be permitted inside of any culvert pipes used as drainage structures.
5. **Trench Backfill:** Trench backfill and backfill materials shall conform per STD 115 of the Town of Windsor Design and Construction Standards latest edition.
6. **Temporary Patching:** The Contractor shall continually maintain the patch, at the contractor's expense, as directed by Town Staff, until the final pavement is placed. Temporary paving shall be completely removed prior to final paving.
    a. Unless installing permanent paving, temporary paving shall be placed at the end of each work day. Temporary pavement shall be 1½-inch minimum thickness and shall be replaced within ten working days with permanent pavement.
    b. Open trench must be backfilled and capped with at least 2" of cold mix asphalt or metal plated according to Town specifications during non-working hours. Metal plates are required to have

cold mix asphalt ramps at all edges and must be maintained.

c. Temporary patching of trench is required on lateral cuts in surfaced streets immediately after backfilling. After completion of the refilling and compacting of the backfill material in the excavation as specified and the removal of the obstruction, the permittee shall promptly replace with temporary or permanent patching material or repair any portion of the road surface removed or damaged by the excavation, obstruction or construction operations to the satisfaction of Town staff. Temporary patching material may be left in place for up to 10 working days.

d. Hot patch is required at high traffic areas, such as intersections, or in harsh weather. Town staff determines such.

7. **Final Paving:** The Contractor shall apply the final paving no later than ten (10) working days after traffic is allowed to pass over the work area. Failure to do so will require the Town Forces to perform the paving work at the cost incurred by the Town including 100 percent of the administrative and overhead costs associated with such work. This paving cost shall be paid by Permittee within thirty (30) days of Permittee's receipt of invoice of such paving costs. Permittee shall restore the roadway to its preconstruction condition unless otherwise directed by Town staff.

F. **Public Safety**

In addition to any other measures taken by the Contractor pursuant to the latest adopted provisions of the Standard Specifications of the State of California Department of Transportation regarding "Public Safety" the Contractor shall install temporary railing (Type K) between any lane carrying public traffic and any excavation, obstacle, or storage area when one of the following conditions exist.

1. **Excavations:** Any excavation with the near edge which is 12 feet or less from the edge of the lane, except:

   a. For excavations covered with steel trench plates or concrete covers in accordance with the latest adopted provisions of the Standard Specifications of the State of California Department of Transportation, to prevent accidental entry by traffic or the public.

   b. For excavations in side slopes, where the slope is less than 4:1.

   c. For excavations protected by an existing barrier or railing.

2. **Temporarily Unprotected Permanent Obstacles:** Whenever the work includes the installation of a fixed obstacle together with a protective system, such as a sign structure together with protective railing, and the Contractor elects to install the obstacle prior to installing the protective system; or whenever the Contractor, for his convenience and with permission of the Town Engineer, removes a portion of an existing protective railing at an obstacle and does not replace such railing complete in place during the same day.

3. **Storage Areas:** Whenever material or equipment is stored within 12 feet of the lane and such storage is not otherwise prohibited by the specifications.

G. **ADA Requirements**

1. **Pedestrian Traffic and the ADA:** Temporary paving in areas subject to pedestrian traffic shall be compliant with the latest ADA regulations and shall be constructed with non-slip surfaces.

   The Americans with Disabilities Act (ADA) is a civil rights law which mandates equal opportunity for individuals with disabilities. The Title II of the ADA prohibits discrimination in access to public facilities, this includes, but not limited to, pedestrian access on sidewalks and streets, including crosswalks, curb ramps, parking and other components of the right of way in the accessible route of travel.

   All work within the public right of way must comply with the requirements of the Americans with Disabilities Act (ADA). If the work in the public right of way affects pedestrian access, the permitee

of the Encroachment Permit is required to provide a compliant accessible route of travel including proper signage at the pedestrian access. The temporary accessible route of travel shall be inspected and approved by the Town of Windsor's ADA coordinator prior to work commencing.

H. **Drainage**

1. **Maintenance of Drainage:** Work performed under the Encroachment Permit shall not interfere with the established drainage. The Contractor shall maintain drainage through the work area. Such work shall include but not be limited to keeping all culverts and inlets clean and open. Natural drainage entering the work site shall not be obstructed in any way. The Contractor shall take any and all measures necessary to prevent the flow of silt and debris from leaving the work site. Any silt and debris accumulation in drainage facilities off the work site due to the construction shall be removed immediately.

2. **Storm Water Guidelines:** All construction shall conform to the requirements of the State of California, Construction Activities Storm Water General Permit 2009-0009-DWQ, effective July 1, 2010 and including subsequent amendments thereto, to Town Ordinance 2008-246, 2008-249, 2010-261 and subsequent revisions and if applicable, to the City of Santa Rosa and County of Sonoma Storm Water Low Impact Development Technical Design Manual, dated August 2011 and adopted by the Town of Windsor on December 31, 2014,including any subsequent manual updates.

I. **Tree Protection**

1. **Removal or trimming of trees:** Removal or trimming of protected trees requires Town of Windsor planning approval; refer to the Town of Windsor Code – Title XVII, Zoning, Chapter 27.36 – Tree Preservation and Protection.

2. **Tree Protection in the Work Area:** The contractor shall follow any conditions imposed on the Encroachment Permit regarding Tree Protection in the area of work.

J. **Work Hours**

1. **Work Hours permitted:** Unless approved otherwise, working hours shall be between 7:00 a.m. and 5:00 p.m. Monday through Friday.

2. **Work on Weekends and Holidays:** Unless approved otherwise, no work shall be performed on weekends or holidays.

Appendix F – Video and Spinner Log Reports

WATER WELL VIDEO REPORT

Espoti Supply Well

City of Windsor

West Coast Well Logging Services

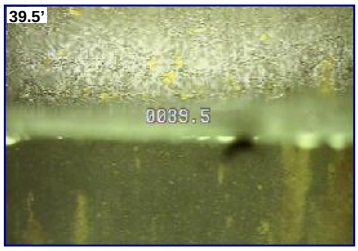
P.O.Box 2797 Rancho Cordova, CA. 95741

Phone: 916-224-3810 Fax: 916-858-8174 Web: www.wcwls.com

Client: Weeks Drilling & Pump, Inc.
Survey Date: April 18, 2016
Address: P.O.Box 176
Invoice No.: 1287
Run: One
City: Sebastopol, CA 95473
P.O.:
Van: WC-1
County: Sonoma
Operator: Mark F. Sharpless
Requested By: Josh
Type Camera: CCV Color Flip Camera - Short L.H.
Copy To:
Latitude: 38.52654°
Longitude: 122.77948°
Reason For Survey: General Inspection
Section: 19
TWP: 8N
Range: 8W
Location: Shilo & Old Redwood Hwy.
Field: Windsor
Other Information:

CASING INFORMATION		DEPTHS (SideScan)	VIDEO OBSERVATIONS
Stainless Steel Screen	**Well Depth**	0.0 Ft.	Recording Starts - Zeroed on SideScan Lens
384-423 Ft.	656 Ft.	39.5 Ft.	Static Water Level (SWL)
434-453 Ft.		160.8 Ft.	Visible cement leakage at casing joint
464-473 Ft.	**S.W.L**	382-383 Ft.	Dielectric Joint
484-513 Ft.	39.5 Ft.	383.5 Ft.	Perforations, Top Of Screen (384-423)
549-569 Ft.		433.7 Ft.	Perforations, Top Of Screen (434-453)
620-656 Ft.		463.8 Ft.	Perforations, Top Of Screen (464-473)
		483.9 Ft.	Perforations, Top Of Screen (484-513)
		549.2 Ft.	Perforations, Top Of Screen (549-569)
		620.2 Ft.	Perforations, Top Of Screen (620-659)
		656.4 Ft.	Downview of soft fill, still in screen
	10" I.D. Casing		
	0-656 Ft.		
Zero Datum	Type: Steel		
Top Of Casing			
Dia. Reference			
Measured			
Casing Buildup			
Moderate			

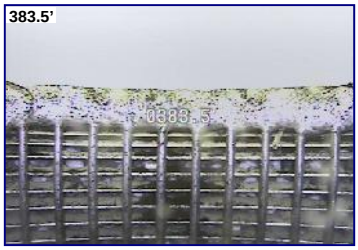


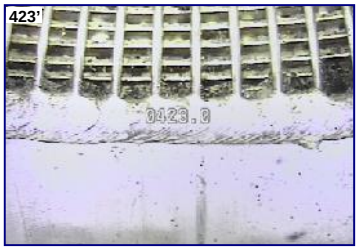


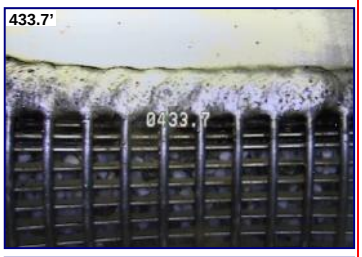


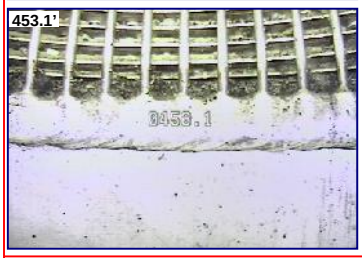


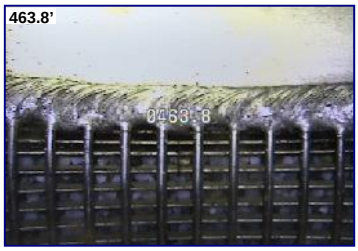




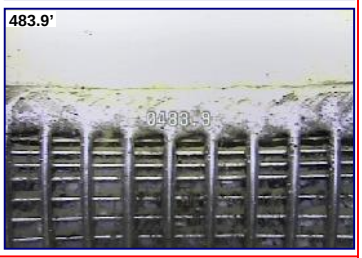












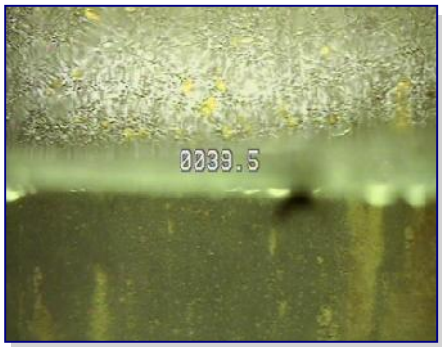
Notes:

WELLBORE SNAPSHOT(S)

Depth: 0 Feet



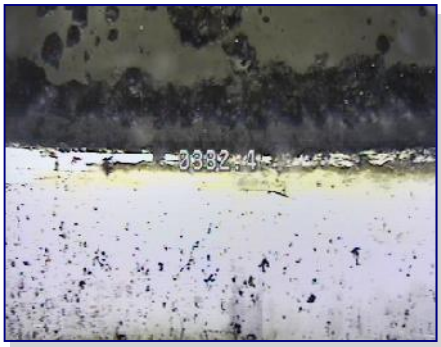
Depth: 39.5 Feet



Depth: 160.8 Feet



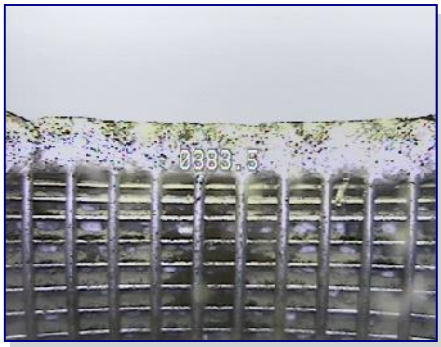
Depth: 382.4 Feet



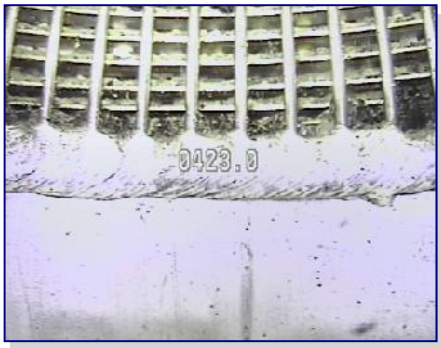
Depth: 383.2 Feet



Depth: 383.5 Feet



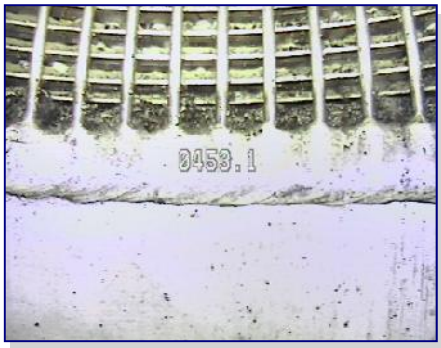
Depth: 423 Feet



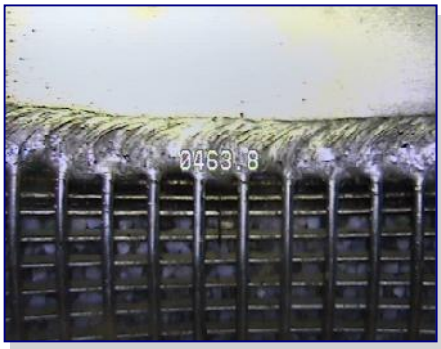
Depth: 433.7 Feet



Depth: 453.1 Feet



Depth: 463.8 Feet



Depth: 473.2 Feet



Depth: 483.9 Feet



WATER WELL VIDEO REPORT

Espoti Supply Well

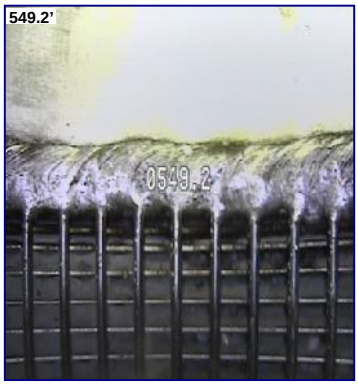
City of Windsor

West Coast Well Logging Services

P.O.Box 2797 Rancho Cordova, CA. 95741
Phone: 916-224-3810 Fax: 916-858-8174 Web: www.wcwls.com

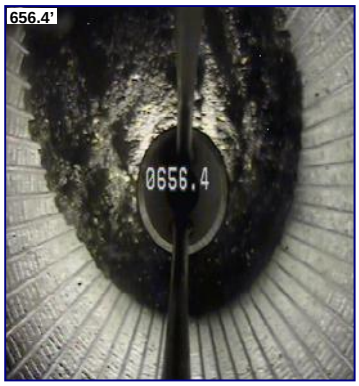
CASING INFORMATION		DEPTHS (SideScan)	VIDEO OBSERVATIONS
Stainless Steel Screen	**Well Depth**		Additional snapshots
384-423 Ft.	656 Ft.		
434-453 Ft.			
464-473 Ft.	**S.W.L**		
484-513 Ft.	39.5 Ft.		
549-569 Ft.			
620-656 Ft.			
	10" I.D. Casing		
	0-656 Ft.		
Zero Datum	Type: Steel		
Top Of Casing			
Dia. Reference			
Measured			
Casing Buildup			
Moderate			







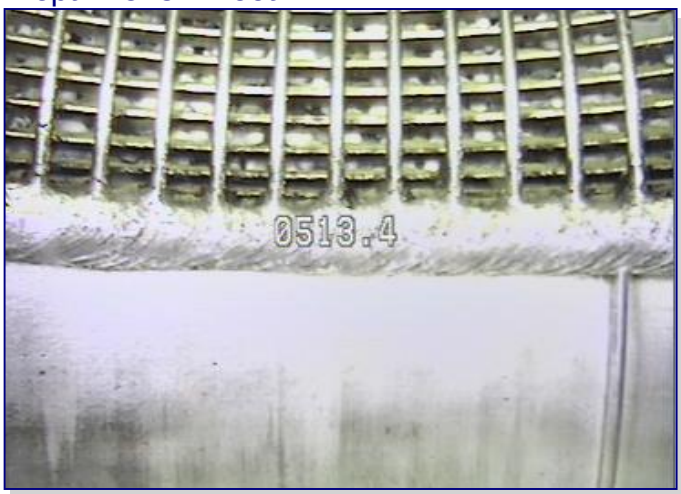




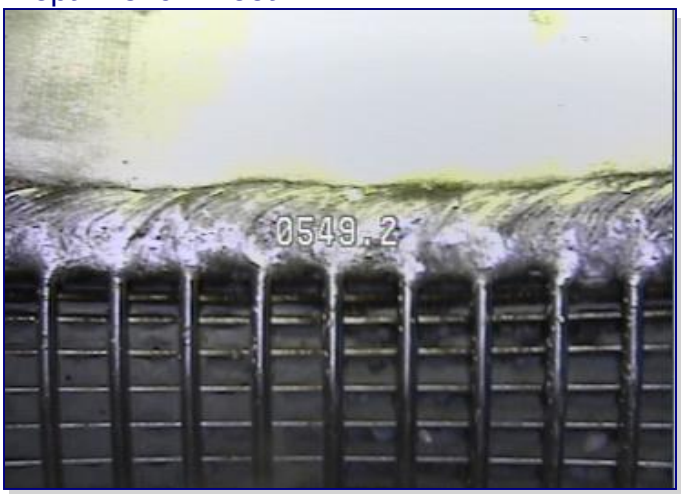
Notes:

WELLBORE SNAPSHOT(S)

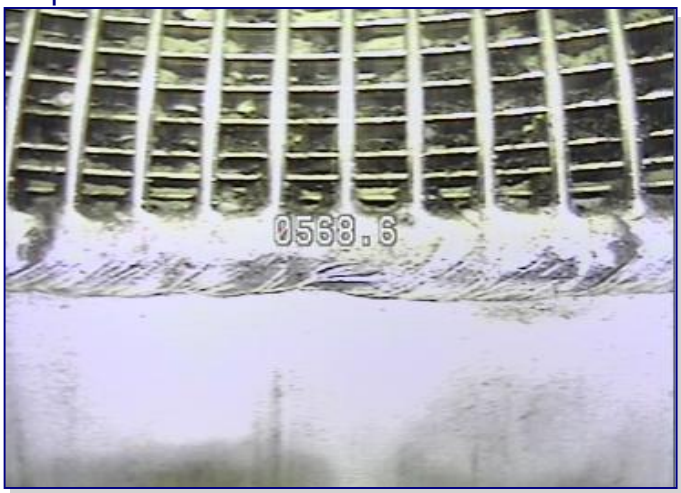
Depth: 513.4 Feet



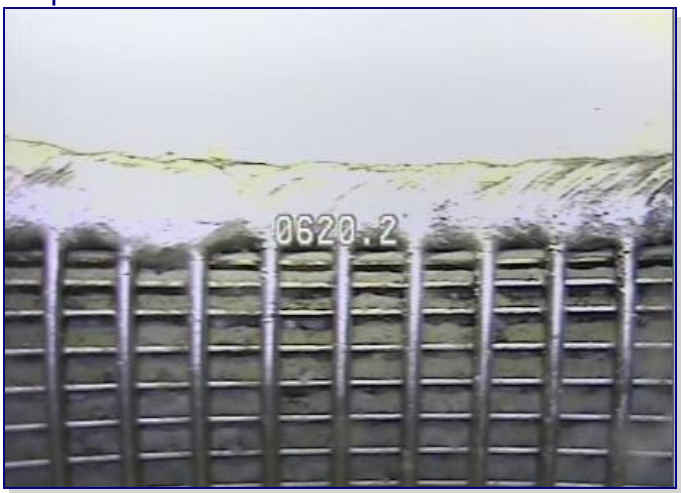
Depth: 549.2 Feet



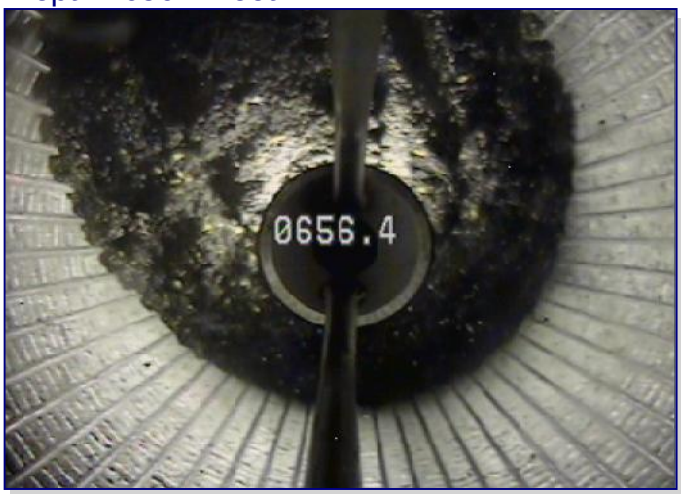
Depth: 568.6 Feet



Depth: 620.2 Feet



Depth: 656.4 Feet



STATIC SPINNER LOGS

WEST COAST WELL LOGGING SERVICES
GEOPHYSICAL & VIDEO LOGGING
P.O.Box 2797, Rancho Cordova CA 95741 · Phone: 916-858-8148 Fax: 916-858-8174 · Web: www.wcwls.com Email: wcwls@sbcglobal.net

Filing No.

COMPANY **Weeks Drilling & Pump Co., Inc.**

WELL **Espoti Supply Well**

FIELD **Windsor**

STATE **California** COUNTY **Sonoma**

LOCATION:
Shilo Rd. & Old Redwood Hwy.

OTHER SERVICES:
Video

Job No.
1287

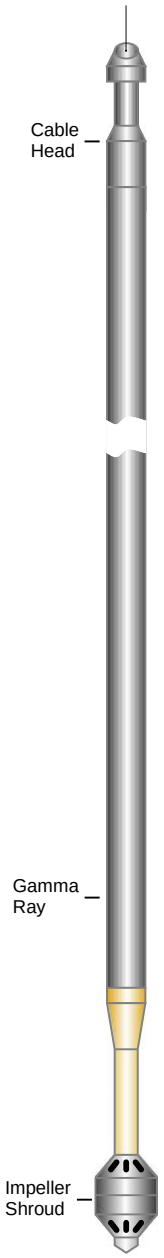
SEC: **19** TWP: **8N** RGE: **8W** LAT.: **38.52654** LONG.: **122.77948**

Permanent Datum: **Ground Level** Elev.: **155** Ft. Elevs.: K.B. ____ Ft.
Log Measured From: **Top of Casing** , **0** Ft. Above Perm. Datum D.F. ____ Ft.
Drilling Measured From: **Ground Level** G.L. **155** Ft.

Date	**Apr 18, 2016**			
Type Log	**Spinner**			
Run	**One**			
Depth-Driller	**685** Ft	Ft	Ft	Ft
Depth-Logger	**656** Ft	Ft	Ft	Ft
Top Logged Interval	**0** Ft	Ft	Ft	Ft
Btm Logged Interval	**650** Ft	Ft	Ft	Ft
Type Fluid In Hole	**Water**			
Fluid Level	**39.5** Ft	Ft	Ft	Ft
Max Temp	**n/a** °F	°F	°F	°F
Operating Rig Time	**n/a** °Hr	°Hr	°Hr	°Hr
Van No. / Location	**WC-1** / **RC**			
Recorded By	**Sharpless**			
Witnessed By	**K. O'Brian**			

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT SIZE	FROM	TO	CASING SIZE	CASING TYPE	FROM	TO
1	In	Ft	Ft	**10** In		**0** Ft	**685** Ft
2	In	Ft	Ft	In		Ft	Ft
3	In	Ft	Ft	In		Ft	Ft

STATIC SPINNER LOGS TOOL



SPINNER LOGS:

Spinner logs are used to quantify flow (up or down) in a water well. In a producing water well, the spinner log is usually run downwards at a constant speed. Deflections in the curve are indicative of water entry. Proper calibrations, eliminating the effective of line speed, will quantify the flow rate from zones of interest.

SPINNER SPECIFICATIONS:

Diameter	1.77, 2.76, or 3.94 Inches
Length	5.5 Feet
Weight	16.1 Lbs.
Max. Temp	158° F
Gamma Ray	1.97 inches long x .98 inches diameter Scintillation crystal

MISCELLANEOUS INFORMATION

Type Of Well: Producing

Spinner Info			Screen	
FPM	**Direction**	**Line Style**	**From**	**To**
30	Down	_____	384 Ft.	423 Ft.
31	Up	. . . .	434 Ft.	453 Ft.
			464 Ft.	473 Ft.
			484 Ft.	513 Ft.
			549 Ft.	569 Ft.
			620 Ft.	656 Ft.

NOTICE

All interpretations are opinions based on inferences from electrical and other measurements and we do not guarantee the accuracy or correctness of any verbal or written interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by one of our officers, agents or employees. These interpretations are also subject to our General Terms and Conditions as set out in our current Price Schedule.

REMARKS

West Coast Well Logging Services - P.O.Box 2797 - CA - 95741 Fax: 916-858-8174 Phone:916-858-8148

Weeks Drilling & Pump Co., Inc.
Espoti Supply Well
Apr 18, 2016

STATIC SPINNER LOGS

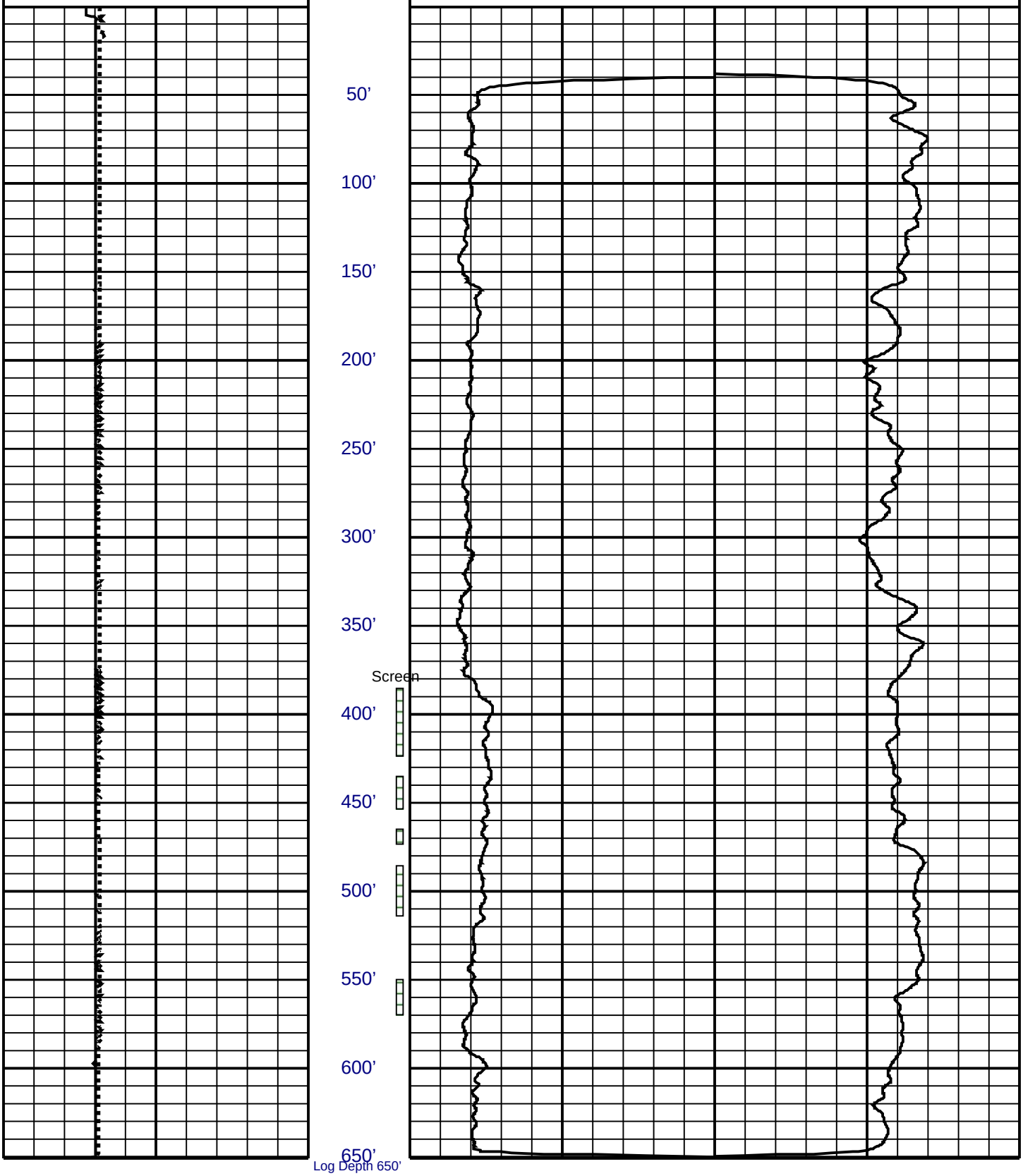
Single Page

DEPTHS
(Feet)

0 Line Speed Run 2 (fpm) 100

0 Line Speed Run 1 (fpm) 100

-600 Spinner Log Run 1 (rpm) -300 300 Spinner Log Run 2 (rpm) 600



Log Depth 650’

GHD Job 11110001

FIELD REPORT

DATE: 8/23/2016	LOCATION: Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Supply Well	JOB NO: 11110001.20
EVENT: Spinner Log - sewer check	WEATHER/TEMP: 65 ° at am/10:00 ° at pm
PRESENT AT SITE: Meeks, Kent Olsen	

THE FOLLOWING WAS NOTED:

10 AM - Meeks on-site pump installed suction (pump intake @ 220

Explained to Josh that packer inflation is to be 225 psi not 275

Samples to be collected 1, 5, 60 & End (4 hours)

11:05: Town arrives for Traffic control, open S130-S130A

Start pump 11:20 start

11:21 First sample 15:21 4th Last

11:26 second sample

12:21 3rd sample

11:39 - Town closes sewer lid & leaves - checked flow at S130 where Shiloh Rd & Old Redwood Hwy sewers cross Flow O.K.

11:55: spinner log truck arrived - West Coast

12:25 (approx) set up spinner

13:20 got spinner data print out

DATE: ~~5/10/2016~~ 8/23/2016	LOCATION: : Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Supply Well	EVENT: Zone Test - Spinner log

Estimations based on field interp.

370 1625 RPM = 400 gpm = 100%

1 screen 38.5% 154 gpm 38.5%

429 1000 RPM

2 screen 0% 0 gpm 0%

459 1000 RPM

3 screen 0% 0 gpm 0%

477 1000 RPM

4 screen 20% 80 gpm 20%

535 675 RPM

5 screen 41% 164 gpm 41%

575 0 RPM

6 screen 0% 0 gpm 0%

Screen

1	154 gpm	38.5%
2	0 gpm	0%
3	0 gpm	0%
4	80 gpm	20%
5	164 gpm	41%
6	0 gpm	0%

Start Flow meter 065600 x 100 gallons

End Flow meter 066620 x 100 gallons

96000 gallons pumped

PUMPING WELL

Drawdown Sheet

Kent OBrien 8/23/2016

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Measured Well	Owner: Town of Windsor		Well ID: Esposti Supply Well	
	Location: Esposti Park		Name/Site:	
Pumped Well	Owner: Town of Windsor		Well ID: Esposti Supply Well	
	Location:		Name/Site:	
Test Details	Date pumping commenced:		Time:	Test No.
	Date pumping ceased:		Time:	

Are Measurements below for the pumped well? yes Distance from pumped well (ft): NA

Static DTW ..... Feet below measuring point

Measuring Point..... Feet above/below ground level

Watch Time	Elapsed Time (min)	Calculated drawdown (ft) (DTW - Static)	Measured DTW (feet) below measuring point	Discharge (gpm) Only if pumped well	Comments or pressure measurements from transducer
11:20			56.50	400	
11:24			103.3	400	
11:34			111.0	400	
11:47			115.75	400	
12:17			120.30	400	
~~12:43~~ 13:13			124.50	400	
14:15			127.40	400	
15:18			129.20	400	
					4 hour specific
					capacity =
					5.59 gpm/ft

GHD | MANAGEMENT ENGINEERING ENVIRONMENT

Parameter Record

Well ID: Esposito Supply well

Job Information		Sampling Information		Well Information	
Client:	Town of Windsor	Sample Method:	direct from pump	SWL: 56.5 ft	Check:
Project:		WQ Meter Type:		Date: 8/23/216	Time: 11:20
		Flow Cell:	Pump Depth: 220 mft	Ref.datum: TOC	Stick Up:
Proj. No.:	11110001	WLevel Meter Type:	intake ft N. packer	Well Depth: NM ft	Well Diam.: 10 ft
Sampler:	Kent O'Brien			Screen From: ft	To: ft

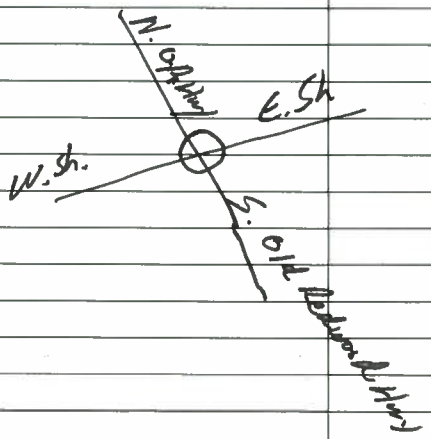
Time (.....)	Temp (°C)	pH (pH units)	Elec.Cond (µS/cm)	TDS (mg/L)	Dis.Oxygen (.....)	Ox-Red Pt. (± mV)	Note	Note	Comment: Colour, turbidity, sediment load, sheen, odour
Stable When:		+/- 0.2 C	+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV			
11:21	25.9	7.29	523.8	359.4		-138			start at 11:20
11:26	27.7	7.30	499.2	340.1		-92			
11:29	27.7	7.33	500.1	340.6		-71			clear - slight very fine sediment
11:41	27.0	7.36	501.4	342.0		-56			clear - very slight fines
11:49	26.6	7.37	504.6	344.5		-44			
12:06	26.9	7.38	506.6	345.3		-20			no sand
12:21	26.6	7.35	507.8	347.6		-41			
13:13	27.7	7.36	505.5	344.4		-30			27.7°C no odor no sand
14:23	26.5	7.38	515.6	352.7		-2			2nd opinion on odor - yes light sulfur
14:40	26.9	7.41	517.6	355.6		+1			orp not stable +17 to -23
15:07	26.4	7.23	518.4	354.7		-29			water musty - no change from start
15:21	26.8	7.34	516.3	352.5		-34			End
									400 gpm pumping to
									Selma For 4 hours
									11:20 to 13:21

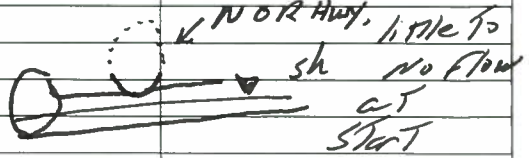
FIELD REPORT

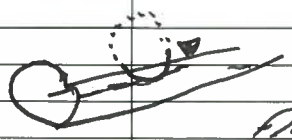
DATE: 8/23/2016	LOCATION: Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Well	JOB NO: 11110001.20
EVENT: Sewer Flow Test and Observations	WEATHER/TEMP: ° at am ° at pm
PRESENT AT SITE: Kent O'Brien	

DATE: ~~dd/mm/yr~~ Aug 23 2016

Time: use 24 hour time record at 15 min intervals or more freq.	Manhole number/description	Observed flow as a % of full pipe	Other observations
1115	S130	10% 0 spm pump	
1122	S130	45% 400 spm	20% going ORH
1132	S130	50% 400 spm	
Pump Start: 11:20			
by KOB!			







20% of total flow going down N. OR. Hwy

O'Brien, Kent

From: O'Brien, Kent
Sent: Wednesday, August 24, 2016 5:50 AM
To: Elizabeth Cargay (ecargay@townofwindsor.com)
Cc: Dave Vossler (dave.vossler@ghd.com); ryan.crawford@ghd.com
Subject: 8/23/2016 Esposti Supply Well discharge to sewer volume report

Elizabeth – sewer discharge summary is below:

Non-Residential One-Time Discharge Permit
Permit number - TD-04152016
Effective Date - 04/15/2016
Expiration Date- 12/31/2016

Date of discharge – **8/23/2016**
Point of discharge – sewer manhole S130A (Shiloh and Old Redwood Hwy)
Total gallons **discharged – 96,000 gallons**

Kent O'Brien PG, CEG

Senior Associate | Hazen and Sawyer
201 Mission Street, Suite 500, San Francisco, CA 94105
628-242-0050 (direct) 707-478-9559 (cell) 628-242-0042 (main)
41828 (VOIP Extension)
kobrien@hazenandsawyer.com | hazenandsawyer.com

SPINNER INTERPRETATAION

WEST COAST
WELL LOGGING SERVICES
GEOPHYSICAL & VIDEO LOGGING

P.O.Box 2797, Rancho Cordova CA 95741 · Phone: 916-858-8148 Fax: 916-858-8174 · Web: www.wcwls.com Email: wcwls@sbcglobal.net

Filing No.

COMPANY Weeks Drilling & Pump Co., Inc.

WELL Espoti Supply Well

FIELD Windsor

STATE California COUNTY Sonoma

LOCATION:
Old Redwood Hwy. & Shilo Rd.

OTHER SERVICES:
Stops

Job No.
1425

SEC: 19 TWP: 8N RGE: 8W LAT.: 38.52649 LONG.: 122.77953

Permanent Datum: Ground Level Elev.: 150 Ft. Elevs.: K.B. ____ Ft.
Log Measured From: Top of Casing 0 Ft. Above Perm. Datum D.F. ____ Ft.
Drilling Measured From: Ground Level G.L. 150 Ft.

Date	Aug 23, 2016			
Type Log	Spinner			
Run	One			
Depth-Driller	575 Ft	Ft	Ft	Ft
Depth-Logger	575 Ft	Ft	Ft	Ft
Top Logged Interval	300 Ft	Ft	Ft	Ft
Btm Logged Interval	575 Ft	Ft	Ft	Ft
Type Fluid In Hole	Water			
Fluid Level	122 pwl Ft	Ft	Ft	Ft
Max Temp	n/a °F	°F	°F	°F
Operating Rig Time	n/a °Hr	°Hr	°Hr	°Hr
Van No. / Location	WC-1 / RC			
Recorded By	Sharpless			
Witnessed By	J. Moore			

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT SIZE	FROM	TO	CASING SIZE	CASING TYPE	FROM	TO
1	In	Ft	Ft	10 In		0 Ft	656 Ft
2	In	Ft	Ft	In		Ft	Ft
3	In	Ft	Ft	In		Ft	Ft

SPINNER INTERPRETATAION TOOL



SPINNER LOGS:

Spinner logs are used to quantify flow (up or down) in a water well. In a producing water well, the spinner log is usually run downwards at a constant speed. Deflections in the curve are indicative of water entry. Proper calibrations, eliminating the effective of line speed, will quantify the flow rate from zones of interest.

SPINNER SPECIFICATIONS:

Diameter	1.77, 2.76, or 3.94 Inches
Length	5.5 Feet
Weight	16.1 Lbs.
Max. Temp	158° F
Gamma Ray	1.97 inches long x .98 inches diameter Scintillation crystal

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REMARKS

A recreational GPS accurate to +/- 45 feet set for Datum WGS84 was used to calculate Latitude, Longitude, and Elevation values.

Bottom of well blocked by debris

West Coast Well Logging Services - P.O.Box 2797 - CA - 95741 Fax: 916-858-8174 Phone:916-858-8148

SPINNER INTERPRETATAION

Weeks Drilling & Pump Co., Inc.
Espoti Supply Well
Aug 23, 2016

Single Page

DEPTHS
(Feet)

0 Spin 3(rpm) 3000
0 Spin 2(rpm) 3000
0 Spin 1(rpm) 3000

0 Bar Graph(gpm) 500

0 Pumping Profile(gpm) 500
0 Normalized Spinner Log (gpm) 500

350'

400'

450'

500'

550'

Screen
- 423'

Screen
- 453'

Screen
- 473'

Screen
- 513'

Screen
- 569'

10" Ca
900'

Tota

93.8 GPM Entry

37.9 GPM Entry

12.6 GPM Entry

10.6 GPM Entry

87.4 GPM Entry

113.8 GPM Entry

Log Depth 575'

alpha
Alpha Analytical Laboratories Inc.
www.alpha-labs.com
WATERS, SEDIMENTS, SOLIDS

Corporate Laboratory
208 Mason Street, Ukiah, CA 95482
707-468-0401 F) 707-468-5267
clientservices@alpha-labs.com

Bay Area Laboratory
6398 Dougherty Road, #35, Dublin, CA 94568
925-828-6226 F) 925-828-6309

Central Valley Laboratory
9090 Union Park Wy., #113, Elk Grove, CA 95624
916-686-5190 F) 916-686-5192

Work Order
Chain of Custody Record

Lab No._____ Page_____of_____

Name: Town of Windsor - Drinking Water	**Project ID:** Source Chemical
Mailing Address: 9291 Old Redwood Highway Building 400, Windsor, CA 95492	**Phase:** Esposti Well
Project Contact (Hardcopy or PDF to): Elizabeth Cargay ecargay@townofwindsor.com and To kobrien@hazenandsawyer.com Kent O'Brien, Hazen and Sawyer	**PO#**
	Bill to: month end billing

Signature below authorizes work under terms stated on reverse side.

Analysis Request

TAT: 24 hr ○ 48 hr ○ (Lab Approval Required) — 1 wk ○ — 2 wk (standard) ○ — Lab Approval Required For Rush

Field Sampler - Print Name & Signature / Sample Identification	Sample Collection Date	Time	Container: 40ml VOA	Poly	Amber	Glass	Preservative: HCL	HNO3	NH4Cl	Other	None	Matrix: Water	Soil	200.8 As	200.7 Fe	200.7 Mn	TAT
~~Esposti Well~~	~~8/23~~			x				x				x		x	x	x	
ESW-8-23-11:21	8/23	11:21		x				x				x		x	x	x	↑
ESW-8-23-11:26	8/23	11:26		x				x				x		x	x	x	Standard
ESW-8-23-12:21	8/23	12:21		x				x				x		x	x	x	↓
~~ESW-8-23-13:21~~	8/23	~~13:21~~		x				x				x		x	x	x	48 hr.
ESW-8-23-15:21	8/23	15:21															

Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time

CDPH Write On EDT Report? Yes ○ No (X)

State System Number:

CA Geotracker EDF Report Yes ○ No (X)

Sampling Company Log Code:

Global ID: EDF to (Email Address)

Travel and Site Time:	Mileage:	Misc. Supplies:

send results to:
ecargay@townofwindsor.com
~~kent~~ kobrien@hazenandsawyer.com

Appendix G – May 5, 2016 Downhole Video Report

WATER WELL VIDEO REPORT

Espoti Supply Well

City of Windsor

West Coast Well Logging Services

P.O.Box 2797 Rancho Cordova, CA. 95741

Phone: 916-224-3810 Fax: 916-858-8174 Web: www.wcwls.com

Client:	Weeks Drilling & Pump, Inc.	Survey Date:	May 4, 2016
Address:	P.O.Box 176	Invoice No.:	1308 Run: Two
City:	Sebastopol, CA 95473	P.O.:	Van: WC-1
County:	Sonoma	Operator:	Mark F. Sharpless
Requested By:	Josh	Type Camera:	CCV Color Flip Camera - Short L.H.
Copy To:		Latitude:	38.52654° Longitude: 122.77948°
Reason For Survey:	Possible damage	Section:	19 TWP: 8N Range: 8W
Location:	Espoti Park, Old Redwood Hwy. & Shilo		
Field:	Windsor		
Other Information:			

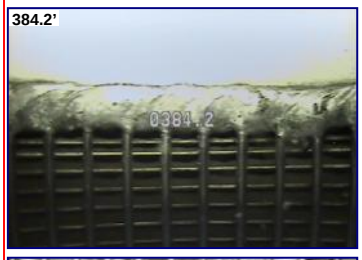
CASING INFORMATION		DEPTHS (SideScan)	VIDEO OBSERVATIONS
Stainless Steel Screen	**Well Depth**	0.0 Ft.	Recording Starts - Zeroed on SideScan Lens
384-424 Ft.	665 Ft.	40.4 Ft.	Static Water Level (SWL)
434-454 Ft.		374.7 Ft.	Small hole in the scale, not the casing
465-474 Ft.	**S.W.L**	382-384 Ft.	Dielectric Joint
485-514 Ft.	40.4 Ft.	383.0 Ft.	Top of Stainless steel
550-569 Ft.		384.2 Ft.	Perforations, Top Of Screen (384-424)
621-654 Ft.		433.6 Ft.	Shipping label on casing wall
		434.4 Ft.	Perforations, Top Of Screen (434-454)
		464.5 Ft.	Perforations, Top Of Screen (465-474)
		484.8 Ft.	Perforations, Top Of Screen (485-514)
		549.9 Ft.	Perforations, Top Of Screen (550-569)
		571.9 Ft.	Top of bailer cable
	10" I.D. Casing	599.4 Ft.	Shipping label on casing wall
	0-665 Ft.	620.9 Ft.	Perforations, Top Of Screen
Zero Datum	Type: Steel	654.1 Ft.	Well plugged screen, camera is stopped on the top of the bailer
Top Of Casing			End of in hole survwy
Dia. Reference			
Measured			
Casing Buildup			
Very Heavy			











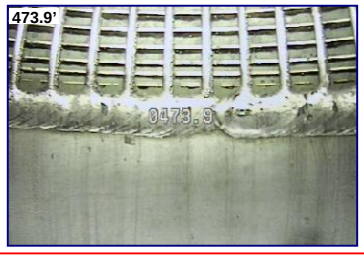














Notes:

WELLBORE SNAPSHOT(S)

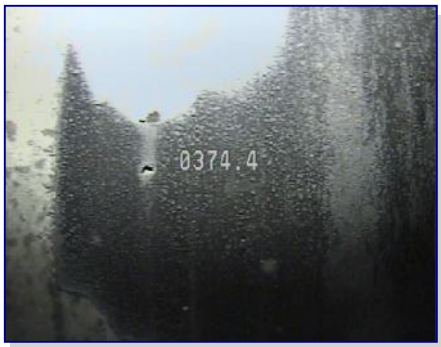
Depth: 0 Feet



Depth: 40.4 Feet



Depth: 374.4 Feet



Depth: 383 Feet



Depth: 384.2 Feet



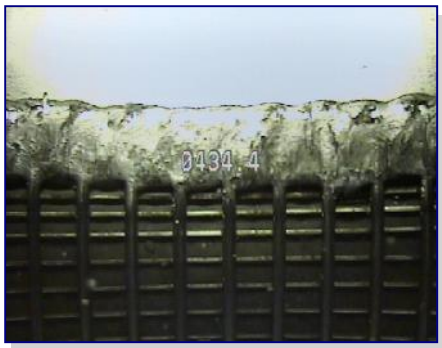
Depth: 423.7 Feet



Depth: 433.6 Feet



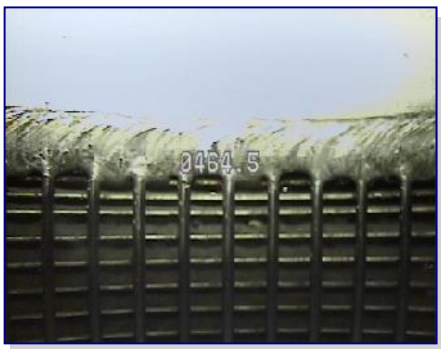
Depth: 434.4 Feet



Depth: 453.8 Feet



Depth: 464.5 Feet



Depth: 473.9 Feet



Depth: 484.6 Feet



WATER WELL VIDEO REPORT

Espoti Supply Well

City of Windsor

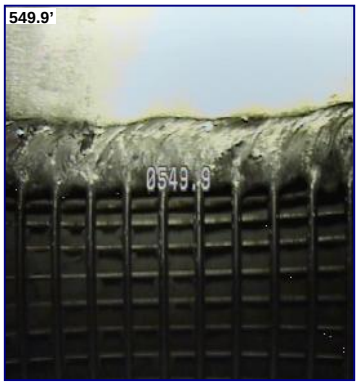
West Coast Well Logging Services

P.O.Box 2797 Rancho Cordova, CA. 95741

Phone: 916-224-3810 Fax: 916-858-8174 Web: www.wcwls.com

CASING INFORMATION		DEPTHS (SideScan)	VIDEO OBSERVATIONS
Stainless Steel Screen	**Well Depth**		Additional snapshots
384-424 Ft.	665 Ft.		
434-454 Ft.			
465-474 Ft.	**S.W.L**		
485-514 Ft.	40.4 Ft.		
550-569 Ft.			
621-654 Ft.			
	10" I.D. Casing		
	0-665 Ft.		
Zero Datum	Type: Steel		
Top Of Casing			
Dia. Reference			
Measured			
Casing Buildup			
Very Heavy			















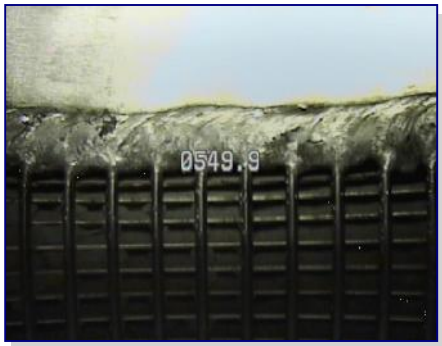
Notes:

WELLBORE SNAPSHOT(S)

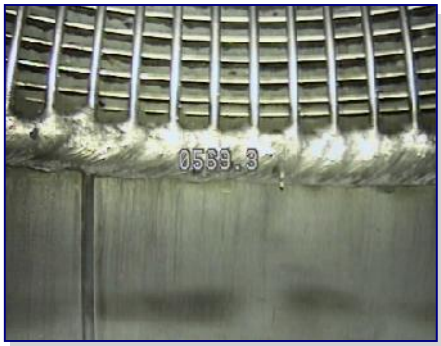
Depth: 514.1 Feet



Depth: 549.9 Feet



Depth: 569.3 Feet



Depth: 571.9 Feet



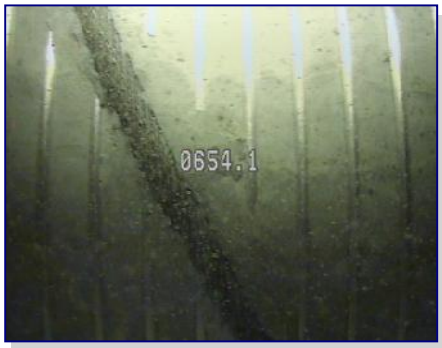
Depth: 599.4 Feet



Depth: 620.9 Feet



Depth: 654.1 Feet



FIELD REPORT

DATE: 5/4/2016	LOCATION: Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Well	JOB NO: 11110001.20
EVENT: Well Development	WEATHER/TEMP: — ° at am 70 ° at pm BREEZE
PRESENT AT SITE: ~~Dave Vossler,~~ GHD; RYAN CRAWFORD	

THE FOLLOWING WAS NOTED:

1145 RC / WEEKS / WEST COAST ONSITE. SITE SAFETY MEETING. REVIEW SCOPE & TARGET AREAS (430', 598' & BOTTOM) AND SCREENED ZONES.

1215 SET-UP HIGH DEF. DOWNHOLE CAMERA AND GO DOWN ESW.

145 CONFIRM 430' WAS NOT A HOLE IN CASING, BUT FACTORY LABELS & TAPE. SAME FOR THE 598' INTERVAL.

BOTTOM OF HOLE HAS 77' CABLE & BAILER (WEEKS). COUPLE SMALL (1/4") HOLES @ 373'. UPPER SCREENS VERY CLEAN, BOTTOM (640-654') SCREEN DIRTY. TD = 654'. TAKE SPIN VIDEO BACK UP ESW. BURN 3 COPIES OF VIDEO. LOCK-UP SITE.

350 RC / WEEKS / WEST COAST OFFSITE

Appendix H – Site Visit Reports

DAILY FIELD NOTES

Logged by: RJ/DV Sheet 1 of ___

GHD Project Name: ESPOSTI REHAB Date: 4/21/16

GHD Project Number: _____ Project Location: _____

Rig Type: _____ Pump Type: _____

	Well Construction	Well Contractor: WEEKS
	Pumping Test	Pumping Contractor: " "
	Site Reconnaissance	
	Video Well	
	Other	

NOTES

1005 BLUE BIRD - TDW (TOC ELEV) ~~28.20'~~ 28.82'

1010 SET TRANSD. # 19828 @ 38.5'

1020 CHURCH WELL - TD = 75', 4" STEEL LINER TO ORIGINAL 6" ½" ACCESS PORT "VENT"

ESPOSTI IRRIGATION WELL - 3/4" ACCESS PORT, DUT @ ~77' PROBE GETS STUCK, NEED TO REAM OUT NEW 7/8" ACCESS PORT ON NORTH SIDE

4/22/16 DV INSTALLED EGS IN ESP. IRR WELL @ 75' BGS STILL NEEDS BARO IN

Client | Job Number | Sheet ____ of ____

Project | Sheets by | Date

Subject ESPOSTI TRANSDUCER SET-UP | Checked by | Date

- ONE MIN. INTERVALS
- SYNC TO PC UNIT

- ID	TIME/ DATE STARTED	TIME INTERVAL	STATIC WL	TRANSD. DEPTH	TRANSD TYPE/ MODEL
CHURCH	~~9AM 4/21~~	1 M	?	NONE	F30, ~~21582~~ 20188
BLUEBIRD	9AM 4/21	~~1 MIN~~ 1 MIN	28.82' (TOC ELEV IT)	38.50'	F15
ESPOSTI IRR	9AM 4/21 SET IN MOTION 9AM 4/22	~~1 MIN~~ 1 MIN	>150' TOC	75' (TOC)	F65
BAROMETER	9AM 4/21	1 MIN	—	SURFACE	F1

FIELD REPORT

DATE: WEEK OF 25TH APRIL	LOCATION:
PROJECT NAME: EWS REHAB	JOB NO:
EVENT:	WEATHER/TEMP: ° at am ° at pm
PRESENT AT SITE:	

THE FOLLOWING WAS NOTED:

4/27 1100 RC ONSITE TO DISCUSS PURGING / BAILING & TRANSDUCER OPTIONS W/ WEEKS & TOWN. NO SAMPLE TODAY OF EWS.

WEST SIDE SEWER @ CONDE IS TOO FAR FOR MONITORING SEWER FLUX FROM PUMP TEST.

JON @ MOBILE HOME SAYS 4/28 BETTER FOR TRANSDUCER INSTALL.

4/28 1010 RC @ MOBILE PARK, MEET W/ JON BOCCI
MOBILE PARK WELL DTW = 32.61' (TOC)
SET TRANSDUCER 20188 (F30) @ 45' TOC

ONSITE TO DISCUSS W/ MATT (WEEKS), COLLECT EWS SAMPLE, WEEK TO GET WADDLES FOR AN INFILTRATION BASIN FOR BAILOUT SEDIMENT

DATE: 4/28/2016	LOCATION: : Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Well	EVENT: Well Development

CONT. - WEEKS TO BRING WADDLES & CONFIRM RFR TANK DISCHARGE PUMP WILL DO > 500 GPM TO SEWER. ✓

1230 - RO OFFSITE TO MEET LKB COURIER FOR SAMPLE.

FIELD REPORT

DATE: 5-2-2016	LOCATION: Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Well	JOB NO: 11110001.20
EVENT: Well Development	WEATHER/TEMP: 55° at am 75° at pm BREEZE
PRESENT AT SITE: Dave Vossler, GHD;	

THE FOLLOWING WAS NOTED:

1045 - RC ONSITE, START BAILING W/ 8" x 10' SUCTION BAILER. PULLING REALLY GOOD. TOP ~ 2' FINES, NEXT ~ 8' GRAVEL PACK!

1130 EC ONSITE. DISCUSS GRAVEL PACK & UPCOMING PUMP TEST (24-hour) EC OFFSITE ~1150

1200 BAILER STUCK, GET WIRE GRIP TOOL TO USE BOTH WINCHES TO TEESE UP BAILER. WIRE TO BAILER BROKE. CALL TEAM & EC.

1245 RC OFFSITE. WEEKS TO MOBILIZE CAMERA MEET BACK OUT @ 1500

WEEKS/

1445 RC ONSITE SET-UP CAMERA. 1505 CAMERA DOWN HOLE, SCREENS LOOK SHINY ON WAY DOWN (ALBEIT TURBID) GOT CAMERA TO 648 + 16" TOC ~ 649.25' = TD'

1600 RC/WEEKS OFFSITE

FIELD REPORT

DATE: 5/4/2016	LOCATION: Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Well	JOB NO: 11110001.20
EVENT: Well Development	WEATHER/TEMP: — ° at am 70 ° at pm BREEZE
PRESENT AT SITE: ~~Dave Vossler,~~ GHD; RYAN CRAWFORD	

THE FOLLOWING WAS NOTED:

1145 RC / WEEKS / WEST COAST ONSITE. SITE SAFETY MEETING. REVIEW SCOPE & TARGET AREAS (430', 598' & BOTTOM) AND SCREENED ZONES.

1215 SET-UP HIGH DEF. DOWNHOLE CAMERA AND GO DOWN ESW.

145 CONFIRM 430' WAS NOT A HOLE IN CASING, BUT FACTORY LABELS & TAPE. SAME FOR THE 598' INTERVAL.

BOTTOM OF HOLE HAS 77' CABLE & BAILER (WEEKS). COUPLE SMALL (1/4") HOLES @ 373'. UPPER SCREENS VERY CLEAN, BOTTOM (640-654') SCREEN DIRTY. TD = 654'. TAKE SPIN VIDEO BACK UP ESW. BURN 3 COPIES OF VIDEO. LOCK-UP SITE.

350 RC / WEEKS / WEST COAST OFFSITE

FIELD REPORT

DATE: 5/6/2016	LOCATION: WINDSOR
PROJECT NAME: ESPOSTI WELL REHAB.	JOB NO: 111100001
EVENT: TRANSDUCER INSTALL/CHK	WEATHER/TEMP: 64 ° at am DRIZZLE & WIND 64 ° at pm
PRESENT AT SITE: RC / WEEKS	

THE FOLLOWING WAS NOTED:

1145 - RC ONSITE. DISCUSS SITE SAFETY ✓
MEASURE OUT 270' OF DIRECT READ (IN-SITU) CABLE, PROGRAM TROLL 700 AND PLACE IN ESPOSTI SUPPLY WELL.
TRANSDUCER DEPTH (TOC) = 270'
DTW = 42.70, UNIT SAYS 237.30' HEAD
228.30 + 42.70 = 270' ✓

1245 - ESPOSTI IRRIGATION WELL
DTW = 33.60' (PORT) ✓
UNIT SAYS HEAD = 42.37' SO 33.60' + 42.37' = 75.97' DEPTH OF TRANS.

1315 - MOBILE HOME ESTATES WELL
DTW = 19.78 ✓
UNIT SAYS HEAD = 25.22 SO 19.78 + 25.22 = 45' DEPTH OF TRANS.

1410 - WEEKS SETTING PUMP & FLOW METER TODAY
RC OFFSITE

WINZLER & KELLY
718 Third Street, Eureka, CA 95501-0504
(707) 443-8326

By _____ Date _____ Client _____ Sheet No. _____ of _____

Subject ESW VIDEO Job No. _____

TARGET DEPTHS

WELD @ 160' → SLOPPY, MIGHT BE A CRACK OR?
180

350 - 360+ HIGHLY ENCRUSTED

510 - 530 SCOUR / TOOL MARKS

430 - 432 HOLE? @ COLLAR

5/6/16 ESW TRANSDUCER PLACEMENT

@ 1230 SET @ 270' TOC
DTW = 42.70, IN-SITU TROLL 700
DIRECT READ CABLE ✓ TRIAL RUN / DOWNLOAD GOOD
SAYS 237.30' HEAD

270.0
- 237.3
42.7 = DTW ✓

ESPORTI INJECTION WELL

SOLINST "LEVEL" (DIRECT READ) = 42.37'

SET @ 75' TOC, DTW = 34.60 (FROM PORT)

34.60
+ 42.37
76.97' = TOTAL DIRECT READ CABLE LENGTH

CONT →

WINZLER & KELLY
718 Third Street, Eureka, CA 95501-0504
(707) 443-8326

By _____ Date _____ Client _____ Sheet No. _____ of _____

Subject ESW Job No. _____

Cont. TRANSDUCER REVIEW

MOBILE HOME ESTATES WELL

5/6/16 1350 REAL TIME "LEVEL" = 25.22

DTW = 20.05, TRANSD. SET @ 45' TOC
-25.2 = 20' ✓

PUMP KICKED ON → FLATLINE @ "LEVEL" = 2.8-2.9

PUMP KICKED
5 MIN OFF. BACK TO 25.22 IN 2 MIN. ✓

DATE: 5/9/2016	LOCATION: ESPOSTI PARK, WINDSOR
PROJECT NAME: ESPOSTI REHAB.	EVENT: SEWER DISCHARGE MONITORING & SPECIFIC CAPACITY TEST

5/9 SEWER DISCHARGE MONITORING SITE SAFETY W/ TOWN OSE, JORDAN

0855- ESW DTW = 40.55 TOC

0910 - TURN ON ESW TO CONFIRM GP. & P.

* @ 0940 START PUMPING 200 GPM TO S130

* @ 0945 START PUMPING FROM RFR TANKS, BUT FILTERS CLOGGED (?) AND ONLY DOES 100GPM! CLEAN OUT BAGS-FILTERS ✓ GOOD FOR HIGHER FLOW

1105 - START DISCHARGING @ 200 GPM TO S130

DTW @ 1235 = 104.22 HEAD = 270 - 104

LOST COMMUNICATION W/ IN-SITU 700 @ 1235

1255 - DISCHARGING @ 300 GPM FROM FILTER PUMP

1330 - ESW DTW = 106.68, @ 1340 DTW = 106.69

1345 - ESW PUMP OFF - NO CAPACITY. 400 GPM 0910-1345

1425 - START DISCHARGE @ 400 GPM

1515 - STOP MONITORING & NOW DISCHARGING @ 200 GPM

S/S.40 - DTW @ 241 PM 221.42 head

1600 - STOP SURGE/PURGE - TANKS FULL

1620 - RC/WEEKS OFFSITE

* FINAL NOTES PUMPED ESW @ 400 GPM FOR 4.5 HOURS & DRAWDOWN BEGAN TO FLATTEN OUT @ 65'. TOTAL DRAWDOWN WAS 66.14'

FIELD REPORT

DATE: 5/9/2016	LOCATION: Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Well	JOB NO: 11110001.20
EVENT: Sewer Flow Test and Observations	WEATHER/TEMP: Cloudy ° at am 1000 Sunny ° at pm 1440
PRESENT AT SITE: Jourdan (Town of Windsor)	

DATE: dd/mm/yr 05 / 09 / 16

Time: use 24 hour time record at 15 min intervals or more freq.	Manhole number/description	Observed flow as a % of full pipe	Other observations
0936	S 375	15%	Initail
1000	S375	20%	5% increase w/1000gpm
1100	S374	15%	
1105	S375	15%	
1111	S374	15%	
1113	S375	15%	
1121	S374	30%	
1123	S375	30%	
1140	S374	30%	
1147	S375	30%	
1238	S333	25%	
1252	S374	30%	
1305	S374	30%	
1311	S374	30%	
1331	S374	30%	
1341	S374	30%	
1423	S374	30%	
1430	S374	35-40%	400 gpm
1440	S374	40-45%	400 gpm
1453	S374	45%	
1506	S374	30%	

Jose + Jordan

Jose Jordan

FIELD REPORT

DATE: 5/9/2016	LOCATION: Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Well	JOB NO: 11110001.20
EVENT: Sewer Flow Test and Observations	WEATHER/TEMP: 930 ° at am Overcast 60° ° at pm
PRESENT AT SITE: 9am Weeks (2), Town(3), GHD (1)	

DATE: dd/mm/yr 5 / 9 / 16

Time: use 24 hour time record at 15 min intervals or more freq.	Manhole number/description	Observed flow as a % of full pipe	Other observations
0933	S374	~15%	Fairly open flow
0940 - 0942			Side flow coming in 5%
0954		~15-20% apparent	increase in flow - faster
1000		~15-20%	Same

FIELD REPORT

DATE: 5/9/2016	LOCATION: Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Well	JOB NO: 11110001.20
EVENT: Sewer Flow Test and Observations	WEATHER/TEMP: ° at am ° at pm
PRESENT AT SITE: Weeks GHD	

DATE: dd/mm/yr 5/9/16

Time: use 24 hour time record at 15 min intervals or more freq.	Manhole number/description	Observed flow as a % of full pipe	Other observations
09:44 AM	S376	15%	15% open flow ~~Get Grease~~ 17 GPM
09:53 AM	S376	25%	10% increase
[redacted]1000 AM	" "	Same	at 100 GPM
1100[redacted] AM	" "	15%	open flow 200
1115 [redacted]5 AM	" "	20%	5% increase GPM
1122 [redacted] AM	" "	Same	
11[redacted]45 AM	" "	25%	5% increase in flow
12[redacted]9 PM	" "	25% Same	10% increase in flow
12:49 PM	" "	30%	5% increase in flow 30
1310 PM	" "	30% same	Same increase in flow GPM
1325 PM	" "	Same	" " "
1339 PM	"	30% Same	5% increase flow 40
1425 PM	" "	35%	5% increase in flow GPM
1440 PM	" "	35% Same	" " "
11[redacted]55 PM	" "	35% Same	" " "
1510 PM	" "	30%	5% Decrease in flow

Special notes regarding: traffic during test, trucks, buses. Pedestrians, kids in the area, homeless. Is location appropriate for night monitoring. Photograph location and inside of manhole. Consider appropriateness of manhole as a permanent monitoring station with automatic measuring for final system.

on 5/19/16 Light traffic on Shiloh Rd at 5376 from 9:30AM to 1:40pm heavier traffic after 3:00pm & one or two pedestrians walking bye.

Alpha Analytical Laboratories Inc.
www.alpha-labs.com
WATERS, SEDIMENTS, SOLIDS

Corporate Laboratory
208 Mason Street, Ukiah, CA 95482
707-468-0401 F) 707-468-5267
clientservices@alpha-labs.com

Bay Area Laboratory
6398 Dougherty Road, #35, Dublin, CA 94568
925-828-6226 F) 925-828-6309

Central Valley Laboratory
9090 Union Park Wy., #113, Elk Grove, CA 95624
916-686-5190 F) 916-686-5192

Work Order
Chain of Custody Record

Lab No._____ Page_____of_____

Name: Town of Windsor - Drinking Water	**Project ID:** Esposti Potable Well
Mailing Address: 9291 Old Redwood Highway Building 400, Windsor, CA 95492	**Phase:**
Project Contact (Hardcopy or PDF to): Elizabeth Cargay, ecargay@townofwindsor.com; Kent O'Brien, kent.obrien@ghd.com	PO#
	Bill to: month end billing

Signature below authorizes work under terms stated on reverse side.

Analysis Request

TAT: 24 hr (X) / 48 hr ( ) / Lab Approval Required / 1 wk ( ) / 2 wk (standard) ( ) / Lab Approval Required For Rush

Field Sampler - Print Name & Signature / Sample Identification	Sample Collection Date	Time	Container: 40ml VOA	Poly	Amber	Glass	Preservative: Na2S2O3	HNO3	NH4Cl	Other	None	Matrix: Water	Soil	200.8 As (Dissolved)	200.7 Fe (Dissolved)	200.7 Mn (Dissolved)	200.8 Cr (Dissolved)	218.6 Cr6 (Dissolved)	200.7 Ca, Mg, K, Na (Dissolved)	Alkalinity	Chloride	Nitrate as N, Nitrite as N	Sulfate	Total Nitrogen (includes TKN, NO2, NO3)	Silica	200.8 Vanadium - total	Phosphate	CAM 17	TPH G, BTEX, D/MO	6010 As STLC	Title 22 Scan (**Below List)	TAT
ESW-5-9-10:50	5/9	10:50		X							X	X		X	X	X															Filter-a-fix
ESW-5-9-15:35	5/9	1535		X							X	X		X	X	X															in Lab

**Title 22 Scan

64432 Primary Inorganics, 64432.1 NO2/NO3, 64449 A&B
Asbestos, Perchlorate, Gross Alpha, 504.1, 507, 508, 515.1,
524.2, 531.1, 548.1, 549.2

Relinquished by:	Received by:	Date	Time
[signature]	[signature]	5/10	1400

CDPH Write On EDT Report? Yes ( ) No (X)

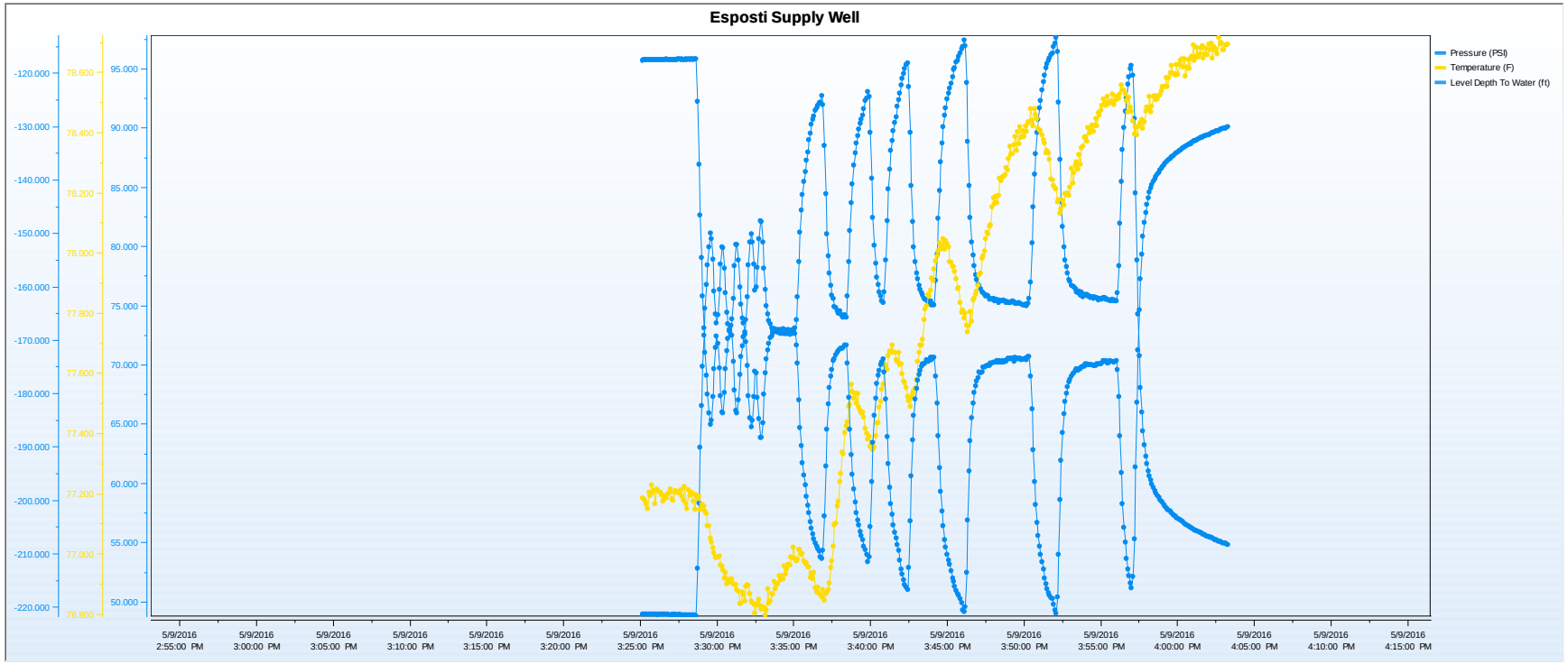
State System Number:

CA Geotracker EDF Report Yes ( ) No (X)

Sampling Company Log Code:

Global ID: EDF to (Email Address):

Travel and Site Time: Mileage: Misc. Supplies:


Esposti Supply Well
Pressure (PSI)
Temperature (F)
Level Depth To Water (ft)
-120.000
-130.000
-140.000
-150.000
-160.000
-170.000
-180.000
-190.000
-200.000
-210.000
-220.000
78.600
78.400
78.200
78.000
77.800
77.600
77.400
77.200
77.000
76.800
95.000
90.000
85.000
80.000
75.000
70.000
65.000
60.000
55.000
50.000
5/9/2016 2:55:00 PM
5/9/2016 3:00:00 PM
5/9/2016 3:05:00 PM
5/9/2016 3:10:00 PM
5/9/2016 3:15:00 PM
5/9/2016 3:20:00 PM
5/9/2016 3:25:00 PM
5/9/2016 3:30:00 PM
5/9/2016 3:35:00 PM
5/9/2016 3:40:00 PM
5/9/2016 3:45:00 PM
5/9/2016 3:50:00 PM
5/9/2016 3:55:00 PM
5/9/2016 4:00:00 PM
5/9/2016 4:05:00 PM
5/9/2016 4:10:00 PM
5/9/2016 4:15:00 PM

FIELD REPORT

DATE: 5/10/2016	LOCATION: Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Well	JOB NO: 11110001.20
EVENT: Well development by pumping and flow testing	WEATHER/TEMP: ° at am ° at pm
PRESENT AT SITE: Kent O'Brien GHD;	

THE FOLLOWING WAS NOTED:

7:57 - set up generator, test run with dogs, plan
casing volume DTW = 42, DTB = 655, water column = 613
613 Feet in 10" casing = 334 FT³ = 2,479 gallons
3 Casing volumes = 7437 gallons - 7.5 minutes at 1,000 gpm
18.6 minutes at 400 gpm
Tanks all at 1/4; 60,000 gallons capacity
8:09 sewer discharge on at 200 gpm
8:13 (approx) start pumping at 400 gpm - water clear
8:17 - cell phone photo of jar
8:41 - cell phone photo of Jar
8:42 - system hard shut off - Amperage problem - pump kick off at 1,000 gpm
9:07 restart at 800 gpm
9:09 water test
9:15 water test
9:16 (approx) shut down automatic at 800 gpm and DTW at 164 Ft BTOC
9:34 sewer discharge continuity @ 190 gpm 6364 on totalizer
9:48 restart ramp up to 800
9:49 Water test immediately at reaching 800 gpm
9:54 DTW 158.5 BTOC - start DTW not measured

DATE: 5/10/2016	LOCATION: : Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Well	EVENT:

10:01 pump auto shutdown at 168 FT BTOC 800 gpm
10:09 water test - lab sample collection
10:22 back up to secure - pump shut down auto - exact time not recorded.
Locked irrigation well enclosure (combo 1111)
Weeks to stay on site and trouble shoot pump

WELL SAMPLING DATA SHEET

PROJECT NAME: Esposti PROJECT DATE: 5/11/2016

PROJECT NUMBER: 111/0001.2 SAMPLER: Kent Olsen

WELL DESIGNATION: Esposti Supply well SAMPLE NUMBER: _____

CONDITION OF WELL HEAD / VAULT / CAP & LOCK: _____

A. TOP OF CASING ELEVATION: ____

B. DEPTH TO GROUNDWATER (initial): ____

C. DEPTH OF WELL: ____ MEASURED: _____

D. HEIGHT OF WATER COLUMN (C-B): ____

E. GROUNDWATER ELEVATION (A-B): ____

CASTING DIAMETER: 2" _____ 3" _____ 4" _____ OTHER 10"

CALCULATED WELL VOLUME: D X V = _____

Volume (V) of 2" well – 0.163 gal/ft
Volume (V) of 4" well – 0.653 gal/ft

ODOR: _____ SHEEN: _____ FLOATING PRODUCT THICKNESS _____

PUMP TYPE: _____ POLY BAILER: _____ STAINLESS BAILER: _____
ELECTRIC: _____ OTHER: _____

DECON PROCEDURE: LIQUINOX/ALCONOX ____ TAP____ BLEACH____OTHER ____WATER SOURCE _____

PUMP DEPTH: 30ft Flow 4.0 7.0 10
4.2 7.1 10

METER USED: CALIBRATED?

TIME	GALLONS PURGED	NO. OF WELL VOLUMES	pH	TEMP C	CONDUCTIVITY (µMHOS/CM)	ORP (mV)	TURBIDITY (Visual)
08:17	400 to 1,000 surging		6.67	22.7	3214 µS	64	mud/mod/F.sand
8:32	400 to 1,000 surge		7.02	23.3	829	-10	v.mud/mod/F.S
8:41	"	"	7.44	22.9	560.2	-17	L.mud/mod/F.Sa
					TDS		
9:09	800 gpm		7.51	23.5	554.2/368	-40	L.mud/mod/F.San
9:15	800 gpm		7.55	24.0	553/369	-52	VL.mud/Light/F.San
9:49	800 gpm	measure depth check; start pump and run 1 min	7.61	22.7	551/369	-59	VL mud/light/F.San
	repeat meas		7.50	22.4	548/367	-58	
9:56	800 gpm	Fill & measure after 1 min, restart - sample	7.53	23.8	549/366	-47	VL mud/light/mod F. sand
10:06	800 gpm		7.63	23.6	552/367	-47	VL mud/VLight/F.Sa
10:09	800 gpm	Lab sample	7.63	24.3	550/367	-65	VL mud/VLight/F.Sa

RECHARGE RATE (qualitative): ____

SAMPLER TYPE: TEFLON BAILER ____ ACRYLIC BAILER ____ DISPOSABLE BAILER ____

SAMPLES COLLECTED:

PRESERVED VOA'S ____ UNPRESERVED VOA'S ____
PRESERVED LITERS ____ UNPRESERVED LITERS ____
500 ml PLASTIC OR GLASS BOTTLE:____ OTHER: _____

FIELD FILTERED: ____ UNFILTERED: ____

COMMENTS: _____

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Central Valley Laboratory
9090 Unioln Park Wy., #113, Elk Grove, CA 95624
916-686-5190 F) 916-686-5192

Work Order
Chain of Custody Record

Lab No._____ Page_____of_____

Name: Town of Windsor - Drinking Water	**Project ID:** Esposti Potable Well
Mailing Address: 9291 Old Redwood Highway Building 400, Windsor, CA 95492	**Phase:**
Project Contact (Hardcopy or PDF to): Elizabeth Cargay, ecargay@townofwindsor.com	PO#
Kent O'Brien, kent.obrien@ghd.com	**Bill to:** month end billing

Signature below authorizes work under terms stated on reverse side.

Analysis Request

TAT: 24 hr ⊗ 48 hr ○ (Lab Approval Required) | 1 wk ○ | 2 wk (standard) ○ | Lab Approval Required For Rush

Field Sampler - Print Name & Signature / Sample Identification	Sample Collection Date	Time	Container: 40ml VOA	Poly	Amber	Glass	Preservative: Na2S2O3	HNO3	NH4Cl	Other	None	Matrix: Water	Soil	200.8 As (Dissolved)	200.7 Fe (Dissolved)	200.7 Mn (Dissolved)	200.8 Cr (Dissolved)	218.6 Cr6 (Dissolved)	200.7 Ca, Mg, K, Na (Dissolved)	Alkalinity	Chloride	Nitrate as N, Nitrite as N	Sulfate	Total Nitrogen (includes TKN, NO2, NO3)	Silica	200.8 Vanadium - total	Phosphate	CAM 17	TPH G, BTEX, D/MO	6010 As STLC	Title 22 Scan (**Below List)	TAT
ESW-5-10-10:09	5/10	10:09		X							X	X		X	X	X															Filter and Fix
																													NO		Filter Then Fix
ESW-5-10-10:09 Total	5/10	10:09		X							X	X		X	X	X															

**Title 22 Scan

64432 Primary Inorganics, 64432.1 NO2/NO3, 64449 A&B
Asbestos, Perchlorate, Gross Alpha, 504.1, 507, 508, 515.1,
524.2, 531.1, 548.1, 549.2

Relinquished by:	Received by:	Date	Time
[signature]	[signature]	5/10	1400

CDPH Write On EDT Report? Yes ○ No ○

State System Number:

CA Geotracker EDF Report Yes ○ No ○

Sampling Company Log Code:

Global ID: EDF to (Email Address):

Travel and Site Time: | Mileage: | Misc. Supplies:

FIELD REPORT

DATE: 5/10/2016 5/11/2016	LOCATION: Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Well	JOB NO: 11110001.20
EVENT: Well development by pumping and flow testing Flow @ 800 Sewer Test	WEATHER/TEMP: ° at am ° at pm
PRESENT AT SITE: Kent O'Brien GHD;	

THE FOLLOWING WAS NOTED:

9:00 - meet E. Cagay, Tim Smith start of site discuss results / last 2 days 800 gpm is Target - Today is rest for direct discharge and test sewer at higher flow rates

Plan on Aquifer test Monday irrigation to be shut off Sat → Thursday

11:18 Pump from 800 gpm start pumping 10 Am - some low & high flow 400-800 800 constant at 10:35 (Approx) sample at 10:44

Jordan - 707 486 1561

Jose - 707 217 8239

Jacki Joshua - 1916-532-6654

Start sewer flow test see sheet A

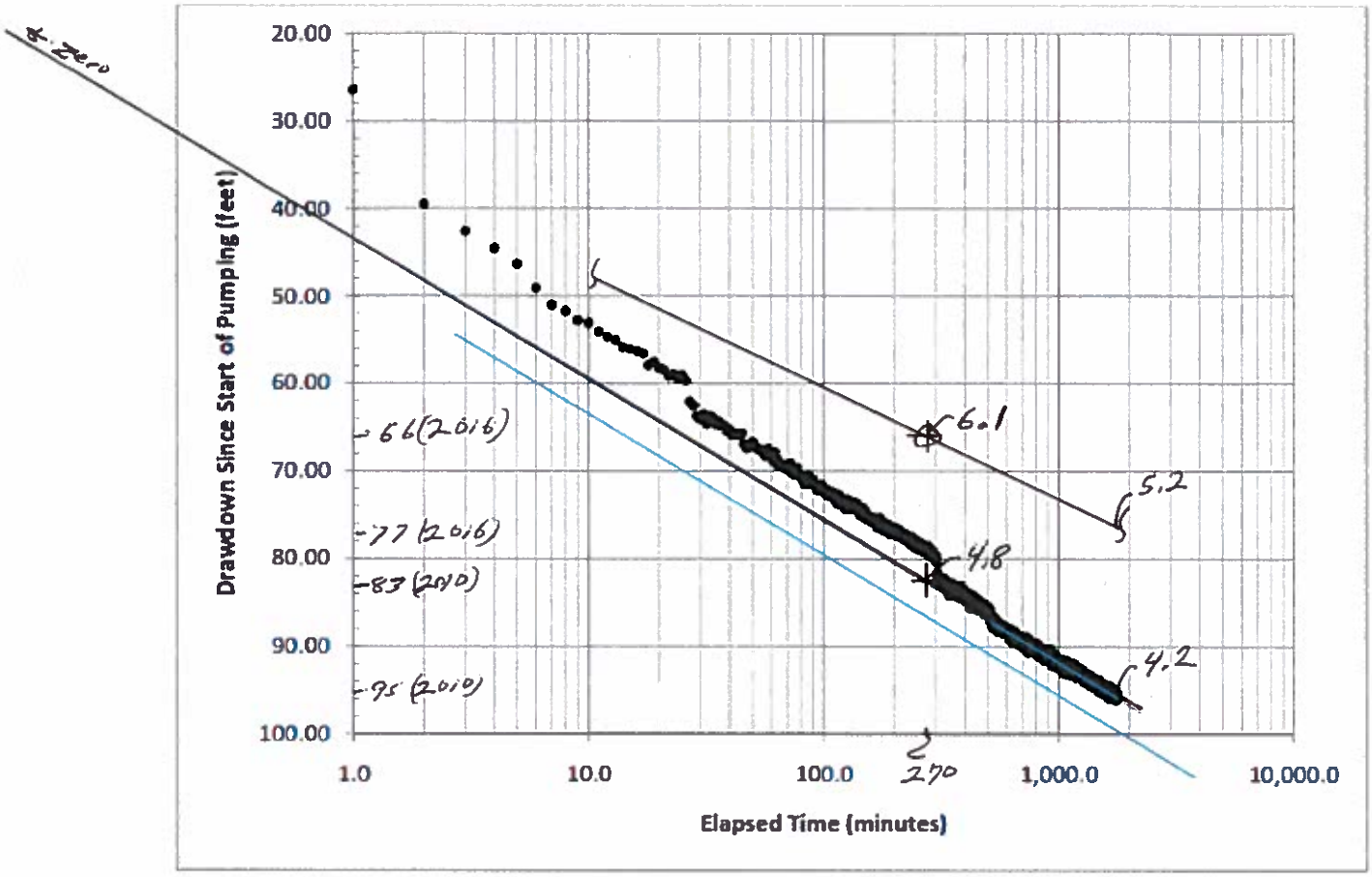
16:08 irrigation well Turned on For short period of time - need To irrigate Field

5/11/2016

← zero

Drawdown Estimations

Figure 4-4: Groundwater Level Data – Esposti Park Replacement Well



@270 minutes (4.5hr) pumping @400 gpm

2010 - 400gpm/83ft = 4.8 gpm/ft Data

2016 - 400gpm/66ft = 6.1 gpm/ft Data

$\frac{(6.1-4.8)}{4.8} = 27\%$ improvement

@1440 minutes (24hr) pumping at 400gpm

2010 - 400 gpm/95ft = 4.2 gpm/ft Data

2016 - 400 gpm/77ft = 5.2 gpm/ft projected 1.65 ft/sec velocity

@1440minutes (24hr) pumping at 800gpm

2016 77ft x (800/400) = 154 ft Estimate 3.3 ft/sec velocity

@1440 minutes (24hr) pumping at 1,000gpm

2016 77 (1,000/400) = 193 ft Estimate 4.1 ft/sec velocity

Kent O'Brien 707-478-9559 cell and text

Sheet A

FIELD REPORT

DATE: 5/11/2016	LOCATION: Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Well	JOB NO: 11110001.20
EVENT: Sewer Flow Test and Observations	WEATHER/TEMP: ° at am ° at pm
PRESENT AT SITE:	

DATE: dd/mm/yr ___/___/___

Time: use 24 hour time record at ~~15~~ min intervals or more freq.	~~Manhole~~ number/description	Observed flow as a % of full pipe	Other observations
			sample 10:44
13:13	900 gpm	DTW Not Measured	
13:32	500 gpm end→	95 FT BTOC	
13:49	600 gpm end→	116 FT BTOC	
14:23	700 gpm end→	139.75 BTOC	
14:50	800 gpm end→	162 BTOC	
15:06	900 gpm →	185 BTOC	
15:20	900 gpm	208.93 BTOC	
15:25	900 gpm	209.9 BTOC	
15:30	900 gpm	210.75 BTOC	
15:35	900 gpm	211.75 BTOC	sample 15:38
15:40	900 gpm	212.30 BTOC	
15:45	900	213.3 BTOC	
15:50	900	213.83 BTOC	
15:55	900	214.91	@well head flow meter
16:00	900	215.0	2980850 0 gallons
16:05	~~900~~ 880	215.41	
16:10	~~900~~ 880	215.92	change in pump rate
16:15	910	219.30	
16:20	910	220.6	
16:25	910	221.3	
16:30	910	221.75	
16:35	890 (reduction)	222.3	
16:40	890	222.6	
16:45	890 Pump Max	223.0	
16:50	890	223.3	off

WELL SAMPLING DATA SHEET

PROJECT NAME: Esposti well PROJECT DATE: 5/11/2016

PROJECT NUMBER: 1110001 SAMPLER: _____

WELL DESIGNATION: Esposti Supply SAMPLE NUMBER: _____

CONDITION OF WELL HEAD / VAULT / CAP & LOCK: _____

A. TOP OF CASING ELEVATION: ____

B. DEPTH TO GROUNDWATER (initial): ____

C. DEPTH OF WELL: ____ MEASURED: _____

D. HEIGHT OF WATER COLUMN (C-B): ____

E. GROUNDWATER ELEVATION (A-B): ____

CASTING DIAMETER: 2" _____ 3" _____ 4" _____ OTHER _____

CALCULATED WELL VOLUME: D X V = _____

Volume (V) of 2" well – 0.163 gal/ft
Volume (V) of 4" well – 0.653 gal/ft

ODOR: _____ SHEEN: _____ FLOATING PRODUCT THICKNESS _____

PUMP TYPE: _____ POLY BAILER: _____ STAINLESS BAILER: _____
ELECTRIC: _____ OTHER: _____

DECON PROCEDURE: LIQUINOX/ALCONOX ____ TAP____ BLEACH____OTHER ____WATER SOURCE _____

PUMP DEPTH:____

METER USED: CALIBRATED?

TIME	GALLONS PURGED	NO. OF WELL VOLUMES	pH	TEMP (C)	CONDUCTIVITY (µMHOS/CM) /1000	ORP (mV)	TURBIDITY (Visual)
10:44	pumping at 800 gpm		6.58	23.9	554 µS	25	clear
10:49	"	"	7.32	24.7	549/365 ppm	-5	clear
10:56	"	"	7.50	24.9	550/365	-21	clear slightly iron stain
11:10	"		7.56	25.1	549/365	-25	no sand
14:14	600		7.31	27	553/365	-30	
14:18	660		7.41	26.5	604/402	-28	
15:22	900 gpm		7.53	26.2	551/364	-11	cloudy F. sand
15:25	900		7.40	26.6	545/360	-35	slight cloudy minor F. sand
15:38	900	sample	7.42	25.9	544/360	-35	clear
15:51	900 gpm		7.44	25.9	545/361	-28	
16:03	900 gpm		7.46	26.5	545/361	-28	Fine air bubbles clear water

Photos

RECHARGE RATE (qualitative): ____

SAMPLER TYPE: TEFLON BAILER ____ ACRYLIC BAILER ____ DISPOSABLE BAILER ____

SAMPLES COLLECTED:

PRESERVED VOA'S ____ UNPRESERVED VOA'S ____
PRESERVED LITERS ____ UNPRESERVED LITERS ____
500 ml PLASTIC OR GLASS BOTTLE:____ OTHER: _____

FIELD FILTERED: ____ UNFILTERED: ____

COMMENTS: _____

WELL SAMPLING DATA SHEET

PROJECT NAME: Esparto Supply well
PROJECT DATE: 5/11/2016
PROJECT NUMBER: 11110001
SAMPLER: Ken O'Brien
WELL DESIGNATION: Esparto Supply
SAMPLE NUMBER: _____

CONDITION OF WELL HEAD / VAULT / CAP & LOCK: _____

A. TOP OF CASING ELEVATION: ____
B. DEPTH TO GROUNDWATER (initial): ____
C. DEPTH OF WELL: ____ MEASURED: _____
D. HEIGHT OF WATER COLUMN (C-B): ____
E. GROUNDWATER ELEVATION (A-B): ____

CASTING DIAMETER: 2" _____ 3" _____ 4" _____ OTHER _____

CALCULATED WELL VOLUME: D X V = _____
Volume (V) of 2" well – 0.163 gal/ft
Volume (V) of 4" well – 0.653 gal/ft

ODOR: _____ SHEEN: _____ FLOATING PRODUCT THICKNESS _____

PUMP TYPE: _____ POLY BAILER: _____ STAINLESS BAILER: _____
ELECTRIC: _____ OTHER: _____

DECON PROCEDURE: LIQUINOX/ALCONOX ____ TAP____ BLEACH____OTHER ____WATER SOURCE _____

PUMP DEPTH:____

METER USED: CALIBRATED?

TIME	GALLONS PURGED	NO. OF WELL VOLUMES	pH	TEMP	CONDUCTIVITY (µMHOS/CM)	ORP (mV)	TURBIDITY (Visual)
16:15	910	increase flow	7.52	25.0	543 µs/360 ppm	-27	
16:23	910		7.46	26.2	544/360	-32	
16:32	910		7.52	25.9	544/360	-39	
16:38	890		7.50	25.8	543/359	-30	
16:45	890		7.40	25.8	542/359	-34	

RECHARGE RATE (qualitative): ____

SAMPLER TYPE: TEFLON BAILER ____ ACRYLIC BAILER ____ DISPOSABLE BAILER ____

SAMPLES COLLECTED:
PRESERVED VOA'S ____ UNPRESERVED VOA'S ____
PRESERVED LITERS ____ UNPRESERVED LITERS ____
500 ml PLASTIC OR GLASS BOTTLE:____ OTHER: _____

FIELD FILTERED: ____ UNFILTERED: ____

COMMENTS: _____

Kent O'Brien 707-478-9559 cell and text

FIELD REPORT

DATE: 5/11/2016	LOCATION: Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Well	JOB NO: 11110001.20
EVENT: Sewer Flow Test and Observations	WEATHER/TEMP: ° at am ° at pm
PRESENT AT SITE: WEEKS	JOSE BANUELOS

DATE: dd/mm/yr 5/11/16

Time: use 24 hour time record at 15 min intervals or more freq.	Manhole number/description	Observed flow as a % of full pipe	Other observations
1313	S376	10%	increase flow 400 GPM
1315	S376	35%	20% increase in flow
1325	S376	Same	Same in flow
1332	S376	35%	Same in flow 400 to 500 GPM
1344	S376	40%	5% increase in flow 600 GPM
1359	S376	Same 40%	Same " " 600 GPM
1414	S376	Same 40%	Same " " "
1424	S376	45%	5% increase in flow 700 GPM
~~1444~~ "	"	"	AT 700 water starts to trickling into Lateral on the Southside. but it's fi
"	"	"	
"	"	"	
1439	S376	45% Same	Same at 700 GPM is flo
1450	S376	50%	5% increase in flow to 80 GP
1458	S376	55%	5% increase in flow to 80 GP
1506	S376	60%	5% increase flow 800 GPM
1521	S376	Same 60%	Same " "
1535	S376	Same 60%	Same " " "
1550	S376	Same 60%	Same " " " 800 GPM
1525	checked S#130B	and flow look good	
~~1600~~ 1605	S376	Same 60%	Same " " " " 800 GPM
1620	S376	Same 60%	Same " " " " at 800 GPM
1635	S376	Same 60%	Same " " " "
1653	S376	40%	Drop 20%

5/11/2016

Special notes regarding: traffic during test, trucks, buses. Pedestrians, kids in the area, homeless. Is location appropriate for night monitoring. Photograph location and inside of manhole. Consider appropriateness of manhole as a permanent monitoring station with automatic measuring for final system.

on 5/11/16 A little more people walking than 5/10/16 flow it's nice and clear & Heavy traffic manhole is on the bike lane.

Kent O'Brien 707-478-9559 cell and text

FIELD REPORT

DATE: 5/11/2016	LOCATION: Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Well	JOB NO: 11110001.20
EVENT: Sewer Flow Test and Observations	WEATHER/TEMP: ° at am 1:13 ° at pm Sunny
PRESENT AT SITE: Jourdan (Town of Windsor)	

DATE: dd/mm/yr 5 / 11 / 16

Time: use 24 hour time record at 15 min intervals or more freq.	Manhole number/description	Observed flow as a % of full pipe	Other observations
1310	S374 (Shiloh)	10%	Inital inspection
1320	S374	40%	Clear water/400 gpm
1328	S374	40%	
1338	S374	40-45%	at 500 gpm
1349	S374	45-50%	at 600 gpm
1356	S374	50%	
1403	~~S344~~ S343 (Hembree)	50%	Looks good
1413	S327 (Conde)	25-30%	plenty of capacity
1429	S374	50-55%	at 700 gpm
1440	S374	50-55%	at 700 gpm
1455	S374	50-60%	at 800 gpm
1504	S374	60%	at 900 gpm
1511	S374	60-65%	at 900 gpm
1522	~~S21~~ S343 (Hembree)	50~~%~~%	at 900 gpm
1526	S366	40-50%	at 900 gpm
1536	S374	60-65%	at 900 gpm
1556	S374	60-65%	
1617	S374	60-65%	
1625	S374	60-65%	
1654	S374	40%	End of run

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Central Valley Laboratory
9090 Union Park Wy., #113, Elk Grove, CA 95624
916-686-5190 F) 916-686-5192

Work Order
Chain of Custody Record

Lab No._____ Page_____of_____

Name: Town of Windsor - Drinking Water	**Project ID:** Esposti Potable Well
Mailing Address: 9291 Old Redwood Highway Building 400, Windsor, CA 95492	**Phase:**
Project Contact (Hardcopy or PDF to): Elizabeth Cargay, ecargay@townofwindsor.com	PO#
Kent O'Brien, kent.obrien@ghd.com	**Bill to:** month end billing

Signature below authorizes work under terms stated on reverse side.

Analysis Request

TAT: 24hr ☑ 48hr ○ (Lab Approval Required) 1 wk ○ 2 wk (standard) ○ — Lab Approval Required For Rush

Field Sampler - Print Name & Signature / Sample Identification	Sample Collection Date	Sample Collection Time	Container: 40ml VOA	Container: Poly	Container: Amber	Container: Glass	Container:	Preservative: Na2S2O3	Preservative: HNO3	Preservative: NH4Cl	Preservative: Other	Preservative: None	Matrix: Water	Matrix: Soil	Matrix:	200.8 As (Dissolved)	200.7 Fe (Dissolved)	200.7 Mn (Dissolved)	200.8 Cr (Dissolved)	218.6 Cr6 (Dissolved)	200.7 Ca, Mg, K, Na (Dissolved)	Alkalinity	Chloride	Nitrate as N, Nitrite as N	Sulfate	Total Nitrogen (includes TKN, NO2, NO3)	Silica	200.8 Vanadium - total	Phosphate	CAM 17	TPH G, BTEX, D/MO	6010 As STLC	Title 22 Scan (**Below List)	TAT
ESW-5-11-10:44	5/11	10:44		X								X	X			X	X	X															Filter-f, X

**Title 22 Scan

64432 Primary Inorganics, 64432.1 NO2/NO3, 64449 A&B
Asbestos, Perchlorate, Gross Alpha, 504.1, 507, 508, 515.1,
524.2, 531.1, 548.1, 549.2

Relinquished by:	Received by:	Date	Time
[signature]	David Roma	5/11/11	11:57

CDPH Write On EDT Report? Yes ○ No ○

State System Number: _____

CA Geotracker EDF Report Yes ○ No ○

Sampling Company Log Code: _____

Global ID: EDF to (Email Address):

Travel and Site Time:	Mileage:	Misc. Supplies:

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Work Order
Chain of Custody Record

Lab No._____ Page_____of_____

Name: Town of Windsor - Drinking Water	**Project ID:** Esposti Potable Well
Mailing Address: 9291 Old Redwood Highway Building 400, Windsor, CA 95492	**Phase:**
Project Contact (Hardcopy or PDF to): Elizabeth Cargay, ecargay@townofwindsor.com	PO#
Kent O'Brien, kent.obrien@ghd.com	**Bill to:** month end billing

Signature below authorizes work under terms stated on reverse side.

Analysis Request

TAT: 24 hr ⊗ / 48 hr ○ (Lab Approval Required) / 1 wk ○ / 2 wk (standard) ○ — Lab Approval Required For Rush

Field Sampler - Print Name & Signature / Sample Identification	Sample Collection Date	Sample Collection Time	Container: 40ml VOA	Container: Poly	Container: Amber	Container: Glass	Preservative: Na2S2O3	Preservative: HNO3	Preservative: NH4Cl	Preservative: Other	Preservative: None	Matrix: Water	Matrix: Soil	200.8 As (Dissolved)	200.7 Fe (Dissolved)	200.7 Mn (Dissolved)	200.8 Cr (Dissolved)	218.6 Cr6 (Dissolved)	200.7 Ca, Mg, K, Na (Dissolved)	Alkalinity	Chloride	Nitrate as N, Nitrite as N	Sulfate	Total Nitrogen (includes TKN, NO2, NO3)	Silica	200.8 Vanadium - total	Phosphate	CAM 17	TPH G, BTEX, DMO	6010 As STLC	Title 22 Scan (**Below List)	TAT
EWS-5-11-16:42	5/11	16:42		X							X	X		X	X	X																Total + Dissolved (B.14)
EWS-5-11-15:38	5/11	15:38		X							X	X		X	X	X																Filtered for dissolved

**Title 22 Scan

64432 Primary Inorganics, 64432.1 NO2/NO3, 64449 A&B
Asbestos, Perchlorate, Gross Alpha, 504.1, 507, 508, 515.1,
524.2, 531.1, 548.1, 549.2

Relinquished by:	Received by:	Date	Time
	Dot Rialdini	5/12/16	11:00

CDPH Write On EDT Report? Yes ○ No ○

State System Number: _____

CA Geotracker EDF Report Yes ○ No ○

Sampling Company Log Code: _____

Global ID: EDF to (Email Address):

Travel and Site Time:	Mileage:	Misc. Supplies:

Client | Job Number | Sheet ... of ...

Project | Sheets by | Date

Subject ESW Pump Test TD Downloads/Stitch-IV | Checked by | Date 5/12/16 5/13/16

RC @
-1130 MOBILE HOME ESTATES ✓ Goods, well pumping Downloaded DATA.

-1145 RC OFFSITE

-1150 RC ONSITE @ ESPOSTI PARK
Collect E.I.W DATA, RESTART TO COLLECT ONLY 25% MEMORY LEFT, DATA GOOD ✓

-1215 RC @ ESW DTW = 44.09' (TOC)
COLLECT IN-SITU TD DATA... NO. COLLECTOR STOPPED. RESET, CONFIRM RUNNING. DOWNLOAD WHAT I GOT TO DAT. ✓

-1300 RC/EC ONSITE BLUEBIRD DTW = 28.56 (TOC)
DATA GOOD

-1350 RC/EC OFFSITE

5/13

-0715 RC ONSITE ESW DTW = 42.62 (TOC)
TIE F650 SOCKET TO BOTTOM OF IN-SITU +2'
SET @ 755. DOWNLOAD IN-SITU ESW DATA ✓

-0815 COLLECT BARODATA ✓ RESET DUE TO ONLY 25% MEMORY LEFT. ✓

-0845 LOCK-UP SITE, RC OFFSITE

FIELD REPORT

DATE: 5/16/2016 + 5/17/2016	LOCATION: Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Supply Well	JOB NO: 11110001.20
EVENT: 800 gpm 24 hr Pump test	WEATHER/TEMP: 55 ° at am 5.30 ° at pm
PRESENT AT SITE: Kent O'Brien, Matt (weeks)	

THE FOLLOWING WAS NOTED:

5:30 AM arrive - weeks on site setting up (Matt)

Drillr reported that pump was run for about 0.3 minutes @ lowest RPM 42.35 @ 603

collected Samples at 6:06, 6:07 6:12

Ryan arrives 5.55 AM

Josh arrives 7:26 AM depart 7:35 (Josh has the Ke to the IOT

Distance between Esposti Supply & irrigation 29.5 FT.

Elizabeth - 217-8365

Rich Ramos - 696-5794 pgr- 8385389

900 - KENT LEFT - CONTINUED WELL TEST & SAMPLING EVERY 30 MIN

1300 - TOOK WATER SAMPLE FOR GHD

1430 - SPOKE W/ DAVE L. & LINED OUT HAND OFF TONIGHT

1706 - DAVE L. ARRIVED - WENT OVER WELL TEST & SAMPLING

1749 - KENT W/ GHD ARRIVED BACK ON SITE / off site at 6:00 PM

Security on site 6:15

17MAY16 -

0600 - SECURITY LEFT SITE

0630 - DAVE L. LEFT SITE

DATE: 5/10/2016	LOCATION: : Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Supply Well	EVENT:

0715 - MIKE G ON SITE

0810 - JOSH SHOWED UP - FUELED GENERATOR

0850 - SAMPLE BOTTLES DROPPED OFF ON SITE

0915 - MIKE G. LEFT FOR A SERVICE CALL

0933 - KENT W/ GHD ON SITE

SET up To collect samples

PUMPING WELL

Drawdown Sheet

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Measured Well	Owner: Town of Windsor		Well ID: Esposti Supply Well	
	Location:		Name/Site:	
Pumped Well	Owner: Town of Windsor		Well ID: Esposti Supply Well	
	Location:		Name/Site:	
Test Details	Date pumping commenced: 5/16/2016	Time:		Test No. 1
	Date pumping ceased:	Time:		

Are Measurements below for the pumped well? Yes Distance from pumped well (ft): 0

Static DTW ..... Feet below measuring point

Measuring Point..... Feet above/below ground level

Watch Time	Elapsed Time (min)	Calculated drawdown (ft) (DTW - Static)	Measured DTW (feet) below measuring point	Discharge (gpm) Only if pumped well	Comments or pressure measurements from transducer
6:03	–		42.35		
6:05	0	0	42.35		
6:15	10	120.54	162.86	800	285 ft head above transducer
6:25	10	131.43	173.78	800	
6:35	10	135.05	177.40	800	
6:45	10	141.74	184.09	800	
6:55	10	144.03	186.38	800	
7:05	10	145.80	188.15	800	
7:15	10	147.32	189.67	800	
7:25	10	148.62	190.97	800	
7:35	10		192.25	800	
7:45	10		193.74	800	
7:55	10		195.10	800	
8:05			196.46	800	
8 30			199.-	800	
9 00			201.65	800	
9 30			203.17	800	
10 00			204.66	800	

PUMPING WELL

Watch Time	Elapsed Time (min)	Calculated drawdown (ft) (DTW - Static)	Measured DTW (feet) below measuring point	Discharge (gpm) Only if pumped well	Comments or pressure measurements from transducer
1030			205.38		
1100			206.84		
1130			207.34		
1200			208.35		
1230			209.18		
1300			209.02		
1330			210.18		
1400			210.89		
1430			211.40		
1500			211.86		
1530			212.24		
1600			212.65		
1630			213.18		
1700			214.23		
1730			215.79		
6PM → 1800			216.38		
7PM — 1900			218.55		
2000			220.26		
2100			221.90		
2200			223.52		
2300			224.63		
24			225.85		
0100			227.10		
0200			228.18		
0300			228.76		
0400			229.24		
0500			229.72		
0600			230.58		
0700			232.46		
0800			233.08		

PUMPING WELL

Watch Time	Elapsed Time (min)	Calculated drawdown (ft) (DTW - Static)	Measured DTW (feet) below measuring point	Discharge (gpm) Only if pumped well	Comments or pressure measurements from transducer
0900			233.43		
1000			233.97		

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Parameter Record

Well ID: .....

Job Information		Sampling Information		Well Information			
Client:	Town of Windsor	Sample Method:	direct from pump	SWL:	42.35 ft	Check:	.....
Project:	.....	WQ Meter Type:	UltraMeter II	Date:	5/16/2016	Time:	6:05
	.....	Flow Cell:	Pump Depth:.....m	Ref.datum:	TOC	Stick Up:	
Proj. No.:	11110001	WLevel Meter Type:	meter calibrated by Rob 5/13/2016	Well Depth:	..... ft	Well Diam.:	ft
Sampler:	.....			Screen From:	..... ft	To:	..... ft

Time (.....)	Temp (°C)	pH (pH units)	Elec.Cond (.....)	TDS (.....)	Dis.Oxygen (.....)	Ox-Red Pt. (± mV)	Note	Note	Comment: Colour, turbidity, sediment load, sheen, odour
Stable When:		+/- 0.2 C	+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV			
6:06	17.8	6.70	568	363		-133			Clear
6:14	23.2	7.13	557	371		-69			Clear
6:19	23.3	7.31	558	369		-78			Clear
6:23	23.4	7.34	556	369		-70			Clear - slow fill of sample jar no air bubbles
6:39	23.0	7.32	551	366		-55			
6:57	22.1	7.46	549	366		-28			
7:04	23.0	7.42	550	365		-34			
7:15	23.3	7.38	551	365		-39			
7:20	22.8	7.59	545	362		-54			
7:42	21.7	7.58	545	364		-35			
7:54	22.6	7.54	549	364		-41			
8:39	23.2	7.72	546	365		-28			
9:00	24.2	7.70	545	360		-37			
9:30	24.00	7.65	549	363		-13			
10:00	25.01	7.62	544	360		-7			
10:30	26.04	7.59	540	354		-5			
11:00	27.8	7.57	535	351		17			
11:30	27.3	7.65	535	351		10			
12:00	26.7	7.46	538	352		-13			
12:30	26.7	7.42	540	354		-8			
13:00	26.9	7.69	540	353		-16			

Time (.....)	Temp (°C)	pH (pH units)	Elec.Cond (.....)	TDS (.....)	Dis.Oxygen (.....)	Ox-Red Pt. (± mV)	Note ORP after 2min	Note	Comment: Colour, turbidity, sediment load, sheen, odour
Stable When:		+/- 0.2 C	+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV			
1530	27.5	7.63	534	350		28			
1400	26.9	7.49	537	352		-8			
1430	27.3	7.61	548	358		40			
1500	26.8	7.82	543	358		27			
1530	26.5	7.69	540	355		7			
1600	26.4	7.73	541	364		-10			
1630	26.5	7.76	540	353		-20			
1700	26.5	7.54	538	353		14			
1730	25.7	7.50	539	355		3			
1800	Kent =	=	=	=	=	=			
1900	26.1	7.61	537	356		-10	-13		
2000	26.0	7.51	537	352		-22	-30		
2100	25.3	7.64	535	352		-3	5		
2200	25.5	7.58	537	353		-2	-30		
2300	25.1	7.67	538	353		-26	-19		
2400	25.4	7.54	534	354		-8	-10		
0100	25.4	7.47	536	353		-23	-27		
0200	25.0	7.62	535	354		-32	-35		
0300	25.3	7.76	531	351		-31	-46		
0400	25.3	7.73	532	355		-19	-31		
0500	25.3	7.71	537	356		-27	-33		
0600	25.5	7.57	534	353		-22	-30		
0700	23.0	7.61	534	353		20	20		
0800	24.9	7.63	530	350		-1	8		
0900	25.9	7.79	532	350		-8	-3		

Test Start Date 5/16/16

Time (..........)	Temp (°C)	pH (pH units)	Elec.Cond (..........)	TDS (..........)	Dis.Oxygen (..........)	Ox-Red Pt. (± mV)	Note	Note	Comment: Colour, turbidity, sediment load, sheen, odour
Stable When:		*+/- 0.2 C*	*+/- 0.05 pH*	*+/- 3%*	*+/- 10%*	*+/- 10 mV*			
1000	26.2	7.04	534	353	-7				

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Central Valley Laboratory
9090 Union Park Wy., #113, Elk Grove, CA 95624
916-686-5190 F) 916-686-5192

Work Order
Chain of Custody Record

Lab No._____ Page 1 of 1

Name: Town of Windsor - Drinking Water	**Project ID:** Source Chemical
Mailing Address: 9291 Old Redwood Highway Building 400 Windsor, CA 95492	**Phase:** Esposti Well
Project Contact (Hardcopy or PDF to): Elizabeth Cargay ecargay@townofwindsor.com	PO# 200336
Kent O'Brien kent.obrien@ghd.com	**Bill to:** month end billing

Signature below authorizes work under terms stated on reverse side.

Analysis Request

TAT: 24 hr ○ 48 hr ○ Lab Approval Required ○ 1 wk ○ 2 wk (standard) ✓ — Lab Approval Required For Rush

Field Sampler - Print Name & Signature / Sample Identification	Sample Collection Date	Sample Collection Time	Container: 40ml VOA	Container: Poly	Container: Amber	Container: Glass	Container:	Preservative: HCL	Preservative: HNO3	Preservative: H2SO4	Preservative: Other	Preservative: None	Matrix: Water	Matrix: Soil		As III & IV RS	Ammonia	Sulfide	Cr6 DW	Cyanide DW	Radium 228	525.2 DDW Reg 3	547 Glyphosate	1613 Dioxin DW
~~Esposti~~ ESW-5-17-10:00	5/17	10:00		x	x			x	x	x	x	x	x			x	x	x	x	x	x	x	x	x

Relinquished by:	Received by:	Date 5/17/16	Time 1305
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time

CDPH Write On EDT Report? Yes (x) No ○

State System Number:

CA Geotracker EDF Report Yes ○ No ○

Sampling Company Log Code:

Global ID: EDF to (Email Address):

Travel and Site Time: Mileage: Misc. Supplies:

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Work Order
Chain of Custody Record

Lab No._____ Page 1 of 1

Name: Town of Windsor - Drinking Water	**Project ID:** Source Chemical
Mailing Address: 9291 Old Redwood Highway Building 400, Windsor, CA 95492	**Phase:** Esposti Well
Project Contact (Hardcopy or PDF to): Elizabeth Cargay, ecargay@townofwindsor.com; Kent O'Brien, kent.obrien@ghd.com	**PO#** 200336
	Bill to: month end billing

Signature below authorizes work under terms stated on reverse side.

Analysis Request

TAT: see note

24 hr (Y) / 48 hr / Lab Approval Required / 1 wk / 2 wk (standard) (X) — Lab Approval Required For Rush

Field Sampler - Print Name & Signature / Sample Identification	Sample Collection Date	Time	Container: 40ml VOA	Poly	Amber	Glass	Preservative: HCL	HNO3	NH4Cl	Other	None	Matrix: Water	Soil	200.8 As	200.7 Fe	200.7 Mn	200.8 Cr	218.6 Cr6	200.7 Ca, Mg, K, Na	Alkalinity	Chloride	Nitrate as N, Nitrite as N	Sulfate	Total Nitrogen (includes TKN, NO2, NO3)	Silica	200.8 Vanadium - total	Phosphate	Title 22 Scan (**Below List)	TAT
ESW-5-16-13:00	5/16	13:00		X							X	X		X	X	X													↑ Standard
ESW-5-16-18:00	5/16	18:00		X							X	X		X	X	X													Preserve in lab ↓
ESW-5-16-24:00	5/16	24:00		X							X	X		X	X	X													24-hr
ESW-5-17-04:00	5/17	0400		X							X	X		X	X	X													

**Title 22 Scan

64432 Primary Inorganics, 64432.1 NO2/NO3, 64449 A&B
Asbestos, Perchlorate, Gross Alpha, 504.1, 507, 508, 515.1,
524.2, 531.1, 548.1, 549.2

Relinquished by:	Received by:	Date	Time
[signature]	[signature]	5/17/16	1315

CDPH Write On EDT Report? Yes (X) No ( )

State System Number: _____

CA Geotracker EDF Report Yes ( ) No ( )

Sampling Company Log Code: _____

Global ID: EDF to (Email Address):

Travel and Site Time: | Mileage: | Misc. Supplies:

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Work Order
Chain of Custody Record

Lab No._____ Page 1 of 2

Signature below authorizes work under terms stated on reverse side.

Name: Town of Windsor - Drinking Water	**Project ID:** Source Chemical
Mailing Address: 9291 Old Redwood Highway Building 400, Windsor, CA 95492	**Phase:** Esposti Well
Project Contact (Hardcopy or PDF to): Elizabeth Cargay, ecargay@townofwindsor.com; Kent O'Brien, kent.obrien@ghd.com	PO# 200336
	Bill to: month end billing

TAT: 24 hr ○ 48 hr ○ (Lab Approval Required) 1 wk ○ 2 wk (standard) ⊘ — Lab Approval Required for Rush

Field Sampler - Print Name & Signature / Sample Identification	Sample Collection Date	Time	Container: 40ml VOA	Poly	Amber	Glass		Preservative: HCL	HNO3	NH4Cl	Other	None	Matrix: Water	Soil	200.8 As	200.7 Fe	200.7 Mn	200.8 Cr	218.6 Cr6	200.7 Ca, Mg, K, Na	Alkalinity	Chloride	Nitrate as N, Nitrite as N	Sulfate	Total Nitrogen (includes TKN, NO2, NO3)	Silica	200.8 Vanadium - total	Phosphate				Title 22 Scan (**Below List)	TAT
ESW-5-17- 10:00	5/17	10:00	x	x	x			x	x		x	x	x																		x	See Attached Page - verify all analytes Tested

**Title 22 Scan

64432 Primary Inorganics, 64432.1 NO2/NO3, 64449 A&B
Asbestos, Perchlorate, Gross Alpha, 504.1, 507, 508, 515.1,
524.2, 531.1, 548.1, 549.2

Relinquished by:	Received by:	Date	Time
	Received by:	5/17/16	1315
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time

CDPH Write On EDT Report? Yes (x) No ○

State System Number: _____

CA Geotracker EDF Report Yes ○ No ○

Sampling Company Log Code: _____

Global ID: EDF to (Email Address):

Travel and Site Time: | Mileage: | Misc. Supplies:

Provide analysis for each of the compounds listed below:

Well Water Analysis*

**	pH	6.67	
**	Temperature	66	°F
**	ORP (EMF)	4	mV
**	Conductivity	458	µS/cm
**	Dissolved Solids	300	mg/L TDS
**	Suspended Solids	--	mg/L TSS
**	Turbidity	354.0	NTU

Cations

	Hardness	120	mg/L $CaCO_3$
***	Ammonia	0.30	mg/L NH_3
	Calcium	22	mg/L Ca
	Magnesium	15	mg/L Mg
	Sodium	54	mg/L Na

Anions

Alkalinity	230	mg/L $CaCO_3$
Bicarbonate	280	mg/L $CaCO_3$
Carbonate	<1.0	mg/L $CaCO_3$
Chloride	17	mg/L Cl
Fluoride	0.37	mg/L F
Nitrate	<2.0	mg/L NO_3
Phosphate		mg/L PO_4
***Silica	87.0	mg/L SiO_2
Sulfate	12	mg/L SO_4
Sulfide		mg/L S
_____		mg/L ____
_____		mg/L ____

Metals & Radionuclides

Antimony	<6.0	µg/L Sb
Total Arsenic	56.0	µg/L As
Reduced As(III)		µg/L As(III)
Copper	<50	µg/L Cu
Iron	<100	µg/L Fe
Lead	<5.0	µg/L Pb
Manganese	750	µg/L Mn
Mercury	<1.0	µg/L Hg
Selenium	<5.0	µg/L Se
Uranium		µg/L U
Vanadium		µg/L V
_____		µg/L ___

Red Water Analysis are critical for basic design estimates

GHD Job 11110001

FIELD REPORT

DATE: 8/23/2016	LOCATION: Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Supply Well	JOB NO: 11110001.20
EVENT: Spinner Log - sewer check	WEATHER/TEMP: 65 ° at am/10:00 ° at pm
PRESENT AT SITE: Meeks, Kent Olsen	

THE FOLLOWING WAS NOTED:

10 AM - Meeks on-site pump installed suction (pump intake @ 220

Explained to Josh that packer inflation is to be 225 psi not 275

Samples to be collected 1, 5, 60 & End (4 hours)

11:05: Town arrives for Traffic control, open S130-S130A

Start pump 11:20 start

11:21 First sample 15:21 4th Last

11:26 second sample

12:21 3rd sample

11:39 - Town closes sewer lid & leaves - checked flow at S130 where Shiloh Rd & Old Redwood Hwy sewers cross Flow O.K.

11:55: spinner log truck arrived - West Coast

12:25 (approx) set up spinner

13:20 got spinner data print out

DATE: ~~5/10/2016~~ 8/23/2016	LOCATION: : Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Supply Well	EVENT: Zone Test - Spinner log

Estimations based on field interp.

370 1625 RPM = 400 gpm = 100%

1 screen 38.5% 154 gpm 38.5%

429 1000 RPM

2 screen 0% 0 gpm 0%

459 1000 RPM

3 screen 0% 0 gpm 0%

477 1000 RPM

4 screen 20% 80 gpm 20%

535 675 RPM

5 screen 41% 164 gpm 41%

575 0 RPM

6 screen 0% 0 gpm 0%

Screen

1	154 gpm	38.5%
2	0 gpm	0%
3	0 gpm	0%
4	80 gpm	20%
5	164 gpm	41%
6	0 gpm	0%

Start Flow meter 065600 x 100 gallons

End Flow meter 066620 x 100 gallons

96000 gallons pumped

PUMPING WELL

Drawdown Sheet

Kent OBrien 8/23/2016

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Measured Well	Owner: Town of Windsor		Well ID: Esposti Supply Well	
	Location: Esposti Park		Name/Site:	
Pumped Well	Owner: Town of Windsor		Well ID: Esposti Supply Well	
	Location:		Name/Site:	
Test Details	Date pumping commenced:		Time:	Test No.
	Date pumping ceased:		Time:	

Are Measurements below for the pumped well? yes Distance from pumped well (ft): NA

Static DTW ..... Feet below measuring point

Measuring Point..... Feet above/below ground level

Watch Time	Elapsed Time (min)	Calculated drawdown (ft) (DTW - Static)	Measured DTW (feet) below measuring point	Discharge (gpm) Only if pumped well	Comments or pressure measurements from transducer
11:20			56.50	400	
11:24			103.3	400	
11:34			111.0	400	
11:47			115.75	400	
12:17			120.30	400	
~~12:43~~ 13:13			124.50	400	
14:15			127.40	400	
15:18			129.20	400	
					4 hour specific
					capacity =
					5.59 gpm/ft

GHD | MANAGEMENT ENGINEERING ENVIRONMENT

Parameter Record

Well ID: Esposito Supply well

Job Information		Sampling Information		Well Information	
Client:	Town of Windsor	Sample Method:	direct from pump	SWL: 56.5 ft	Check:
Project:		WQ Meter Type:		Date: 8/23/216	Time: 11:20
		Flow Cell:	Pump Depth: 220 mft	Ref.datum: TOC	Stick Up:
Proj. No.:	11110001	WLevel Meter Type:	intake ft N. packer	Well Depth: NM ft	Well Diam.: 10 ft
Sampler:	Kent O'Brien			Screen From: ft	To: ft

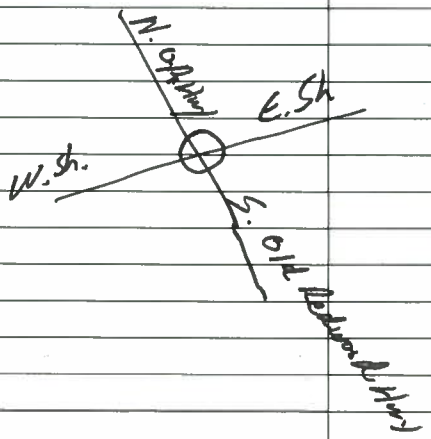
Time (.....)	Temp (°C)	pH (pH units)	Elec.Cond (µS/cm)	TDS (mg/L)	Dis.Oxygen (.....)	Ox-Red Pt. (± mV)	Note	Note	Comment: Colour, turbidity, sediment load, sheen, odour
Stable When:		+/- 0.2 C	+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV			
11:21	25.9	7.29	523.8	359.4		-138			start at 11:20
11:26	27.7	7.30	499.2	340.1		-92			
11:29	27.7	7.33	500.1	340.6		-71			clear - slight very fine sediment
11:41	27.0	7.36	501.4	342.0		-56			clear - very slight fines
11:49	26.6	7.37	504.6	344.5		-44			
12:06	26.9	7.38	506.6	345.3		-20			no sand
12:21	26.6	7.35	507.8	347.6		-41			
13:13	27.7	7.36	505.5	344.4		-30			27.7°C no odor no sand
14:23	26.5	7.38	515.6	352.7		-2			2nd opinion on odor - yes light sulfur
14:40	26.9	7.41	517.6	355.6		+1			orp not stable +17 to -23
15:07	26.4	7.23	518.4	354.7		-29			water musty - no change from start
15:21	26.8	7.34	516.3	352.5		-34			End
									400 gpm pumping to
									Selma For 4 hours
									11:20 to 13:21

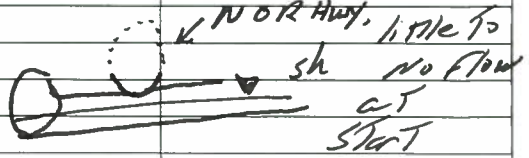
FIELD REPORT

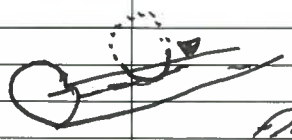
DATE: 8/23/2016	LOCATION: Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Well	JOB NO: 11110001.20
EVENT: Sewer Flow Test and Observations	WEATHER/TEMP: ° at am ° at pm
PRESENT AT SITE: Kent O'Brien	

DATE: ~~dd/mm/yr~~ Aug 23 2016

Time: use 24 hour time record at 15 min intervals or more freq.	Manhole number/description	Observed flow as a % of full pipe	Other observations
1115	S130	10% 0 spm pump	
1122	S130	45% 400 spm	20% going ORH
1132	S130	50% 400 spm	
Pump Start: 11:20			
by KOB!			







20% of total flow going down N. OR. Hwy

O'Brien, Kent

From: O'Brien, Kent
Sent: Wednesday, August 24, 2016 5:50 AM
To: Elizabeth Cargay (ecargay@townofwindsor.com)
Cc: Dave Vossler (dave.vossler@ghd.com); ryan.crawford@ghd.com
Subject: 8/23/2016 Esposti Supply Well discharge to sewer volume report

Elizabeth – sewer discharge summary is below:

Non-Residential One-Time Discharge Permit
Permit number - TD-04152016
Effective Date - 04/15/2016
Expiration Date- 12/31/2016

Date of discharge – **8/23/2016**
Point of discharge – sewer manhole S130A (Shiloh and Old Redwood Hwy)
Total gallons **discharged – 96,000 gallons**

Kent O'Brien PG, CEG

Senior Associate | Hazen and Sawyer
201 Mission Street, Suite 500, San Francisco, CA 94105
628-242-0050 (direct) 707-478-9559 (cell) 628-242-0042 (main)
41828 (VOIP Extension)
kobrien@hazenandsawyer.com | hazenandsawyer.com

SPINNER INTERPRETATAION

WEST COAST
WELL LOGGING SERVICES
GEOPHYSICAL & VIDEO LOGGING

P.O.Box 2797, Rancho Cordova CA 95741 · Phone: 916-858-8148 Fax: 916-858-8174 · Web: www.wcwls.com Email: wcwls@sbcglobal.net

Filing No.

COMPANY Weeks Drilling & Pump Co., Inc.

WELL Espoti Supply Well

FIELD Windsor

STATE California COUNTY Sonoma

LOCATION:
Old Redwood Hwy. & Shilo Rd.

OTHER SERVICES:
Stops

Job No.
1425

SEC: 19 TWP: 8N RGE: 8W LAT.: 38.52649 LONG.: 122.77953

Permanent Datum: Ground Level Elev.: 150 Ft. Elevs.: K.B. ____ Ft.
Log Measured From: Top of Casing 0 Ft. Above Perm. Datum D.F. ____ Ft.
Drilling Measured From: Ground Level G.L. 150 Ft.

Date	Aug 23, 2016			
Type Log	Spinner			
Run	One			
Depth-Driller	575 Ft	Ft	Ft	Ft
Depth-Logger	575 Ft	Ft	Ft	Ft
Top Logged Interval	300 Ft	Ft	Ft	Ft
Btm Logged Interval	575 Ft	Ft	Ft	Ft
Type Fluid In Hole	Water			
Fluid Level	122 pwl Ft	Ft	Ft	Ft
Max Temp	n/a °F	°F	°F	°F
Operating Rig Time	n/a °Hr	°Hr	°Hr	°Hr
Van No. / Location	WC-1 / RC			
Recorded By	Sharpless			
Witnessed By	J. Moore			

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT SIZE	FROM	TO	CASING SIZE	CASING TYPE	FROM	TO
1	In	Ft	Ft	10 In		0 Ft	656 Ft
2	In	Ft	Ft	In		Ft	Ft
3	In	Ft	Ft	In		Ft	Ft

SPINNER INTERPRETATAION TOOL



SPINNER LOGS:

Spinner logs are used to quantify flow (up or down) in a water well. In a producing water well, the spinner log is usually run downwards at a constant speed. Deflections in the curve are indicative of water entry. Proper calibrations, eliminating the effective of line speed, will quantify the flow rate from zones of interest.

SPINNER SPECIFICATIONS:

Diameter	1.77, 2.76, or 3.94 Inches
Length	5.5 Feet
Weight	16.1 Lbs.
Max. Temp	158° F
Gamma Ray	1.97 inches long x .98 inches diameter Scintillation crystal

NOTICE

All interpretations are opinions based on inferences from electrical and other measurements and we do not guarantee the accuracy or correctness of any verbal or written interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by one of our officers, agents or employees. These interpretations are also subject to our General Terms and Conditions as set out in our current Price Schedule.

REMARKS

A recreational GPS accurate to +/- 45 feet set for Datum WGS84 was used to calculate Latitude, Longitude, and Elevation values.

Bottom of well blocked by debris

West Coast Well Logging Services - P.O.Box 2797 - CA - 95741 Fax: 916-858-8174 Phone:916-858-8148

SPINNER INTERPRETATAION

Weeks Drilling & Pump Co., Inc.
Espoti Supply Well
Aug 23, 2016

Single Page

DEPTHS
(Feet)

0 Spin 3(rpm) 3000
0 Spin 2(rpm) 3000
0 Spin 1(rpm) 3000

0 Bar Graph(gpm) 500

0 Pumping Profile(gpm) 500
0 Normalized Spinner Log (gpm) 500

350'

400'

450'

500'

550'

Screen
- 423'

Screen
- 453'

Screen
- 473'

Screen
- 513'

Screen
- 569'

10" Ca
900'

Tota

93.8 GPM Entry

37.9 GPM Entry

12.6 GPM Entry

10.6 GPM Entry

87.4 GPM Entry

113.8 GPM Entry

Log Depth 575'

alpha
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Central Valley Laboratory
9090 Union Park Wy., #113, Elk Grove, CA 95624
916-686-5190 F) 916-686-5192

Work Order
Chain of Custody Record

Lab No._____ Page_____of_____

Name: Town of Windsor - Drinking Water	**Project ID:** Source Chemical
Mailing Address: 9291 Old Redwood Highway Building 400, Windsor, CA 95492	**Phase:** Esposti Well
Project Contact (Hardcopy or PDF to): Elizabeth Cargay ecargay@townofwindsor.com and To kobrien@hazenandsawyer.com Kent O'Brien, Hazen and Sawyer	**PO#**
	Bill to: month end billing

Signature below authorizes work under terms stated on reverse side.

Analysis Request

TAT: 24 hr ○ 48 hr ○ (Lab Approval Required) — 1 wk ○ — 2 wk (standard) ○ — Lab Approval Required For Rush

Field Sampler - Print Name & Signature / Sample Identification	Sample Collection Date	Time	Container: 40ml VOA	Poly	Amber	Glass	Preservative: HCL	HNO3	NH4Cl	Other	None	Matrix: Water	Soil	200.8 As	200.7 Fe	200.7 Mn	TAT
~~Esposti Well~~	~~8/23~~			x				x				x		x	x	x	
ESW-8-23-11:21	8/23	11:21		x				x				x		x	x	x	↑
ESW-8-23-11:26	8/23	11:26		x				x				x		x	x	x	Standard
ESW-8-23-12:21	8/23	12:21		x				x				x		x	x	x	↓
~~ESW-8-23-13:21~~	8/23	~~13:21~~		x				x				x		x	x	x	48 hr.
ESW-8-23-15:21	8/23	15:21															

Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time

CDPH Write On EDT Report? Yes ○ No (X)

State System Number:

CA Geotracker EDF Report Yes ○ No (X)

Sampling Company Log Code:

Global ID: EDF to (Email Address)

Travel and Site Time:	Mileage:	Misc. Supplies:

send results to:
ecargay@townofwindsor.com
~~kent~~ kobrien@hazenandsawyer.com

FIELD REPORT

DATE: 8/24/16	LOCATION: WINDSOR, ESPOSTI PARK
PROJECT NAME: ESPOSTI PILOT TEST	JOB NO: 11110001.20
EVENT: ZONE TESTING (PACKER)	WEATHER/TEMP: 55 ° at am, 90 ° at pm
PRESENT AT SITE: RC / MATT (WEEKS)	

THE FOLLOWING WAS NOTED:

1530 - RC ONSITE, WEEKS ASSEMBLED PACKER. INSPECT / MEASER AND REVIEW PLACEMENT ASSUMPTIONS SUCH THAT THE PACKER SITS EXACTLY AT 428' BTOC. ✓

1645 - RC OFFSITE

8/25/16

0730 - RC ONSITE TO REVIEW PACKER ✓ / PUMP ✓ / PIPE ✓ / DISCHARGE ✓ ASSEMBLY. LOOKS GOOD, WEEKS NEEDS 6 MORE PIPES TO PUMP, THEN TRANSDUCER & DTW METER PVC TUBES INSTALL.

930 - RC OFFSITE

1505 - RC ONSITE. 15:15 DTW = 57.3. PREP FOR TEST-RUN (45 MIN) @ 400

DATE: 8/25/16	LOCATION: WINDSOR, ESPOSTI PARK
PROJECT NAME: ESPOSTI PILOT TEST	EVENT: ZONE TEST 1

45 MIN TEST RUN

TIME	DTW	ON/OFF	COND. (µS)	pH	TEMP (C°)
1525	57.3	–			
1526	104.3	ON			
1531	119.5	↓			
1536	124.0	↓			
1541	129.8	↓			
1556	132.0	↓			
1605	133.8	↓	517	7.10	27.1
1610	134.7	OFF	518	7.30	27.1

TOTAL DRAWDOWN = 134.7 - 57.3 = 77.4'

45 MIN @ 400 GPM SPECIFIC CAPACITY = 400 GPM / 77'
= 5.2 GPM/FT

1615 - DISCHARGE PIPE / SEWER LOOK GOOD, PIN HOLE LEAK @ PIPE NEAR CORNER OF SHILOH & REDWOOD HWY → NO STORMWATER DISCHARGE ✓

1630 - CALL KOB, SCHEDULE TMRW FOR 0700 START TIME

FIELD REPORT

DATE: 8/26/16	LOCATION: Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Supply Well	JOB NO: 11110001.20
EVENT: ZONE TEST (1ST)	WEATHER/TEMP: 55 ° at am OVERCAST 75 ° at pm SUNNY/BREEZY
PRESENT AT SITE: RC, MATT (WEEKS)	

THE FOLLOWING WAS NOTED:

0630 - RC/MATT ONSITE. SITE SAFETY MEETING ✓
- SET UP PAPERWORK, SAMPLE BOTTLES, AND CALIBRATE MULTIMETER. ✓

0715 - START 400 GPM "1ST TEST"
SAMPLE @ 0716, 0720, 0815

0945 - RC OFFSITE

1110 - RC ONSITE COLLECT SAMPLE @ 1115,
RC OFFSITE 1120

1430 - RC ONSITE, GET LABELS/SAMPLES PREPARED
CHECK SEWER OK ✓ COLLECT SAMPLES @
1515. TOTAL DRAWDOWN = 153.5 (DTW)
STOP PUMPING @ 1516 - 57.5
SPECIFIC CAPACITY 96'
@ 400 GPM AFTER 4 HOURS
= 400/96 = 4.2 GPM/FOOT

DATE: ~~5/10/2016~~ 8/26/16	LOCATION: : Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Supply Well	EVENT: ZONE TEST (1ST)

1530 - BEGIN HOSE / EQUIP BREAKDOWN, FINAL SEWER / STORM DRAIN CHECK GOOD ✓

- SITE CLEAN-UP, MATT TO COLLECT RECOVERY DTW WHILE HE WRAPS UP AND CLOSES DOWN SITE.

1615 - RC OFFSITE

PUMPING WELL

Drawdown Sheet

GHD | MANAGEMENT ENGINEERING ENVIRONMENT

Measured Well	Owner:	WINDSOR	Well ID:	ESW
	Location:	ESPOSTI PARK	Name/Site:	
Pumped Well	Owner:	Town of Windsor	Well ID:	Esposti Supply Well
	Location:		Name/Site:	
Test Details	Date pumping commenced:		Time:	Test No.
	Date pumping ceased:		Time:	

Are Measurements below for the pumped well? Distance from pumped well (ft):

Static DTW 57.55 Feet below measuring point

Measuring Point TOC Feet above/below ground level

Watch Time	Elapsed Time (min)	Calculated drawdown (ft) (DTW - Static)	Measured DTW (feet) below measuring point	Discharge (gpm) Only if pumped well	Comments or pressure measurements from transducer
0715	0	—	57.55	—	PUMP ON (METER S 66846)
0716	1		105.80	400	
0720	4		123.-	400	
0725	5		127.90	400	
0745	20		136.09	400	
0800	15		138.25	400	
0900	60		143.20	400	
1000	60		146.25	400	
1100	60		149.-	400	WW15 SAMPLE
1200	60		150.45	400	
1300	60		151.65	400	
1400	60		152.60	400	
1515	75		153.50	400	
1615	60		73'	↘	PUMP OFF (METER END 68957)
					RECOVERY

1866 G10237C

8/26/16

Parameter Record

Well ID: ESW

Job Information		Sampling Information		Well Information	
Client:	Town of Windsor	Sample Method:	direct from pump	SWL: 57.55 ft	Check:
Project:	ESPOSTI SUPPLY WELL	WQ Meter Type:		Date: 8/26/16	Time: 0710
		Flow Cell:	Pump Depth: 428' ~~ft~~	Ref.datum: TOC	Stick Up:
Proj. No.:	11110001	WLevel Meter Type:		Well Depth: NM ft	Well Diam.: 10 ~~ft~~ "
Sampler:	RC/MATT			Screen From: ..... ft	To: ..... ft

Time (.....)	Temp (°C)	pH (pH units)	Elec.Cond (.....)	TDS (.....)	Dis.Oxygen (.....)	Ox-Red Pt. (± mV)	Note	Note	Comment: Colour, turbidity, sediment load, sheen, odour
Stable When:		+/- 0.2 C	+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV			
0716	24.9	7.52	543	376		-65			PUMP ON @ 715AM @400GPM
0720	26.4	7.30	523	358		-66			
0725	26.4	7.33	520	357		-43			
0730	26.1	7.31	520	356		-57			
0745	26.7	7.30	521	359		-54			
0800	26.6	7.29	524	358		-49			SLIGHT SULFUR ODOR
0830	25.5	7.33	523	359		-41			
0900	26.0	7.34	525	360		-23			SLIGHT SULFUR ODOR
0930	26.8	7.37	525	360		-15			
1000	25.6	7.34	525	359		-17			
1030	25.7	7.32	517	359		-2			
1100	26.2	7.33	525	359		-19			
1130	26.6	7.33	523	359		-28			
1200	26.6	7.34	524	359		-24			
1230	26.4	7.32	525	359		-16			
1300	26.3	7.27	529	362		-5			
1330	26.6	7.31	525	360		-21			
1400	26.6	7.33	523	360		-19			
1430	26.5	7.33	526	360		-23			
1500	26.5	7.35	525	359		-23			
1515	26.5	7.37	525	360		-33			STOP PUMP

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Central Valley Laboratory
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916-686-5190 F) 916-686-5192

Work Order
Chain of Custody Record

Lab No._____ Page 1 of 1

Name: Town of Windsor - ~~Drinking Water~~ FEASIBILITY STUDY	**Project ID:** Source Chemical
Mailing Address: 9291 Old Redwood Highway Building 400, Windsor, CA 95492	**Phase:** Esposti Well
Project Contact (Hardcopy or PDF to): Elizabeth Cargay, ecargay@townofwindsor.com AND KOBRIEN@HAZENANDSAWYER.com	PO# 200336
	Bill to: month end billing

Signature below authorizes work under terms stated on reverse side.

Analysis Request

TAT: 24 hr ( ) 48 hr ( ) Lab Approval Required ( ) 1 wk ( ) 2 wk (standard) (✓) — Lab Approval Required For Rush

Field Sampler - Print Name & Signature: RYAN CRAWFORD Ryan Crawford

Sample Identification	Sample Collection Date	Time	Container: 40ml VOA	Poly	Amber	Glass	Preservative: HCL	HNO3	H2SO4	Other	None	Matrix: Water	Soil	200.8 As	200.7 Fe/Mn	200.8 Cr	218.6 Cr6	200.7 Ca, Mg, K, Na	Alkalinity	Chloride	Sulfate	Total Nitrogen (includes TKN, NO2, NO3)	Silica	200.8 Vanadium - total	Phosphate	As3 & As5 - sub Weck
Esposti Well				x				x	x	x	x	x				x	x	x	x	x	x	x	x	x	x	x
ESW-8-26-7:16	8/26/16	716		X																						
ESW-8-26-7:20	↓	720		X																						
ESW-8-26-8:15		815		X																						
ESW-8-26-11:15		1115		X																						
ESW-8-26-15:15	↓	1515		X				X	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X

Relinquished by:	Received by:	Date	Time
Ryan Crawford		8/29/16	0630
		8/30/16	1 & CD

CDPH Write On EDT Report? Yes ( ) No (✓)

State System Number:

CA Geotracker EDF Report Yes ( ) No (✓)

Sampling Company Log Code:

Global ID: EDF to (Email Address):

Travel and Site Time: Mileage: Misc. Supplies:

FIELD REPORT

DATE: 9/6/16	LOCATION: ESPOSTI PARK, WINDSOR
PROJECT NAME: ESPOSTI WELL	JOB NO: WEEKS, SEBASTOPOL
EVENT: IRRIGATION WELL SAMPLING/PACKER MEASUREMENTS	WEATHER/TEMP: 70° at am —° at pm —
PRESENT AT SITE:	

THE FOLLOWING WAS NOTED:

-1000 RC ONSITE, AT PARK BEGIN ASSEMBLING SAMPLE PORT COMPONENTS AND PREPARE FIELD ARSENIC TEST (AS A COMP. TO THE ARSENIC ANALYTICAL)

-1035 BRETT (WINDSOR) ONSITE, OPEN IRRIGATION WELL ENCLOSURE. ISOLATE SAMPLE PORT PLUG WITH VALVES AT PRESSURE TANK AND OUT TO SYSTEM. INSTALL SAMPLE PORT. ✓

-1045 SAMPLE FOR ANALYTICAL AND RUN A FIELD TEST ARSENIC = 10-13 ug/L

-1130 RC OFFSITE

-1300 RC ONSITE @ WEEKS. MEET W/ JOSH AND GO OVER YARD AND MEASURE ALL ZONE TEST PIPING, PUMP ASSEMBLY, PACKER, BRACKET, COUPLERS

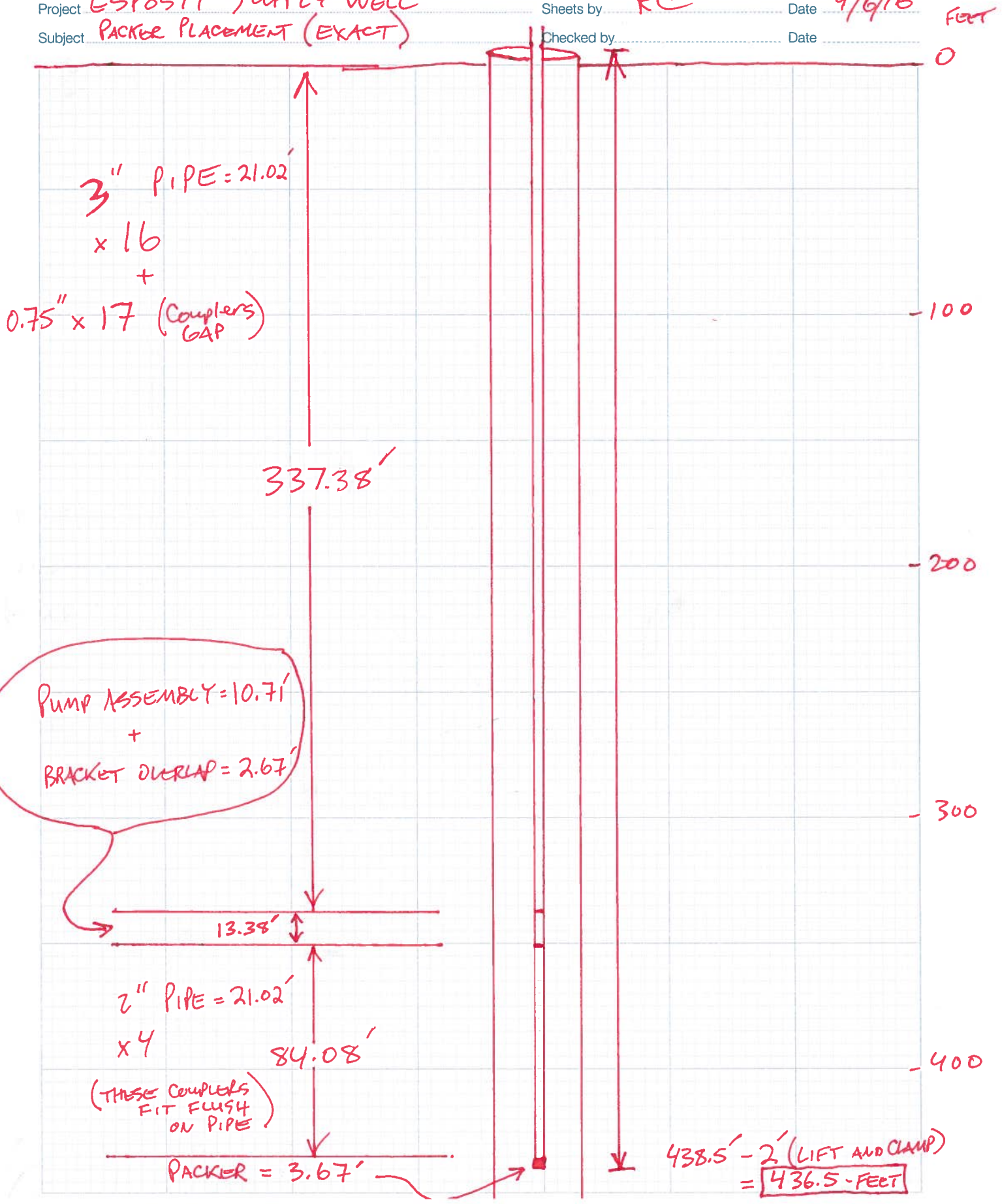
-1415 RC OFFSITE

GHD

Client: TOWN OF WINDSOR
Project: ESPOSTI SUPPLY WELL
Subject: PACKER PLACEMENT (EXACT)

Job Number: FEASIBILITY STUDY
Sheets by: RC
Checked by:

Sheet ... of ...
Date: 9/6/16
Date:



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Work Order
Chain of Custody Record

Lab No._____ Page 1 of 1

Name: Town of Windsor - ~~Drinking Water~~ FEASIBILITY STUDY	**Project ID:** #25-1310
Mailing Address: 9291 Old Redwood Highway Building 400, Windsor, CA 95492	**Phase:** Esposti Well
Project Contact (Hardcopy or PDF to): Elizabeth Cargay, ecargay@townofwindsor.com AND KOBRIEN@HAZENANDSAWYER.com	**PO#** 200336
	Bill to: month end billing

Signature below authorizes work under terms stated on reverse side.

Field Sampler - Print Name & Signature: RYAN CRAWFORD Ryan Crawford

Sample Identification	Sample Collection Date	Time	Container: 40ml VOA	Poly	Amber	Glass	Preservative: HCL	HNO3	H2SO4	Other	None	Matrix: Water	Soil	200.8 As	200.7 Fe/Mn	200.8 Cr	218.6 Cr6	200.7 Ca, Mg, K, Na	Alkalinity	Chloride		Sulfate	Total Nitrogen (includes TKN, NO2, NO3)	Silica	200.8 Vanadium - total	Phosphate	As3 & As5 - sub Weck			
Esposti Irrigation Well #9-6-16	9/6/16	1045		x				x	x	x	x	x		X	X	x	x	x	x	x		x	x	x	x	x	x			

TAT: 24 hr ○ 48 hr ○ (Lab Approval Required) 1 wk ○ 2 wk (standard) ⊗ — Lab Approval Required For Rush

BOTTLE KIT ORDER for Esposti Irrigation Well placed 9/1/2016, deliver kit on Friday 9/2/20016 in a cooler to:
Ryan Crawford
2235 Mercury Way, Suite 150,
Santa Rosa, CA 95407

Relinquished by:	Received by:	Date	Time	Global ID:	EDF to (Email Address):
Ryan Crawford		9/6/16	1430	Travel and Site Time:	Mileage: / Misc. Supplies:

DATE: 9/12/16	LOCATION: ESPOSTI PARK, WINDSOR
PROJECT NAME:	EVENT: HI DEF CAMERA VIDEO ESW

-1258 RC ONSITE – WEEKS / WEST COAST LOGGING ONSITE ALREADY. SCOPE TO "SEE" 400-460' ✓

-1310 SET CAMERA → START DTW = 57.5 (TOC)

383' SCREEN/BLANK JOINT GOOD

400' SCREEN STILL GOOD NOTE.. ~ 10%-30% FINE IN SCREENS

403' SCREEN/BLANK WELD GOOD

403 - 424.1 SCREEN GOOD

424.1 - SCREEN/BLANK WELD GOOD

424.1 - 434.5 BLANK GOOD

00 REVIEW 434.5 BLANK/SCREEN GOOD

*438.8 434.5 - 454 SCREEN GOOD. JUST PAST 438 SOME MATERIALS IN USMG?

DONE ROCK IN SCREEN * 454 - SCREEN/BLANK WELD GOOD

454 - 460+ GOOD

-1440 START TO MAKE CD COPIES, PRINT RPT PICS BEFORE/AFTER ✓
- 2 COPIES CD & RPT, RC TO BURN FOR KOS/CITY.

-1335 RC OFFSITE

FIELD REPORT

DATE: 9/19 - 9/21/2016	LOCATION: Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Supply Well	JOB NO: 11110001.20
EVENT: PREP. AND ZONE TEST	WEATHER/TEMP: 55-75 ° at am 75-100 ° at pm
PRESENT AT SITE: RC / WEEKS (OTTO & MATT)	

THE FOLLOWING WAS NOTED:

- 9/19 10:10 – RC ONSITE, CALL WINDSOR (EC) TO GET INTO ENCLOSURE (EIW) FOR BAROMETRIC TRANSDUCER ETC. EC TO BE ONSITE @ 15:00.

1030 – WEEKS ONSITE, SET-UP, UNLOAD, FENCING ↓

1100 – START ASSEMBLING PACKER & PUMP ASSEMBLY ALL THE WAY DOWN (SEE SCHEMATIC & PICS)

1455 – STOPPING POINT FOR DOWNHOLE EQUIP INSTALL. CALL FOR REGARDING START-UP ZONE TEST FOR WEDS NOT TUES. ✓ GOOD. WEEKS OFFSITE FOR GENERATOR, NITRO TANK (PACKER) ETC.

1500 – EC ONSITE TO OPEN EIW ENCLOSURE, DROP OFF BAROMETER, DATA DUMP/SYNC TRANSDUCER THATS IN EIW ✓

-1550 RC OFFSITE

DATE: ~~5/10/2016~~ 9/19 - 9/21	LOCATION: : Esposti Well, Old Redwood Hwy at Shiloh Road, Windsor, CA
PROJECT NAME: Town of Windsor, Esposti Supply Well	EVENT: SEPT. ZONE TEST (R2)

9/20/2016

-1100 - RC / WEEKS ONSITE - FINISH 3" PIPE INSTALL, INSTALL FLEXI PIPE OUT TO SEWER (SHILOH/RED. HWY)

- INSTALL TRANSDUCER IN SOUND TUBE @ 240' ± 1' (TOC)
- ESW STATIC DTW = 58.5' TOC
- RUN PRE-TEST @ 1237 @ 400 GPM

TIME	(MIN)	DTW (TOC	FLOW (Q, GPM)
1237	0	58.5	0
1242	5	203	400 → RAPID DROP TO 390 WITH VALVE WIDE OPEN
1247	10	208	375 MAX!
1252	15	206	375 → CALL KOB DISCUSS
1257	20	207.5	375 + CHANGE ZONE TEST TO 300GPM

1345 - RC / WEEKS OFFSITE

9/21/16

0630 - RC / WEEKS ONSITE, CALIBRATE METER ± 0.1 ✓ SET-UP SAMPLE BOTTLE SET

0700 - START TEST, COLLECT 0701, 0705, 0800 SAMPLES & INDICATOR PARAMETERS, MANUAL DTW (WEEKS)

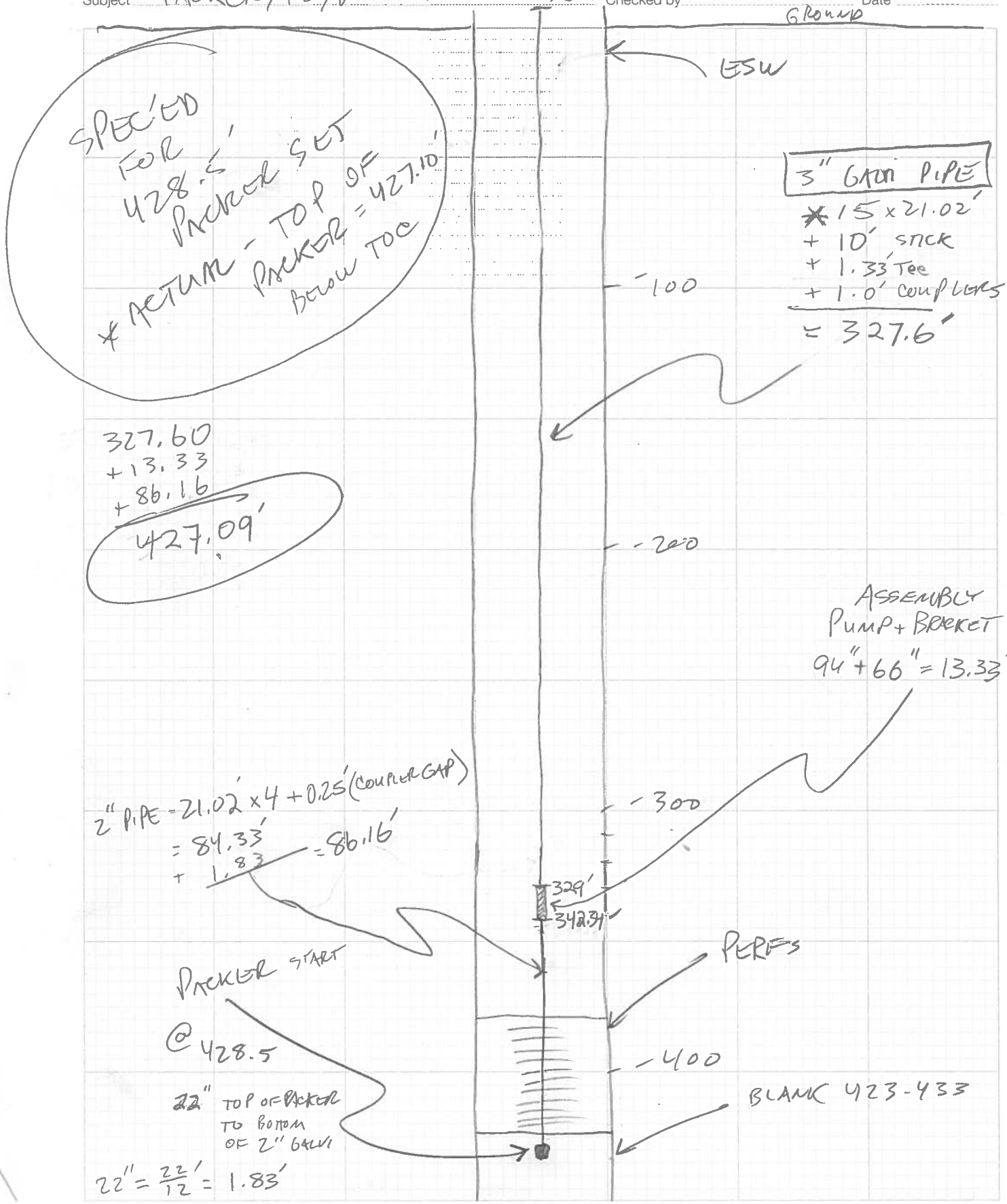
1100 - SAMPLE

1400 - SET-UP FIELD As TEST & FINAL SAMPLES @ 1500 ✓
FIELD As = 13 ppb

1540 - CLEAN-UP, RC/WEEKS OFFSITE

WEEKS WCK-6100
CODE

Client | Job Number | Sheet of
Project | Sheets by RC | Date 9/19
Subject PACKER/TD/PUMP INSTALL SCHEMATIC | Checked by | Date



9/21/16

GHD MANAGEMENT ENGINEERING ENVIRONMENT

Parameter Record

Well ID: GSW

Job Information		Sampling Information		Well Information			
Client:	Town of Windsor	Sample Method:	direct from pump	SWL:	58.4 ft	Check:	
Project:		WQ Meter Type:		Date:		Time:	
		Flow Cell:	Pump Depth:.....m	Ref.datum:		Stick Up:	
Proj. No.:	11110001	WLevel Meter Type:		Well Depth:	ft	Well Diam.:	ft
Sampler:				Screen From:	ft	To:	ft

Time (.....)	Temp (°C)	pH (pH units)	Elec.Cond (.....)	TDS (.....)	Dis.Oxygen (.....)	Ox-Red Pt. (± mV)	Note	Note	Comment: Colour, turbidity, sediment load, sheen, odour
Stable When:		+/- 0.2 C	+/- 0.05 pH	+/- 3%	+/- 10%	+/- 10 mV			
701	25.1	7.39	515	353	—	-96		300GPM	TURBID (SLIGHTLY)
705	26.0	7.27	513	352	—	-69			CLEAR
710	26.2	7.33	506	347	—	-65			"
715	26.7	7.34	509	349	—	-63			"
730	23.2	7.30	494	342	—	-33			"
745	24.3	7.25	510	351	—	-25	MISSED	745 RC	↓
800	↓	↓	↓	↓		↓			
830	25.2	7.28	526	358		-29			
900	25.7	7.17	525	360		-27			
930	25.2	7.30	526	361		-30			
1000	25.6	7.31	525	360		-35			
1030	25.5	7.33	527	362		-38			
1100	26.-	7.26	528	362		-38			
1130	25.7	7.32	529	362		-35			
1200	26.7	7.31	525	359		-16			
1230	26.7	7.41	527	359		-29			
100	26.2	7.21	530	364		-21			
130	26.3	7.33	533	364		-33			
200	26.2	7.28	533	366		-38			
230	25.9	7.30	531	364		-38			
300	25.8	7.29	533	365		-30			

PUMPING WELL

Drawdown Sheet

GHD | MANAGEMENT ENGINEERING ENVIRONMENT

Measured Well	Owner: TOWN OF WINDSOR		Well ID:	
	Location: ESPOSTI PARK		Name/Site:	
Pumped Well	Owner: Town of Windsor		Well ID:	Esposti Supply Well
	Location:		Name/Site:	
Test Details	Date pumping commenced: 21SEPT16	Time: 0700		Test No.
	Date pumping ceased: 21SEPT16	Time:		

Are Measurements below for the pumped well? Distance from pumped well (ft):

Static DTW ..... Feet below measuring point

Measuring Point TOC ..... Feet above/below ground level

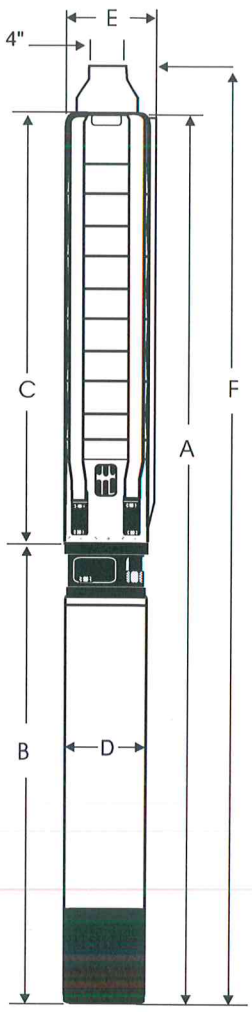
Watch Time	Elapsed Time (min)	Calculated drawdown (ft) (DTW - Static)	Measured DTW (feet) below measuring point	Discharge (gpm) Only if pumped well	Comments or pressure measurements from transducer
0700	0	—	58.40	300	Pump START - METER 69051
0705	5		152.—	300	
0710	5		158.65	300	
0715	5		162.45	300	
0725	10		165.00	300	
0735	10		167.25	300	
0745	10		169.90	300	
0800	15		171.75	300	
0900	1		177.10	300	
1000	1		177.80	300	
1100	1		178.40	300	
1200	1		180.50	300	
1300	1		178.70	300	
1400	1		179.65	300	
1500	1		180.60	300	
1510				300	Pump STOP-METER-70712
1515	10		91.25	—	RECOVERY
1530	15		73.45	—	"
1600	30		69.20	—	"
1615	15		67.80	—	"

Appendix I – Equipment Technical Information and Photographic Documentation

DIMENSIONS AND WEIGHTS

MODEL NO.	FIG.	HP	MOTOR SIZE	DISCH. SIZE	DIMENSIONS IN INCHES						APPROX. SHIP WT.
					A	B	C	D	E	F	
385S75-1	A	7.5	6"	4" NPT	48.3	24.0	24.3	5.4	7.0	53.1	148
385S100-2BA	A	10	6"	4" NPT	54.8	25.4	29.4	5.4	7.0	59.6	178
385S150-2	A	15	6"	4" NPT	57.4	28.0	29.4	5.4	7.0	62.2	192
385S200-3A	A	20	6"	4" NPT	65.0	30.6	34.4	5.4	7.0	69.8	223
385S250-3	A	25	6"	4" NPT	67.5	33.1	34.4	5.4	7.0	72.3	210
385S250-4B	A	25	6"	4" NPT	72.6	33.1	39.5	5.4	7.0	77.4	210
385S300-4	A	30	6"	4" NPT	75.2	35.7	39.5	5.4	7.0	80.0	243
385S300-5BB	A	30	6"	4" NPT	80.2	35.7	44.5	5.4	7.0	85.0	252
385S400-5*	A	40	6"	4" NPT	85.3	40.8	44.5	5.4	7.0	90.1	276
385S400-6B	A	40	6"	4" NPT	90.4	40.8	49.6	5.4	7.0	95.2	285
385S500-6*	A	50	6"	4" NPT	107.4	57.8	49.6	5.4	7.0	112.2	285
385S500-7A	A	50	6"	4" NPT	113.0	57.8	55.2	5.4	7.0	117.8	450
385S600-7*	A	60	6"	4" NPT	119.0	63.8	55.2	5.4	7.0	123.8	450
385S600-8*	A	60	6"	4" NPT	124.0	63.8	60.2	5.4	7.0	128.8	459
385S750-9	A	75	8"	4" NPT	112.7	47.4	65.3	7.6	7.7	117.5	577
385S750-10	A	75	8"	4" NPT	117.7	47.4	70.3	7.6	7.7	122.5	586
385S1000-11	A	100	8"	4" NPT	130.3	54.91	75.4	7.6	7.7	135.1	672
385S1000-12	A	100	8"	4" NPT	135.3	54.91	80.4	7.6	7.7	140.1	701
385S1000-13	A	100	8"	4" NPT	140.3	54.91	85.4	7.6	7.7	145.1	709
Pipe Adapter	A									4.8	

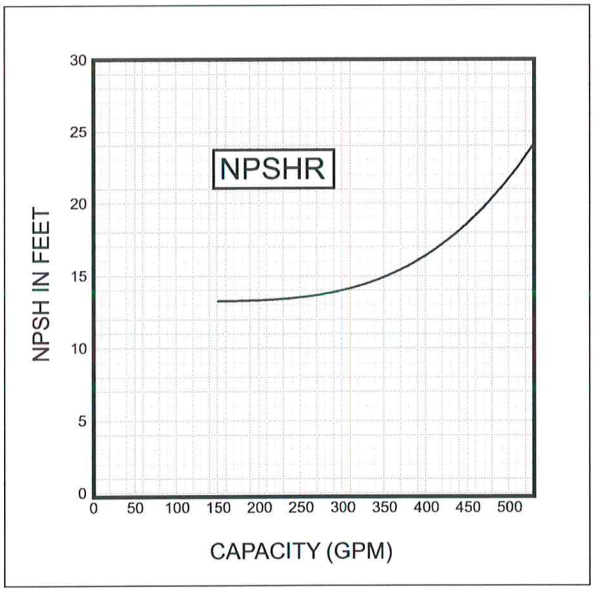
NOTES: All models suitable for use in 8" wells, unless otherwise noted.
Weights include pump end with motor in lbs.
*Alternate motor sizes available.
All models come with a standard 5"-4" Pipe Adapter. Refer to chart for dimensions.



MATERIALS OF CONSTRUCTION

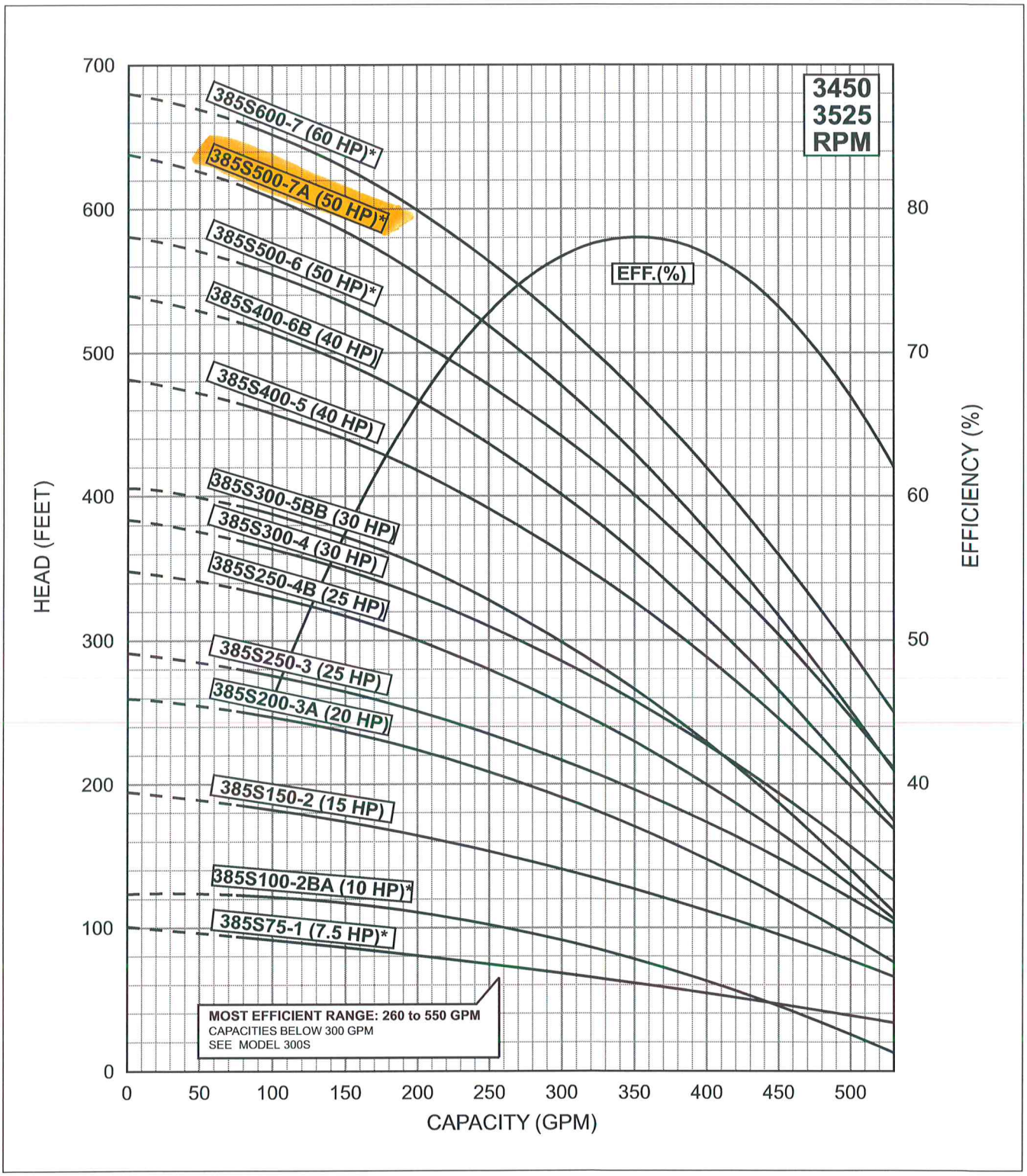
COMPONENT	CYLINDRICAL SHAFT (1-13 Stgs.)
Valve Housing	304 Stainless Steel
Check Valve	304 Stainless Steel
Diffuser Chamber	304 Stainless Steel
Split Cone Nut	304 Stainless Steel
Split Cone	304 Stainless Steel
Impeller	304 Stainless Steel
Suction Interconnector	304 Stainless Steel
Inlet Screen	304 Stainless Steel
Straps	304 Stainless Steel
Cable Guard	304 Stainless Steel
Coupling	316/329 Stainless Steel
Pump Shaft	431 Stainless Steel
Intermediate Bearings	NBR
Impeller Seal Ring	NBR/PPS
Lower Bearing	NBR/316 Stainless Steel
Upthrust Washer	Carbon/Graphite HY22
Upthrust stop ring	304 S.S./Tungsten Carbide
O-Ring	NBR
Valve Seat	304 Stainless Steel
Lower Valve Seat Retainer	316 Stainless Steel
Upper Valve Seat Retainer	304 Stainless Steel
Valve Guide	304 Stainless Steel
Valve Cup Spring	304 Stainless Steel

NOTES: Specifications are subject to change without notice.



PERFORMANCE CURVES 385 GPM MODEL 385S

FLOW RANGE: 75 - 550 GPM **OUTLET SIZE: 4" NPT** **NOMINAL DIA. 8"**



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
6" MOTOR STANDARD, 7.5-60 HP/3450 RPM.
8" MOTOR STANDARD,75-100 HP/3525 RPM.
* Alternate motor sizes available.

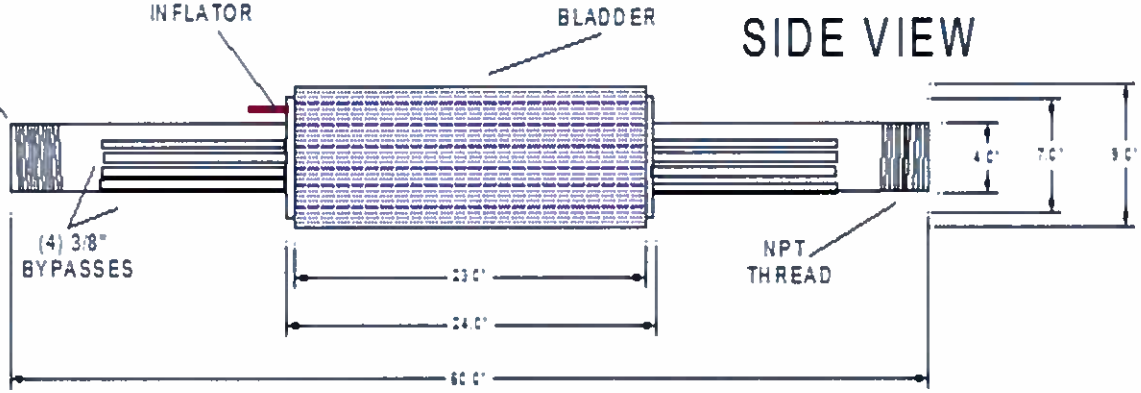
Performance conforms to ISO 9906. 1999 (E) Annex A
Minimum submergance is 8 feet.

LANSAS ®

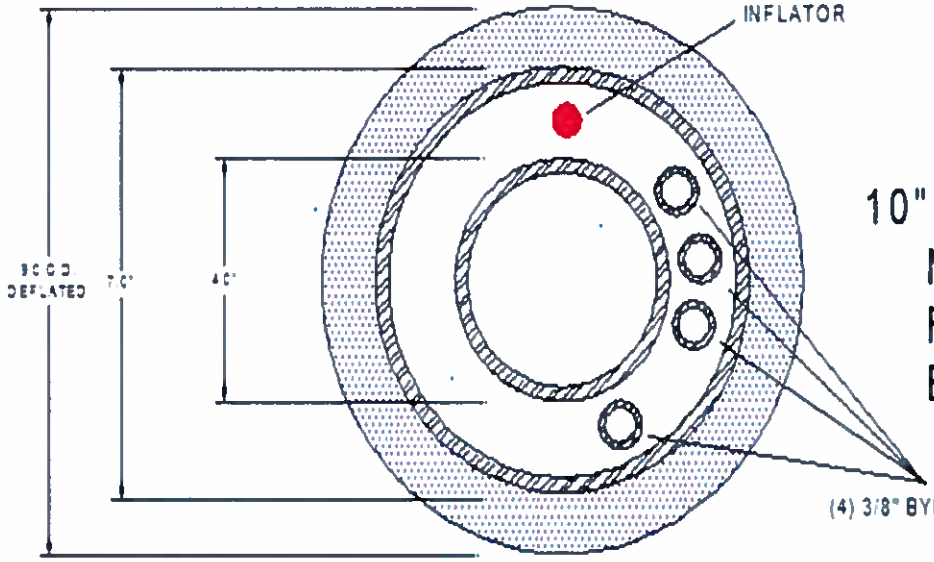
DO NOT SCALE DRAWING. WORK TO DIMENSIONS ONLY.
THIS PROPERTY IS THE SOLE AND EXCLUSIVE PROPERTY OF VANDERLANS & SONS, INC. (LANSAS) AND MAY NOT BE USED OR DISCLOSED TO OTHERS WITHOUT PRIOR WRITTEN APPROVAL FROM LANSAS PRODUCTS

PART NUMBER: 999-99

SIDE VIEW



TOP VIEW



10" WELL PACKER:

MAXIMUM BACK PRESSURE: 200 PSI

REQUIRED INFLATION: 275 PSI

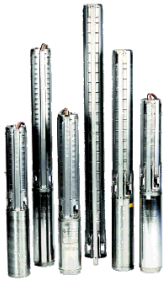
BLADDER: FABRIC REINFORCED NATURAL RUBBER.

GRUNDFOS

Company name:
Created by:
Phone:

Date: 1/4/2016

Position	Count	Description
	1	**1100S1000-3-AA**



Product photo could vary from the actual product

Produ t o. 18BG00B3
Multi stage su mersi le pump for ra ater suppl ,
ground ater lo ering and pressure oosting. he
pump is suita le for pumping lean, thin, non agressi e
li uids ithout solid parti les or fi ers.

he pump is made entirel of Stainless steel
DI W. r. 1.4301 and suita le for
hori ontal and erti al installation.
he pump is fitted ith a uilt in non return al e.

Liquid:

Pumped li uid	Water
Ma imum li uid temperature	104 F
Li uid temp	68 F
Densit	62.29 l /ft

Technical:

Speed for pump data	3450 rpm
Rated flo	1130 S gpm
Rated head	2772 ft
Cur e toleran e	ISO9906 2012 3B

Materials:

Pump	Stainless steel 1.4301 AISI AS M 304
Impeller	Stainless steel 1.4301 AISI 304

Installation:

Pump outlet	6" P
Motor diameter	8 in h

Electrical data:

Rated po er P2	100 HP
Po er (P2) re uired pump	100 HP

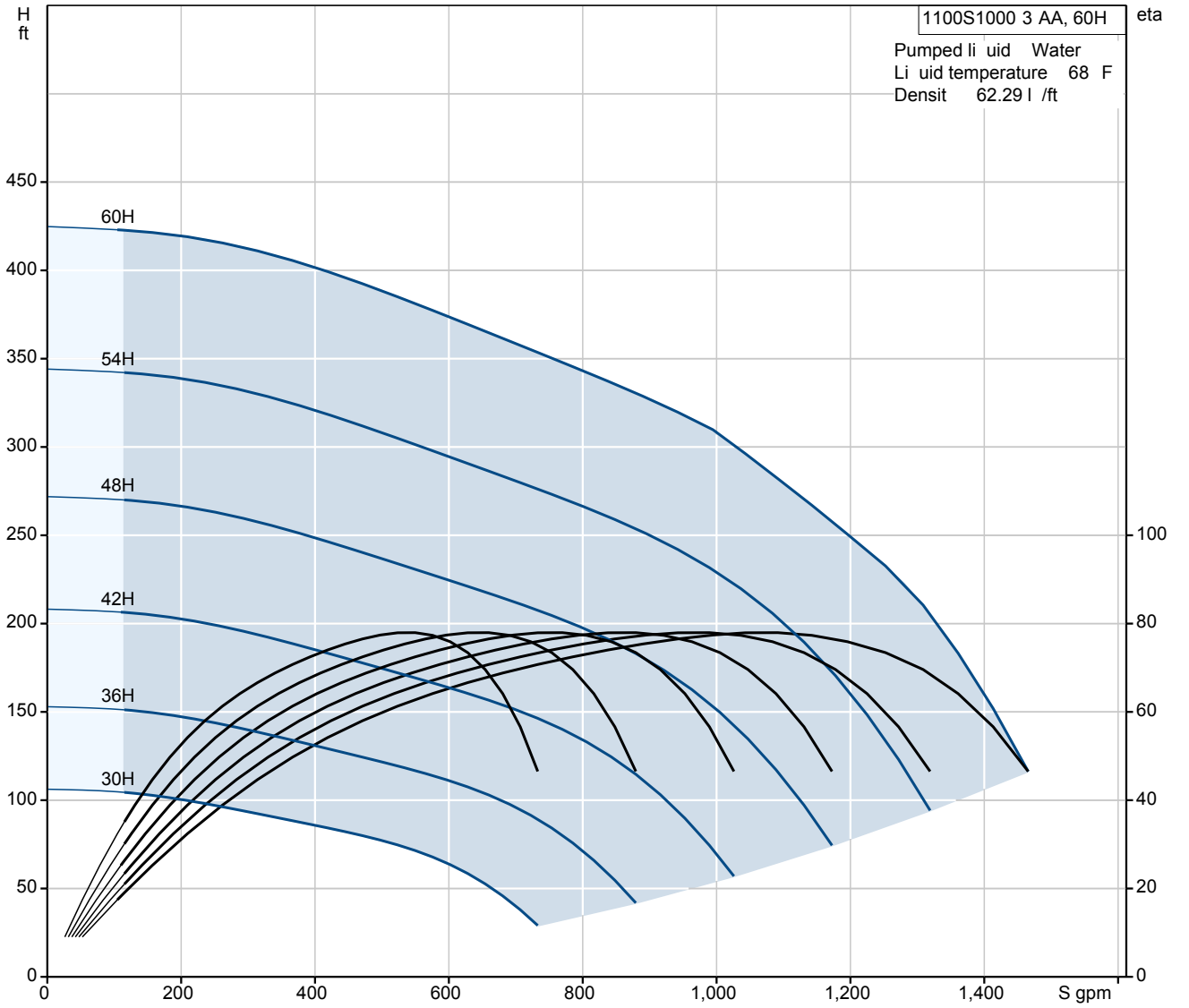
Others:

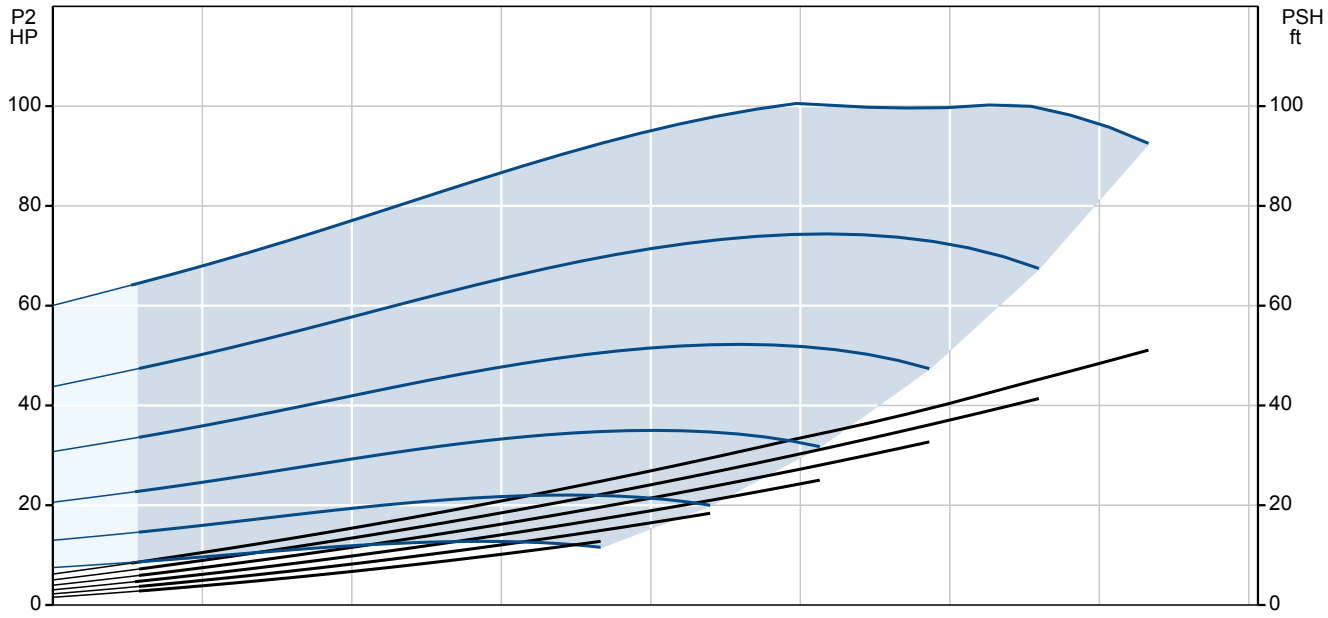
rP status	uP Standalone/Prod.
et eight	138 l
Gross eight	198 l
Shipping olume	8.58 ft

Company name:
Created by:
Phone:

Date: 1/4/2016

18BG00B3 1100S1000-3-AA 60 Hz







Baker tanks staged along Old Redwood Hwy used for settling of silt prior to filtration through bag filters.



Video service at Esposti Supply Well prior to well development.



Baker tanks staged along Old Redwood Hwy.



Bag filters used for sediment removal prior to discharge of water to sanitary sewer.



Configuration of well head during pumping tests.



Head assembly for dual swab development tool.



Dual swap development tool.

Appendix J – Analytical Reports

Alpha Analytical Laboratories Inc.
e-mail: clientservices@alpha-labs.com
Corporate: 208 Mason St., Ukiah, CA 95482 • Phone: (707) 468-0401 • Fax: (707) 468-5267
Bay Area: 6398 Dougherty Rd., Suite 35, Dublin, CA 94568 • Phone: (925) 828-6226 • Fax: (925) 828-6309
Central Valley: 9090 Union Park Way, Suite 113, Elk Grove, CA 95624 • Phone: (916) 686-5190 • Fax: (916) 686-5192

ELAP Certificates 1551, 2728, and 2922

26 April 2016

Town Of Windsor - Drinking Water
Attn: Elizabeth Cargay
8400 Windsor Rd.
Windsor, CA 95492-0100
RE: Esposti Potable Well
Work Order: 16D1995

Enclosed are the results of analyses for samples received by the laboratory on 04/22/16 16:43. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jeanette Poplin

Jeanette L. Poplin For Robbie C. Phillips
Project Manager

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e-mail: clientservices@alpha-labs.com
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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	04/26/16 15:39

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
ESW-4-20-08:23	16D1995-01	Water	04/20/16 08:23	04/22/16 16:43

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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e-mail: clientservices@alpha-labs.com
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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	04/26/16 15:39

	Result	Reporting Limit	Dilution	Batch	Prepared	Analyzed	Method	Note
ESW-4-20-08:23 (16D1995-01)		**Sample Type: Water**			**Sampled: 04/20/16 08:23**			
Metals (Dissolved) by EPA 200 Series Methods								**FILT**
Iron, dissolved	ND mg/L	0.10	1	AD63610	04/25/16 08:01	04/26/16 11:06	EPA 200.7	
Manganese, dissolved	**1.0 mg/L**	**0.020**	1	AD63610	04/25/16 08:01	04/26/16 11:06	EPA 200.7	
Metals (Dissolved) by EPA Method 200.8 ICP/MS								**FILT**
Arsenic, dissolved	**4.4 ug/L**	**0.40**	1	AD63608	04/25/16 07:54	04/26/16 12:34	EPA 200.8	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	04/26/16 15:39

Metals (Dissolved) by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AD63610 - EPA 200 Series										
Blank (AD63610-BLK1)				Prepared & Analyzed: 04/26/16						
Iron, dissolved	ND	0.10	mg/L							
Manganese, dissolved	ND	0.020	mg/L							
LCS (AD63610-BS1)				Prepared & Analyzed: 04/26/16						
Iron, dissolved	2.21	0.10	mg/L	2.00		111	85-115			
Manganese, dissolved	0.219	0.020	mg/L	0.200		110	85-115			
Duplicate (AD63610-DUP1)		**Source: 16D1995-01**		Prepared & Analyzed: 04/26/16						
Iron, dissolved	ND	0.10	mg/L		ND			6.07	20	
Manganese, dissolved	1.03	0.020	mg/L		0.995			3.48	20	
Matrix Spike (AD63610-MS1)		**Source: 16D1995-01**		Prepared & Analyzed: 04/26/16						
Iron, dissolved	2.28	0.10	mg/L	2.00	ND	111	70-130			
Manganese, dissolved	1.24	0.020	mg/L	0.200	0.995	120	70-130			
Matrix Spike Dup (AD63610-MSD1)		**Source: 16D1995-01**		Prepared & Analyzed: 04/26/16						
Iron, dissolved	2.35	0.10	mg/L	2.00	ND	115	70-130	3.23	20	
Manganese, dissolved	1.28	0.020	mg/L	0.200	0.995	140	70-130	3.11	20	QM-01

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	04/26/16 15:39

Metals (Dissolved) by EPA Method 200.8 ICP/MS - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AD63608 - EPA 200 Series										
Blank (AD63608-BLK1)				Prepared: 04/25/16 Analyzed: 04/26/16						
Arsenic, dissolved	ND	0.40	ug/L							
LCS (AD63608-BS1)				Prepared: 04/25/16 Analyzed: 04/26/16						
Arsenic, dissolved	21.4	0.40	ug/L	20.0		107	85-115			
Duplicate (AD63608-DUP1)		Source: 16D1995-01		Prepared: 04/25/16 Analyzed: 04/26/16						
Arsenic, dissolved	4.48	0.40	ug/L		4.36			2.85	20	
Matrix Spike (AD63608-MS1)		Source: 16D1995-01		Prepared: 04/25/16 Analyzed: 04/26/16						
Arsenic, dissolved	26.8	0.40	ug/L	20.0	4.36	112	70-130			
Matrix Spike Dup (AD63608-MSD1)		Source: 16D1995-01		Prepared: 04/25/16 Analyzed: 04/26/16						
Arsenic, dissolved	26.6	0.40	ug/L	20.0	4.36	111	70-130	0.697	20	

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Central Valley: 9090 Union Park Way, Suite 113, Elk Grove, CA 95624 • Phone: (916) 686-5190 • Fax: (916) 686-5192

Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	04/26/16 15:39

Notes and Definitions

FILT	The sample was filtered in the lab prior to analysis.
QM-01	The spike recovery for this QC sample is outside of established control limits possibly due to a sample matrix interference.
ND	Analyte NOT DETECTED at or above the reporting limit
dry	Sample results reported on a dry weight basis
REC	Recovery
RPD	Relative Percent Difference

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916-686-5190 F) 916-686-5192

Work Order
Chain of Custody Record

Lab No. 16D1995 Page ____ of ____

.4

Name: Town of Windsor - Drinking Water	**Project ID:** Esposti Potable Well
Mailing Address: 9291 Old Redwood Highway Building 400, Windsor, CA 95492	**Phase:**
Project Contact (Hardcopy or PDF to): Elizabeth Cargay, ecargay@townofwindsor.com; Kent O'Brien, kent.obrien@ghd.com	PO#
	Bill to: month end billing

Signature below authorizes work under terms stated on reverse side.

Analysis Request

TAT: 24 hr (●) 48 hr ( ) Lab Approval Required — 1 wk ( ) 2 wk (standard) ( ) — Lab Approval Required For Rush

Field Sampler - Print Name & Signature / Sample Identification	Sample Collection Date	Time	Container: 40ml VOA	Poly	Amber	Glass	Preservative: Na2S2O3	HNO3	NH4Cl	Other	None	Matrix: Water	Soil	200.8 As (Dissolved)	200.7 Fe (Dissolved)	200.7 Mn (Dissolved)	200.8 Cr (Dissolved)	218.6 Cr6 (Dissolved)	200.7 Ca, Mg, K, Na (Dissolved)	Alkalinity	Chloride	Nitrate as N, Nitrite as N	Sulfate	Total Nitrogen (includes TKN, NO2, NO3)	Silica	200.8 Vanadium - total	Phosphate	CAM 17	TPH G, BTEX, D/MO	6010 As STLC	Title 22 Scan (**Below List)	TAT
ESW-4.20-08:23	4/20/16	08:23		X							X	X		X	X	X																Filter & Fix in lab.

**Title 22 Scan

64432 Primary Inorganics, 64432.1 NO2/NO3, 64449 A&B
Asbestos, Perchlorate, Gross Alpha, 504.1, 507, 508, 515.1, 524.2, 531.1, 548.1, 549.2

		Date	Time
Relinquished by: David Poma	Received by: David Poma	4/20/16	11:10
Relinquished by: David Poma	Received by:	4.22.16	1643
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time

CDPH Write On EDT Report? Yes ( ) No (●)

State System Number:

CA Geotracker EDF Report Yes ( ) No (●)

Sampling Company Log Code:

Global ID: EDF to (Email Address):

Travel and Site Time: Mileage: Misc. Supplies:

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ELAP Certificates 1551, 2728, and 2922

27 April 2016

Town Of Windsor - Drinking Water
Attn: Elizabeth Cargay
8400 Windsor Rd.
Windsor, CA 95492-0100
RE: Esposti Potable Well
Work Order: 16D2256

Enclosed are the results of analyses for samples received by the laboratory on 04/26/16 15:40. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jeanette Poplin

Jeanette L. Poplin For Robbie C. Phillips
Project Manager

Alpha Analytical Laboratories Inc.
e-mail: clientservices@alpha-labs.com
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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	04/27/16 16:12

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
ESW-4-26-11:50	16D2256-01	Water	04/26/16 11:50	04/26/16 15:40

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	04/27/16 16:12

	Result	Reporting Limit	Dilution	Batch	Prepared	Analyzed	Method	Note
ESW-4-26-11:50 (16D2256-01)		**Sample Type: Water**			**Sampled: 04/26/16 11:50**			
Metals (Dissolved) by EPA 200 Series Methods								**FILT**
Iron, dissolved	ND mg/L	0.10	1	AD63610	04/27/16 11:20	04/27/16 11:55	EPA 200.7	
Manganese, dissolved	**0.64 mg/L**	**0.020**	1	AD63610	04/27/16 11:20	04/27/16 11:55	EPA 200.7	
Metals (Dissolved) by EPA Method 200.8 ICP/MS								**FILT**
Arsenic, dissolved	**3.0 ug/L**	**0.40**	1	AD63608	04/27/16 11:20	04/27/16 13:19	EPA 200.8	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	04/27/16 16:12

Metals (Dissolved) by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AD63610 - EPA 200 Series										
Blank (AD63610-BLK1)				Prepared & Analyzed: 04/26/16						
Iron, dissolved	ND	0.10	mg/L							
Manganese, dissolved	ND	0.020	mg/L							
LCS (AD63610-BS1)				Prepared & Analyzed: 04/26/16						
Iron, dissolved	2.21	0.10	mg/L	2.00		111	85-115			
Manganese, dissolved	0.219	0.020	mg/L	0.200		110	85-115			
Duplicate (AD63610-DUP1)		**Source: 16D1995-01**		Prepared & Analyzed: 04/26/16						
Iron, dissolved	ND	0.10	mg/L		ND			6.07	20	
Manganese, dissolved	1.03	0.020	mg/L		0.995			3.48	20	
Matrix Spike (AD63610-MS1)		**Source: 16D1995-01**		Prepared & Analyzed: 04/26/16						
Iron, dissolved	2.28	0.10	mg/L	2.00	ND	111	70-130			
Manganese, dissolved	1.24	0.020	mg/L	0.200	0.995	120	70-130			
Matrix Spike Dup (AD63610-MSD1)		**Source: 16D1995-01**		Prepared & Analyzed: 04/26/16						
Iron, dissolved	2.35	0.10	mg/L	2.00	ND	115	70-130	3.23	20	
Manganese, dissolved	1.28	0.020	mg/L	0.200	0.995	140	70-130	3.11	20	QM-01

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	04/27/16 16:12

Metals (Dissolved) by EPA Method 200.8 ICP/MS - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AD63608 - EPA 200 Series										
Blank (AD63608-BLK1)				Prepared: 04/25/16 Analyzed: 04/26/16						
Arsenic, dissolved	ND	0.40	ug/L							
LCS (AD63608-BS1)				Prepared: 04/25/16 Analyzed: 04/26/16						
Arsenic, dissolved	21.4	0.40	ug/L	20.0		107	85-115			
Duplicate (AD63608-DUP1)		**Source: 16D1995-01**		Prepared: 04/25/16 Analyzed: 04/26/16						
Arsenic, dissolved	4.48	0.40	ug/L		4.36			2.85	20	
Matrix Spike (AD63608-MS1)		**Source: 16D1995-01**		Prepared: 04/25/16 Analyzed: 04/26/16						
Arsenic, dissolved	26.8	0.40	ug/L	20.0	4.36	112	70-130			
Matrix Spike Dup (AD63608-MSD1)		**Source: 16D1995-01**		Prepared: 04/25/16 Analyzed: 04/26/16						
Arsenic, dissolved	26.6	0.40	ug/L	20.0	4.36	111	70-130	0.697	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	04/27/16 16:12

Notes and Definitions

FILT	The sample was filtered in the lab prior to analysis.
QM-01	The spike recovery for this QC sample is outside of established control limits possibly due to a sample matrix interference.
ND	Analyte NOT DETECTED at or above the reporting limit
dry	Sample results reported on a dry weight basis
REC	Recovery
RPD	Relative Percent Difference

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Work Order
Chain of Custody Record

Lab No. 1602256 Page ____ of ____

0.4

Name: Town of Windsor - Drinking Water	**Project ID:** Esposti Potable Well
Mailing Address: 9291 Old Redwood Highway Building 400, Windsor, CA 95492	**Phase:**
Project Contact (Hardcopy or PDF to): Elizabeth Cargay, ecargay@townofwindsor.com; Kent O'Brien, kent.obrien@ghd.com	PO#
	Bill to: month end billing

Signature below authorizes work under terms stated on reverse side.

Analysis Request

TAT: 24 hr (X) · 48 hr ( ) · Lab Approval Required · 1 wk ( ) · 2 wk (standard) ( ) · Lab Approval Required For Rush

Field Sampler - Print Name & Signature / Sample Identification	Sample Collection Date	Sample Collection Time	Container: 40ml VOA	Container: Poly	Container: Amber	Container: Glass	Preservative: Na2S2O3	Preservative: HNO3	Preservative: NH4Cl	Preservative: Other	Preservative: None	Matrix: Water	Matrix: Soil	200.8 As (Dissolved)	200.7 Fe (Dissolved)	200.7 Mn (Dissolved)	200.8 Cr (Dissolved)	218.6 Cr6 (Dissolved)	200.7 Ca, Mg, K, Na (Dissolved)	Alkalinity	Chloride	Nitrate as N, Nitrite as N	Sulfate	Total Nitrogen (includes TKN, NO2, NO3)	Silica	200.8 Vanadium - total	Phosphate	CAM 17	TPH G, BTEX, D/MO	6010 As STLC	Title 22 Scan (**Below List)	TAT
ESW-4-26-11:50	4/26/16	1150	X								X	X		X	X	X																FILTER & FIX IN LAB

**Title 22 Scan

64432 Primary Inorganics, 64432.1 NO2/NO3, 64449 A&B
Asbestos, Perchlorate, Gross Alpha, 504.1, 507, 508, 515.1,
524.2, 531.1, 548.1, 549.2

Relinquished by:	Received by:	Date	Time
[signature]	[signature]	4/26/16	1220
[signature]	[signature]		1540

CDPH Write On EDT Report? Yes ( ) No (X)

State System Number: ____

CA Geotracker EDF Report Yes ( ) No (X)

Sampling Company Log Code: ____

Global ID: EDF to (Email Address):

Travel and Site Time: | Mileage: | Misc. Supplies: -

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ELAP Certificates 1551, 2728, and 2922

29 April 2016

Town Of Windsor - Drinking Water
Attn: Elizabeth Cargay
8400 Windsor Rd.
Windsor, CA 95492-0100
RE: Esposti Potable Well
Work Order: 16D2432

Enclosed are the results of analyses for samples received by the laboratory on 04/28/16 15:15. If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Robin C. Edens For Robbie C. Phillips
Project Manager

Alpha Analytical Laboratories Inc.
e-mail: clientservices@alpha-labs.com
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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	04/29/16 16:24

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
EWS-4-28-11:40	16D2432-01	Water	04/28/16 11:40	04/28/16 15:15

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Central Valley: 9090 Union Park Way, Suite 113, Elk Grove, CA 95624 • Phone: (916) 686-5190 • Fax: (916) 686-5192

Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	04/29/16 16:24

	Result	Reporting Limit	Dilution	Batch	Prepared	Analyzed	Method	Note
EWS-4-28-11:40 (16D2432-01)		**Sample Type: Water**			**Sampled: 04/28/16 11:40**			
Metals (Dissolved) by EPA 200 Series Methods								**FILT**
Iron, dissolved	ND mg/L	0.10	1	AD63610	04/29/16 08:20	04/29/16 10:49	EPA 200.7	
Manganese, dissolved	**0.93 mg/L**	**0.020**	1	AD63610	04/29/16 08:20	04/29/16 10:49	EPA 200.7	
Metals (Dissolved) by EPA Method 200.8 ICP/MS								**FILT**
Arsenic, dissolved	**18 ug/L**	**0.40**	1	AD63608	04/29/16 08:20	04/29/16 10:52	EPA 200.8	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	04/29/16 16:24

Metals (Dissolved) by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AD63610 - EPA 200 Series										
Blank (AD63610-BLK1)				Prepared & Analyzed: 04/26/16						
Iron, dissolved	ND	0.10	mg/L							
Manganese, dissolved	ND	0.020	mg/L							
LCS (AD63610-BS1)				Prepared & Analyzed: 04/26/16						
Iron, dissolved	2.21	0.10	mg/L	2.00		111	85-115			
Manganese, dissolved	0.219	0.020	mg/L	0.200		110	85-115			
Duplicate (AD63610-DUP1)		**Source: 16D1995-01**		Prepared & Analyzed: 04/26/16						
Iron, dissolved	ND	0.10	mg/L		ND			6.07	20	
Manganese, dissolved	1.03	0.020	mg/L		0.995			3.48	20	
Matrix Spike (AD63610-MS1)		**Source: 16D1995-01**		Prepared & Analyzed: 04/26/16						
Iron, dissolved	2.28	0.10	mg/L	2.00	ND	111	70-130			
Manganese, dissolved	1.24	0.020	mg/L	0.200	0.995	120	70-130			
Matrix Spike Dup (AD63610-MSD1)		**Source: 16D1995-01**		Prepared & Analyzed: 04/26/16						
Iron, dissolved	2.35	0.10	mg/L	2.00	ND	115	70-130	3.23	20	
Manganese, dissolved	1.28	0.020	mg/L	0.200	0.995	140	70-130	3.11	20	QM-01

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	04/29/16 16:24

Metals (Dissolved) by EPA Method 200.8 ICP/MS - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AD63608 - EPA 200 Series										
Blank (AD63608-BLK1)				Prepared: 04/25/16 Analyzed: 04/26/16						
Arsenic, dissolved	ND	0.40	ug/L							
LCS (AD63608-BS1)				Prepared: 04/25/16 Analyzed: 04/26/16						
Arsenic, dissolved	21.4	0.40	ug/L	20.0		107	85-115			
Duplicate (AD63608-DUP1)		**Source: 16D1995-01**		Prepared: 04/25/16 Analyzed: 04/26/16						
Arsenic, dissolved	4.48	0.40	ug/L		4.36			2.85	20	
Matrix Spike (AD63608-MS1)		**Source: 16D1995-01**		Prepared: 04/25/16 Analyzed: 04/26/16						
Arsenic, dissolved	26.8	0.40	ug/L	20.0	4.36	112	70-130			
Matrix Spike Dup (AD63608-MSD1)		**Source: 16D1995-01**		Prepared: 04/25/16 Analyzed: 04/26/16						
Arsenic, dissolved	26.6	0.40	ug/L	20.0	4.36	111	70-130	0.697	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	04/29/16 16:24

Notes and Definitions

FILT	The sample was filtered in the lab prior to analysis.
QM-01	The spike recovery for this QC sample is outside of established control limits possibly due to a sample matrix interference.
ND	Analyte NOT DETECTED at or above the reporting limit
dry	Sample results reported on a dry weight basis
REC	Recovery
RPD	Relative Percent Difference

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916-686-5190 F) 916-686-5192

Work Order Chain of Custody Record

6.6

Lab No. 1602432 Page ____ of ____

Name: Town of Windsor - Drinking Water	**Project ID:** Esposti Potable Well
Mailing Address: 9291 Old Redwood Highway Building 400, Windsor, CA 95492	**Phase:**
Project Contact (Hardcopy or PDF to): Elizabeth Cargay, ecargay@townofwindsor.com; Kent O'Brien, kent.obrien@ghd.com	PO#
	Bill to: month end billing

Signature below authorizes work under terms stated on reverse side.

Field Sampler - Print Name & Signature: RYAN CRAWFORD

Sample Identification	Sample Collection Date	Sample Collection Time	Container: 40ml VOA	Container: Poly	Container: Amber	Container: Glass	Preservative: $Na_2S_2O_3$	Preservative: HNO_3	Preservative: NH_4Cl	Preservative: Other	Preservative: None	Matrix: Water	Matrix: Soil
EWS-4-28-11:40	4/28/16	1140		X							X	X	

Analysis Request

Sample Identification	200.8 As (Dissolved)	200.7 Fe (Dissolved)	200.7 Mn (Dissolved)	200.8 Cr (Dissolved)	218.6 Cr6 (Dissolved)	200.7 Ca, Mg, K, Na (Dissolved)	Alkalinity	Chloride	Nitrate as N, Nitrite as N	Sulfate	Total Nitrogen (includes TKN, NO2, NO3)	Silica	200.8 Vanadium - total	Phosphate	CAM 17	TPH G, BTEX, D/MO	6010 As STLC	Title 22 Scan (**Below List)
EWS-4-28-11:40	X	X	X															

TAT

24 hr (X) 48 hr ( ) Lab Approval Required

1 wk ( ) 2 wk (standard) ( )

Lab Approval Required For Rush

FILTER & FIX IN LAB

****Title 22 Scan**

64432 Primary Inorganics, 64432.1 NO2/NO3, 64449 A&B
Asbestos, Perchlorate, Gross Alpha, 504.1, 507, 508, 515.1,
524.2, 531.1, 548.1, 549.2

Relinquished by:	Received by:	Date	Time
Ryan Crawford	Vlad Gialdini	4/28/16	1240
Vlad Gialdini		11	1515

CDPH Write On EDT Report? Yes ( ) No (X)

State System Number:

CA Geotracker EDF Report Yes ( ) No (X)

Sampling Company Log Code:

Global ID: EDF to (Email Address):

Travel and Site Time: Mileage: Misc. Supplies:

Alpha Analytical Laboratories Inc.
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ELAP Certificates 1551, 2728, and 2922

02 May 2016

Town Of Windsor - Drinking Water
Attn: Elizabeth Cargay
8400 Windsor Rd.
Windsor, CA 95492-0100
RE: Esposti Potable Well
Work Order: 16D2537

Enclosed are the results of analyses for samples received by the laboratory on 04/29/16 14:57. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jeanette Poplin

Jeanette L. Poplin For Robbie C. Phillips
Project Manager

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/02/16 16:46

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
ESW-4-29-1145	16D2537-01	Water	04/29/16 11:45	04/29/16 14:57

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/02/16 16:46

	Result	Reporting Limit	Dilution	Batch	Prepared	Analyzed	Method	Note
ESW-4-29-1145 (16D2537-01)		**Sample Type: Water**				**Sampled: 04/29/16 11:45**		
Metals (Dissolved) by EPA 200 Series Methods								**FILT**
Iron, dissolved	ND mg/L	0.10	1	AD63610	04/29/16 12:20	04/29/16 18:22	EPA 200.7	
Manganese, dissolved	**0.89 mg/L**	**0.020**	1	AD63610	04/29/16 12:20	04/29/16 18:22	EPA 200.7	
Metals (Dissolved) by EPA Method 200.8 ICP/MS								**FILT**
Arsenic, dissolved	**16 ug/L**	**0.40**	1	AD63608	04/29/16 12:20	05/02/16 10:14	EPA 200.8	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/02/16 16:46

Metals (Dissolved) by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AD63610 - EPA 200 Series										
Blank (AD63610-BLK1)				Prepared & Analyzed: 04/26/16						
Iron, dissolved	ND	0.10	mg/L							
Manganese, dissolved	ND	0.020	mg/L							
LCS (AD63610-BS1)				Prepared & Analyzed: 04/26/16						
Iron, dissolved	2.21	0.10	mg/L	2.00		111	85-115			
Manganese, dissolved	0.219	0.020	mg/L	0.200		110	85-115			
Duplicate (AD63610-DUP1)		**Source: 16D1995-01**		Prepared & Analyzed: 04/26/16						
Iron, dissolved	ND	0.10	mg/L		ND			6.07	20	
Manganese, dissolved	1.03	0.020	mg/L		0.995			3.48	20	
Matrix Spike (AD63610-MS1)		**Source: 16D1995-01**		Prepared & Analyzed: 04/26/16						
Iron, dissolved	2.28	0.10	mg/L	2.00	ND	111	70-130			
Manganese, dissolved	1.24	0.020	mg/L	0.200	0.995	120	70-130			
Matrix Spike Dup (AD63610-MSD1)		**Source: 16D1995-01**		Prepared & Analyzed: 04/26/16						
Iron, dissolved	2.35	0.10	mg/L	2.00	ND	115	70-130	3.23	20	
Manganese, dissolved	1.28	0.020	mg/L	0.200	0.995	140	70-130	3.11	20	QM-01

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/02/16 16:46

Metals (Dissolved) by EPA Method 200.8 ICP/MS - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AD63608 - EPA 200 Series										
Blank (AD63608-BLK1)				Prepared: 04/25/16 Analyzed: 04/26/16						
Arsenic, dissolved	ND	0.40	ug/L							
LCS (AD63608-BS1)				Prepared: 04/25/16 Analyzed: 04/26/16						
Arsenic, dissolved	21.4	0.40	ug/L	20.0		107	85-115			
Duplicate (AD63608-DUP1)		**Source: 16D1995-01**		Prepared: 04/25/16 Analyzed: 04/26/16						
Arsenic, dissolved	4.48	0.40	ug/L		4.36			2.85	20	
Matrix Spike (AD63608-MS1)		**Source: 16D1995-01**		Prepared: 04/25/16 Analyzed: 04/26/16						
Arsenic, dissolved	26.8	0.40	ug/L	20.0	4.36	112	70-130			
Matrix Spike Dup (AD63608-MSD1)		**Source: 16D1995-01**		Prepared: 04/25/16 Analyzed: 04/26/16						
Arsenic, dissolved	26.6	0.40	ug/L	20.0	4.36	111	70-130	0.697	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/02/16 16:46

Notes and Definitions

FILT	The sample was filtered in the lab prior to analysis.
QM-01	The spike recovery for this QC sample is outside of established control limits possibly due to a sample matrix interference.
ND	Analyte NOT DETECTED at or above the reporting limit
dry	Sample results reported on a dry weight basis
REC	Recovery
RPD	Relative Percent Difference

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

alpha
Alpha Analytical Laboratories Inc
www.alpha-labs.com
WATERS, SEDIMENTS, SOLIDS

Corporate Laboratory
208 Mason Street, Ukiah CA 95482
707-468-0401 F) 707-468-5267
email: clientservices@alpha-labs.com

ELAP Certifications
Ukiah 1551 / Dublin 2728 / Elk Grove 2922

Bay Area Laboratory
6398 Dougherty Rd #35, Dublin CA 94568
925-828-6226 F) 925-828-6309

Central Valley Laboratory
9090 Union Park Way #113, Elk Grove CA 95624
916-686-5190 F) 916-686-5192

Chain of Custody - Work Order

Reports and Invoices delivered by email in PDF format

Lab No 16D2537 Pg _____ of _____

Signature below authorizes work under terms stated on reverse side.

Report to	Invoice to (if different)	Project Information
Company: TOWN OF WINDSOR - DRINKING WATER	Contact:	Project ID: ESPOSTI POTABLE WELL
Attn: ELIZABETH CARGAY	Email address:	Project No:
Address: 9291 OLD REDWOOD HWY BUILDING 400, WINDSOR CA	Address:	PO Number:
Phone/Fax:	Phone/Fax:	

Email Address: ecargay@TOWNOFWINDSOR.COM / KENT.OBRIEN@GHD.COM

Field Sampler - Printed Name & Signature: RYAN CRAWFORD Ryan Crawford

Sample Identification	Sampling Date	Sampling Time	Container: 40ml Vial	Container: Poly	Container: Glass	Container: Sleeve	Container: Other	Preservative: HCl	Preservative: HNO3	Preservative: H2SO4	Preservative: Other	Preservative: None	Matrix: Water	Matrix: Soil	Matrix: Other	Total Number of Containers per Sample ID	Analysis Request: 200.8 As (Diss)	Analysis Request: 200.7 Fe (Diss)	Analysis Request: 200.7 Mn (Diss)	Sample Notes or DDW Source Numbers:
ESW-4-29-1145	4/29/16	1145		X								X	X				X	X	X	FILTER/FIX IN LAB.

TAT
Standard 10 days ○
RUSH: 5 days ○ / 48 hours ○ / Other: 1 days ●
Lab preapproval required

Temp upon Receipt °C
Ukiah temp: 2.0
Dublin temp:
Elk Grove temp:

Relinquished by	Received by	Date	Time
Ryan Crawford	Daniel Poma	4.29.16	1304
Daniel Poma		4.29.16	1457

DDW Write On EDT Transmission? ○ Yes ● No
State System Number: _____
If "Y" please enter the Source Number(s) in the column above

CA Geotracker EDF Report? ○ Yes ● No
Global ID: Sampling Company Log Code:
EDF to (Email Address):

Travel and Site Time:	Mileage:	Misc. Supplies:

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ELAP Certificates 1551, 2728, and 2922

11 May 2016

Town Of Windsor - Drinking Water
Attn: Elizabeth Cargay
8400 Windsor Rd.
Windsor, CA 95492-0100
RE: Esposti Potable Well
Work Order: 16E0997

Enclosed are the results of analyses for samples received by the laboratory on 05/10/16 15:50. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jeanette Poplin

Jeanette L. Poplin For Robbie C. Phillips
Project Manager

Alpha Analytical Laboratories Inc.
e-mail: clientservices@alpha-labs.com
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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/11/16 15:40

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
ESW-5-9-10:50	16E0997-01	Water	05/09/16 10:50	05/10/16 15:50
ESW-5-9-15:35	16E0997-02	Water	05/09/16 15:35	05/10/16 15:50

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/11/16 15:40

	Result	Reporting Limit	Dilution	Batch	Prepared	Analyzed	Method	Note
ESW-5-9-10:50 (16E0997-01)		**Sample Type: Water**				**Sampled: 05/09/16 10:50**		
Metals (Dissolved) by EPA 200 Series Methods								**FILT**
Iron, dissolved	ND mg/L	0.10	1	AE63518	05/11/16 12:39	05/11/16 13:38	EPA 200.7	
Manganese, dissolved	**0.92 mg/L**	**0.020**	1	AE63518	05/11/16 12:39	05/11/16 13:38	EPA 200.7	
Metals (Dissolved) by EPA Method 200.8 ICP/MS								**FILT**
Arsenic, dissolved	**26 ug/L**	**0.40**	1	AE63517	05/11/16 12:37	05/11/16 14:44	EPA 200.8	
ESW-5-9-15:35 (16E0997-02)		**Sample Type: Water**				**Sampled: 05/09/16 15:35**		
Metals (Dissolved) by EPA 200 Series Methods								**FILT**
Iron, dissolved	ND mg/L	0.10	1	AE63518	05/11/16 12:39	05/11/16 14:08	EPA 200.7	
Manganese, dissolved	**0.94 mg/L**	**0.020**	1	AE63518	05/11/16 12:39	05/11/16 14:08	EPA 200.7	
Metals (Dissolved) by EPA Method 200.8 ICP/MS								**FILT**
Arsenic, dissolved	**16 ug/L**	**0.40**	1	AE63517	05/11/16 12:37	05/11/16 14:59	EPA 200.8	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/11/16 15:40

Metals (Dissolved) by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE63518 - EPA 200 Series										
Blank (AE63518-BLK1)				Prepared & Analyzed: 05/11/16						
Iron, dissolved	ND	0.10	mg/L							
Manganese, dissolved	ND	0.020	mg/L							
LCS (AE63518-BS1)				Prepared & Analyzed: 05/11/16						
Iron, dissolved	2.16	0.10	mg/L	2.00		108	85-115			
Manganese, dissolved	0.212	0.020	mg/L	0.200		106	85-115			
Duplicate (AE63518-DUP1)		**Source: 16E0997-02**		Prepared & Analyzed: 05/11/16						
Iron, dissolved	ND	0.10	mg/L		ND				20	
Manganese, dissolved	0.928	0.020	mg/L		0.937			0.958	20	
Matrix Spike (AE63518-MS1)		**Source: 16E0997-02**		Prepared & Analyzed: 05/11/16						
Iron, dissolved	2.19	0.10	mg/L	2.00	ND	109	70-130			
Manganese, dissolved	1.08	0.020	mg/L	0.200	0.937	70.1	70-130			
Matrix Spike Dup (AE63518-MSD1)		**Source: 16E0997-02**		Prepared & Analyzed: 05/11/16						
Iron, dissolved	2.31	0.10	mg/L	2.00	ND	116	70-130	5.56	20	
Manganese, dissolved	1.10	0.020	mg/L	0.200	0.937	79.0	70-130	1.64	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/11/16 15:40

Metals (Dissolved) by EPA Method 200.8 ICP/MS - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE63517 - EPA 200 Series										
Blank (AE63517-BLK1)				Prepared & Analyzed: 05/11/16						
Arsenic, dissolved	ND	0.40	ug/L							
LCS (AE63517-BS1)				Prepared & Analyzed: 05/11/16						
Arsenic, dissolved	20.3	0.40	ug/L	20.0		102	85-115			
Duplicate (AE63517-DUP1)	**Source: 16E0997-01**			Prepared & Analyzed: 05/11/16						
Arsenic, dissolved	25.7	0.40	ug/L		25.6			0.443	20	
Matrix Spike (AE63517-MS1)	**Source: 16E0997-01**			Prepared & Analyzed: 05/11/16						
Arsenic, dissolved	48.0	0.40	ug/L	20.0	25.6	112	70-130			
Matrix Spike Dup (AE63517-MSD1)	**Source: 16E0997-01**			Prepared & Analyzed: 05/11/16						
Arsenic, dissolved	48.2	0.40	ug/L	20.0	25.6	113	70-130	0.268	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/11/16 15:40

Notes and Definitions

FILT	The sample was filtered in the lab prior to analysis.
ND	Analyte NOT DETECTED at or above the reporting limit
dry	Sample results reported on a dry weight basis
REC	Recovery
RPD	Relative Percent Difference

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Corporate Laboratory
208 Mason Street, Ukiah, CA 95482
707-468-0401 F) 707-468-5267
clientservices@alpha-labs.com

Bay Area Laboratory
6398 Dougherty Road, #35, Dublin, CA 94568
925-828-6226 F) 925-828-6309

Central Valley Laboratory
9090 Union Park Wy., #113, Elk Grove, CA 95624
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Work Order
Chain of Custody Record

Lab No. 16E0997 Page ____ of ____

1 of 6

Name:	Project ID:
Town of Windsor - Drinking Water	Esposti Potable Well
Mailing Address: 9291 Old Redwood Highway Building 400, Windsor, CA 95492	**Phase:**
Project Contact (Hardcopy or PDF to): Elizabeth Cargay, ecargay@townofwindsor.com; Kent O'Brien, kent.obrien@ghd.com	PO#
	Bill to: month end billing

Signature below authorizes work under terms stated on reverse side.

Analysis Request

TAT: 24 hr (X) / 48 hr ( ) — Lab Approval Required — 1 wk ( ) / 2 wk (standard) ( ) — Lab Approval Required For Rush

Field Sampler - Print Name & Signature / Sample Identification	Sample Collection Date	Time	Container: 40ml VOA	Poly	Amber	Glass		Preservative: Na2S2O3	HNO3	NH4Cl	Other	None	Matrix: Water	Soil		200.8 As (Dissolved)	200.7 Fe (Dissolved)	200.7 Mn (Dissolved)	200.8 Cr (Dissolved)	218.6 Cr6 (Dissolved)	200.7 Ca, Mg, K, Na (Dissolved)	Alkalinity	Chloride	Nitrate as N, Nitrite as N	Sulfate	Total Nitrogen (includes TKN, NO2, NO3)	Silica	200.8 Vanadium - total	Phosphate	CAM 17	TPH G, BTEX, D/MO	6010 As STLC	Title 22 Scan (**Below List)	
ESW-5-9-10:50	5/9	10:50		X								X	X			X	X	X															Filter-fix
ESW-5-9-15:35	5/9	1535		X								X	X			X	X	X															in Lab
																																	—

**Title 22 Scan

64432 Primary Inorganics, 64432.1 NO2/NO3, 64449 A&B
Asbestos, Perchlorate, Gross Alpha, 504.1, 507, 508, 515.1,
524.2, 531.1, 548.1, 549.2

Relinquished by:	Received by:	Date	Time
[signature]	[signature]	5/10	1460
[signature]	[signature]	11	1550

CDPH Write On EDT Report? Yes ( ) No (X)

State System Number: _____

CA Geotracker EDF Report Yes ( ) No (X)

Sampling Company Log Code: _____

Global ID: EDF to (Email Address):

Travel and Site Time: | Mileage: | Misc. Supplies:

Alpha Analytical Laboratories Inc.
e-mail: clientservices@alpha-labs.com
Corporate: 208 Mason St., Ukiah, CA 95482 • Phone: (707) 468-0401 • Fax: (707) 468-5267
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Central Valley: 9090 Union Park Way, Suite 113, Elk Grove, CA 95624 • Phone: (916) 686-5190 • Fax: (916) 686-5192

ELAP Certificates 1551, 2728, and 2922

11 May 2016

Town Of Windsor - Drinking Water
Attn: Elizabeth Cargay
8400 Windsor Rd.
Windsor, CA 95492-0100
RE: Esposti Potable Well
Work Order: 16E0995

Enclosed are the results of analyses for samples received by the laboratory on 05/10/16 15:50. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jeanette Poplin

Jeanette L. Poplin For Robbie C. Phillips
Project Manager

Alpha Analytical Laboratories Inc.
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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/11/16 15:40

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
ESW-5-10-10:09	16E0995-01	Water	05/10/16 10:09	05/10/16 15:50
ESW-5-10-10:09 Total	16E0995-02	Water	05/10/16 10:09	05/10/16 15:50

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/11/16 15:40

	Result	Reporting Limit	Dilution	Batch	Prepared	Analyzed	Method	Note
ESW-5-10-10:09 (16E0995-01)		**Sample Type: Water**				**Sampled: 05/10/16 10:09**		
Metals (Dissolved) by EPA 200 Series Methods								**FILT**
Iron, dissolved	ND mg/L	0.10	1	AE63518	05/11/16 12:39	05/11/16 14:23	EPA 200.7	
Manganese, dissolved	**0.91 mg/L**	**0.020**	1	AE63518	05/11/16 12:39	05/11/16 14:23	EPA 200.7	
Metals (Dissolved) by EPA Method 200.8 ICP/MS								**FILT**
Arsenic, dissolved	**29 ug/L**	**0.40**	1	AE63517	05/11/16 12:37	05/11/16 14:51	EPA 200.8	
ESW-5-10-10:09 Total (16E0995-02)		**Sample Type: Water**				**Sampled: 05/10/16 10:09**		
Metals by EPA 200 Series Methods								**P-02**
Iron	**1.1 mg/L**	**0.10**	1	AE63520	05/11/16 12:41	05/11/16 14:53	EPA 200.7	
Manganese	**1.0 mg/L**	**0.020**	1	AE63520	05/11/16 12:41	05/11/16 14:53	EPA 200.7	
Metals by EPA Method 200.8 ICP/MS								
Arsenic	**33 ug/L**	**0.40**	1	AE63290	05/11/16 12:43	05/11/16 15:06	EPA 200.8	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/11/16 15:40

Metals by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE63520 - EPA 200 Series										
Blank (AE63520-BLK1)				Prepared & Analyzed: 05/11/16						
Iron	ND	0.10	mg/L							
Manganese	ND	0.020	mg/L							
LCS (AE63520-BS1)				Prepared & Analyzed: 05/11/16						
Iron	2.18	0.10	mg/L	2.00		109	85-115			
Manganese	0.213	0.020	mg/L	0.200		107	85-115			
Duplicate (AE63520-DUP1)		**Source: 16E0995-02**		Prepared & Analyzed: 05/11/16						
Iron	1.18	0.10	mg/L		1.06			11.2	20	
Manganese	0.995	0.020	mg/L		1.02			2.29	20	
Matrix Spike (AE63520-MS1)		**Source: 16E0995-02**		Prepared & Analyzed: 05/11/16						
Iron	3.22	0.10	mg/L	2.00	1.06	108	70-130			
Manganese	1.20	0.020	mg/L	0.200	1.02	93.3	70-130			
Matrix Spike Dup (AE63520-MSD1)		**Source: 16E0995-02**		Prepared & Analyzed: 05/11/16						
Iron	3.12	0.10	mg/L	2.00	1.06	103	70-130	3.35	20	
Manganese	1.20	0.020	mg/L	0.200	1.02	89.7	70-130	0.588	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/11/16 15:40

Metals by EPA Method 200.8 ICP/MS - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE63290 - EPA 200 Series										
Blank (AE63290-BLK1)				Prepared: 05/05/16 Analyzed: 05/06/16						
Arsenic	ND	0.40	ug/L							
LCS (AE63290-BS1)				Prepared: 05/05/16 Analyzed: 05/06/16						
Arsenic	21.8	0.40	ug/L	20.0		109	85-115			
Duplicate (AE63290-DUP1)		Source: 16E0341-07		Prepared: 05/05/16 Analyzed: 05/06/16						
Arsenic	4.48	2.0	ug/L		4.33			3.52	20	
Matrix Spike (AE63290-MS1)		Source: 16E0341-07		Prepared: 05/05/16 Analyzed: 05/06/16						
Arsenic	114	2.0	ug/L	100	4.33	110	70-130			
Matrix Spike Dup (AE63290-MSD1)		Source: 16E0341-07		Prepared: 05/05/16 Analyzed: 05/06/16						
Arsenic	114	2.0	ug/L	100	4.33	109	70-130	0.320	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/11/16 15:40

Metals (Dissolved) by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE63518 - EPA 200 Series										
Blank (AE63518-BLK1)				Prepared & Analyzed: 05/11/16						
Iron, dissolved	ND	0.10	mg/L							
Manganese, dissolved	ND	0.020	mg/L							
LCS (AE63518-BS1)				Prepared & Analyzed: 05/11/16						
Iron, dissolved	2.16	0.10	mg/L	2.00		108	85-115			
Manganese, dissolved	0.212	0.020	mg/L	0.200		106	85-115			
Duplicate (AE63518-DUP1)		**Source: 16E0997-02**		Prepared & Analyzed: 05/11/16						
Iron, dissolved	ND	0.10	mg/L		ND				20	
Manganese, dissolved	0.928	0.020	mg/L		0.937			0.958	20	
Matrix Spike (AE63518-MS1)		**Source: 16E0997-02**		Prepared & Analyzed: 05/11/16						
Iron, dissolved	2.19	0.10	mg/L	2.00	ND	109	70-130			
Manganese, dissolved	1.08	0.020	mg/L	0.200	0.937	70.1	70-130			
Matrix Spike Dup (AE63518-MSD1)		**Source: 16E0997-02**		Prepared & Analyzed: 05/11/16						
Iron, dissolved	2.31	0.10	mg/L	2.00	ND	116	70-130	5.56	20	
Manganese, dissolved	1.10	0.020	mg/L	0.200	0.937	79.0	70-130	1.64	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/11/16 15:40

Metals (Dissolved) by EPA Method 200.8 ICP/MS - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE63517 - EPA 200 Series										
Blank (AE63517-BLK1)				Prepared & Analyzed: 05/11/16						
Arsenic, dissolved	ND	0.40	ug/L							
LCS (AE63517-BS1)				Prepared & Analyzed: 05/11/16						
Arsenic, dissolved	20.3	0.40	ug/L	20.0		102	85-115			
Duplicate (AE63517-DUP1)	**Source: 16E0997-01**			Prepared & Analyzed: 05/11/16						
Arsenic, dissolved	25.7	0.40	ug/L		25.6			0.443	20	
Matrix Spike (AE63517-MS1)	**Source: 16E0997-01**			Prepared & Analyzed: 05/11/16						
Arsenic, dissolved	48.0	0.40	ug/L	20.0	25.6	112	70-130			
Matrix Spike Dup (AE63517-MSD1)	**Source: 16E0997-01**			Prepared & Analyzed: 05/11/16						
Arsenic, dissolved	48.2	0.40	ug/L	20.0	25.6	113	70-130	0.268	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/11/16 15:40

Notes and Definitions

FILT	The sample was filtered in the lab prior to analysis.
P-02	Sample was received with insufficient preservative. Sample was preserved and allowed to sit 24 hours before further processing.
ND	Analyte NOT DETECTED at or above the reporting limit
dry	Sample results reported on a dry weight basis
REC	Recovery
RPD	Relative Percent Difference

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Alpha Analytical Laboratories Inc.
www.alpha-labs.com
WATERS, SEDIMENTS, SOLIDS

Corporate Laboratory
208 Mason Street, Ukiah, CA 95482
707-468-0401 F) 707-468-5267
clientservices@alpha-labs.com

Bay Area Laboratory
6398 Dougherty Road, #35, Dublin, CA 94568
925-828-6226 F) 925-828-6309

Central Valley Laboratory
9090 Union Park Wy., #113, Elk Grove, CA 95624
916-686-5190 F) 916-686-5192

Work Order
Chain of Custody Record

Lab No. 16E0995 Page ____ of ____

Name: Town of Windsor - Drinking Water	**Project ID:** Esposti Potable Well
Mailing Address: 9291 Old Redwood Highway Building 400, Windsor, CA 95492	**Phase:**
Project Contact (Hardcopy or PDF to): Elizabeth Cargay, ecargay@townofwindsor.com; Kent O'Brien, kent.obrien@ghd.com	PO#
	Bill to: month end billing

Signature below authorizes work under terms stated on reverse side.

Analysis Request

TAT: 24 hr (X) · 48 hr ( ) · 1 wk ( ) · 2 wk (standard) ( ) · Lab Approval Required · Lab Approval Required For Rush

1.6

Field Sampler - Print Name & Signature / Sample Identification	Sample Collection Date	Time	Container: 40ml VOA	Poly	Amber	Glass	Preservative: Na2S2O3	HNO3	NH4Cl	Other	None	Matrix: Water	Soil	200.8 As (Dissolved)	200.7 Fe (Dissolved)	200.7 Mn (Dissolved)	200.8 Cr (Dissolved)	218.6 Cr6 (Dissolved)	200.7 Ca, Mg, K, Na (Dissolved)	Alkalinity	Chloride	Nitrate as N, Nitrite as N	Sulfate	Total Nitrogen (includes TKN, NO2, NO3)	Silica	200.8 Vanadium - total	Phosphate	CAM 17	TPH G, BTEX, D/MO	6010 As STLC	Title 22 Scan (**Below List)	
ESW-5-10-10:09	5/10	10:09		X							X	X		X	X	X															Filter and fix
																														1610	Filter then fix
ESW-5-10-10:09 Total	5/10	10:09		X							X	X		X	X	X				total metals per Kent.											

**Title 22 Scan

64432 Primary Inorganics, 64432.1 NO2/NO3, 64449 A&B
Asbestos, Perchlorate, Gross Alpha, 504.1, 507, 508, 515.1,
524.2, 531.1, 548.1, 549.2

Relinquished by:	Received by:	Date	Time
[signature]	[signature]	5/10	1400
[signature]	[signature]	5/11	1550

CDPH Write On EDT Report? Yes ( ) No ( )

State System Number: ____

CA Geotracker EDF Report Yes ( ) No ( )

Sampling Company Log Code: ____

Global ID: EDF to (Email Address):

Travel and Site Time: | Mileage: | Misc. Supplies:

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ELAP Certificates 1551, 2728, and 2922

12 May 2016

Town Of Windsor - Drinking Water
Attn: Elizabeth Cargay
8400 Windsor Rd.
Windsor, CA 95492-0100
RE: Esposti Potable Well
Work Order: 16E1054

Enclosed are the results of analyses for samples received by the laboratory on 05/11/16 14:20. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jeanette Poplin

Jeanette L. Poplin For Robbie C. Phillips
Project Manager

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/12/16 16:12

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
ESW-5-11-10:44	16E1054-01	Water	05/11/16 10:44	05/11/16 14:20

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/12/16 16:12

	Result	Reporting Limit	Dilution	Batch	Prepared	Analyzed	Method	Note
ESW-5-11-10:44 (16E1054-01)		**Sample Type: Water**			**Sampled: 05/11/16 10:44**			
Metals (Dissolved) by EPA 200 Series Methods								**FILT**
Iron, dissolved	ND mg/L	0.10	1	AE63518	05/11/16 15:09	05/11/16 17:14	EPA 200.7	
Manganese, dissolved	**1.0 mg/L**	**0.020**	1	AE63518	05/11/16 15:09	05/11/16 17:14	EPA 200.7	
Metals (Dissolved) by EPA Method 200.8 ICP/MS								**FILT**
Arsenic, dissolved	**28 ug/L**	**0.40**	1	AE63517	05/11/16 15:09	05/12/16 09:31	EPA 200.8	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/12/16 16:12

Metals (Dissolved) by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE63518 - EPA 200 Series										
Blank (AE63518-BLK1)				Prepared & Analyzed: 05/11/16						
Iron, dissolved	ND	0.10	mg/L							
Manganese, dissolved	ND	0.020	mg/L							
LCS (AE63518-BS1)				Prepared & Analyzed: 05/11/16						
Iron, dissolved	2.16	0.10	mg/L	2.00		108	85-115			
Manganese, dissolved	0.212	0.020	mg/L	0.200		106	85-115			
Duplicate (AE63518-DUP1)		**Source: 16E0997-02**		Prepared & Analyzed: 05/11/16						
Iron, dissolved	ND	0.10	mg/L		ND				20	
Manganese, dissolved	0.928	0.020	mg/L		0.937			0.958	20	
Matrix Spike (AE63518-MS1)		**Source: 16E0997-02**		Prepared & Analyzed: 05/11/16						
Iron, dissolved	2.19	0.10	mg/L	2.00	ND	109	70-130			
Manganese, dissolved	1.08	0.020	mg/L	0.200	0.937	70.1	70-130			
Matrix Spike Dup (AE63518-MSD1)		**Source: 16E0997-02**		Prepared & Analyzed: 05/11/16						
Iron, dissolved	2.31	0.10	mg/L	2.00	ND	116	70-130	5.56	20	
Manganese, dissolved	1.10	0.020	mg/L	0.200	0.937	79.0	70-130	1.64	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/12/16 16:12

Metals (Dissolved) by EPA Method 200.8 ICP/MS - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE63517 - EPA 200 Series										
Blank (AE63517-BLK1)				Prepared & Analyzed: 05/11/16						
Arsenic, dissolved	ND	0.40	ug/L							
LCS (AE63517-BS1)				Prepared & Analyzed: 05/11/16						
Arsenic, dissolved	20.3	0.40	ug/L	20.0		102	85-115			
Duplicate (AE63517-DUP1)	**Source: 16E0997-01**			Prepared & Analyzed: 05/11/16						
Arsenic, dissolved	25.7	0.40	ug/L		25.6			0.443	20	
Matrix Spike (AE63517-MS1)	**Source: 16E0997-01**			Prepared & Analyzed: 05/11/16						
Arsenic, dissolved	48.0	0.40	ug/L	20.0	25.6	112	70-130			
Matrix Spike Dup (AE63517-MSD1)	**Source: 16E0997-01**			Prepared & Analyzed: 05/11/16						
Arsenic, dissolved	48.2	0.40	ug/L	20.0	25.6	113	70-130	0.268	20	

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Central Valley: 9090 Union Park Way, Suite 113, Elk Grove, CA 95624 • Phone: (916) 686-5190 • Fax: (916) 686-5192

Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/12/16 16:12

Notes and Definitions

FILT	The sample was filtered in the lab prior to analysis.
ND	Analyte NOT DETECTED at or above the reporting limit
dry	Sample results reported on a dry weight basis
REC	Recovery
RPD	Relative Percent Difference

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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Corporate Laboratory
208 Mason Street, Ukiah, CA 95482
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clientservices@alpha-labs.com

Bay Area Laboratory
6398 Dougherty Road, #35, Dublin, CA 94568
925-828-6226 F) 925-828-6309

Central Valley Laboratory
9090 Unioin Park Wy., #113, Elk Grove, CA 95624
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Work Order
Chain of Custody Record

Lab No. 16E1054 Page ____ of ____

04

Name:	Project ID:
Town of Windsor - Drinking Water	Esposti Potable Well
Mailing Address: 9291 Old Redwood Highway Building 400 Windsor, CA 95492	**Phase:**
Project Contact (Hardcopy or PDF to): Elizabeth Cargay ecargay@townofwindsor.com	PO#
Kent O'Brien kent.obrien@ghd.com	**Bill to:** month end billing

Signature below authorizes work under terms stated on reverse side.

Analysis Request

TAT: 24 hr (✓) / 48 hr ( ) / Lab Approval Required / 1 wk ( ) / 2 wk (standard) ( ) — Lab Approval Required For Rush

Field Sampler - Print Name & Signature	Sample Collection		Container					Preservative					Matrix			200.8 As (Dissolved)	200.7 Fe (Dissolved)	200.7 Mn (Dissolved)	200.8 Cr (Dissolved)	218.6 Cr6 (Dissolved)	200.7 Ca, Mg, K, Na (Dissolved)	Alkalinity	Chloride	Nitrate as N, Nitrite as N	Sulfate	Total Nitrogen (includes TKN, NO2, NO3)	Silica	200.8 Vanadium - total	Phosphate	CAM 17	TPH G, BTEX, D/MO	6010 As STLC	Title 22 Scan (**Below List)	TAT
Sample Identification	Date	Time	40ml VOA	Poly	Amber	Glass		Na2S2O3	HNO3	NH4Cl	Other	None	Water	Soil																				
ESW-5-11-10:44	5/11	10:44		X								X	X			X	X	X																Filter & FIX

**Title 22 Scan

64432 Primary Inorganics, 64432.1 NO2/NO3, 64449 A&B
Asbestos, Perchlorate, Gross Alpha, 504.1, 507, 508, 515.1,
524.2, 531.1, 548.1, 549.2

		Date	Time
Relinquished by:	Received by: David Poma	5/11/16	11:57
Relinquished by: David Poma	Received by:	5-11-16	1420
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time

CDPH Write On EDT Report? Yes ( ) No ( )

State System Number: _____

CA Geotracker EDF Report Yes ( ) No ( )

Sampling Company Log Code: _____

Global ID: EDF to (Email Address):

Travel and Site Time:	Mileage:	Misc. Supplies:

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ELAP Certificates 1551, 2728, and 2922

13 May 2016

Town Of Windsor - Drinking Water
Attn: Elizabeth Cargay
8400 Windsor Rd.
Windsor, CA 95492-0100
RE: Esposti Potable Well
Work Order: 16E1210

Enclosed are the results of analyses for samples received by the laboratory on 05/12/16 14:15. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jeanette Poplin

Jeanette L. Poplin For Robbie C. Phillips
Project Manager

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/13/16 11:31

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
EWS-5-11-16:42	16E1210-01	Water	05/11/16 16:42	05/12/16 14:15
EWS-5-11-15:38	16E1210-02	Water	05/11/16 15:38	05/12/16 14:15

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/13/16 11:31

	Result	Reporting Limit	Dilution	Batch	Prepared	Analyzed	Method	Note
EWS-5-11-16:42 (16E1210-01)		**Sample Type: Water**				**Sampled: 05/11/16 16:42**		
Metals by EPA 200 Series Methods								**P-02**
Iron	**0.29 mg/L**	**0.10**	1	AE63520	05/12/16 15:30	05/12/16 15:54	EPA 200.7	
Manganese	**1.0 mg/L**	**0.020**	1	AE63520	05/12/16 15:30	05/12/16 15:54	EPA 200.7	
Metals by EPA Method 200.8 ICP/MS								**P-02**
Arsenic	**41 ug/L**	**0.40**	1	AE63373	05/12/16 15:30	05/13/16 10:26	EPA 200.8	
Metals (Dissolved) by EPA 200 Series Methods								**FILT**
Iron, dissolved	ND mg/L	0.10	1	AE63518	05/12/16 15:11	05/12/16 15:44	EPA 200.7	
Manganese, dissolved	**0.99 mg/L**	**0.020**	1	AE63518	05/12/16 15:11	05/12/16 15:44	EPA 200.7	
Metals (Dissolved) by EPA Method 200.8 ICP/MS								**FILT**
Arsenic, dissolved	**41 ug/L**	**0.40**	1	AE63517	05/12/16 14:15	05/13/16 10:39	EPA 200.8	
EWS-5-11-15:38 (16E1210-02)		**Sample Type: Water**				**Sampled: 05/11/16 15:38**		
Metals (Dissolved) by EPA 200 Series Methods								**FILT**
Iron, dissolved	ND mg/L	0.10	1	AE63518	05/12/16 15:11	05/12/16 15:49	EPA 200.7	
Manganese, dissolved	**0.97 mg/L**	**0.020**	1	AE63518	05/12/16 15:11	05/12/16 15:49	EPA 200.7	
Metals (Dissolved) by EPA Method 200.8 ICP/MS								**FILT**
Arsenic, dissolved	**38 ug/L**	**0.40**	1	AE63517	05/12/16 14:15	05/13/16 10:46	EPA 200.8	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/13/16 11:31

Metals by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE63520 - EPA 200 Series										
Blank (AE63520-BLK1)				Prepared & Analyzed: 05/11/16						
Iron	ND	0.10	mg/L							
Manganese	ND	0.020	mg/L							
LCS (AE63520-BS1)				Prepared & Analyzed: 05/11/16						
Iron	2.18	0.10	mg/L	2.00		109	85-115			
Manganese	0.213	0.020	mg/L	0.200		107	85-115			
Duplicate (AE63520-DUP1)		**Source: 16E0995-02**		Prepared & Analyzed: 05/11/16						
Iron	1.18	0.10	mg/L		1.06			11.2	20	
Manganese	0.995	0.020	mg/L		1.02			2.29	20	
Matrix Spike (AE63520-MS1)		**Source: 16E0995-02**		Prepared & Analyzed: 05/11/16						
Iron	3.22	0.10	mg/L	2.00	1.06	108	70-130			
Manganese	1.20	0.020	mg/L	0.200	1.02	93.3	70-130			
Matrix Spike Dup (AE63520-MSD1)		**Source: 16E0995-02**		Prepared & Analyzed: 05/11/16						
Iron	3.12	0.10	mg/L	2.00	1.06	103	70-130	3.35	20	
Manganese	1.20	0.020	mg/L	0.200	1.02	89.7	70-130	0.588	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/13/16 11:31

Metals by EPA Method 200.8 ICP/MS - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE63373 - EPA 200 Series										
Blank (AE63373-BLK1)				Prepared: 05/09/16 Analyzed: 05/13/16						
Arsenic	ND	0.40	ug/L							
LCS (AE63373-BS1)				Prepared: 05/09/16 Analyzed: 05/13/16						
Arsenic	21.5	0.40	ug/L	20.0		107	85-115			
Duplicate (AE63373-DUP1)		**Source: 16E0543-21**		Prepared: 05/09/16 Analyzed: 05/13/16						
Arsenic	ND	2.0	ug/L		ND			10.1	20	
Matrix Spike (AE63373-MS1)		**Source: 16E0543-21**		Prepared: 05/09/16 Analyzed: 05/13/16						
Arsenic	108	2.0	ug/L	100	ND	107	70-130			
Matrix Spike Dup (AE63373-MSD1)		**Source: 16E0543-21**		Prepared: 05/09/16 Analyzed: 05/13/16						
Arsenic	110	2.0	ug/L	100	ND	109	70-130	1.83	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/13/16 11:31

Metals (Dissolved) by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE63518 - EPA 200 Series										
Blank (AE63518-BLK1)				Prepared & Analyzed: 05/11/16						
Iron, dissolved	ND	0.10	mg/L							
Manganese, dissolved	ND	0.020	mg/L							
LCS (AE63518-BS1)				Prepared & Analyzed: 05/11/16						
Iron, dissolved	2.16	0.10	mg/L	2.00		108	85-115			
Manganese, dissolved	0.212	0.020	mg/L	0.200		106	85-115			
Duplicate (AE63518-DUP1)		**Source: 16E0997-02**		Prepared & Analyzed: 05/11/16						
Iron, dissolved	ND	0.10	mg/L		ND				20	
Manganese, dissolved	0.928	0.020	mg/L		0.937			0.958	20	
Matrix Spike (AE63518-MS1)		**Source: 16E0997-02**		Prepared & Analyzed: 05/11/16						
Iron, dissolved	2.19	0.10	mg/L	2.00	ND	109	70-130			
Manganese, dissolved	1.08	0.020	mg/L	0.200	0.937	70.1	70-130			
Matrix Spike Dup (AE63518-MSD1)		**Source: 16E0997-02**		Prepared & Analyzed: 05/11/16						
Iron, dissolved	2.31	0.10	mg/L	2.00	ND	116	70-130	5.56	20	
Manganese, dissolved	1.10	0.020	mg/L	0.200	0.937	79.0	70-130	1.64	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/13/16 11:31

Metals (Dissolved) by EPA Method 200.8 ICP/MS - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE63517 - EPA 200 Series										
Blank (AE63517-BLK1)				Prepared & Analyzed: 05/11/16						
Arsenic, dissolved	ND	0.40	ug/L							
LCS (AE63517-BS1)				Prepared & Analyzed: 05/11/16						
Arsenic, dissolved	20.3	0.40	ug/L	20.0		102	85-115			
Duplicate (AE63517-DUP1)	**Source: 16E0997-01**			Prepared & Analyzed: 05/11/16						
Arsenic, dissolved	25.7	0.40	ug/L		25.6			0.443	20	
Matrix Spike (AE63517-MS1)	**Source: 16E0997-01**			Prepared & Analyzed: 05/11/16						
Arsenic, dissolved	48.0	0.40	ug/L	20.0	25.6	112	70-130			
Matrix Spike Dup (AE63517-MSD1)	**Source: 16E0997-01**			Prepared & Analyzed: 05/11/16						
Arsenic, dissolved	48.2	0.40	ug/L	20.0	25.6	113	70-130	0.268	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/13/16 11:31

Notes and Definitions

FILT	The sample was filtered in the lab prior to analysis.
P-02	Sample was received with insufficient preservative. Sample was preserved and allowed to sit 24 hours before further processing.
ND	Analyte NOT DETECTED at or above the reporting limit
dry	Sample results reported on a dry weight basis
REC	Recovery
RPD	Relative Percent Difference

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clientservices@alpha-labs.com

Bay Area Laboratory
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Central Valley Laboratory
9090 Union Park Wy., #113, Elk Grove, CA 95624
916-686-5190 F) 916-686-5192

Work Order
Chain of Custody Record

3.0

Lab No. 16E1210 Page ____ of ____

Name: Town of Windsor - Drinking Water	**Project ID:** Esposti Potable Well
Mailing Address: 9291 Old Redwood Highway Building 400, Windsor, CA 95492	**Phase:**
Project Contact (Hardcopy or PDF to): Elizabeth Cargay, ecargay@townofwindsor.com	**PO#**
Kent O'Brien, kent.obrien@ghd.com	**Bill to:** month end billing

Signature below authorizes work under terms stated on reverse side.

Analysis Request

TAT: 24 hr (X) 48 hr ( ) Lab Approval Required 1 wk ( ) 2 wk (standard) ( ) — Lab Approval Required For Rush

Field Sampler - Print Name & Signature / Sample Identification	Sample Collection Date	Time	Container: 40ml VOA	Poly	Amber	Glass		Preservative: Na2S2O3	HNO3	NH4Cl	Other	None	Matrix: Water	Soil		200.8 As (Dissolved)	200.7 Fe (Dissolved)	200.7 Mn (Dissolved)	200.8 Cr (Dissolved)	218.6 Cr6 (Dissolved)	200.7 Ca, Mg, K, Na (Dissolved)	Alkalinity	Chloride	Nitrate as N, Nitrite as N	Sulfate	Total Nitrogen (includes TKN, NO2, NO3)	Silica	200.8 Vanadium - total	Phosphate	CAM 17	TPH G, BTEX, D/MO	6010 As STLC	Title 22 Scan (**Below List)	TAT
EWS-5-11-16:42	5/11	16:42		X								X	X			X	X	X															Total + Dissolved (8.12)
EWS-5-11-15:38	5/11	15:38		X								X	X			X	X	X															Filtered for (dissolved)

****Title 22 Scan**

64432 Primary Inorganics, 64432.1 NO2/NO3, 64449 A&B
Asbestos, Perchlorate, Gross Alpha, 504.1, 507, 508, 515.1,
524.2, 531.1, 548.1, 549.2

Relinquished by:	Received by: Dot Gialdini	5/12/16	11:00
Relinquished by: Dot Gialdini	Received by:	11	6415
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time

CDPH Write On EDT Report? Yes ( ) No ( )

State System Number:

CA Geotracker EDF Report Yes ( ) No ( )

Sampling Company Log Code:

Global ID: EDF to (Email Address):

Travel and Site Time: | Mileage: | Misc. Supplies:

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ELAP Certificates 1551, 2728, and 2922

18 May 2016

Town Of Windsor - Drinking Water
Attn: Elizabeth Cargay
8400 Windsor Rd.
Windsor, CA 95492-0100
RE: Esposti Potable Well
Work Order: 16E1515

Enclosed are the results of analyses for samples received by the laboratory on 05/17/16 15:15. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jeanette Poplin

Jeanette L. Poplin For Robbie C. Phillips
Project Manager

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/18/16 16:44

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
ESW-5-17-04:00	16E1515-01	Water	05/17/16 04:00	05/17/16 15:15

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/18/16 16:44

	Result	Reporting Limit	Dilution	Batch	Prepared	Analyzed	Method	Note
ESW-5-17-04:00 (16E1515-01)	**Sample Type: Water**				**Sampled: 05/17/16 04:00**			
Metals by EPA 200 Series Methods								**P-02**
Iron	ND mg/L	0.10	1	AE63520	05/18/16 07:30	05/18/16 11:15	EPA 200.7	
Manganese	**0.88 mg/L**	**0.020**	1	AE63520	05/18/16 07:30	05/18/16 11:15	EPA 200.7	
Metals by EPA Method 200.8 ICP/MS								**P-02**
Arsenic	**53 ug/L**	**0.40**	1	AE63743	05/18/16 07:46	05/18/16 10:57	EPA 200.8	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/18/16 16:44

Metals by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE63520 - EPA 200 Series										
Blank (AE63520-BLK1)				Prepared & Analyzed: 05/11/16						
Iron	ND	0.10	mg/L							
Manganese	ND	0.020	mg/L							
LCS (AE63520-BS1)				Prepared & Analyzed: 05/11/16						
Iron	2.18	0.10	mg/L	2.00		109	85-115			
Manganese	0.213	0.020	mg/L	0.200		107	85-115			
Duplicate (AE63520-DUP1)		**Source: 16E0995-02**		Prepared & Analyzed: 05/11/16						
Iron	1.18	0.10	mg/L		1.06			11.2	20	
Manganese	0.995	0.020	mg/L		1.02			2.29	20	
Matrix Spike (AE63520-MS1)		**Source: 16E0995-02**		Prepared & Analyzed: 05/11/16						
Iron	3.22	0.10	mg/L	2.00	1.06	108	70-130			
Manganese	1.20	0.020	mg/L	0.200	1.02	93.3	70-130			
Matrix Spike Dup (AE63520-MSD1)		**Source: 16E0995-02**		Prepared & Analyzed: 05/11/16						
Iron	3.12	0.10	mg/L	2.00	1.06	103	70-130	3.35	20	
Manganese	1.20	0.020	mg/L	0.200	1.02	89.7	70-130	0.588	20	

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Central Valley: 9090 Union Park Way, Suite 113, Elk Grove, CA 95624 • Phone: (916) 686-5190 • Fax: (916) 686-5192

Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/18/16 16:44

Metals by EPA Method 200.8 ICP/MS - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE63743 - EPA 200 Series										
Blank (AE63743-BLK1)				Prepared & Analyzed: 05/18/16						
Arsenic	ND	0.40	ug/L							
LCS (AE63743-BS1)				Prepared & Analyzed: 05/18/16						
Arsenic	21.6	0.40	ug/L	20.0		108	85-115			
Duplicate (AE63743-DUP1)	**Source: 16E1515-01**			Prepared & Analyzed: 05/18/16						
Arsenic	53.7	0.40	ug/L		52.5			2.17	20	
Matrix Spike (AE63743-MS1)	**Source: 16E1515-01**			Prepared & Analyzed: 05/18/16						
Arsenic	75.8	0.40	ug/L	20.0	52.5	116	70-130			
Matrix Spike Dup (AE63743-MSD1)	**Source: 16E1515-01**			Prepared & Analyzed: 05/18/16						
Arsenic	75.5	0.40	ug/L	20.0	52.5	115	70-130	0.314	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	05/18/16 16:44

Notes and Definitions

P-02	Sample was received with insufficient preservative. Sample was preserved and allowed to sit 24 hours before further processing.
ND	Analyte NOT DETECTED at or above the reporting limit
dry	Sample results reported on a dry weight basis
REC	Recovery
RPD	Relative Percent Difference

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Corporate Laboratory
208 Mason Street, Ukiah, CA 95482
707-468-0401 F) 707-468-5267
clientservices@alpha-labs.com

Bay Area Laboratory
6398 Dougherty Road, #35, Dublin, CA 94568
925-828-6226 F) 925-828-6309

Central Valley Laboratory
9090 Unioin Park Wy., #113, Elk Grove, CA 95624
916-686-5190 F) 916-686-5192

Work Order
Chain of Custody Record

Lab No. 16E1515 Page 1 of 1

Signature below authorizes work under terms stated on reverse side.

Name: Town of Windsor - Drinking Water	**Project ID:** Source Chemical
Mailing Address: 9291 Old Redwood Highway Building 400, Windsor, CA 95492	**Phase:** Esposti Well
Project Contact (Hardcopy or PDF to): Elizabeth Cargay, ecargay@townofwindsor.com; Kent O'Brien, kent.obrien@ghd.com	PO# 200336
	Bill to: month end billing

Analysis Request

TAT: see note

Lab Approval Required For Rush: 24 hr (Y), 48 hr, Lab Approval Required, 1 wk, 2 wk (standard) (X)

Field Sampler - Print Name & Signature	Sample Collection		Container					Preservative					Matrix			200.8 As	200.7 Fe	200.7 Mn	200.8 Cr	218.6 Cr6	200.7 Ca, Mg, K, Na	Alkalinity	Chloride	Nitrate as N, Nitrite as N	Sulfate	Total Nitrogen (includes TKN, NO2, NO3)	Silica	200.8 Vanadium - total	Phosphate				Title 22 Scan (**Below List)	
Sample Identification	**Date**	**Time**	40ml VOA	Poly	Amber	Glass		HCL	HNO3	NH4Cl	Other	None	Water	Soil																				
ESW-5-16-13:00	5/16	13:00		X								X	X			X	X	X															*	↑
ESW-5-16-18:00	5/16	18:00		X								X	X			X	X	X															*	Preserve in
ESW-5-16-24:00	5/16	24:00		X								X	X			X	X	X															*	lab ↓
ESW-5-17-04:00	5/17	0400		X								X	X			X	X	X																
																																	*	on sep WO

TAT standard → 24-hr

****Title 22 Scan**

64432 Primary Inorganics, 64432.1 NO2/NO3, 64449 A&B
Asbestos, Perchlorate, Gross Alpha, 504.1, 507, 508, 515.1,
524.2, 531.1, 548.1, 549.2

Relinquished by:	Received by:	Date: 5/17/16	Time: 1315
Relinquished by:	Received by:	Date: 5/17/16	Time: 1515
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time

CDPH Write On EDT Report? Yes (X) No ( )

State System Number:

CA Geotracker EDF Report Yes ( ) No ( )

Sampling Company Log Code:

Global ID: EDF to (Email Address):

Travel and Site Time:	Mileage:	Misc. Supplies:

Alpha Analytical Laboratories Inc.
e-mail: clientservices@alpha-labs.com
Corporate: 208 Mason St., Ukiah, CA 95482 • Phone: (707) 468-0401 • Fax: (707) 468-5267
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ELAP Certificates 1551, 2728, and 2922

01 June 2016

Town Of Windsor - Drinking Water
Attn: Elizabeth Cargay
8400 Windsor Rd.
Windsor, CA 95492-0100
RE: Esposti Potable Well
Work Order: 16E1580

Enclosed are the results of analyses for samples received by the laboratory on 05/17/16 15:15. If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Robin C. Edens For Robbie C. Phillips
Project Manager

Alpha Analytical Laboratories Inc.
e-mail: clientservices@alpha-labs.com
Corporate: 208 Mason St., Ukiah, CA 95482 • Phone: (707) 468-0401 • Fax: (707) 468-5267
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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	06/01/16 10:45

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
ESW-5-16-13:00	16E1580-01	Water	05/16/16 13:00	05/17/16 15:15
ESW-5-16-18:00	16E1580-02	Water	05/16/16 18:00	05/17/16 15:15
ESW-5-16-24:00	16E1580-03	Water	05/17/16 00:00	05/17/16 15:15

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	06/01/16 10:45

	Result	Reporting Limit	Dilution	Batch	Prepared	Analyzed	Method	Note
ESW-5-16-13:00 (16E1580-01)		**Sample Type: Water**				**Sampled: 05/16/16 13:00**		
Metals by EPA 200 Series Methods								
Iron	**0.10 mg/L**	**0.10**	1	AE64055	05/25/16 12:54	05/26/16 11:40	EPA 200.7	
Manganese	**0.88 mg/L**	**0.020**	1	AE64055	05/25/16 12:54	05/26/16 11:40	EPA 200.7	
Metals by EPA Method 200.8 ICP/MS								
Arsenic	**44 ug/L**	**0.50**	1	AE64103	05/26/16 14:54	05/28/16 01:01	EPA 200.8	
ESW-5-16-18:00 (16E1580-02)		**Sample Type: Water**				**Sampled: 05/16/16 18:00**		
Metals by EPA 200 Series Methods								
Iron	ND mg/L	0.10	1	AE64055	05/25/16 12:54	05/26/16 14:42	EPA 200.7	
Manganese	**0.87 mg/L**	**0.020**	1	AE64055	05/25/16 12:54	05/26/16 14:42	EPA 200.7	
Metals by EPA Method 200.8 ICP/MS								
Arsenic	**49 ug/L**	**0.50**	1	AE64103	05/26/16 14:54	05/31/16 12:03	EPA 200.8	
ESW-5-16-24:00 (16E1580-03)		**Sample Type: Water**				**Sampled: 05/17/16 00:00**		
Metals by EPA 200 Series Methods								
Iron	**0.11 mg/L**	**0.10**	1	AE64055	05/25/16 12:54	05/26/16 14:48	EPA 200.7	
Manganese	**0.85 mg/L**	**0.020**	1	AE64055	05/25/16 12:54	05/26/16 14:48	EPA 200.7	
Metals by EPA Method 200.8 ICP/MS								
Arsenic	**52 ug/L**	**0.50**	1	AE64103	05/26/16 14:54	05/31/16 12:11	EPA 200.8	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	06/01/16 10:45

Metals by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE64055 - Metals Digest										
Blank (AE64055-BLK1)				Prepared: 05/25/16 Analyzed: 05/26/16						
Iron	ND	0.10	mg/L							
Manganese	ND	0.020	mg/L							
LCS (AE64055-BS1)				Prepared: 05/25/16 Analyzed: 05/26/16						
Iron	1.96	0.10	mg/L	2.00		98.0	85-115			
Manganese	0.191	0.020	mg/L	0.200		95.4	85-115			
Duplicate (AE64055-DUP1)		**Source: 16E1580-01**		Prepared: 05/25/16 Analyzed: 05/26/16						
Iron	0.102	0.10	mg/L		ND			2.08	20	
Manganese	0.891	0.020	mg/L		0.882			1.01	20	
Matrix Spike (AE64055-MS1)		**Source: 16E1580-01**		Prepared: 05/25/16 Analyzed: 05/26/16						
Iron	1.97	0.10	mg/L	2.00	ND	93.3	70-130			
Manganese	1.06	0.020	mg/L	0.200	0.882	90.0	70-130			
Matrix Spike (AE64055-MS2)		**Source: 16E1981-02**		Prepared: 05/25/16 Analyzed: 05/26/16						
Iron	2.09	0.10	mg/L	2.00	0.110	99.2	70-130			
Manganese	0.223	0.020	mg/L	0.200	0.0252	99.0	70-130			
Matrix Spike Dup (AE64055-MSD1)		**Source: 16E1580-01**		Prepared: 05/25/16 Analyzed: 05/26/16						
Iron	1.90	0.10	mg/L	2.00	ND	90.0	70-130	3.43	20	
Manganese	1.06	0.020	mg/L	0.200	0.882	86.9	70-130	0.589	20	

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Bay Area: 6398 Dougherty Rd., Suite 35, Dublin, CA 94568 • Phone: (925) 828-6226 • Fax: (925) 828-6309
Central Valley: 9090 Union Park Way, Suite 113, Elk Grove, CA 95624 • Phone: (916) 686-5190 • Fax: (916) 686-5192

Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	06/01/16 10:45

Metals by EPA Method 200.8 ICP/MS - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE64103 - EPA 200.8										
Blank (AE64103-BLK1)				Prepared: 05/26/16 Analyzed: 05/27/16						
Arsenic	ND	0.50	ug/L							
LCS (AE64103-BS1)				Prepared: 05/26/16 Analyzed: 05/27/16						
Arsenic	21.5	0.50	ug/L	20.0		107	85-115			
Duplicate (AE64103-DUP1)		**Source: 16E1994-01**		Prepared: 05/26/16 Analyzed: 05/27/16						
Arsenic	ND	2.0	ug/L		ND				20	R-01

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: [none]	06/01/16 10:45

Notes and Definitions

R-01	The Reporting Limit for this analyte has been raised to account for matrix interference.
ND	Analyte NOT DETECTED at or above the reporting limit
dry	Sample results reported on a dry weight basis
REC	Recovery
RPD	Relative Percent Difference

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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Corporate Laboratory
208 Mason Street, Ukiah, CA 95482
707-468-0401 F) 707-468-5267
clientservices@alpha-labs.com

Bay Area Laboratory
6398 Dougherty Road, #35, Dublin, CA 94568
925-828-6226 F) 925-828-6309

Central Valley Laboratory
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916-686-5190 F) 916-686-5192

Work Order
Chain of Custody Record

Lab No 16E1580 Page 1 of 1

Name: Town of Windsor - Drinking Water	Project ID: Source Chemical
Mailing Address: 9291 Old Redwood Highway Building 400, Windsor, CA 95492	Phase: Esposti Well
Project Contact (Hardcopy or PDF to): Elizabeth Cargay, ecargay@townofwindsor.com	PO# 200336
Kent O'Brien, kent.obrien@ghd.com	Bill to: month end billing

Signature below authorizes work under terms stated on reverse side.

Analysis Request

TAT: see note

Lab Approval Required For Rush: 24 hr (Y), 48 hr, Lab Approval Required, 1 wk, 2 wk (standard) (X)

Field Sampler - Print Name & Signature / Sample Identification	Sample Collection Date	Time	Container: 40ml VOA	Poly	Amber	Glass	Preservative: HCL	HNO3	NH4Cl	Other	None	Matrix: Water	Soil	200.8 As	200.7 Fe	200.7 Mn	200.8 Cr	218.6 Cr6	200.7 Ca, Mg, K, Na	Alkalinity	Chloride	Nitrate as N, Nitrite as N	Sulfate	Total Nitrogen (includes TKN, NO2, NO3)	Silica	200.8 Vanadium - total	Phosphate	Title 22 Scan (**Below List) (cn)
ESW-5-16-13:00	5/16	13:00		X							X	X		X	X	X												
ESW-5-16-18:00	5/16	18:00		X							X	X		X	X	X												
ESW-5-16-24:00	5/16	24:00		X							X	X		X	X	X												
ESW-5-17-04:00	5/17	0400		X							X	X		X	X	X												*

Preserve in lab ↓

TAT standard

24-hr

* on sep w/o (cn)

**Title 22 Scan

64432 Primary Inorganics, 64432.1 NO2/NO3, 64449 A&B
Asbestos, Perchlorate, Gross Alpha, 504.1, 507, 508, 515.1,
524.2, 531.1, 548.1, 549.2

		Date	Time
Relinquished by:	Received by:	5/17/16	1315
Relinquished by:	Received by:	5/17/16	1515
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time

CDPH Write On EDT Report? Yes (X) No ( )

State System Number:

CA Geotracker EDF Report Yes ( ) No ( )

Sampling Company Log Code:

Global ID: EDF to (Email Address):

Travel and Site Time:	Mileage:	Misc. Supplies:

2.1

Alpha Analytical Laboratories Inc.
e-mail: clientservices@alpha-labs.com
Corporate: 208 Mason St., Ukiah, CA 95482 • Phone: (707) 468-0401 • Fax: (707) 468-5267
Bay Area: 6398 Dougherty Rd., Suite 35, Dublin, CA 94568 • Phone: (925) 828-6226 • Fax: (925) 828-6309
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ELAP Certificates 1551, 2728, and 2922

03 June 2016

Town Of Windsor - Drinking Water
Attn: Elizabeth Cargay
8400 Windsor Rd.
Windsor, CA 95492-0100
RE: Esposti Potable Well
Work Order: 16E1535

Enclosed are the results of analyses for samples received by the laboratory on 05/17/16 15:15. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Chelsea L. Sandelin For Robbie C. Phillips
Project Manager

Alpha Analytical Laboratories Inc.
e-mail: clientservices@alpha-labs.com
Corporate: 208 Mason St., Ukiah, CA 95482 • Phone: (707) 468-0401 • Fax: (707) 468-5267
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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
ESW-5-17-10:00	16E1535-01	Water	05/17/16 10:00	05/17/16 15:15

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Central Valley: 9090 Union Park Way, Suite 113, Elk Grove, CA 95624 • Phone: (916) 686-5190 • Fax: (916) 686-5192

Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

	Result	Reporting Limit	Dilution	Batch	Prepared	Analyzed	Method	Note
ESW-5-17-10:00 (16E1535-01)		**Sample Type: Water**				**Sampled: 05/17/16 10:00**		
Metals (Drinking Water) by EPA 200 Series Methods								
Calcium	**22 mg/L**	**1.0**	1	AE64104	05/26/16 15:05	05/27/16 15:08	EPA 200.7	
Iron	ND ug/L	100	1	AE64104	05/26/16 15:05	05/27/16 15:08	EPA 200.7	
Magnesium	**16 mg/L**	**1.0**	1	AE64104	05/26/16 15:05	05/27/16 15:08	EPA 200.7	
Mercury	ND ug/L	1.0	1	AE64068	05/26/16 05:57	05/26/16 12:30	EPA 245.1	
Sodium	**53 mg/L**	**1.0**	1	AE64104	05/26/16 15:05	05/27/16 15:08	EPA 200.7	
Metals by EPA 200 Series Methods								
Chromium, hexavalent	ND ug/L	1.0	1	AE63824	05/19/16 20:55	05/19/16 20:55	EPA 218.6	
Metals by EPA Method 200.8 ICP/MS								
Aluminum	ND ug/L	50	4	AE64054	05/25/16 12:49	05/26/16 11:53	EPA 200.8	
Antimony	ND ug/L	6.0	4	AE64054	05/25/16 12:49	05/26/16 11:53	EPA 200.8	
Arsenic	**57 ug/L**	**2.0**	4	AE64054	05/25/16 12:49	05/26/16 11:53	EPA 200.8	
Barium	**150 ug/L**	**100**	4	AE64054	05/25/16 12:49	05/26/16 11:53	EPA 200.8	
Beryllium	ND ug/L	1.0	4	AE64054	05/25/16 12:49	05/26/16 11:53	EPA 200.8	
Cadmium	ND ug/L	1.0	4	AE64054	05/25/16 12:49	05/26/16 11:53	EPA 200.8	
Chromium	ND ug/L	10	4	AE64054	05/25/16 12:49	05/26/16 11:53	EPA 200.8	
Copper	ND ug/L	50	4	AE64054	05/25/16 12:49	05/26/16 11:53	EPA 200.8	
Lead	ND ug/L	5.0	4	AE64054	05/25/16 12:49	05/26/16 11:53	EPA 200.8	
Manganese	**860 ug/L**	**20**	4	AE64054	05/25/16 12:49	05/26/16 11:53	EPA 200.8	
Nickel	ND ug/L	10	4	AE64054	05/25/16 12:49	05/26/16 11:53	EPA 200.8	
Selenium	ND ug/L	5.0	4	AE64054	05/25/16 12:49	05/26/16 11:53	EPA 200.8	
Silver	ND ug/L	10	4	AE64054	05/25/16 12:49	05/26/16 11:53	EPA 200.8	
Thallium	ND ug/L	1.0	4	AE64054	05/25/16 12:49	05/26/16 11:53	EPA 200.8	
Uranium	ND pCi/l	1.0	4	AE64054	05/25/16 12:49	05/26/16 11:53	EPA 200.8	
Vanadium	ND ug/L	3.0	4	AE64054	05/25/16 12:49	05/26/16 11:53	EPA 200.8	
Zinc	ND ug/L	50	4	AE64054	05/25/16 12:49	05/26/16 11:53	EPA 200.8	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

	Result		Reporting Limit	Dilution	Batch	Prepared	Analyzed	Method	Note
ESW-5-17-10:00 (16E1535-01)			**Sample Type: Water**			**Sampled: 05/17/16 10:00**			
Conventional Chemistry Parameters by APHA/EPA Methods									
Aggressive Index	**11.68**	**NU**	**2.00**	1	AE64104	05/26/16 15:05	05/31/16 13:55	AWWA	
Ammonia as NH3	ND	mg/L	0.50	1	AE63917	05/23/16 08:13	05/23/16 17:00	SM4500NH3C	
Bicarbonate	**270**	**mg/L**	**5.0**	1	AE63838	05/23/16 10:00	05/23/16 12:08	SM2320B	
Carbonate	ND	mg/L	5.0	1	AE63838	05/23/16 10:00	05/23/16 12:08	SM2320B	
Color	ND	CU	5.0	1	AE63720	05/18/16 09:40	05/18/16 09:40	SM2120B	
Hydroxide	ND	mg/L	5.0	1	AE63838	05/23/16 10:00	05/23/16 12:08	SM2320B	
MBAS, calculated as LAS, mw 340	ND	mg/L	0.050	1	AE63736	05/19/16 10:00	05/20/16 16:00	SM5540C	
Odor	ND	T.O.N.	1.0	1	AE63720	05/18/16 09:15	05/18/16 09:15	EPA 140.1	
Perchlorate	ND	ug/L	4.0	1	AE63921	05/23/16 17:34	05/23/16 17:34	EPA 314.0	
pH	**7.60**	**pH Units**	**1.68**	1	AE63882	05/18/16 17:00	05/18/16 17:00	SM4500-H+ B	T-14
Phosphate, Total	**1.4**	**mg/L**	**0.20**	2	AE63977	05/24/16 08:00	05/24/16 12:10	SM4500-P E	
Specific Conductance (EC)	**520**	**umhos/cm**	**20**	1	AE63882	05/18/16 17:00	05/18/16 17:00	SM2510B	
Sulfide	ND	mg/L	0.10	1	AE63936	05/23/16 13:30	05/23/16 15:00	SM4500SD	
Total Dissolved Solids	**350**	**mg/L**	**10**	1	AE63820	05/19/16 09:07	05/23/16 09:22	SM2540C	
Turbidity	**0.26**	**NTU**	**0.10**	1	AE63882	05/18/16 17:00	05/18/16 17:00	SM2130B	
Silica	**50**	**mg/L**	**5.0**	5	AE63850	05/19/16 14:00	05/19/16 16:00	SM4500-SiO2 C	
Total Alkalinity as CaCO3	**220**	**mg/L**	**5.0**	1	AE63838	05/23/16 10:00	05/23/16 12:08	SM2320B	
Hardness, Total	**120**	**mg/L**	**5**	1	AE64104	05/26/16 15:05	05/27/16 15:08	SM2340B	
Miscellaneous Physical/Conventional Chemistry Parameters									
Cyanide (total)	ND	mg/L	0.10	1	AE64032	05/25/16 16:00	05/26/16 10:55	10-204-00-1X	
Anions by EPA Method 300.0									
Chloride	**21**	**mg/L**	**0.50**	1	AE63804	05/18/16 19:56	05/18/16 19:56	EPA 300.0	
Fluoride	**0.15**	**mg/L**	**0.10**	1	AE63804	05/18/16 19:56	05/18/16 19:56	EPA 300.0	
Nitrate as N	ND	mg/L	0.40	1	AE63804	05/18/16 19:40	05/18/16 19:40	EPA 300.0	
Nitrite as N	ND	mg/L	0.40	1	AE63804	05/18/16 19:56	05/18/16 19:56	EPA 300.0	
Sulfate as SO4	**14**	**mg/L**	**0.50**	1	AE63804	05/18/16 19:56	05/18/16 19:56	EPA 300.0	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

	Result	Reporting Limit	Dilution	Batch	Prepared	Analyzed	Method	Note
ESW-5-17-10:00 (16E1535-01)		**Sample Type: Water**				**Sampled: 05/17/16 10:00**		
Volatile Organic Compounds by EPA Method 524.2								
Benzene	ND ug/L	0.50	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
Carbon tetrachloride	ND ug/L	0.50	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
Chlorobenzene	ND ug/L	0.50	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
1,2-Dichlorobenzene	ND ug/L	0.50	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
1,4-Dichlorobenzene	ND ug/L	0.50	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
1,1-Dichloroethane	ND ug/L	0.50	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
1,2-Dichloroethane	ND ug/L	0.50	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
1,1-Dichloroethene	ND ug/L	0.50	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
cis-1,2-Dichloroethene	ND ug/L	0.50	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
trans-1,2-Dichloroethene	ND ug/L	0.50	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
1,2-Dichloropropane	ND ug/L	0.50	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
1,3-Dichloropropene (total)	ND ug/L	0.50	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
Ethylbenzene	ND ug/L	0.50	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
Methyl tert-butyl ether	ND ug/L	3.0	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
Methylene chloride	ND ug/L	0.50	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
Styrene	ND ug/L	0.50	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
1,1,2,2-Tetrachloroethane	ND ug/L	0.50	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
Tetrachloroethene	ND ug/L	0.50	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
Toluene	ND ug/L	0.50	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
1,2,4-Trichlorobenzene	ND ug/L	0.50	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
1,1,1-Trichloroethane	ND ug/L	0.50	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
1,1,2-Trichloroethane	ND ug/L	0.50	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
Trichloroethene	ND ug/L	0.50	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
Trichlorofluoromethane	ND ug/L	5.0	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
Trichlorotrifluoroethane	ND ug/L	10	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
Vinyl chloride	ND ug/L	0.50	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
Xylenes (total)	ND ug/L	0.50	1	AE64140	05/27/16 12:18	05/27/16 22:06	EPA 524.2	
Surrogate: Bromofluorobenzene	*94.1 %*	*70-130*		*AE64140*	*05/27/16 12:18*	*05/27/16 22:06*	*EPA 524.2*	
Surrogate: Dibromofluoromethane	*78.0 %*	*70-130*		*AE64140*	*05/27/16 12:18*	*05/27/16 22:06*	*EPA 524.2*	
Surrogate: Toluene-d8	*89.2 %*	*70-130*		*AE64140*	*05/27/16 12:18*	*05/27/16 22:06*	*EPA 524.2*	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

	Result	Reporting Limit	Dilution	Batch	Prepared	Analyzed	Method	Note
ESW-5-17-10:00 (16E1535-01)		**Sample Type: Water**				**Sampled: 05/17/16 10:00**		
Nitrogen- and Phosphorus- Pesticides by EPA Method 507								
Alachlor	ND ug/L	1.0	1	AE64018	05/24/16 14:02	05/28/16 07:01	EPA 507	
Atrazine	ND ug/L	0.50	1	AE64018	05/24/16 14:02	05/28/16 07:01	EPA 507	
Molinate	ND ug/L	2.0	1	AE64018	05/24/16 14:02	05/28/16 07:01	EPA 507	
Simazine	ND ug/L	1.0	1	AE64018	05/24/16 14:02	05/28/16 07:01	EPA 507	
Thiobencarb	ND ug/L	1.0	1	AE64018	05/24/16 14:02	05/28/16 07:01	EPA 507	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*88.1 %*	*70-130*		*AE64018*	*05/24/16 14:02*	*05/28/16 07:01*	*EPA 507*	
Organic Analytes by EPA Method 504.1								
1,2-Dibromo-3-chloropropane	ND ug/L	0.010	1	AE63739	05/18/16 07:30	05/19/16 07:38	EPA 504.1	
1,2-Dibromoethane (EDB)	ND ug/L	0.020	1	AE63739	05/18/16 07:30	05/19/16 07:38	EPA 504.1	
Chlorinated Acids by EPA Method 515.1								
Bentazon	ND ug/L	2.0	1	AE64076	05/26/16 07:26	05/28/16 20:49	EPA 515.1	
2,4-D	ND ug/L	10	1	AE64076	05/26/16 07:26	05/28/16 20:49	EPA 515.1	
Dalapon	ND ug/L	10	1	AE64076	05/26/16 07:26	05/28/16 20:49	EPA 515.1	
Dinoseb	ND ug/L	2.0	1	AE64076	05/26/16 07:26	05/28/16 20:49	EPA 515.1	
Pentachlorophenol	ND ug/L	0.20	1	AE64076	05/26/16 07:26	05/28/16 20:49	EPA 515.1	
Picloram	ND ug/L	1.0	1	AE64076	05/26/16 07:26	05/28/16 20:49	EPA 515.1	
2,4,5-TP (Silvex)	ND ug/L	1.0	1	AE64076	05/26/16 07:26	05/28/16 20:49	EPA 515.1	
Surrogate: DCAA	*99.8 %*	*70-130*		*AE64076*	*05/26/16 07:26*	*05/28/16 20:49*	*EPA 515.1*	
Glyphosate by EPA Method 547								
Glyphosate	ND ug/L	25	1	AE63749	05/18/16 08:59	05/19/16 06:44	EPA 547	

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8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

	Result	Reporting Limit	Dilution	Batch	Prepared	Analyzed	Method	Note
ESW-5-17-10:00 (16E1535-01)		**Sample Type: Water**				**Sampled: 05/17/16 10:00**		
Diquat by EPA Method 549.2								
Diquat	ND ug/L	4.0	1	AE63821	05/19/16 09:12	05/19/16 21:08	EPA 549.2	
Semivolatile Organic Compounds by EPA Method 525.2								
Benzo (a) pyrene	ND ug/L	0.10	1	AE64017	05/25/16 06:00	06/02/16 22:43	EPA 525.2	
Di(2-ethylhexyl)adipate	ND ug/L	5.0	1	AE64017	05/25/16 06:00	06/02/16 22:43	EPA 525.2	
Di(2-ethylhexyl)phthalate	ND ug/L	3.0	1	AE64017	05/25/16 06:00	06/02/16 22:43	EPA 525.2	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*100 %*	*70-130*		*AE64017*	*05/25/16 06:00*	*06/02/16 22:43*	*EPA 525.2*	
Surrogate: Triphenyl phosphate	*124 %*	*70-130*		*AE64017*	*05/25/16 06:00*	*06/02/16 22:43*	*EPA 525.2*	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

Metals (Drinking Water) by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE64068 - EPA 245.1 Hg Water										
Blank (AE64068-BLK1)				Prepared & Analyzed: 05/26/16						
Mercury	ND	1.0	ug/L							
LCS (AE64068-BS1)				Prepared & Analyzed: 05/26/16						
Mercury	2.41	1.0	ug/L	2.50		96.4	85-115			
Duplicate (AE64068-DUP1)		**Source: 16E1813-01**		Prepared & Analyzed: 05/26/16						
Mercury	ND	1.0	ug/L		ND				20	
Matrix Spike (AE64068-MS1)		**Source: 16E1813-01**		Prepared & Analyzed: 05/26/16						
Mercury	2.53	1.0	ug/L	2.50	ND	101	70-130			
Matrix Spike (AE64068-MS2)		**Source: 16E1535-01**		Prepared & Analyzed: 05/26/16						
Mercury	2.23	1.0	ug/L	2.50	ND	89.2	70-130			
Matrix Spike Dup (AE64068-MSD1)		**Source: 16E1813-01**		Prepared & Analyzed: 05/26/16						
Mercury	2.53	1.0	ug/L	2.50	ND	101	70-130	0.00	20	
Batch AE64104 - Metals Digest										
Blank (AE64104-BLK1)				Prepared: 05/26/16 Analyzed: 05/27/16						
Calcium	ND	1.0	mg/L							
Iron	ND	100	ug/L							
Magnesium	ND	1.0	mg/L							
Sodium	ND	1.0	mg/L							
LCS (AE64104-BS1)				Prepared: 05/26/16 Analyzed: 05/27/16						
Calcium	7.22	1.0	mg/L	8.00		90.2	85-115			
Iron	1880	100	ug/L	2000		93.8	85-115			
Magnesium	7.10	1.0	mg/L	8.00		88.7	85-115			
Sodium	7.52	1.0	mg/L	8.00		94.0	85-115			

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

Metals (Drinking Water) by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE64104 - Metals Digest										
Duplicate (AE64104-DUP1)	**Source: 16E1641-01**			Prepared: 05/26/16 Analyzed: 05/27/16						
Calcium	26.6	1.0	mg/L		26.4			0.622	20	
Iron	ND	100	ug/L		ND				20	
Magnesium	19.4	1.0	mg/L		19.3			0.0967	20	
Sodium	19.6	1.0	mg/L		19.5			0.891	20	
Matrix Spike (AE64104-MS1)	**Source: 16E1641-01**			Prepared: 05/26/16 Analyzed: 05/27/16						
Calcium	33.8	1.0	mg/L	8.00	26.4	92.6	70-130			
Iron	1880	100	ug/L	2000	ND	93.8	70-130			
Magnesium	27.1	1.0	mg/L	8.00	19.3	97.2	70-130			
Sodium	26.7	1.0	mg/L	8.00	19.5	90.6	70-130			
Matrix Spike (AE64104-MS2)	**Source: 16E1684-01**			Prepared: 05/26/16 Analyzed: 05/27/16						
Calcium	57.6	1.0	mg/L	8.00	50.0	95.4	70-130			
Iron	1900	100	ug/L	2000	ND	95.1	70-130			
Magnesium	16.9	1.0	mg/L	8.00	9.53	92.6	70-130			
Sodium	34.0	1.0	mg/L	8.00	26.6	93.2	70-130			
Matrix Spike Dup (AE64104-MSD1)	**Source: 16E1641-01**			Prepared: 05/26/16 Analyzed: 05/27/16						
Calcium	34.7	1.0	mg/L	8.00	26.4	104	70-130	2.69	20	
Iron	1880	100	ug/L	2000	ND	94.2	70-130	0.354	20	
Magnesium	26.7	1.0	mg/L	8.00	19.3	91.8	70-130	1.58	20	
Sodium	27.5	1.0	mg/L	8.00	19.5	100	70-130	2.85	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

Metals by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE63824 - General Preparation										
Blank (AE63824-BLK1)				Prepared & Analyzed: 05/19/16						
Chromium, hexavalent	ND	1.0	ug/L							
LCS (AE63824-BS1)				Prepared & Analyzed: 05/19/16						
Chromium, hexavalent	9.67	1.0	ug/L	10.0		96.7	90-110			
Duplicate (AE63824-DUP1)		Source: 16E1268-01		Prepared & Analyzed: 05/19/16						
Chromium, hexavalent	ND	1.0	ug/L		ND			3.21	20	
Matrix Spike (AE63824-MS1)		Source: 16E1268-01		Prepared & Analyzed: 05/19/16						
Chromium, hexavalent	10.2	1.0	ug/L	10.0	ND	97.0	90-110			
Matrix Spike (AE63824-MS2)		Source: 16E1707-05		Prepared & Analyzed: 05/20/16						
Chromium, hexavalent	9.56	1.0	ug/L	10.0	ND	95.6	90-110			
Matrix Spike Dup (AE63824-MSD1)		Source: 16E1268-01		Prepared & Analyzed: 05/19/16						
Chromium, hexavalent	10.2	1.0	ug/L	10.0	ND	97.4	90-110	0.421	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

Metals by EPA Method 200.8 ICP/MS - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE64054 - EPA 200.8										
Blank (AE64054-BLK1)				Prepared: 05/25/16 Analyzed: 05/26/16						
Aluminum	ND	50	ug/L							
Antimony	ND	6.0	ug/L							
Arsenic	ND	2.0	ug/L							
Barium	ND	100	ug/L							
Beryllium	ND	1.0	ug/L							
Cadmium	ND	1.0	ug/L							
Chromium	ND	10	ug/L							
Copper	ND	50	ug/L							
Lead	ND	5.0	ug/L							
Manganese	ND	20	ug/L							
Nickel	ND	10	ug/L							
Selenium	ND	5.0	ug/L							
Silver	ND	10	ug/L							
Thallium	ND	1.0	ug/L							
Uranium	ND	1.0	pCi/l							
Vanadium	ND	3.0	ug/L							
Zinc	ND	50	ug/L							
LCS (AE64054-BS1)				Prepared: 05/25/16 Analyzed: 05/26/16						
Aluminum	539	50	ug/L	520		104	85-115			
Antimony	20.9	6.0	ug/L	20.0		104	85-115			
Arsenic	21.7	2.0	ug/L	20.0		109	85-115			
Barium	20.6	100	ug/L	20.0		103	85-115			
Beryllium	22.5	1.0	ug/L	20.0		113	85-115			
Cadmium	21.2	1.0	ug/L	20.0		106	85-115			
Chromium	20.9	10	ug/L	20.0		105	85-115			
Copper	21.3	50	ug/L	20.0		106	85-115			
Lead	21.4	5.0	ug/L	20.0		107	85-115			
Manganese	20.8	20	ug/L	20.0		104	85-115			
Nickel	20.8	10	ug/L	20.0		104	85-115			
Selenium	20.8	5.0	ug/L	20.0		104	85-115			
Silver	20.5	10	ug/L	20.0		103	85-115			
Thallium	21.8	1.0	ug/L	20.0		109	85-115			

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

Metals by EPA Method 200.8 ICP/MS - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE64054 - EPA 200.8										
LCS (AE64054-BS1)				Prepared: 05/25/16 Analyzed: 05/26/16						
Uranium	14.0	1.0	pCi/l	13.4		105	85-115			
Vanadium	20.7	3.0	ug/L	20.0		104	85-115			
Zinc	107	50	ug/L	100		107	85-115			
Duplicate (AE64054-DUP1)		**Source: 16E1535-01**		Prepared: 05/25/16 Analyzed: 05/26/16						
Aluminum	ND	50	ug/L		ND			6.19	20	
Antimony	ND	6.0	ug/L		ND			19.8	20	
Arsenic	55.4	2.0	ug/L		56.5			2.03	20	
Barium	150	100	ug/L		151			0.834	20	
Beryllium	ND	1.0	ug/L		ND				20	
Cadmium	ND	1.0	ug/L		ND				20	
Chromium	ND	10	ug/L		ND			43.8	20	
Copper	ND	50	ug/L		ND			91.6	20	
Lead	ND	5.0	ug/L		ND				20	
Manganese	848	20	ug/L		861			1.61	20	
Nickel	ND	10	ug/L		ND			114	20	
Selenium	ND	5.0	ug/L		ND				20	
Silver	ND	10	ug/L		ND				20	
Thallium	ND	1.0	ug/L		ND				20	
Uranium	ND	1.0	pCi/l		ND			2.61	20	
Vanadium	ND	3.0	ug/L		ND				20	
Zinc	ND	50	ug/L		ND			15.7	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE63736 - General Preparation										
Blank (AE63736-BLK1)				Prepared: 05/18/16 Analyzed: 05/20/16						
MBAS, calculated as LAS, mw 340	ND	0.050	mg/L							
LCS (AE63736-BS1)				Prepared: 05/18/16 Analyzed: 05/20/16						
MBAS, calculated as LAS, mw 340	0.192	0.050	mg/L	0.200		96.2	80-120			
LCS Dup (AE63736-BSD1)				Prepared: 05/18/16 Analyzed: 05/20/16						
MBAS, calculated as LAS, mw 340	0.197	0.050	mg/L	0.200		98.7	80-120	2.60	20	
Duplicate (AE63736-DUP1)		**Source: 16E1588-02**		Prepared: 05/19/16 Analyzed: 05/20/16						
MBAS, calculated as LAS, mw 340	ND	0.050	mg/L		ND				20	
Matrix Spike (AE63736-MS1)		**Source: 16E1588-02**		Prepared: 05/19/16 Analyzed: 05/20/16						
MBAS, calculated as LAS, mw 340	0.206	0.050	mg/L	0.200	ND	103	80-120			
Matrix Spike (AE63736-MS2)		**Source: 16E1588-02**		Prepared: 05/19/16 Analyzed: 05/20/16						
MBAS, calculated as LAS, mw 340	0.204	0.050	mg/L	0.200	ND	102	80-120			
Batch AE63820 - General Preparation										
Blank (AE63820-BLK1)				Prepared: 05/19/16 Analyzed: 05/23/16						
Total Dissolved Solids	ND	10	mg/L							
Duplicate (AE63820-DUP1)		**Source: 16E1535-01**		Prepared: 05/19/16 Analyzed: 05/23/16						
Total Dissolved Solids	348	10	mg/L		352			1.14	15	
Duplicate (AE63820-DUP2)		**Source: 16E1653-02**		Prepared: 05/19/16 Analyzed: 05/23/16						
Total Dissolved Solids	388	10	mg/L		373			3.85	15	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE63838 - General Preparation										
Duplicate (AE63838-DUP1)	**Source: 16E1725-01**			Prepared & Analyzed: 05/23/16						
Hydroxide	ND	5.0	mg/L		ND				5	
Carbonate	ND	5.0	mg/L		ND				20	
Bicarbonate	190	5.0	mg/L		189			0.643	20	
Total Alkalinity as CaCO3	156	5.0	mg/L		155			0.643	20	
Batch AE63850 - General Preparation										
Blank (AE63850-BLK1)				Prepared & Analyzed: 05/19/16						
Silica	ND	1.0	mg/L							
LCS (AE63850-BS1)				Prepared & Analyzed: 05/19/16						
Silica	9.93	1.0	mg/L	10.0		99.3	85-115			
LCS Dup (AE63850-BSD1)				Prepared & Analyzed: 05/19/16						
Silica	9.89	1.0	mg/L	10.0		98.9	85-115	0.366	20	
Duplicate (AE63850-DUP1)	**Source: 16E1535-01**			Prepared & Analyzed: 05/19/16						
Silica	51.5	5.0	mg/L		50.4			2.14	20	
Matrix Spike (AE63850-MS1)	**Source: 16E1535-01**			Prepared & Analyzed: 05/19/16						
Silica	93.6	5.0	mg/L	50.0	50.4	86.4	80-120			
Matrix Spike Dup (AE63850-MSD1)	**Source: 16E1535-01**			Prepared & Analyzed: 05/19/16						
Silica	94.5	5.0	mg/L	50.0	50.4	88.2	80-120	0.965	20	
Batch AE63882 - General Preparation										
Duplicate (AE63882-DUP1)	**Source: 16E1535-01**			Prepared & Analyzed: 05/18/16						
Specific Conductance (EC)	520	20	umhos/cm		515			0.966	5	
pH	7.61	1.68	pH Units		7.60			0.131	20	T-14
Turbidity	0.260	0.10	NTU		0.260			0.00	15	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE63917 - General Preparation										
Blank (AE63917-BLK1)				Prepared & Analyzed: 05/23/16						
Ammonia as NH3	ND	0.50	mg/L							
LCS (AE63917-BS1)				Prepared & Analyzed: 05/23/16						
Ammonia as NH3	5.85	0.50	mg/L	6.10		96.0	90-110			
LCS Dup (AE63917-BSD1)				Prepared & Analyzed: 05/23/16						
Ammonia as NH3	5.96	0.50	mg/L	6.10		97.7	90-110	1.81	10	
Matrix Spike (AE63917-MS1)		Source: 16E1775-02		Prepared & Analyzed: 05/23/16						
Ammonia as NH3	5.96	0.50	mg/L	6.10	ND	97.7	85-115			
Matrix Spike Dup (AE63917-MSD1)		Source: 16E1775-02		Prepared & Analyzed: 05/23/16						
Ammonia as NH3	5.75	0.50	mg/L	6.10	ND	94.2	85-115	3.64	20	
Batch AE63921 - General Preparation										
Blank (AE63921-BLK1)				Prepared & Analyzed: 05/23/16						
Perchlorate	ND	4.0	ug/L							
LCS (AE63921-BS1)				Prepared & Analyzed: 05/23/16						
Perchlorate	25.6	4.0	ug/L	25.0		102	85-115			
Duplicate (AE63921-DUP1)		Source: 16E1095-01		Prepared & Analyzed: 05/23/16						
Perchlorate	ND	4.0	ug/L		ND				15	
Matrix Spike (AE63921-MS1)		Source: 16E1095-01		Prepared & Analyzed: 05/23/16						
Perchlorate	24.9	4.0	ug/L	25.0	ND	99.6	70-130			

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE63921 - General Preparation										
Matrix Spike Dup (AE63921-MSD1)	**Source: 16E1095-01**			Prepared & Analyzed: 05/23/16						
Perchlorate	24.2	4.0	ug/L	25.0	ND	96.9	70-130	2.76	15	
Batch AE63936 - General Preparation										
Blank (AE63936-BLK1)				Prepared & Analyzed: 05/23/16						
Sulfide	ND	0.10	mg/L							
LCS (AE63936-BS1)				Prepared & Analyzed: 05/23/16						
Sulfide	0.420	0.10	mg/L	0.400		105	85-115			
Duplicate (AE63936-DUP1)	**Source: 16E1711-05**			Prepared & Analyzed: 05/23/16						
Sulfide	ND	0.10	mg/L		ND				15	
Matrix Spike (AE63936-MS1)	**Source: 16E1711-05**			Prepared & Analyzed: 05/23/16						
Sulfide	0.203	0.10	mg/L	0.400	ND	50.8	80-120			QM-05
Matrix Spike Dup (AE63936-MSD1)	**Source: 16E1711-05**			Prepared & Analyzed: 05/23/16						
Sulfide	0.202	0.10	mg/L	0.400	ND	50.5	80-120	0.494	15	QM-05
Batch AE63977 - General Prep										
Blank (AE63977-BLK1)				Prepared & Analyzed: 05/24/16						
Phosphate, Total	ND	0.10	mg/L							
LCS (AE63977-BS1)				Prepared & Analyzed: 05/24/16						
Phosphate, Total	0.582	0.10	mg/L	0.600		97.0	85-115			

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE63977 - General Prep										
Duplicate (AE63977-DUP1)		**Source: 16E1886-01**		Prepared & Analyzed: 05/24/16						
Phosphate, Total	0.118	0.10	mg/L		0.122			3.32	20	
Matrix Spike (AE63977-MS1)		**Source: 16E1886-01**		Prepared & Analyzed: 05/24/16						
Phosphate, Total	0.666	0.10	mg/L	0.600	0.122	90.6	70-130			
Matrix Spike Dup (AE63977-MSD1)		**Source: 16E1886-01**		Prepared & Analyzed: 05/24/16						
Phosphate, Total	0.670	0.10	mg/L	0.600	0.122	91.3	70-130	0.599	20	
Batch AE64104 - Metals Digest										
Blank (AE64104-BLK1)				Prepared: 05/26/16 Analyzed: 05/27/16						
Hardness, Total	ND	5	mg/L							
Duplicate (AE64104-DUP1)		**Source: 16E1641-01**		Prepared: 05/26/16 Analyzed: 05/27/16						
Hardness, Total	146	5	mg/L		146			0.335	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

Miscellaneous Physical/Conventional Chemistry Parameters - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE64032 - General Preparation										
Blank (AE64032-BLK1)				Prepared: 05/25/16 Analyzed: 05/26/16						
Cyanide (total)	ND	0.10	mg/L							
LCS (AE64032-BS1)				Prepared: 05/25/16 Analyzed: 05/26/16						
Cyanide (total)	0.214	0.10	mg/L	0.200		107	85-115			
Duplicate (AE64032-DUP1)		Source: 16E1234-01		Prepared: 05/25/16 Analyzed: 05/26/16						
Cyanide (total)	ND	0.10	mg/L		ND				25	
Matrix Spike (AE64032-MS1)		Source: 16E1234-01		Prepared: 05/25/16 Analyzed: 05/26/16						
Cyanide (total)	0.209	0.10	mg/L	0.200	ND	105	85-115			
Matrix Spike (AE64032-MS2)		Source: 16E2085-02		Prepared: 05/25/16 Analyzed: 05/26/16						
Cyanide (total)	0.173	0.10	mg/L	0.200	ND	84.6	85-115			QM-07
Matrix Spike Dup (AE64032-MSD1)		Source: 16E1234-01		Prepared: 05/25/16 Analyzed: 05/26/16						
Cyanide (total)	0.210	0.10	mg/L	0.200	ND	105	85-115	0.534	25	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

Anions by EPA Method 300.0 - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE63804 - General Preparation										
Blank (AE63804-BLK1)				Prepared & Analyzed: 05/18/16						
Nitrite as N	ND	0.40	mg/L							
Nitrate as N	ND	0.40	mg/L							
Chloride	ND	0.50	mg/L							
Fluoride	ND	0.10	mg/L							
Sulfate as SO4	ND	0.50	mg/L							
LCS (AE63804-BS1)				Prepared & Analyzed: 05/18/16						
Fluoride	5.29	0.10	mg/L	5.56		95.2	90-110			
Nitrate as N	5.79	0.40	mg/L	5.56		104	90-110			
Nitrite as N	5.70	0.40	mg/L	5.56		103	90-110			
Sulfate as SO4	23.1	0.50	mg/L	22.2		104	90-110			
Chloride	11.5	0.50	mg/L	11.1		103	90-110			
Duplicate (AE63804-DUP1)		**Source: 16E1525-01**		Prepared & Analyzed: 05/18/16						
Nitrate as N	0.434	0.40	mg/L		0.405			6.94	20	
Fluoride	0.147	0.10	mg/L		0.145			1.37	20	
Sulfate as SO4	0.778	0.50	mg/L		0.769			1.16	20	
Nitrite as N	ND	0.40	mg/L		ND				20	
Chloride	0.664	0.50	mg/L		0.649			2.28	20	
Matrix Spike (AE63804-MS1)		**Source: 16E1525-01**		Prepared & Analyzed: 05/18/16						
Chloride	12.4	0.50	mg/L	11.1	0.649	106	80-120			
Nitrate as N	6.39	0.40	mg/L	5.56	0.405	108	80-120			
Fluoride	5.53	0.10	mg/L	5.56	0.145	97.0	80-120			
Nitrite as N	5.90	0.40	mg/L	5.56	ND	105	80-120			
Sulfate as SO4	24.4	0.50	mg/L	22.2	0.769	106	80-120			
Matrix Spike (AE63804-MS2)		**Source: 16E1518-02**		Prepared & Analyzed: 05/18/16						
Nitrate as N	6.11	0.40	mg/L	5.56	ND	107	80-120			
Nitrite as N	5.89	0.40	mg/L	5.56	ND	105	80-120			
Sulfate as SO4	40.1	0.50	mg/L	22.2	17.9	100	80-120			
Chloride	20.1	0.50	mg/L	11.1	8.98	99.8	80-120			
Fluoride	5.59	0.10	mg/L	5.56	0.113	98.6	80-120			

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Corporate: 208 Mason St., Ukiah, CA 95482 • Phone: (707) 468-0401 • Fax: (707) 468-5267
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Central Valley: 9090 Union Park Way, Suite 113, Elk Grove, CA 95624 • Phone: (916) 686-5190 • Fax: (916) 686-5192

Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

Anions by EPA Method 300.0 - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE63804 - General Preparation										
Matrix Spike Dup (AE63804-MSD1)	**Source: 16E1525-01**			Prepared & Analyzed: 05/18/16						
Sulfate as SO4	24.3	0.50	mg/L	22.2	0.769	106	80-120	0.387	20	
Nitrate as N	6.37	0.40	mg/L	5.56	0.405	107	80-120	0.338	20	
Fluoride	5.52	0.10	mg/L	5.56	0.145	96.8	80-120	0.221	20	
Nitrite as N	5.88	0.40	mg/L	5.56	ND	105	80-120	0.283	20	
Chloride	12.4	0.50	mg/L	11.1	0.649	105	80-120	0.197	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

Volatile Organic Compounds by EPA Method 524.2 - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE64140 - VOAs in Water GCMS										
Blank (AE64140-BLK1)				Prepared & Analyzed: 05/27/16						
Benzene	ND	0.50	ug/L							
Carbon tetrachloride	ND	0.50	ug/L							
Chlorobenzene	ND	0.50	ug/L							
1,2-Dichlorobenzene	ND	0.50	ug/L							
1,4-Dichlorobenzene	ND	0.50	ug/L							
1,1-Dichloroethane	ND	0.50	ug/L							
1,2-Dichloroethane	ND	0.50	ug/L							
1,1-Dichloroethene	ND	0.50	ug/L							
cis-1,2-Dichloroethene	ND	0.50	ug/L							
trans-1,2-Dichloroethene	ND	0.50	ug/L							
1,2-Dichloropropane	ND	0.50	ug/L							
1,3-Dichloropropene (total)	ND	0.50	ug/L							
Ethylbenzene	ND	0.50	ug/L							
Methyl tert-butyl ether	ND	3.0	ug/L							
Methylene chloride	ND	0.50	ug/L							
Styrene	ND	0.50	ug/L							
1,1,2,2-Tetrachloroethane	ND	0.50	ug/L							
Tetrachloroethene	ND	0.50	ug/L							
Toluene	ND	0.50	ug/L							
1,2,4-Trichlorobenzene	ND	0.50	ug/L							
1,1,1-Trichloroethane	ND	0.50	ug/L							
1,1,2-Trichloroethane	ND	0.50	ug/L							
Trichloroethene	ND	0.50	ug/L							
Trichlorofluoromethane	ND	5.0	ug/L							
Trichlorotrifluoroethane	ND	10	ug/L							
Vinyl chloride	ND	0.50	ug/L							
Xylenes (total)	ND	0.50	ug/L							
Surrogate: Bromofluorobenzene	*23.2*		*ug/L*	*25.0*		*92.8*	*70-130*			
Surrogate: Dibromofluoromethane	*19.7*		*ug/L*	*25.0*		*78.7*	*70-130*			
Surrogate: Toluene-d8	*22.0*		*ug/L*	*25.0*		*88.2*	*70-130*			

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

Volatile Organic Compounds by EPA Method 524.2 - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE64140 - VOAs in Water GCMS										
LCS (AE64140-BS1)				Prepared & Analyzed: 05/27/16						
Benzene	5.02	0.50	ug/L	5.00		100	70-130			
Carbon tetrachloride	4.29	0.50	ug/L	5.00		85.8	70-130			
Chlorobenzene	5.18	0.50	ug/L	5.00		104	70-130			
1,2-Dichlorobenzene	4.96	0.50	ug/L	5.00		99.2	70-130			
1,4-Dichlorobenzene	4.82	0.50	ug/L	5.00		96.4	70-130			
1,1-Dichloroethane	5.34	0.50	ug/L	5.00		107	70-130			
1,2-Dichloroethane	5.35	0.50	ug/L	5.00		107	70-130			
1,1-Dichloroethene	4.84	0.50	ug/L	5.00		96.8	70-130			
cis-1,2-Dichloroethene	5.33	0.50	ug/L	5.00		107	70-130			
trans-1,2-Dichloroethene	5.19	0.50	ug/L	5.00		104	70-130			
1,2-Dichloropropane	5.11	0.50	ug/L	5.00		102	70-130			
Ethylbenzene	5.12	0.50	ug/L	5.00		102	70-130			
Methyl tert-butyl ether	5.00	3.0	ug/L	5.00		100	70-130			
Methylene chloride	4.81	0.50	ug/L	5.00		96.2	70-130			
Styrene	5.23	0.50	ug/L	5.00		105	70-130			
1,1,2,2-Tetrachloroethane	5.44	0.50	ug/L	5.00		109	70-130			
Tetrachloroethene	4.93	0.50	ug/L	5.00		98.6	70-130			
Toluene	4.99	0.50	ug/L	5.00		99.8	70-130			
1,2,4-Trichlorobenzene	5.20	0.50	ug/L	5.00		104	70-130			
1,1,1-Trichloroethane	4.64	0.50	ug/L	5.00		92.8	70-130			
1,1,2-Trichloroethane	5.29	0.50	ug/L	5.00		106	70-130			
Trichloroethene	5.05	0.50	ug/L	5.00		101	70-130			
Trichlorofluoromethane	4.81	5.0	ug/L	5.00		96.2	70-130			
Trichlorotrifluoroethane	5.08	10	ug/L	5.00		102	70-130			
Vinyl chloride	5.43	0.50	ug/L	5.00		109	70-130			
Xylenes (total)	15.4	0.50	ug/L	15.0		102	70-130			
Surrogate: Bromofluorobenzene	*24.5*		*ug/L*	*25.0*		*98.1*	*70-130*			
Surrogate: Dibromofluoromethane	*21.6*		*ug/L*	*25.0*		*86.4*	*70-130*			
Surrogate: Toluene-d8	*22.2*		*ug/L*	*25.0*		*88.6*	*70-130*			

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

Volatile Organic Compounds by EPA Method 524.2 - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE64140 - VOAs in Water GCMS										
LCS Dup (AE64140-BSD1)				Prepared & Analyzed: 05/27/16						
Benzene	5.24	0.50	ug/L	5.00		105	70-130	4.29	30	
Carbon tetrachloride	4.65	0.50	ug/L	5.00		93.0	70-130	8.05	30	
Chlorobenzene	5.42	0.50	ug/L	5.00		108	70-130	4.53	30	
1,2-Dichlorobenzene	5.36	0.50	ug/L	5.00		107	70-130	7.75	30	
1,4-Dichlorobenzene	5.19	0.50	ug/L	5.00		104	70-130	7.39	30	
1,1-Dichloroethane	5.30	0.50	ug/L	5.00		106	70-130	0.752	30	
1,2-Dichloroethane	5.49	0.50	ug/L	5.00		110	70-130	2.58	30	
1,1-Dichloroethene	4.87	0.50	ug/L	5.00		97.4	70-130	0.618	30	
cis-1,2-Dichloroethene	5.19	0.50	ug/L	5.00		104	70-130	2.66	30	
trans-1,2-Dichloroethene	5.16	0.50	ug/L	5.00		103	70-130	0.580	30	
1,2-Dichloropropane	5.43	0.50	ug/L	5.00		109	70-130	6.07	30	
Ethylbenzene	5.45	0.50	ug/L	5.00		109	70-130	6.24	30	
Methyl tert-butyl ether	5.04	3.0	ug/L	5.00		101	70-130	0.797	30	
Methylene chloride	4.71	0.50	ug/L	5.00		94.2	70-130	2.10	30	
Styrene	5.51	0.50	ug/L	5.00		110	70-130	5.21	30	
1,1,2,2-Tetrachloroethane	5.76	0.50	ug/L	5.00		115	70-130	5.71	30	
Tetrachloroethene	5.39	0.50	ug/L	5.00		108	70-130	8.91	30	
Toluene	5.30	0.50	ug/L	5.00		106	70-130	6.03	30	
1,2,4-Trichlorobenzene	5.30	0.50	ug/L	5.00		106	70-130	1.90	30	
1,1,1-Trichloroethane	4.68	0.50	ug/L	5.00		93.6	70-130	0.858	30	
1,1,2-Trichloroethane	5.61	0.50	ug/L	5.00		112	70-130	5.87	30	
Trichloroethene	5.33	0.50	ug/L	5.00		107	70-130	5.39	30	
Trichlorofluoromethane	5.05	5.0	ug/L	5.00		101	70-130	4.87	30	
Trichlorotrifluoroethane	5.18	10	ug/L	5.00		104	70-130	1.95	30	
Vinyl chloride	6.03	0.50	ug/L	5.00		121	70-130	10.5	30	
Xylenes (total)	16.2	0.50	ug/L	15.0		108	70-130	5.38	30	
Surrogate: Bromofluorobenzene	*23.8*		*ug/L*	*25.0*		*95.2*	*70-130*			
Surrogate: Dibromofluoromethane	*20.3*		*ug/L*	*25.0*		*81.1*	*70-130*			
Surrogate: Toluene-d8	*21.9*		*ug/L*	*25.0*		*87.8*	*70-130*			

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

Volatile Organic Compounds by EPA Method 524.2 - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE64140 - VOAs in Water GCMS										
Matrix Spike (AE64140-MS1)	**Source: 16E1420-01**			Prepared & Analyzed: 05/27/16						
Benzene	5.20	0.50	ug/L	5.00	ND	104	70-130			
Carbon tetrachloride	4.50	0.50	ug/L	5.00	ND	90.0	70-130			
Chlorobenzene	5.18	0.50	ug/L	5.00	ND	104	70-130			
1,2-Dichlorobenzene	5.02	0.50	ug/L	5.00	ND	100	70-130			
1,4-Dichlorobenzene	4.79	0.50	ug/L	5.00	ND	95.8	70-130			
1,1-Dichloroethane	5.34	0.50	ug/L	5.00	ND	107	70-130			
1,2-Dichloroethane	5.04	0.50	ug/L	5.00	ND	101	70-130			
1,1-Dichloroethene	4.94	0.50	ug/L	5.00	ND	98.8	70-130			
cis-1,2-Dichloroethene	5.17	0.50	ug/L	5.00	ND	103	70-130			
trans-1,2-Dichloroethene	5.21	0.50	ug/L	5.00	ND	104	70-130			
1,2-Dichloropropane	5.11	0.50	ug/L	5.00	ND	102	70-130			
Ethylbenzene	5.38	0.50	ug/L	5.00	ND	108	70-130			
Methyl tert-butyl ether	4.98	3.0	ug/L	5.00	ND	99.6	70-130			
Methylene chloride	5.03	0.50	ug/L	5.00	ND	101	70-130			
Styrene	5.06	0.50	ug/L	5.00	ND	101	70-130			
1,1,2,2-Tetrachloroethane	5.11	0.50	ug/L	5.00	ND	102	70-130			
Tetrachloroethene	5.38	0.50	ug/L	5.00	ND	108	70-130			
Toluene	5.20	0.50	ug/L	5.00	ND	104	70-130			
1,2,4-Trichlorobenzene	4.70	0.50	ug/L	5.00	ND	94.0	70-130			
1,1,1-Trichloroethane	4.96	0.50	ug/L	5.00	ND	99.2	70-130			
1,1,2-Trichloroethane	4.93	0.50	ug/L	5.00	ND	98.6	70-130			
Trichloroethene	5.32	0.50	ug/L	5.00	ND	106	70-130			
Trichlorofluoromethane	5.22	5.0	ug/L	5.00	ND	104	70-130			
Trichlorotrifluoroethane	5.40	10	ug/L	5.00	ND	108	70-130			
Vinyl chloride	7.57	0.50	ug/L	5.00	ND	151	70-130			QM-05
Xylenes (total)	15.8	0.50	ug/L	15.0	ND	105	70-130			
Surrogate: Bromofluorobenzene	*23.8*		*ug/L*	*25.0*		*95.2*	*70-130*			
Surrogate: Dibromofluoromethane	*20.1*		*ug/L*	*25.0*		*80.3*	*70-130*			
Surrogate: Toluene-d8	*22.3*		*ug/L*	*25.0*		*89.1*	*70-130*			

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

Nitrogen- and Phosphorus- Pesticides by EPA Method 507 - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE64018 - SVOAs in Water GC										
Blank (AE64018-BLK1)				Prepared: 05/24/16 Analyzed: 05/27/16						
Alachlor	ND	1.0	ug/L							
Atrazine	ND	0.50	ug/L							
Molinate	ND	2.0	ug/L							
Simazine	ND	1.0	ug/L							
Thiobencarb	ND	1.0	ug/L							
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*1.61*		*ug/L*	*2.00*		*80.3*	*70-130*			
LCS (AE64018-BS1)				Prepared: 05/24/16 Analyzed: 05/28/16						
Alachlor	1.81	1.0	ug/L	2.00		90.5	62-128			
Atrazine	1.85	0.50	ug/L	2.00		92.3	62-122			
Molinate	1.88	2.0	ug/L	2.00		94.2	44-137			
Simazine	1.88	1.0	ug/L	2.00		93.9	70-130			
Thiobencarb	1.80	1.0	ug/L	2.00		90.1	69-129			
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*1.75*		*ug/L*	*2.00*		*87.4*	*70-130*			
LCS Dup (AE64018-BSD1)				Prepared: 05/24/16 Analyzed: 05/28/16						
Alachlor	2.11	1.0	ug/L	2.00		105	62-128	15.3	30	
Atrazine	2.11	0.50	ug/L	2.00		105	62-122	13.2	30	
Molinate	1.90	2.0	ug/L	2.00		95.2	44-137	1.05	30	
Simazine	2.11	1.0	ug/L	2.00		106	70-130	11.9	30	
Thiobencarb	2.03	1.0	ug/L	2.00		101	69-129	11.7	30	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*1.87*		*ug/L*	*2.00*		*93.6*	*70-130*			
Matrix Spike (AE64018-MS1)		**Source: 16E1425-01**		Prepared: 05/24/16 Analyzed: 05/28/16						
Alachlor	2.16	1.0	ug/L	2.00	ND	108	62-128			
Atrazine	1.91	0.50	ug/L	2.00	ND	95.5	62-122			
Molinate	1.89	2.0	ug/L	2.00	ND	94.3	44-137			
Simazine	1.96	1.0	ug/L	2.00	ND	98.1	70-130			
Thiobencarb	1.89	1.0	ug/L	2.00	ND	94.3	69-129			
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*1.87*		*ug/L*	*2.00*		*93.7*	*70-130*			

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

Organic Analytes by EPA Method 504.1 - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE63739 - EPA 504.1										
Blank (AE63739-BLK1)				Prepared & Analyzed: 05/18/16						
1,2-Dibromo-3-chloropropane	ND	0.010	ug/L							
1,2-Dibromoethane (EDB)	ND	0.020	ug/L							
LCS (AE63739-BS1)				Prepared & Analyzed: 05/18/16						
1,2-Dibromo-3-chloropropane	0.220	0.010	ug/L	0.250		88.1	70-130			
1,2-Dibromoethane (EDB)	0.197	0.020	ug/L	0.250		78.9	70-130			
LCS Dup (AE63739-BSD1)				Prepared & Analyzed: 05/18/16						
1,2-Dibromo-3-chloropropane	0.193	0.010	ug/L	0.250		77.2	70-130	13.1	25	
1,2-Dibromoethane (EDB)	0.205	0.020	ug/L	0.250		81.9	70-130	3.66	25	
Matrix Spike (AE63739-MS1)	**Source: 16E1119-01**			Prepared & Analyzed: 05/18/16						
1,2-Dibromo-3-chloropropane	0.190	0.010	ug/L	0.250	ND	75.9	70-130			
1,2-Dibromoethane (EDB)	0.193	0.020	ug/L	0.250	ND	77.4	70-130			

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e-mail: clientservices@alpha-labs.com
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Bay Area: 6398 Dougherty Rd., Suite 35, Dublin, CA 94568 • Phone: (925) 828-6226 • Fax: (925) 828-6309
Central Valley: 9090 Union Park Way, Suite 113, Elk Grove, CA 95624 • Phone: (916) 686-5190 • Fax: (916) 686-5192

Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

Chlorinated Acids by EPA Method 515.1 - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE64076 - Herbicides										
Blank (AE64076-BLK1)				Prepared: 05/26/16 Analyzed: 05/28/16						
Bentazon	ND	2.0	ug/L							
2,4-D	ND	10	ug/L							
Dalapon	ND	10	ug/L							
Dinoseb	ND	2.0	ug/L							
Pentachlorophenol	ND	0.20	ug/L							
Picloram	ND	1.0	ug/L							
2,4,5-TP (Silvex)	ND	1.0	ug/L							
Surrogate: DCAA	*12.9*		*ug/L*	*14.2*		*90.6*	*70-130*			
LCS (AE64076-BS1)				Prepared: 05/26/16 Analyzed: 05/28/16						
Bentazon	1.67	2.0	ug/L	1.92		87.0	70-130			
2,4-D	1.52	10	ug/L	1.92		78.9	48-124			
Dalapon	11.5	10	ug/L	12.5		92.1	40-112			
Dinoseb	3.79	2.0	ug/L	6.42		59.1	20-105			
Pentachlorophenol	0.819	0.20	ug/L	0.960		85.3	70-130			
Picloram	0.941	1.0	ug/L	0.960		98.1	70-130			
2,4,5-TP (Silvex)	0.846	1.0	ug/L	0.960		88.1	70-130			
Surrogate: DCAA	*14.1*		*ug/L*	*14.2*		*99.4*	*70-130*			
LCS Dup (AE64076-BSD1)				Prepared: 05/26/16 Analyzed: 05/28/16						
Bentazon	1.79	2.0	ug/L	1.92		93.3	70-130	6.95	50	
2,4-D	1.56	10	ug/L	1.92		81.1	48-124	2.71	50	
Dalapon	11.3	10	ug/L	12.5		90.6	40-112	1.59	50	
Dinoseb	4.64	2.0	ug/L	6.42		72.3	20-105	20.1	50	
Pentachlorophenol	0.831	0.20	ug/L	0.960		86.6	70-130	1.56	50	
Picloram	1.08	1.0	ug/L	0.960		113	70-130	13.9	50	
2,4,5-TP (Silvex)	0.857	1.0	ug/L	0.960		89.3	70-130	1.33	50	
Surrogate: DCAA	*13.5*		*ug/L*	*14.2*		*95.0*	*70-130*			

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

Chlorinated Acids by EPA Method 515.1 - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE64076 - Herbicides										
Matrix Spike (AE64076-MS1)	**Source: 16E1438-01**			Prepared: 05/26/16 Analyzed: 05/28/16						
Bentazon	1.59	2.0	ug/L	1.92	ND	82.9	70-130			
2,4-D	1.90	10	ug/L	1.92	ND	98.9	48-124			
Dalapon	11.0	10	ug/L	12.5	ND	87.8	40-112			
Dinoseb	3.32	2.0	ug/L	6.42	ND	51.8	20-105			
Pentachlorophenol	0.385	0.20	ug/L	0.960	ND	40.1	70-130			QM-07
Picloram	0.913	1.0	ug/L	0.960	ND	95.1	70-130			
2,4,5-TP (Silvex)	0.709	1.0	ug/L	0.960	ND	73.9	70-130			
Surrogate: DCAA	*12.1*		*ug/L*	*14.2*		*85.1*	*70-130*			
Matrix Spike Dup (AE64076-MSD1)	**Source: 16E1438-01**			Prepared: 05/26/16 Analyzed: 05/28/16						
Bentazon	1.64	2.0	ug/L	1.92	ND	85.2	70-130	2.75	50	
2,4-D	1.91	10	ug/L	1.92	ND	99.7	48-124	0.758	50	
Dalapon	12.1	10	ug/L	12.5	ND	96.7	40-112	9.66	50	
Dinoseb	4.07	2.0	ug/L	6.42	ND	63.4	20-105	20.2	50	
Pentachlorophenol	0.617	0.20	ug/L	0.960	ND	64.2	70-130	46.2	50	QM-07
Picloram	0.978	1.0	ug/L	0.960	ND	102	70-130	6.84	50	
2,4,5-TP (Silvex)	0.784	1.0	ug/L	0.960	ND	81.6	70-130	9.98	50	
Surrogate: DCAA	*12.6*		*ug/L*	*14.2*		*88.5*	*70-130*			

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

Glyphosate by EPA Method 547 - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE63749 - HPLC										
Blank (AE63749-BLK1)				Prepared & Analyzed: 05/18/16						
Glyphosate	ND	25	ug/L							
LCS (AE63749-BS1)				Prepared & Analyzed: 05/18/16						
Glyphosate	105	25	ug/L	120		87.8	70-130			
LCS Dup (AE63749-BSD1)				Prepared & Analyzed: 05/18/16						
Glyphosate	102	25	ug/L	120		84.6	70-130	3.63	30	
Matrix Spike (AE63749-MS1)	**Source: 16E1193-01**			Prepared: 05/18/16 Analyzed: 05/19/16						
Glyphosate	120	25	ug/L	120	ND	100	70-130			
Matrix Spike Dup (AE63749-MSD1)	**Source: 16E1193-01**			Prepared: 05/18/16 Analyzed: 05/19/16						
Glyphosate	138	25	ug/L	120	ND	115	70-130	13.5	30	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

Diquat by EPA Method 549.2 - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE63821 - HPLC										
Blank (AE63821-BLK1)				Prepared & Analyzed: 05/19/16						
Diquat	ND	4.0	ug/L							
LCS (AE63821-BS1)				Prepared & Analyzed: 05/19/16						
Diquat	16.2	4.0	ug/L	20.0		80.9	70-130			
Matrix Spike (AE63821-MS1)	**Source: 16E1456-01**			Prepared & Analyzed: 05/19/16						
Diquat	21.8	4.0	ug/L	20.0	ND	109	70-130			

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

Semivolatile Organic Compounds by EPA Method 525.2 - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE64017 - EPA 525.2										
Blank (AE64017-BLK1)				Prepared: 05/25/16 Analyzed: 06/02/16						
Benzo (a) pyrene	ND	0.10	ug/L							
Di(2-ethylhexyl)adipate	ND	5.0	ug/L							
Di(2-ethylhexyl)phthalate	ND	3.0	ug/L							
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*4.82*		*ug/L*	*5.00*		*96.4*	*70-130*			
Surrogate: Triphenyl phosphate	*5.60*		*ug/L*	*5.00*		*112*	*70-130*			
LCS (AE64017-BS1)				Prepared: 05/25/16 Analyzed: 06/02/16						
Benzo (a) pyrene	3.10	0.10	ug/L	3.00		103	70-130			
Di(2-ethylhexyl)adipate	5.76	5.0	ug/L	6.00		96.0	70-130			
Di(2-ethylhexyl)phthalate	5.45	3.0	ug/L	6.00		90.8	70-130			
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*4.89*		*ug/L*	*5.00*		*97.8*	*70-130*			
Surrogate: Triphenyl phosphate	*6.06*		*ug/L*	*5.00*		*121*	*70-130*			
LCS Dup (AE64017-BSD1)				Prepared: 05/25/16 Analyzed: 06/02/16						
Benzo (a) pyrene	3.10	0.10	ug/L	3.00		103	70-130	0.00	20	
Di(2-ethylhexyl)adipate	5.71	5.0	ug/L	6.00		95.2	70-130	0.872	20	
Di(2-ethylhexyl)phthalate	5.59	3.0	ug/L	6.00		93.2	70-130	2.54	20	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*4.89*		*ug/L*	*5.00*		*97.8*	*70-130*			
Surrogate: Triphenyl phosphate	*6.13*		*ug/L*	*5.00*		*123*	*70-130*			
Matrix Spike (AE64017-MS1)	**Source: 16E1425-01**			Prepared: 05/25/16 Analyzed: 06/03/16						
Benzo (a) pyrene	3.47	0.10	ug/L	3.00	ND	116	70-130			
Di(2-ethylhexyl)adipate	6.51	5.0	ug/L	6.00	ND	108	70-130			
Di(2-ethylhexyl)phthalate	6.02	3.0	ug/L	6.00	ND	100	70-130			
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*4.93*		*ug/L*	*5.00*		*98.6*	*70-130*			
Surrogate: Triphenyl phosphate	*6.47*		*ug/L*	*5.00*		*129*	*70-130*			

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Potable Well	Reported:
Windsor, CA 95492-0100	Project Number: 4910017 / Esposti Well	06/03/16 16:35

Notes and Definitions

QM-05	The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.
QM-07	The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery.
T-14	Residual chlorine, dissolved oxygen, and pH must be analyzed in the field to meet the EPA specified 15 minute hold time.
ND	Analyte NOT DETECTED at or above the reporting limit
dry	Sample results reported on a dry weight basis
REC	Recovery
RPD	Relative Percent Difference

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Ceres Analytical Laboratory, Inc.
4919 Windplay Dr., Suite 1
El Dorado Hills, CA 95762

May 23, 2016 Ceres ID: 11002

Alpha Analytical Laboratories, Inc.
208 Mason St.
Ukiah, CA 95482

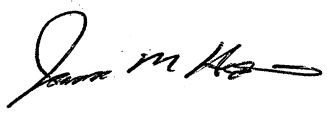
Enclosed please find the results for the one drinking water sample received on May 19, 2016. This sample was analyzed for 2,3,7,8-TCDD by EPA method 1613B. Routine turn-around time was provided for this work.

This work was authorized under Alpha Analytical Laboratories' project # 16E1535.

The report consists of a Cover Letter, Sample Inventory (Section I), Data Summary (Section II), Sample Tracking (Section VI), and Qualifiers/Abbreviations (Section VII). Raw Data (Section III), Continuing Calibration (Section IV), and Initial Calibration (Section V) are available in a full report (.pdf format) upon request.

If you have any questions regarding this report, please feel free to contact me at (916)932-5011.

Sincerely,



James M. Hedin
Director of Operations/CEO
jhedin@ceres-lab.com

Section I: Sample Inventory

Ceres Sample ID:	Sample ID	Date Received	Collection Date	&Time
11002-001	16E1535-01 ESW-5-17-10:00	5/19/2016	5/17/2016	10:00

Section II: Data Summary

CERES Analytical Laboratory, Inc.
4919 Windplay Dr. Suite 1, El Dorado Hills, CA 95762

EPA Method 1613B

Quality Assurance Sample **Method Blank**		**Date Received:** NA
	QC Batch #: 1451	**Date Extracted:** 5/20/2016
	Matrix: Drinking Water	**ZB-5MS Analysis:** 5/21/2016
Project ID: 16E1535	**Sample Size:** 1.000 L	

Analyte	Conc. (pg/L)	Qualifiers	Labeled Standards	% R	LCL-UCL (a)	Qualifiers
2,3,7,8-TCDD	DL= 2.06		13C-2378-TCDD	84.4	31-137	
			CRS			
			37Cl4-2378-TCDD	92.2	35-197	

DL - Signifies Non-Detect (ND) at sample specific detection limit.
EMPC - Estimated Maximum Possible Concentration due to ion abundance ratio failure.
(a) - Lower control limit - Upper control limit

Analyst: JMH **Reviewed by: BS**

CERES Analytical Laboratory, Inc.
4919 Windplay Dr. Suite 1, El Dorado Hills, CA 95762

EPA Method 1613B

Quality Assurance Sample **Ongoing Precision and Recovery**		**Date Received:** NA
	QC Batch #: 1451	**Date Extracted:** 5/20/2016
	Matrix: Drinking Water	**ZB-5MS Analysis:** 5/21/2016
Project ID: 16E1535	**Sample Size:** 1.000 L	

Analyte	Conc. (ng/mL)	Limits (a)	Labeled Standards	% Rec.	Limits (a)
2,3,7,8-TCDD	8.32	7.3-14.6	13C-2378-TCDD	89.2	25-141
			CRS		
			37Cl4-2378-TCDD	89.5	37-158

(a) Limits based on method acceptance criteria.

Analyst: JMH **Reviewed by: BS**

CERES Analytical Laboratory, Inc.
4919 Windplay Dr. Suite 1, El Dorado Hills, CA 95762

Alpha Analytical Laboratory, Inc.
208 Mason St.
Ukiah, CA 95482

EPA Method 1613B

Client Sample ID: 16E1535-01 ESW-5-17-10:00

Project ID: 16E1535	**Ceres Sample ID:** 11002-001	**Date Received:** 5/19/2016
	QC Batch #: 1451	**Date Extracted:** 5/20/2016
Date Collected: 5/17/2016	**Matrix:** Drinking Water	**ZB-5MS Analysis:** 5/21/2016
Time Collected: 10:00 AM	**Sample Size:** 1.004 L	

Analyte	Conc. (pg/L)	Qualifiers	Labeled Standards	% R	LCL-UCL (a)	Qualifiers
2,3,7,8-TCDD	DL= 1.88		13C-2378-TCDD	69.4	31-137	
			CRS			
			37Cl4-2378-TCDD	75.8	42-164	

DL - Signifies Non-Detect (ND) at sample specific detection limit.
EMPC - Estimated Maximum Possible Concentration due to ion abundance ratio failure.
(a) - Lower control limit - Upper control limit

Analyst: JMH **Reviewed by: BS**

Section VI: Sample Tracking

SUBCONTRACT ORDER

Alpha Analytical Laboratories, Inc.

16E1535

SENDING LABORATORY:

Alpha Analytical Laboratories, Inc.
208 Mason St.
Ukiah, CA 95482
Phone: (707)468-0401
Fax: (707)468-5267
Project Manager: Robbie C. Phillips

RECEIVING LABORATORY:

Ceres Labs
4919 Windplay Dr.
El Dorado Hills, CA 95762
Phone :(916) 932-5011
Fax: (916) 932-5017
Terms: Net 30

Analysis	Due	Expires	Comments
16E1535-01 ESW-5-17-10:00 [Water] Sampled 05/17/16 10:00 Pacific			
Dioxin 2378 TCDD DW 1613	06/01/16 12:00	05/17/17 10:00	

Containers Supplied:

1L Amber- Unpres. (AH) 1L Amber- Unpres. (AI)

☐ *Report to State*

System Name: _____ **Employed by:** _____

User ID: _____ **Sampler:** _____

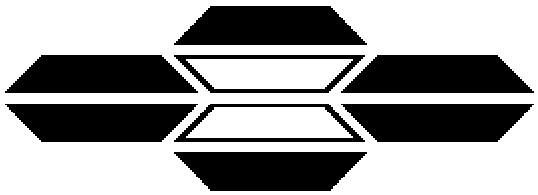
System Number: _____

w/ QC

Released By	Date	Received By	Date
[signature]	5/18/16	Charles M Schlenker	05-19-16
Released By	Date	Received By	Date

Section VII: Qualifiers/Abbreviations

J	Concentration found below the lower quantitation limit but greater than zero.
B	Analyte present in the associated Method Blank.
E	Concentration found exceeds the Calibration range of the HRGC/HRMS.
D	This analyte concentration was calculated from a dilution.
X	The concentration found is the estimated maximum possible concentration due to chlorinated diphenyl ethers present in the sample.
H	Recovery limits exceeded. See cover letter.
*****	Results taken from dilution.
I	Interference. See cover letter.
Conc.	Concentration Found
DL	Calculated Detection Limit
ND	Non-Detect
% Rec.	Percent Recovery



ASBESTOS TEM LABORATORIES, INC.

Modified Drinking Water
Transmission Electron Microscopy
Analytical Report

Laboratory Job # 1288-01013

600 Bancroft Way, Ste. A
Berkeley, CA 94710
(510) 704-8930
FAX (510) 704-8429

ASBESTOS TEM LABORATORIES, INC

Certified by
CA DPH ELAP
Lab No. 1866

Jun 01 2016

Robbie C. Phillips
Alpha Analytical Laboratories, Inc.
208 Mason Street
Ukiah, CA 95482

RE: LABORATORY JOB # 1288-01013
Transmission electron microscopy analytical results for 1 water sample(s).
Job Site:
Job No.: 16E1535

Enclosed please find results for the TEM analysis of one or more water samples. The analytical procedures were performed according to a Modified EPA Method 100.2 which, while similar in analytical technique, does not meet or fulfill the rigorous requirements of the EPA Drinking Water Standard for various reasons (i.e. hold time exceeded 48 hours, unrefrigerated shipping, analytical sensitivity >0.2 MFL due to particulate overloading, etc.).

Prior to analysis, samples are checked for damage, disruption of any chain-of-custody seals, and completeness of accompanying paperwork. If no problems are found, samples are then logged-in, each given a unique laboratory number, and a hard copy containing all pertinent information is generated. This, and all other relevant paper work are kept with each sample throughout the analytical procedures to assure proper analysis.

Preparation of water samples is performed within a HEPA filtered, Class 100 air, laminar flow clean bench environment. Prior to filtration, water sample containers are ultrasonicated, and if necessary, treated with UV light while and ozone gas for three hours to kill and oxidize all organisms and organic materials contained in the water. An aliquot of the water sample is pipetted into a special filtration apparatus where contained particulate is collected onto a mixed cellulose ester (MCE) or polycarbonate (PC) filter. The filters are removed from the apparatus and dried. A portion of each sample filter is sectioned, placed onto a glass microscope slide, and carbon coated. The filters are further sectioned and placed carbon side up onto 200-mesh copper TEM sample grids in a solvent bath until all filter material is dissolved. The TEM grids are removed and placed into labeled grid storage boxes.

TEM analysis is performed on a Philips EM-300 or CM-12 transmission electron microscope operating at 80 or 100 kV. Initially, the grid is scanned at low and medium magnifications to insure proper sample loading, and coherence of the carbon support film. Then TEM grid openings are analyzed at a magnification of ~10,000X. All fibers >10 um in length and exhibiting an aspect ratio >3:1 are analyzed. Scanning continues until either 100 asbestiform fibers >10um in length are counted, 20 grid openings are analyzed, or an analytical sensitivity of 0.2 million fibers per liter (MFL) is achieved. Analyzed fibers are subjected to detailed morphological and selected area diffraction (SAED) analysis. Fibers indicated as asbestos, or potentially asbestos, are further analyzed by energy dispersive X-ray (EDX) analysis as needed. The number of asbestos fibers detected, and other analytical parameters, are then used to calculate the concentration of asbestos in MFL. The results are entered into a standard report format and reviewed by the analyst and the laboratory manager before release to the client.

Sincerely Yours,

Laboratory Manager

--- These results relate only to the samples tested and must not bereproduced, except in full, with the approval of the laboratory. This report must not be used to claim product endorsement by NVLAP or any other agency of the U.S. Government. ---

TRANSMISSION ELECTRON MICROSCOPY
ANALYTICAL REPORT

Contact:	Robbie C. Phillips		
Address:	Alpha Analytical Laboratories, Inc. 208 Mason Street Ukiah, CA 95482	Report No.:	**341142**
		Date:	Jun-01-16
		Total Samples Analyzed:	1
Job Site / No.	16E1535	Sample Collector:	

CLIENT SAMPLE # **16E1535-01**

Laboratory Sample # 1288-01013-001

SAMPLE LOCATION/DESCRIPTION

ESQ-5-17

WATER SAMPLE DATA

Date/Time Collected	May-17-16 / 10:00 am	Volume Submitted (ml)	1 liter
Date/Time Lab Received	May-19-16 / 11:22 am	Volume Filtered (ml)	15
Date/Time Filtered	May-19-16 / 10:09 am	Filter & Pore Size	MCE0.22
Date/Time Analyzed	Jun-01-16 / 11:00 am	UV/Ozone Treated:	YES

IDENTIFIED STRUCTURES (>10um)			
ASBESTOS		OTHER	
CHRYS	AMPH	AMBIG	NON-ASB
NSD	NSD	NSD	NSD

CALCULATED ASBESTOS STRUCTURE CONCENTRATION (>10um)		
CHRYS	AMPH	TOTAL
< 0.2 MFL	< 0.2 MFL	< 0.2 MFL

COMMENTS

No Asbestos Detected

Filter Loading: MODERATE

SAED Photo ID Nos.

TEM / ANALYTICAL PARAMETERS

Grid Openings Scanned at 10,000X	8	Analytical Sensitivity	0.2 MFL
Grid Opening Area (mm2)	0.0090	95% UCL	0.69 MFL
Scan Area (mm2)	0.0720	95% LCL	0 MFL

WATER SAMPLE LAB BLANK RESULTS

Lab ID#	TLB-17470	Analytical Sensitivity	0.01 MFL
Grid Openings Scanned at 10,000X	8	Asbestos Structure Concentration	<0.01 MFL
Volume Filtered (ml)	300		

NOTATION KEY

Chrys. - Chrysotile Asbestos
Amph. - Amphibole Asbestos
NSD - No Structures Detected
1 mm = 1 millimeter
1 um = 1 micron = 0.001 mm
MFL = Millions of Fibers per Liter
UCL = Upper Confidence Level
LCL = Lower Confidence Level

Analyzed by Yang Zhang

Reviewed by Crystal Replogle

SUBCONTRACT ORDER

Alpha Analytical Laboratories, Inc.

16E1535

34142

SENDING LABORATORY:

Alpha Analytical Laboratories, Inc.
208 Mason St.
Ukiah, CA 95482
Phone: (707)468-0401
Fax: (707)468-5267
Project Manager: Robbie C. Phillips

RECEIVING LABORATORY:

Asbestos TEM Laboratories, Inc.
630 Bancroft Way
Berkeley, CA 94710
Phone :(510) 704-8930
Fax: (510) 704-8429
Terms: Net 30

Analysis	Due	Expires	Comments
16E1535-01 ESW-5-17-10:00 [Water] Sampled 05/17/16 10:00 Pacific			
Asbestos-DW SUB	06/01/16 12:00	05/19/16 10:00	
Containers Supplied:			
1L Amber- Unpres. (N)	1L Amber- Unpres. (O)		

☐ *Report to State*

System Name: _____ **Employed by:** _____

User ID: _____ **Sampler:** _____

System Number: _____

w/QC

Released By	Date	Received By	Date
	5/18/16	Ava ATEM	10a.m 5/19
Released By	Date	Received By	Date

June 3, 2016

Alpha Analytical Laboratories, Inc.
208 Mason St.
Ukiah, CA 95482

Lab ID : SP 1605717
Customer : 2-20626

Laboratory Report

Introduction: This report package contains total of 9 pages divided into 3 sections:

Case Narrative	(2 pages)	: An overview of the work performed at FGL.
Sample Results	(2 pages)	: Results for each sample submitted.
Quality Control	(5 pages)	: Supporting Quality Control (QC) results.

Case Narrative

This Case Narrative pertains to the following samples:

Sample Description	Date Sampled	Date Received	FGL Lab ID #	Matrix
ESW-5-17-10:00	05/17/2016	05/19/2016	SP 1605717-001	W

Sampling and Receipt Information: All samples were received in acceptable condition and within temperature requirements, unless noted on the Condition Upon Receipt (CUR) form. All samples arrived at 5 °C. All samples were prepared and analyzed within the method specified hold time. All samples were checked for pH if acid or base preservation is required (except for VOAs). For details of sample receipt information, please see the attached Chain of Custody and Condition Upon Receipt Form.

Quality Control: All samples were prepared and analyzed according to the following tables:

Organic QC

505	05/20/2016:206932 All analysis quality controls are within established criteria, except: The following note applies to Hexachlorocyclopentadiene: 360 CCV above Acceptance Range (AR). Samples which were non detect for this analyte were accepted.
	05/20/2016:207219 All analysis quality controls are within established criteria, except: The following note applies to Tetrachloro-m-xylene: 362 Surrogates are qualified on Control Chart Limits, these are CCV limits. See individual sample reports.
	05/19/2016:205764 All preparation quality controls are within established criteria.
531.1	06/03/2016:207802 All analysis quality controls are within established criteria.
	06/02/2016:206486 All preparation quality controls are within established criteria, except: The following note applies to Aldicarb Sulfone/Sulfoxide, Oxamyl: 435 Sample matrix may be affecting this analyte. Data was accepted based on the LCS or CCV recovery.

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
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June 3, 2016 Lab ID : SP 1605717
Alpha Analytical Laboratories, Inc. Customer : 2-20626

Organic QC

548.1	05/27/2016:207526 All analysis quality controls are within established criteria.
	05/19/2016:205874 All preparation quality controls are within established criteria.

Radio QC

900.0	05/30/2016:207789 All analysis quality controls are within established criteria.
	05/26/2016:206157 All preparation quality controls are within established criteria.
Ra - 05	05/29/2016:207557 All analysis quality controls are within established criteria.
	05/26/2016:206021 All preparation quality controls are within established criteria.

Certification:: I certify that this data package is in compliance with ELAP standards, both technically and for completeness, except for any conditions listed above. Release of the data contained in this data package is authorized by the Laboratory Director or his designee, as verified by the following electronic signature.

KD:DMB

Approved By **Kelly A. Dunnahoo, B.S.** Digitally signed by Kelly A. Dunnahoo, B.S.
Title: Laboratory Director
Date: 2016-06-06

June 3, 2016

Alpha Analytical Laboratories, Inc.
208 Mason St.
Ukiah, CA 95482

Lab ID : SP 1605717-001
Customer ID : 2-20626

Sampled On : May 17, 2016-10:00
Sampled By : Not Available
Received On : May 19, 2016-11:15
Matrix : Water

Description : ESW-5-17-10:00
Project : 16E1535

Sample Result - Organic

Constituent	Result	PQL	Units	Note	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
EPA 505[AGT:1]								
Tetrachloro-m-xylene‡	126	70-130	%		505	05/19/16:205764	505	05/20/16:207219
Alachlor	ND	0.2	ug/L		505	05/19/16:205764	505	05/20/16:206932
Aldrin	ND	0.075	ug/L		505	05/19/16:205764	505	05/20/16:206932
Chlordane	ND	0.1	ug/L		505	05/19/16:205764	505	05/20/16:206932
Dieldrin	ND	0.01	ug/L		505	05/19/16:205764	505	05/20/16:206932
Endrin	ND	0.01	ug/L		505	05/19/16:205764	505	05/20/16:206932
Heptachlor	ND	0.01	ug/L		505	05/19/16:205764	505	05/20/16:206932
Heptachlor Epoxide	ND	0.01	ug/L		505	05/19/16:205764	505	05/20/16:206932
Hexachlorobenzene	ND	0.01	ug/L		505	05/19/16:205764	505	05/20/16:206932
Hexachlorocyclopentadiene	ND	0.1	ug/L		505	05/19/16:205764	505	05/20/16:206932
Lindane (Gamma BHC)	ND	0.05	ug/L		505	05/19/16:205764	505	05/20/16:206932
Methoxychlor	ND	0.1	ug/L		505	05/19/16:205764	505	05/20/16:206932
Toxaphene	ND	0.5	ug/L		505	05/19/16:205764	505	05/20/16:206932
PCB 1016	ND	0.5	ug/L		505	05/19/16:205764	505	05/20/16:206932
PCB 1221	ND	0.5	ug/L		505	05/19/16:205764	505	05/20/16:206932
PCB 1232	ND	0.5	ug/L		505	05/19/16:205764	505	05/20/16:206932
PCB 1242	ND	0.5	ug/L		505	05/19/16:205764	505	05/20/16:206932
PCB 1248	ND	0.5	ug/L		505	05/19/16:205764	505	05/20/16:206932
PCB 1254	ND	0.5	ug/L		505	05/19/16:205764	505	05/20/16:206932
PCB 1260	ND	0.5	ug/L		505	05/19/16:205764	505	05/20/16:206932
EPA 531.1[AGT:1'8]								
Aldicarb	ND	3	ug/L		531.1	06/02/16:206486	531.1	06/03/16:207802
Aldicarb Sulfone	ND	2	ug/L		531.1	06/02/16:206486	531.1	06/03/16:207802
Aldicarb Sulfoxide	ND	3	ug/L		531.1	06/02/16:206486	531.1	06/03/16:207802
Carbaryl	ND	5	ug/L		531.1	06/02/16:206486	531.1	06/03/16:207802
Carbofuran	ND	5	ug/L		531.1	06/02/16:206486	531.1	06/03/16:207802
3-Hydroxycarbofuran	ND	3	ug/L		531.1	06/02/16:206486	531.1	06/03/16:207802
Methomyl	ND	2	ug/L		531.1	06/02/16:206486	531.1	06/03/16:207802
Oxamyl	ND	5	ug/L		531.1	06/02/16:206486	531.1	06/03/16:207802
EPA 548.1[AGT:1]								
Endothall	ND	40	ug/L		548.1	05/19/16:205874	548.1	05/27/16:207526

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (AGT) Amber Glass TFE-Cap, (P) Plastic Preservatives: Monochloracetic Buffer, HNO3 pH < 2 ‡Surrogate. * PQL adjusted for dilution.

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853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
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2500 Stagecoach Road
Stockton, CA 95215
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San Luis Obispo, CA 93401
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Office & Laboratory
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Visalia, CA 93291
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June 3, 2016

Alpha Analytical Laboratories, Inc.
208 Mason St.
Ukiah, CA 95482

Lab ID : SP 1605717-001
Customer ID : 2-20626

Sampled On : May 17, 2016-10:00
Sampled By : Not Available
Received On : May 19, 2016-11:15
Matrix : Water

Description : ESW-5-17-10:00
Project : 16E1535

Sample Result - Radio

Constituent	Result ± Error	MDA	Units	MCL/AL	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
Radio Chemistry[P:1'5]								
Gross Alpha	0.818 ± 1.44	1.91	pCi/L	15/5	900.0	05/26/16-08:00 2P1606157	900.0	05/30/16-07:00 2A1607789
Ra 228	0.049 ± 0.560	0.200	pCi/L	2	Ra - 05	05/26/16-19:30 2P1606021	Ra - 05	05/29/16-11:40 2A1607557

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (AGT) Amber Glass TFE-Cap, (P) Plastic Preservatives: Monochloracetic Buffer, HNO3 pH < 2 * PQL adjusted for dilution.

MDA = Minimum Detectable Activity (Calculated at the 95% confidence level) = Data utilized by DHS to determine matrix interference.
MCL / AL = Maximum Contamination Level / Action Level. Alpha's Action Level of 5 pCi/L is based on the Assigned Value (AV).
AV = Assigned Value(Gross Alpha Result + (0.84 x Error)). CCR Section 64442: Drinking Water Compliance Note: Do the following
If Gross Alpha's (AV) exceeds 5 pCi/L run Uranium. If Gross Alpha's (AV) minus Uranium exceeds 5 pCi/L run Radium 226.

Drinking Water Compliance:
Gross Alpha (AV) minus Uranium is less than or equal to 15 pCi/L
Uranium is less than or equal to 20 pCi/L
Radium 226 + Radium 228 is less than or equal to 5 pCi/L

Note: Samples are held for 3-6 months prior to disposal.

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June 3, 2016 Lab ID : SP 1605717
Alpha Analytical Laboratories, Inc. Customer : 2-20626

Quality Control - Organic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Organic								
Alachlor	505	05/19/16:205764JOM	Blank	ug/L		ND	<0.2	
			LCS	ug/L	5.802	88.5 %	84-135	
			MS	ug/L	5.596	83.1 %	73-137	
		(SP 1605533-001)	MSD	ug/L	5.729	92.4 %	73-137	
			MSRPD	ug/L	5.729	12.9%	≤30	
	505	05/20/16:206932VRG	CCV	ug/L	100.0	111 %	70-130	
			CCV	ug/L	100.0	89.5 %	70-130	
Aldrin	505	05/19/16:205764JOM	Blank	ug/L		ND	<0.075	
			LCS	ug/L	0.5802	87.5 %	69-134	
			MS	ug/L	0.5596	84.9 %	21-166	
		(SP 1605533-001)	MSD	ug/L	0.5729	90.3 %	21-166	
			MSRPD	ug/L	5.729	8.5%	≤30	
	505	05/20/16:206932VRG	CCV	ug/L	10.00	118 %	70-130	
			CCV	ug/L	10.00	96.5 %	70-130	
Chlordane	505	05/19/16:205764JOM	Blank	ug/L		ND	<0.1	
Dieldrin	505	05/19/16:205764JOM	Blank	ug/L		ND	<0.01	
			LCS	ug/L	0.5802	83.9 %	82-131	
			MS	ug/L	0.5596	82.0 %	66-141	
		(SP 1605533-001)	MSD	ug/L	0.5729	84.4 %	66-141	
			MSRPD	ug/L	5.729	5.2%	≤30	
	505	05/20/16:206932VRG	CCV	ug/L	10.00	113 %	70-130	
			CCV	ug/L	10.00	86.8 %	70-130	
Endrin	505	05/19/16:205764JOM	Blank	ug/L		ND	<0.01	
			LCS	ug/L	0.5802	85.1 %	83-120	
			MS	ug/L	0.5596	84.6 %	58-134	
		(SP 1605533-001)	MSD	ug/L	0.5729	87.4 %	58-134	
			MSRPD	ug/L	5.729	5.6%	≤30	
	505	05/20/16:206932VRG	CCV	ug/L	10.00	117 %	70-130	
			CCV	ug/L	10.00	90.4 %	70-130	
Heptachlor	505	05/19/16:205764JOM	Blank	ug/L		ND	<0.01	
			LCS	ug/L	0.5802	88.2 %	71-131	
			MS	ug/L	0.5596	89.5 %	73-135	
		(SP 1605533-001)	MSD	ug/L	0.5729	93.4 %	73-135	
			MSRPD	ug/L	5.729	6.6%	≤30	
	505	05/20/16:206932VRG	CCV	ug/L	10.00	123 %	70-130	
			CCV	ug/L	10.00	99.5 %	70-130	
Heptachlor Epoxide	505	05/19/16:205764JOM	Blank	ug/L		ND	<0.01	
			LCS	ug/L	0.5802	89.0 %	75-129	
			MS	ug/L	0.5596	85.8 %	65-134	
		(SP 1605533-001)	MSD	ug/L	0.5729	88.0 %	65-134	
			MSRPD	ug/L	5.729	4.9%	≤30	
	505	05/20/16:206932VRG	CCV	ug/L	10.00	118 %	70-130	
			CCV	ug/L	10.00	90.4 %	70-130	
Hexachlorobenzene	505	05/19/16:205764JOM	Blank	ug/L		ND	<0.01	
			LCS	ug/L	0.5802	88.6 %	69-134	
			MS	ug/L	0.5596	85.8 %	71-136	
		(SP 1605533-001)	MSD	ug/L	0.5729	85.9 %	71-136	
			MSRPD	ug/L	5.729	2.5%	≤30	
	505	05/20/16:206932VRG	CCV	ug/L	10.00	116 %	70-130	
			CCV	ug/L	10.00	90.2 %	70-130	
Hexachlorocyclopentadiene	505	05/19/16:205764JOM	Blank	ug/L		ND	<0.1	
			LCS	ug/L	0.5802	94.3 %	48-144	
			MS	ug/L	0.5596	87.1 %	60-152	
		(SP 1605533-001)	MSD	ug/L	0.5729	91.2 %	60-152	
			MSRPD	ug/L	5.729	6.9%	≤30	

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June 3, 2016 Lab ID : SP 1605717
Alpha Analytical Laboratories, Inc. Customer : 2-20626

Quality Control - Organic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Organic								
Hexachlorocyclopentadiene	505	05/20/16:206932VRG	CCV	ug/L	10.00	133 %	70-130	360
			CCV	ug/L	10.00	104 %	70-130	
Lindane	505	05/19/16:205764JOM	Blank	ug/L		ND	<0.05	
			LCS	ug/L	0.5802	92.3 %	76-131	
			MS	ug/L	0.5596	90.2 %	72-132	
		(SP 1605533-001)	MSD	ug/L	0.5729	89.2 %	72-132	
			MSRPD	ug/L	5.729	1.2%	≤30	
	505	05/20/16:206932VRG	CCV	ug/L	10.00	124 %	70-130	
			CCV	ug/L	10.00	92.2 %	70-130	
Methoxychlor	505	05/19/16:205764JOM	Blank	ug/L		ND	<0.1	
			LCS	ug/L	2.901	90.0 %	73-137	
			MS	ug/L	2.798	89.1 %	59-145	
		(SP 1605533-001)	MSD	ug/L	2.865	95.7 %	59-145	
			MSRPD	ug/L	5.729	9.5%	≤30	
	505	05/20/16:206932VRG	CCV	ug/L	50.00	125 %	70-130	
			CCV	ug/L	50.00	99.9 %	70-130	
PCB 1016/1242 - 1	505	05/19/16:205764JOM	Blank	ug/L		ND	<0.5	
PCB 1221 - 1	505	05/19/16:205764JOM	Blank	ug/L		ND	<0.5	
PCB 1232 - 1	505	05/19/16:205764JOM	Blank	ug/L		ND	<0.5	
PCB 1242	505	05/19/16:205764JOM	Blank	ug/L		ND	<0.5	
PCB 1248 - 1	505	05/19/16:205764JOM	Blank	ug/L		ND	<0.5	
PCB 1254 - 1	505	05/19/16:205764JOM	Blank	ug/L		ND	<0.5	
PCB 1260 - 1	505	05/19/16:205764JOM	Blank	ug/L		ND	<0.5	
Tetrachloro-m-xylene	505	05/19/16:205764JOM	Blank	ug/L	1.144	119 %	70-130	
			LCS	ug/L	1.162	118 %	70-130	
			MS	ug/L	1.120	106 %	N/A	
		(SP 1605533-001)	MSD	ug/L	1.147	117 %	N/A	
			MSRPD	ug/L	5.729	12.5%	≤30.0	
	505	05/20/16:207219VRG	CCV	ug/L	20.02	146 %	70-130	362
			CCV	ug/L	20.02	111 %	70-130	
Toxaphene	505	05/19/16:205764JOM	Blank	ug/L		ND	<0.5	
3-Hydroxycarbofuran	531.1	06/02/16:206486SG	Blank	ug/L		ND	<3	
			LCS	ug/L	20.00	99.4 %	80-120	
			MS	ug/L	20.00	76.0 %	65-135	
		(VI 1641694-001)	MSD	ug/L	20.00	81.2 %	65-135	
			MSRPD	ug/L	20.00	6.6%	≤16.8	
	531.1	06/03/16:207802SG	CCV	ug/L	10.00	113 %	80-120	
			CCV	ug/L	20.00	89.6 %	80-120	
Aldicarb	531.1	06/02/16:206486SG	Blank	ug/L		ND	<3	
			LCS	ug/L	20.00	94.2 %	80-120	
			MS	ug/L	20.00	92.8 %	65-135	
		(VI 1641694-001)	MSD	ug/L	20.00	97.9 %	65-135	
			MSRPD	ug/L	20.00	5.4%	≤11.2	
	531.1	06/03/16:207802SG	CCV	ug/L	10.00	120 %	80-120	
			CCV	ug/L	20.00	98.8 %	80-120	
Aldicarb Sulfone	531.1	06/03/16:207802SG	CCV	ug/L	10.00	92.2 %	80-120	
			CCV	ug/L	20.00	94.6 %	80-120	
Aldicarb Sulfone/Sulfoxide	531.1	06/02/16:206486SG	Blank	ug/L		ND	<2	
			Blank	ug/L		ND	<3	
			LCS	ug/L	20.00	104 %	80-120	
			LCS	ug/L	20.00	100 %	80-120	
			MS	ug/L	20.00	94.6 %	65-135	
			MS	ug/L	20.00	80.8 %	65-135	
		(VI 1641694-001)	MSD	ug/L	20.00	107 %	65-135	

June 3, 2016 Lab ID : SP 1605717
Alpha Analytical Laboratories, Inc. Customer : 2-20626

Quality Control - Organic

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Organic								
Aldicarb Sulfone/Sulfoxide	531.1	(VI 1641694-001)	MSD	ug/L	20.00	110 %	65-135	
			MSRPD	ug/L	20.00	27.8%	≤7.28	435
			MSRPD	ug/L	20.00	14.6%	≤13.8	435
Aldicarb Sulfoxide	531.1	06/03/16:207802SG	CCV	ug/L	10.00	104 %	80-120	
			CCV	ug/L	20.00	100 %	80-120	
Carbaryl	531.1	06/03/16:207802SG	CCV	ug/L	10.00	109 %	80-120	
			CCV	ug/L	20.00	106 %	80-120	
Carbaryl/Naphthol	531.1	06/02/16:206486SG	Blank	ug/L		ND	<5	
			LCS	ug/L	20.00	99.6 %	80-120	
			MS	ug/L	20.00	99.4 %	65-135	
		(VI 1641694-001)	MSD	ug/L	20.00	106 %	65-135	
			MSRPD	ug/L	20.00	1.4	≤5	
Carbofuran	531.1	06/02/16:206486SG	Blank	ug/L		ND	<5	
			LCS	ug/L	20.00	99.0 %	80-120	
			MS	ug/L	20.00	90.0 %	65-135	
		(VI 1641694-001)	MSD	ug/L	20.00	101 %	65-135	
			MSRPD	ug/L	20.00	2.2	≤5	
	531.1	06/03/16:207802SG	CCV	ug/L	10.00	83.0 %	80-120	
			CCV	ug/L	20.00	109 %	80-120	
Methomyl	531.1	06/02/16:206486SG	Blank	ug/L		ND	<2	
			LCS	ug/L	20.00	104 %	80-120	
			MS	ug/L	20.00	100 %	65-135	
		(VI 1641694-001)	MSD	ug/L	20.00	101 %	65-135	
			MSRPD	ug/L	20.00	0.5%	≤53.1	
	531.1	06/03/16:207802SG	CCV	ug/L	10.00	98.5 %	80-120	
			CCV	ug/L	20.00	107 %	80-120	
Oxamyl	531.1	06/02/16:206486SG	Blank	ug/L		ND	<5	
			LCS	ug/L	20.00	90.6 %	80-120	
			MS	ug/L	20.00	122 %	65-135	
		(VI 1641694-001)	MSD	ug/L	20.00	86.8 %	65-135	
			MSRPD	ug/L	20.00	7.0	≤5	435
	531.1	06/03/16:207802SG	CCV	ug/L	10.00	83.9 %	80-120	
			CCV	ug/L	20.00	86.6 %	80-120	
Endothall	548.1	05/19/16:205874SG	Blank	ug/L		ND	<40	
			LCS	ug/L	83.33	58.8 %	30-96	
			MS	ug/L	83.33	65.6 %	15-87	
		(STK1635948-001)	MSD	ug/L	83.33	51.6 %	15-87	
			MSRPD	ug/L	83.33	12	≤40	
	548.1	05/27/16:207526SG	CCV	ug/L	2500	116 %	70-130	
			CCV	ug/L	1000	115 %	70-130	

Definition

CCV	: Continuing Calibration Verification - Analyzed to verify the instrument calibration is within criteria.
Blank	: Method Blank - Prepared to verify that the preparation process is not contributing contamination to the samples.
LCS	: Laboratory Control Standard/Sample - Prepared to verify that the preparation process is not affecting analyte recovery.
MS	: Matrix Spikes - A random sample is spiked with a known amount of analyte. The recoveries are an indication of how that sample matrix affects analyte recovery.
MSD	: Matrix Spike Duplicate of MS/MSD pair - A random sample duplicate is spiked with a known amount of analyted. The recoveries are an indication of how that sample matrix affects analyte recovery.
MSRPD	: MS/MSD Relative Percent Difference (RPD) - The MS relative percent difference is an indication of precision for the preparation and analysis.
ND	: Non-detect - Result was below the DQO listed for the analyte.
DQO	: Data Quality Objective - This is the criteria against which the quality control data is compared.

Explanation

360	: CCV above Acceptance Range (AR). Samples which were non detect for this analyte were accepted.

June 3, 2016 Lab ID : SP 1605717

Alpha Analytical Laboratories, Inc. Customer : 2-20626

Quality Control - Organic

Explanation	
362	: Surrogates are qualified on Control Chart Limits, these are CCV limits. See individual sample reports.
435	: Sample matrix may be affecting this analyte. Data was accepted based on the LCS or CCV recovery.

June 3, 2016 Lab ID : SP 1605717

Alpha Analytical Laboratories, Inc. Customer : 2-20626

Quality Control - Radio

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Radio								
Alpha	900.0	05/30/16:207789caa	CCV	cpm	8661	42.1 %	38 - 47	
			CCB	cpm		0.100	0.18	
Gross Alpha	900.0	05/26/16:206157ELC	Blank	pCi/L		1.12	3	
			LCS	pCi/L	107.4	107 %	75-125	
			MS	pCi/L	107.4	91.2 %	60-140	
		(SP 1605903-001)	MSD	pCi/L	107.4	98.8 %	60-140	
			MSRPD	pCi/L	107.4	7.9%	≤30	
Beta	Ra - 05	05/29/16:207557caa	CCV	cpm	9051	97.8 %	88 - 107	
			CCB	cpm		0.3800	0.49	
Ra 228	Ra - 05	05/26/16:206021emv	RgBlk	pCi/L		-0.05	3	
			LRS	pCi/L	81.13	50.9 %	27-59	
			BS	pCi/L	81.13	108 %	75-125	
			BSD	pCi/L	81.13	111 %	75-125	
			BSRPD	pCi/L	81.13	3.1%	≤25	

Definition

CCV	: Continuing Calibration Verification - Analyzed to verify the instrument calibration is within criteria.
CCB	: Continuing Calibration Blank - Analyzed to verify the instrument baseline is within criteria.
Blank	: Method Blank - Prepared to verify that the preparation process is not contributing contamination to the samples.
RgBlk	: Method Reagent Blank - Prepared to correct for any reagent contributions to sample result.
LCS	: Laboratory Control Standard/Sample - Prepared to verify that the preparation process is not affecting analyte recovery.
LRS	: Laboratory Recovery Standard - Prepared to establish the batch recovery factor used in result calculations.
MS	: Matrix Spikes - A random sample is spiked with a known amount of analyte. The recoveries are an indication of how that sample matrix affects analyte recovery.
MSD	: Matrix Spike Duplicate of MS/MSD pair - A random sample duplicate is spiked with a known amount of analyted. The recoveries are an indication of how that sample matrix affects analyte recovery.
BS	: Blank Spikes - A blank is spiked with a known amount of analyte. It is prepared to verify that the preparation process is not affecting analyte recovery.
BSD	: Blank Spike Duplicate of BS/BSD pair - A blank duplicate is spiked with a known amount of analyte. It is prepared to verify that the preparation process is not affecting analyte recovery.
MSRPD	: MS/MSD Relative Percent Difference (RPD) - The MS relative percent difference is an indication of precision for the preparation and analysis.
BSRPD	: BS/BSD Relative Percent Difference (RPD) - The BS relative percent difference is an indication of precision for the preparation and analysis.
DQO	: Data Quality Objective - This is the criteria against which the quality control data is compared.

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Corporate Laboratory
208 Mason Street, Ukiah, CA 95482
707-468-0401 F) 707-468-5267
clientservices@alpha-labs.com

Bay Area Laboratory
6398 Dougherty Road, #35, Dublin, CA 94568
925-828-6226 F) 925-828-6309

Central Valley Laboratory
9090 Union Park Wy., #113, Elk Grove, CA 95624
916-686-5190 F) 916-686-5192

Work Order
Chain of Custody Record

Lab No. 16E1535 Page 1 of 3 (2nd)

Name: Town of Windsor - Drinking Water	**Project ID:** Source Chemical
Mailing Address: 9291 Old Redwood Highway Building 400, Windsor, CA 95492	**Phase:** Esposti Well
Project Contact (Hardcopy or PDF to): Elizabeth Cargay, ecargay@townofwindsor.com	PO# 200336
Kent O'Brien, kent.obrien@ghd.com	**Bill to:** month end billing

Signature below authorizes work under terms stated on reverse side.

Analysis Request

TAT: 24 hr ○ 48 hr ○ Lab Approval Required ○ 1 wk ○ 2 wk (standard) ⊘ — Lab Approval Required For Rush

2.f

Field Sampler - Print Name & Signature / Sample Identification	Sample Collection Date	Sample Collection Time	Container: 40ml VOA	Poly	Amber	Glass		Preservative: HCL	HNO3	NH4Cl	Other	None	Matrix: Water	Soil		200.8 As	200.7 Fe	200.7 Mn	200.8 Cr	218.6 Cr6	200.7 Ca, Mg, K, Na	Alkalinity	Chloride	Nitrate as N, Nitrite as N	Sulfate	Total Nitrogen (includes TKN, NO2, NO3)	Silica	200.8 Vanadium - total	Phosphate				Title 22 Scan (**Below List)	
ESW-5-17-10:00	5/17	10:00	x	x	x			x	x		x	x	x																			x	See Attached Page verify all analytes tested

**Title 22 Scan

64432 Primary Inorganics, 64432.1 NO2/NO3, 64449 A&B
Asbestos, Perchlorate, Gross Alpha, 504.1, 507, 508, 515.1,
524.2, 531.1, 548.1, 549.2

Relinquished by:	Received by:	Date: 5/17/16	Time: 1315
Relinquished by:	Received by:	Date: "	Time: 1515
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time

CDPH Write On EDT Report? Yes (x) No ○

State System Number:

CA Geotracker EDF Report Yes ○ No ○

Sampling Company Log Code:

Global ID: EDF to (Email Address):

Travel and Site Time:	Mileage:	Misc. Supplies:

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Corporate Laboratory
208 Mason Street, Ukiah, CA 95482
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clientservices@alpha-labs.com

Bay Area Laboratory
6398 Dougherty Road, #35, Dublin, CA 94568
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916-686-5190 F) 916-686-5192

Work Order
Chain of Custody Record

Lab No. 16E1535 Page 2 of 3 (2 of 3 HW)

Name: Town of Windsor - Drinking Water	**Project ID:** Source Chemical
Mailing Address: 9291 Old Redwood Highway Building 400, Windsor, CA 95492	**Phase:** Esposti Well
Project Contact (Hardcopy or PDF to): Elizabeth Cargay, ecargay@townofwindsor.com	PO# 200336
Kent O'Brien, kent.obrien@ghd.com	**Bill to:** month end billing

Signature below authorizes work under terms stated on reverse side.

Analysis Request

TAT: 24 hr ○ 48 hr ○ (Lab Approval Required) 1 wk ○ 2 wk (standard) ⊗ — Lab Approval Required For Rush

2.4

Field Sampler - Print Name & Signature / Sample Identification	Sample Collection Date	Time	Container: 40ml VOA	Poly	Amber	Glass		Preservative: HCL	HNO3	H2SO4	Other	None	Matrix: Water	Soil		As III & IV — RS	Ammonia	Sulfide	Cr6 DW	Cyanide DW	Radium 228	525.2 DDW Reg 3	547 Glyphosate	1613 Dioxin DW
~~Esposti~~ ESW-5-17-10:00	5/17	10:00		x	x			x	x	x	x	x	x			x	x	x	x	x	x	x	x	x

Cancel As III & As IV Speciation due to incorrect Sample Container — SF

Relinquished by:	Received by:	Date 5/17/16	Time 1305	CDPH Write On EDT Report? Yes (X) No ○
Relinquished by:	Received by:	Date "	Time 1515	State System Number:
Relinquished by:	Received by:	Date	Time	CA Geotracker EDF Report Yes ○ No ○
Relinquished by:	Received by:	Date	Time	Sampling Company Log Code:
Relinquished by:	Received by:	Date	Time	Global ID: EDF to (Email Address):
				Travel and Site Time: / Mileage: / Misc. Supplies:

1GE1535

Provide analysis for each of the compounds listed below:

Well Water Analysis*

**	pH	6.67		Anions			Metals & Radionuclides		
**	Temperature	66	°F	Alkalinity	230	mg/L $CaCO_3$	Antimony	<6.0	µg/L Sb
**	ORP (EMF)	4	mV	Bicarbonate	280	mg/L $CaCO_3$	Total Arsenic	56.0	µg/L As
**	Conductivity	458	µS/cm	Carbonate	<1.0	mg/L $CaCO_3$	Reduced As(III)		µg/L As(III)
**	Dissolved Solids	300	mg/L TDS	Chloride	17	mg/L Cl	Copper	<50	µg/L Cu
**	Suspended Solids	–	mg/L TSS	Fluoride	0.37	mg/L F	Iron	<100	µg/L Fe
**	Turbidity	354.0	NTU	Nitrate	<2.0	mg/L NO_3	Lead	<5.0	µg/L Pb
	Cations			Phosphate		mg/L PO_4	Manganese	750	µg/L Mn
	Hardness	120	mg/L $CaCO_3$	***Silica	87.0	mg/L SiO_2	Mercury	<1.0	µg/L Hg
***	Ammonia	0.30	mg/L NH_3	Sulfate	12	mg/L SO_4	Selenium	<5.0	µg/L Se
	Calcium	22	mg/L Ca	Sulfide		mg/L S	Uranium		µg/L U
	Magnesium	15	mg/L Mg	_____		mg/L ____	Vanadium		µg/L V
	Sodium	54	mg/L Na	_____		mg/L ____	_____		µg/L ___

Red Waters Analysis are critical for basin design estimates

3 of 3

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e-mail: clientservices@alpha-labs.com
Corporate: 208 Mason St., Ukiah, CA 95482 • Phone: (707) 468-0401 • Fax: (707) 468-5267
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ELAP Certificates 1551, 2728, and 2922

22 September 2016

Town Of Windsor - Drinking Water
Attn: Elizabeth Cargay
8400 Windsor Rd.
Windsor, CA 95492-0100
RE: Esposti Feasibility Study
Work Order: 16I0423

Enclosed are the results of analyses for samples received by the laboratory on 09/06/16 16:00. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jeanette Poplin

Jeanette L. Poplin For Robbie C. Phillips
Project Manager

Alpha Analytical Laboratories Inc.
e-mail: clientservices@alpha-labs.com
Corporate: 208 Mason St., Ukiah, CA 95482 • Phone: (707) 468-0401 • Fax: (707) 468-5267
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Central Valley: 9090 Union Park Way, Suite 113, Elk Grove, CA 95624 • Phone: (916) 686-5190 • Fax: (916) 686-5192

Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: #25-1310	09/22/16 13:21

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Esposti Irrigation Well	16I0423-01	Water	09/06/16 10:45	09/06/16 16:00

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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Corporate: 208 Mason St., Ukiah, CA 95482 • Phone: (707) 468-0401 • Fax: (707) 468-5267
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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: #25-1310	09/22/16 13:21

	Result	Reporting Limit	Dilution	Batch	Prepared	Analyzed	Method	Note
Esposti Irrigation Well (16I0423-01)		**Sample Type: Water**				**Sampled: 09/06/16 10:45**		
Metals (Drinking Water) by EPA 200 Series Methods								
Calcium	**19 mg/L**	**1.0**	1	AI63409	09/20/16 08:00	09/20/16 17:49	EPA 200.7	
Iron	ND ug/L	100	1	AI63409	09/20/16 08:00	09/20/16 17:49	EPA 200.7	
Magnesium	**19 mg/L**	**1.0**	1	AI63409	09/20/16 08:00	09/20/16 17:49	EPA 200.7	
Manganese	**1500 ug/L**	**20**	1	AI63409	09/20/16 08:00	09/20/16 17:49	EPA 200.7	
Potassium	**7.1 mg/L**	**1.0**	1	AI63409	09/20/16 08:00	09/20/16 17:49	EPA 200.7	
Sodium	**31 mg/L**	**1.0**	1	AI63409	09/20/16 08:00	09/20/16 17:49	EPA 200.7	
Metals by EPA 200 Series Methods								
Chromium, hexavalent	ND ug/L	1.0	1	AI63521	09/19/16 15:44	09/19/16 15:44	EPA 218.6	
Metals by EPA Method 200.8 ICP/MS								
Arsenic	**13 ug/L**	**2.0**	4	AI63407	09/19/16 06:35	09/20/16 12:21	EPA 200.8	
Chromium	ND ug/L	10	4	AI63407	09/19/16 06:35	09/20/16 12:21	EPA 200.8	R-01
Vanadium	ND ug/L	3.0	4	AI63407	09/19/16 06:35	09/20/16 12:21	EPA 200.8	R-01
Conventional Chemistry Parameters by APHA/EPA Methods								
Phosphate, Total	**0.95 mg/L**	**0.10**	1	AI63455	09/19/16 07:45	09/19/16 12:57	SM4500-P E	
Silica	**85 mg/L**	**5.0**	5	AI63462	09/19/16 08:14	09/19/16 11:30	SM4500-SiO2 C	
Total Alkalinity as CaCO3	**150 mg/L**	**5.0**	1	AI63242	09/13/16 08:00	09/13/16 16:13	SM2320B	
Total Kjeldahl Nitrogen	ND mg/L	1.0	1	AI63268	09/14/16 06:19	09/15/16 09:57	SM4500-Norg B	
Total Nitrogen	ND mg/L	1.0	1	AI63246	09/12/16 10:47	09/19/16 16:38	SM4500-N	
Anions by EPA Method 300.0								
Chloride	**27 mg/L**	**2.5**	5	AI63111	09/08/16 03:04	09/08/16 03:04	EPA 300.0	
Nitrate as N	ND mg/L	0.20	1	AI63111	09/08/16 03:20	09/08/16 03:20	EPA 300.0	
Nitrite as N	ND mg/L	0.20	1	AI63111	09/08/16 03:04	09/08/16 03:04	EPA 300.0	
Sulfate as SO4	**9.2 mg/L**	**0.50**	1	AI63111	09/08/16 03:20	09/08/16 03:20	EPA 300.0	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: #25-1310	09/22/16 13:21

Metals (Drinking Water) by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AI63409 - Metals Digest										
Blank (AI63409-BLK1)				Prepared & Analyzed: 09/20/16						
Calcium	ND	1.0	mg/L							
Iron	ND	100	ug/L							
Magnesium	ND	1.0	mg/L							
Manganese	ND	20	ug/L							
Potassium	ND	1.0	mg/L							
Sodium	ND	1.0	mg/L							
LCS (AI63409-BS1)				Prepared & Analyzed: 09/20/16						
Calcium	7.31	1.0	mg/L	8.00		91.4	85-115			
Iron	1930	100	ug/L	2000		96.5	85-115			
Magnesium	7.39	1.0	mg/L	8.00		92.4	85-115			
Manganese	192	20	ug/L	200		96.1	85-115			
Potassium	7.74	1.0	mg/L	8.00		96.8	85-115			
Sodium	6.88	1.0	mg/L	8.00		86.0	85-115			
Duplicate (AI63409-DUP1)		**Source: 16I0351-01**		Prepared & Analyzed: 09/20/16						
Calcium	24.8	1.0	mg/L		24.3			1.77	20	
Iron	ND	100	ug/L		ND			3.83	20	
Magnesium	17.2	1.0	mg/L		17.1			0.696	20	
Manganese	ND	20	ug/L		ND			4.49	20	
Potassium	32.1	1.0	mg/L		31.7			1.28	20	
Sodium	93.5	1.0	mg/L		91.8			1.86	20	
Matrix Spike (AI63409-MS1)		**Source: 16I0351-01**		Prepared & Analyzed: 09/20/16						
Calcium	32.5	1.0	mg/L	8.00	24.3	103	70-130			
Iron	2020	100	ug/L	2000	ND	97.5	70-130			
Magnesium	24.5	1.0	mg/L	8.00	17.1	92.2	70-130			
Manganese	203	20	ug/L	200	ND	98.6	70-130			
Potassium	38.4	1.0	mg/L	8.00	31.7	83.8	70-130			
Sodium	98.7	1.0	mg/L	8.00	91.8	86.7	70-130			

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Corporate: 208 Mason St., Ukiah, CA 95482 • Phone: (707) 468-0401 • Fax: (707) 468-5267
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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: #25-1310	09/22/16 13:21

Metals (Drinking Water) by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AI63409 - Metals Digest										
Matrix Spike (AI63409-MS2)	**Source: 16I0318-01**			Prepared & Analyzed: 09/20/16						
Calcium	48.0	1.0	mg/L	8.00	37.1	135	70-130			QM-4X
Iron	32300	100	ug/L	2000	30200	107	70-130			
Magnesium	36.2	1.0	mg/L	8.00	27.1	113	70-130			
Manganese	6030	20	ug/L	200	5760	137	70-130			QM-4X
Potassium	9.63	1.0	mg/L	8.00	1.14	106	70-130			
Sodium	28.2	1.0	mg/L	8.00	18.5	121	70-130			
Matrix Spike Dup (AI63409-MSD1)	**Source: 16I0351-01**			Prepared & Analyzed: 09/20/16						
Calcium	33.3	1.0	mg/L	8.00	24.3	112	70-130	2.22	20	
Iron	2160	100	ug/L	2000	ND	105	70-130	6.72	20	
Magnesium	24.8	1.0	mg/L	8.00	17.1	96.4	70-130	1.34	20	
Manganese	217	20	ug/L	200	ND	106	70-130	6.75	20	
Potassium	38.7	1.0	mg/L	8.00	31.7	87.7	70-130	0.806	20	
Sodium	102	1.0	mg/L	8.00	91.8	123	70-130	2.89	20	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: #25-1310	09/22/16 13:21

Metals by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AI63521 - General Preparation										
Blank (AI63521-BLK1)				Prepared & Analyzed: 09/19/16						
Chromium, hexavalent	ND	1.0	ug/L							
LCS (AI63521-BS1)				Prepared & Analyzed: 09/19/16						
Chromium, hexavalent	9.93	1.0	ug/L	10.0		99.3	90-110			
Duplicate (AI63521-DUP1)	**Source: 16I0423-01**			Prepared & Analyzed: 09/19/16						
Chromium, hexavalent	ND	1.0	ug/L		ND				20	
Matrix Spike (AI63521-MS1)	**Source: 16I0423-01**			Prepared & Analyzed: 09/19/16						
Chromium, hexavalent	9.72	1.0	ug/L	10.0	ND	97.2	90-110			
Matrix Spike (AI63521-MS2)	**Source: 16I1463-01**			Prepared & Analyzed: 09/19/16						
Chromium, hexavalent	9.83	1.0	ug/L	10.0	ND	98.3	90-110			
Matrix Spike Dup (AI63521-MSD1)	**Source: 16I0423-01**			Prepared & Analyzed: 09/19/16						
Chromium, hexavalent	9.60	1.0	ug/L	10.0	ND	96.0	90-110	1.15	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: #25-1310	09/22/16 13:21

Metals by EPA Method 200.8 ICP/MS - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AI63407 - EPA 200.8										
Blank (AI63407-BLK1)				Prepared: 09/19/16 Analyzed: 09/20/16						
Arsenic	ND	2.0	ug/L							
Chromium	ND	10	ug/L							
Vanadium	ND	3.0	ug/L							
LCS (AI63407-BS1)				Prepared: 09/19/16 Analyzed: 09/20/16						
Arsenic	21.9	2.0	ug/L	20.0		110	85-115			
Chromium	20.9	10	ug/L	20.0		104	85-115			
Vanadium	21.0	3.0	ug/L	20.0		105	85-115			
Duplicate (AI63407-DUP1)	**Source: 16I0351-01**			Prepared: 09/19/16 Analyzed: 09/20/16						
Arsenic	6.08	2.0	ug/L		6.63			8.57	20	
Chromium	ND	10	ug/L		ND				20	
Vanadium	ND	30	ug/L		ND				20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: #25-1310	09/22/16 13:21

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AI63242 - General Preparation										
Duplicate (AI63242-DUP1)		**Source: 16I0603-01**		Prepared & Analyzed: 09/13/16						
Total Alkalinity as CaCO3	11.0	5.0	mg/L		11.0			0.00	20	
Batch AI63268 - General Prep										
LCS (AI63268-BS1)				Prepared: 09/13/16 Analyzed: 09/14/16						
Total Kjeldahl Nitrogen	2.95	1.0	mg/L	2.98		99.0	80-120			
LCS Dup (AI63268-BSD1)				Prepared: 09/13/16 Analyzed: 09/14/16						
Total Kjeldahl Nitrogen	2.95	1.0	mg/L	2.98		99.0	80-120	0.00	20	
Matrix Spike (AI63268-MS1)		**Source: 16I0737-03**		Prepared: 09/13/16 Analyzed: 09/14/16						
Total Kjeldahl Nitrogen	3.13	1.0	mg/L	2.98	ND	105	75-125			
Matrix Spike Dup (AI63268-MSD1)		**Source: 16I0737-03**		Prepared: 09/13/16 Analyzed: 09/14/16						
Total Kjeldahl Nitrogen	3.13	1.0	mg/L	2.98	ND	105	75-125	0.00	20	
Batch AI63455 - General Prep										
Blank (AI63455-BLK1)				Prepared & Analyzed: 09/19/16						
Phosphate, Total	ND	0.10	mg/L							
LCS (AI63455-BS1)				Prepared & Analyzed: 09/19/16						
Phosphate, Total	0.590	0.10	mg/L	0.600		98.4	85-115			
Duplicate (AI63455-DUP1)		**Source: 16I1150-01**		Prepared & Analyzed: 09/19/16						
Phosphate, Total	ND	0.10	mg/L		ND			6.35	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: #25-1310	09/22/16 13:21

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AI63455 - General Prep										
Matrix Spike (AI63455-MS1)	**Source: 16I1150-01**			Prepared & Analyzed: 09/19/16						
Phosphate, Total	0.607	0.10	mg/L	0.600	ND	90.7	70-130			
Matrix Spike Dup (AI63455-MSD1)	**Source: 16I1150-01**			Prepared & Analyzed: 09/19/16						
Phosphate, Total	0.607	0.10	mg/L	0.600	ND	90.7	70-130	0.00	20	
Batch AI63462 - General Preparation										
Blank (AI63462-BLK1)				Prepared & Analyzed: 09/19/16						
Silica	ND	1.0	mg/L							
LCS (AI63462-BS1)				Prepared & Analyzed: 09/19/16						
Silica	9.57	1.0	mg/L	10.0		95.7	85-115			
LCS Dup (AI63462-BSD1)				Prepared & Analyzed: 09/19/16						
Silica	9.61	1.0	mg/L	10.0		96.1	85-115	0.411	20	
Duplicate (AI63462-DUP1)	**Source: 16I0685-01**			Prepared & Analyzed: 09/19/16						
Silica	34.3	5.0	mg/L		35.8			4.50	20	
Matrix Spike (AI63462-MS1)	**Source: 16I0685-01**			Prepared & Analyzed: 09/19/16						
Silica	56.1	5.0	mg/L	25.0	35.8	81.3	80-120			
Matrix Spike Dup (AI63462-MSD1)	**Source: 16I0685-01**			Prepared & Analyzed: 09/19/16						
Silica	56.5	5.0	mg/L	25.0	35.8	82.8	80-120	0.700	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: #25-1310	09/22/16 13:21

Anions by EPA Method 300.0 - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AI63111 - General Preparation										
Blank (AI63111-BLK1)				Prepared & Analyzed: 09/07/16						
Nitrate as N	ND	0.20	mg/L							
Sulfate as SO4	ND	0.50	mg/L							
Nitrite as N	ND	0.20	mg/L							
Chloride	ND	0.50	mg/L							
LCS (AI63111-BS1)				Prepared & Analyzed: 09/07/16						
Sulfate as SO4	23.4	0.50	mg/L	22.2		105	90-110			
Nitrite as N	5.85	0.20	mg/L	5.56		105	90-110			
Nitrate as N	5.86	0.20	mg/L	5.56		105	90-110			
Chloride	11.6	0.50	mg/L	11.1		104	90-110			
Duplicate (AI63111-DUP1)	**Source: 16I0425-04**			Prepared & Analyzed: 09/08/16						
Nitrate as N	ND	0.20	mg/L		ND				20	
Nitrite as N	ND	0.20	mg/L		ND				20	
Chloride	ND	0.50	mg/L		ND				20	
Sulfate as SO4	ND	0.50	mg/L		ND				20	
Matrix Spike (AI63111-MS1)	**Source: 16I0425-04**			Prepared & Analyzed: 09/08/16						
Nitrite as N	5.58	0.20	mg/L	5.56	ND	100	80-120			
Chloride	11.4	0.50	mg/L	11.1	ND	102	80-120			
Nitrate as N	5.76	0.20	mg/L	5.56	ND	104	80-120			
Sulfate as SO4	22.8	0.50	mg/L	22.2	ND	103	80-120			
Matrix Spike (AI63111-MS2)	**Source: 16I0362-03**			Prepared & Analyzed: 09/08/16						
Chloride	15.9	2.5	mg/L	11.1	5.03	98.2	80-120			
Nitrate as N	5.32	1.0	mg/L	5.56	ND	95.7	80-120			
Nitrite as N	5.29	1.0	mg/L	5.56	ND	95.2	80-120			
Sulfate as SO4	32.0	2.5	mg/L	22.2	11.1	93.9	80-120			

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: #25-1310	09/22/16 13:21

Anions by EPA Method 300.0 - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AI63111 - General Preparation										
Matrix Spike Dup (AI63111-MSD1)	**Source: 16I0425-04**			Prepared & Analyzed: 09/08/16						
Chloride	11.6	0.50	mg/L	11.1	ND	104	80-120	1.65	20	
Nitrate as N	5.85	0.20	mg/L	5.56	ND	105	80-120	1.65	20	
Nitrite as N	5.59	0.20	mg/L	5.56	ND	101	80-120	0.139	20	
Sulfate as SO4	23.1	0.50	mg/L	22.2	ND	104	80-120	1.48	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: #25-1310	09/22/16 13:21

Notes and Definitions

QM-4X	The spike recovery was outside of QC acceptance limits for the MS and/or MSD due to analyte concentration at 4 times or greater the spike concentration. The QC batch was accepted based on LCS and/or LCSD recoveries within the acceptance limits.
R-01	The Reporting Limit for this analyte has been raised to account for matrix interference.
ND	Analyte NOT DETECTED at or above the reporting limit
dry	Sample results reported on a dry weight basis
REC	Recovery
RPD	Relative Percent Difference

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WECK LABORATORIES, INC.

Certificate of Analysis

FINAL REPORT

Work Orders: 6I09025

Project: 16I0423

Report Date: 9/13/2016

Received Date: 9/9/2016

Turnaround Time: Normal

Phones: (925) 828-6226

Fax: (925) 828-6309

P.O. #:

Attn: Robbie Phillips

Client: Alpha Analytical Laboratories - Ukiah
208 Mason St
Ukiah, CA 95482

Dear Robbie Phillips,

Enclosed are the results of analyses for samples received 9/09/16 with the Chain-of-Custody document. The samples were received in good condition, at 3.3 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Sample Results

Sample: 16I0423-01, Alias: Esposti Irrigation Well — Sampled: 09/06/16 10:45 by Client

6I09025-01 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Method: IC-ICP/MS **Batch ID:** W6I0467 **Instr:** Inst				**Prepared:** 09/11/16 08:36		**Analyst:** apa
Arsenic III	**0.52**	0.40	ug/l	1	09/11/16 16:57	
Arsenic V	**13**	4.0	ug/l	10	09/11/16 16:57	

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Quality Control Results

Metals by EPA 200 Series Methods

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W6I0467 - Direct Injection										
Blank (W6I0467-BLK1)				**Prepared & Analyzed: 09/11/16**						
Arsenic III	ND	0.40	ug/l							
Arsenic V	ND	0.40	ug/l							
LCS (W6I0467-BS1)				**Prepared & Analyzed: 09/11/16**						
Arsenic III	9.56	0.40	ug/l	10.0		96	85-115			
Arsenic V	8.92	0.40	ug/l	10.0		89	85-115			
Matrix Spike (W6I0467-MS1)	**Source: 6H26026-01**			**Prepared & Analyzed: 09/11/16**						
Arsenic III	118	4.0	ug/l	100	ND	118	70-130			
Arsenic V	119	4.0	ug/l	100	5.42	114	70-130			
Matrix Spike (W6I0467-MS2)	**Source: 6I08004-01**			**Prepared & Analyzed: 09/11/16**						
Arsenic III	112	4.0	ug/l	100	0.260	112	70-130			
Arsenic V	139	4.0	ug/l	100	28.7	110	70-130			
Matrix Spike Dup (W6I0467-MSD1)	**Source: 6H26026-01**			**Prepared & Analyzed: 09/11/16**						
Arsenic III	109	4.0	ug/l	100	ND	109	70-130	8	30	
Arsenic V	114	4.0	ug/l	100	5.42	108	70-130	4	30	
Matrix Spike Dup (W6I0467-MSD2)	**Source: 6I08004-01**			**Prepared & Analyzed: 09/11/16**						
Arsenic III	110	4.0	ug/l	100	0.260	110	70-130	2	30	
Arsenic V	140	4.0	ug/l	100	28.7	112	70-130	1	30	

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Notes and Definitions

Item	Definition
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
Dil	Dilution
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
% Rec	Percent Recovery
Source	Sample that was matrix spiked or duplicated.
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ) and Detection Limit for Reporting (DLR)
MDA	Minimum Detectable Activity
NR	Not Reportable
TIC	Tentatively Identified Compound (TIC) using mass spectrometry. The reported concentration is relative concentration based on the nearest internal standard. If the library search produces no matches at, or above 85%, the compound is reported as unknown.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.
An Absence of Total Coliform meets the drinking water standards as established by the California State Water Resources Control Board (SWRCB)
All results are expressed on wet weight basis unless otherwise specified.
All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS 002.

Not Certified Analyses Summary

Analyte	CAS #	Not Accredited By
IC-ICP/MS in Water		
Arsenic III	22541-54-4	NELAP
Arsenic V	17428-41-0	NELAP

Reviewed by:

Kim G. Tu
Project Manager

DoD-ELAP #L15-366 ● ELAP-CA #1132 ● EPA-UCMR #CA00211 ● HW-DOH # ● ISO 17025 #L15-365 ● NELAP-OR #4047 ● NJ-DEP #CA015 ● NV-DEP #NAC 445A ● SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

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Corporate Laboratory
208 Mason Street, Ukiah, CA 95482
707-468-0401 F) 707-468-5267
clientservices@alpha-labs.com

Bay Area Laboratory
6398 Dougherty Road, #35, Dublin, CA 94568
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Central Valley Laboratory
9090 Union Park Wy., #113, Elk Grove, CA 95624
916-686-5190 F) 916-686-5192

Work Order
Chain of Custody Record

Lab No. 16I0423 Page 1 of 1

Name: Town of Windsor - ~~Drinking Water~~ FEASIBILITY STUDY	**Project ID:** #25-1310
Mailing Address: 9291 Old Redwood Highway Building 400, Windsor, CA 95492	**Phase:** Esposti Well
Project Contact (Hardcopy or PDF to): Elizabeth Cargay, ecargay@townofwindsor.com AND KOBRIEN@HAZENANDSAWYER.COM	**PO#** 200336
	Bill to: month end billing

Signature below authorizes work under terms stated on reverse side.

Analysis Request

TAT: 24 hr ○ 48 hr ○ (Lab Approval Required) 1 wk ○ 2 wk (standard) ⊗ — Lab Approval Required For Rush

Field Sampler - Print Name & Signature	Sample Identification	Sample Collection Date	Sample Collection Time	Container: 40ml VOA	Container: Poly	Container: Amber	Container: Glass	Preservative: HCL	Preservative: HNO3	Preservative: H2SO4	Preservative: Other	Preservative: None	Matrix: Water	Matrix: Soil	X 200.8 As5	X 200.7 Fe/Mn	200.8 Cr	218.6 Cr6	200.7 Ca, Mg, K, Na	Alkalinity	Chloride		Sulfate	Total Nitrogen (includes TKN, NO2, NO3)	Silica	200.8 Vanadium - total	Phosphate	As3 & As5 - sub Weck			
RYAN CRAWFORD Ryan Crawford	Esposti Irrigation Well ~~09-6169~~	9/6/16	1045		x				x	x	x	x	x		X	X	x	x	x	x	x		x	x	x	x	x	x			

BOTTLE KIT ORDER for Esposti Irrigation Well placed 9/1/2016, deliver kit on Friday 9/2/20016 in a cooler to:
Ryan Crawford
2235 Mercury Way, Suite 150,
Santa Rosa, CA 95407

Relinquished by:	Received by:	Date	Time	Global ID:	EDF to (Email Address):
Ryan Crawford	[illegible]	9/6/16	1430	Travel and Site Time:	Mileage: / Misc. Supplies:
[illegible]	[illegible]	9/6/16	1600		

2.2

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ELAP Certificates 1551, 2728, and 2922

30 September 2016

Town Of Windsor - Drinking Water
Attn: Elizabeth Cargay
8400 Windsor Rd.
Windsor, CA 95492-0100
RE: Esposti Feasibility Study - Weeks
Work Order: 16I2059

Enclosed are the results of analyses for samples received by the laboratory on 09/22/16 16:06. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Sheri Speaks

Sheri L. Speaks For Robbie C. Phillips
Project Manager

Alpha Analytical Laboratories Inc.
e-mail: clientservices@alpha-labs.com
Corporate: 208 Mason St., Ukiah, CA 95482 • Phone: (707) 468-0401 • Fax: (707) 468-5267
Bay Area: 6398 Dougherty Rd., Suite 35, Dublin, CA 94568 • Phone: (925) 828-6226 • Fax: (925) 828-6309
Central Valley: 9090 Union Park Way, Suite 113, Elk Grove, CA 95624 • Phone: (916) 686-5190 • Fax: (916) 686-5192

Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study - Weeks	Reported:
Windsor, CA 95492-0100	Project Number: 25-1310	09/30/16 14:14

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
ESW-9-21-7:01	16I2059-01	Water	09/21/16 07:01	09/22/16 16:06
ESW-9-21-7:05	16I2059-02	Water	09/21/16 07:05	09/22/16 16:06
ESW-9-21-8:00	16I2059-03	Water	09/21/16 08:00	09/22/16 16:06
ESW-9-21-11:00	16I2059-04	Water	09/21/16 11:00	09/22/16 16:06
ESW-9-21-15:00	16I2059-05	Water	09/21/16 15:00	09/22/16 16:06

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8400 Windsor Rd.	Project: Esposti Feasibility Study - Weeks	Reported:
Windsor, CA 95492-0100	Project Number: 25-1310	09/30/16 14:14

	Result	Reporting Limit	Dilution	Batch	Prepared	Analyzed	Method	Note
ESW-9-21-7:01 (16I2059-01)		**Sample Type: Water**				**Sampled: 09/21/16 07:01**		
Metals (Drinking Water) by EPA 200 Series Methods								
Iron	**1700 ug/L**	**100**	1	AI63684	09/28/16 13:45	09/28/16 14:45	EPA 200.7	
Manganese	**860 ug/L**	**20**	1	AI63684	09/28/16 13:45	09/28/16 14:45	EPA 200.7	
Metals by EPA Method 200.8 ICP/MS								
Arsenic	**58 ug/L**	**1.6**	1	AI63725	09/28/16 15:30	09/29/16 08:22	EPA 200.8	
ESW-9-21-7:05 (16I2059-02)		**Sample Type: Water**				**Sampled: 09/21/16 07:05**		
Metals (Drinking Water) by EPA 200 Series Methods								
Iron	**3400 ug/L**	**100**	1	AI63684	09/28/16 13:45	09/28/16 14:50	EPA 200.7	
Manganese	**1100 ug/L**	**20**	1	AI63684	09/28/16 13:45	09/28/16 14:50	EPA 200.7	
Metals by EPA Method 200.8 ICP/MS								
Arsenic	**52 ug/L**	**1.6**	1	AI63725	09/28/16 15:30	09/29/16 08:34	EPA 200.8	
ESW-9-21-8:00 (16I2059-03)		**Sample Type: Water**				**Sampled: 09/21/16 08:00**		
Metals (Drinking Water) by EPA 200 Series Methods								
Iron	**260 ug/L**	**100**	1	AI63684	09/28/16 13:45	09/28/16 14:54	EPA 200.7	
Manganese	**860 ug/L**	**20**	1	AI63684	09/28/16 13:45	09/28/16 14:54	EPA 200.7	
Metals by EPA Method 200.8 ICP/MS								
Arsenic	**43 ug/L**	**1.6**	1	AI63725	09/28/16 15:30	09/29/16 08:47	EPA 200.8	
ESW-9-21-11:00 (16I2059-04)		**Sample Type: Water**				**Sampled: 09/21/16 11:00**		
Metals (Drinking Water) by EPA 200 Series Methods								
Iron	**190 ug/L**	**100**	1	AI63684	09/28/16 13:45	09/28/16 14:58	EPA 200.7	
Manganese	**910 ug/L**	**20**	1	AI63684	09/28/16 13:45	09/28/16 14:58	EPA 200.7	

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8400 Windsor Rd.	Project: Esposti Feasibility Study - Weeks	Reported:
Windsor, CA 95492-0100	Project Number: 25-1310	09/30/16 14:14

	Result	Reporting Limit	Dilution	Batch	Prepared	Analyzed	Method	Note
ESW-9-21-11:00 (16I2059-04)		**Sample Type: Water**				**Sampled: 09/21/16 11:00**		
Metals by EPA Method 200.8 ICP/MS								
Arsenic	**38 ug/L**	**1.6**	1	AI63725	09/28/16 15:30	09/29/16 09:00	EPA 200.8	
ESW-9-21-15:00 (16I2059-05)		**Sample Type: Water**				**Sampled: 09/21/16 15:00**		
Metals (Drinking Water) by EPA 200 Series Methods								
Calcium	**23 mg/L**	**1.0**	1	AI63684	09/28/16 13:45	09/28/16 15:03	EPA 200.7	
Iron	**140 ug/L**	**100**	1	AI63684	09/28/16 13:45	09/28/16 15:03	EPA 200.7	
Magnesium	**18 mg/L**	**1.0**	1	AI63684	09/28/16 13:45	09/28/16 15:03	EPA 200.7	
Manganese	**910 ug/L**	**20**	1	AI63684	09/28/16 13:45	09/28/16 15:03	EPA 200.7	
Potassium	**14 mg/L**	**1.0**	1	AI63684	09/28/16 13:45	09/28/16 15:03	EPA 200.7	
Sodium	**52 mg/L**	**1.0**	1	AI63684	09/28/16 13:45	09/28/16 15:03	EPA 200.7	
Metals by EPA 200 Series Methods								
Chromium, hexavalent	ND ug/L	1.0	1	AI63833	09/28/16 11:53	09/28/16 15:40	EPA 218.6	
Metals by EPA Method 200.8 ICP/MS								
Arsenic	**35 ug/L**	**1.6**	1	AI63725	09/28/16 15:30	09/29/16 09:13	EPA 200.8	
Chromium	ND ug/L	8.0	1	AI63725	09/28/16 15:30	09/29/16 15:40	EPA 200.8	
Conventional Chemistry Parameters by APHA/EPA Methods								
Phosphate, Total	**1.2 mg/L**	**0.10**	1	AI63857	09/29/16 08:00	09/29/16 10:34	SM4500-P E	
Silica	**86 mg/L**	**5.0**	5	AI63840	09/28/16 14:00	09/28/16 16:10	SM4500-SiO2 C	
Total Alkalinity as CaCO3	**220 mg/L**	**5.0**	1	AI63828	09/28/16 10:34	09/28/16 12:20	SM2320B	
Total Kjeldahl Nitrogen	ND mg/L	1.0	1	AI63778	09/28/16 06:15	09/29/16 09:54	SM4500-Norg B	
Total Nitrogen	ND mg/L	1.0	1	AI63774	09/26/16 16:38	09/29/16 08:41	SM4500-N	

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8400 Windsor Rd.	Project: Esposti Feasibility Study - Weeks	Reported:
Windsor, CA 95492-0100	Project Number: 25-1310	09/30/16 14:14

	Result	Reporting Limit	Dilution	Batch	Prepared	Analyzed	Method	Note
ESW-9-21-15:00 (16I2059-05)		**Sample Type: Water**				**Sampled: 09/21/16 15:00**		
Anions by EPA Method 300.0								
Chloride	**22 mg/L**	**0.50**	1	AI63687	09/23/16 16:34	09/23/16 16:34	EPA 300.0	
Nitrate as N	ND mg/L	0.20	1	AI63687	09/23/16 16:50	09/23/16 16:50	EPA 300.0	
Nitrite as N	ND mg/L	0.20	1	AI63687	09/23/16 16:50	09/23/16 16:50	EPA 300.0	
Sulfate as SO4	**14 mg/L**	**0.50**	1	AI63687	09/23/16 16:50	09/23/16 16:50	EPA 300.0	

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Windsor, CA 95492-0100	Project Number: 25-1310	09/30/16 14:14

Metals (Drinking Water) by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AI63684 - EPA 200 Series										
Blank (AI63684-BLK1)				Prepared & Analyzed: 09/23/16						
Calcium	ND	1.0	mg/L							
Iron	ND	100	ug/L							
Magnesium	ND	1.0	mg/L							
Manganese	ND	20	ug/L							
Potassium	ND	1.0	mg/L							
Sodium	ND	1.0	mg/L							
LCS (AI63684-BS1)				Prepared & Analyzed: 09/23/16						
Calcium	7.30	1.0	mg/L	6.80		107	85-115			
Iron	1810	100	ug/L	1700		107	85-115			
Magnesium	7.18	1.0	mg/L	6.80		106	85-115			
Manganese	193	20	ug/L	200		96.5	85-115			
Potassium	7.67	1.0	mg/L	7.60		101	85-115			
Sodium	7.36	1.0	mg/L	6.80		108	85-115			
Duplicate (AI63684-DUP1)	**Source: 16I1992-02**			Prepared & Analyzed: 09/23/16						
Calcium	35.3	1.0	mg/L		32.1			9.29	20	
Iron	ND	100	ug/L		ND				20	
Magnesium	11.4	1.0	mg/L		11.0			3.26	20	
Manganese	ND	20	ug/L		ND				20	
Potassium	3.59	1.0	mg/L		3.41			5.15	20	
Sodium	23.8	1.0	mg/L		21.8			8.77	20	
Matrix Spike (AI63684-MS1)	**Source: 16I1992-02**			Prepared & Analyzed: 09/23/16						
Calcium	42.9	1.0	mg/L	6.80	32.1	158	70-130			QM-4X
Iron	1830	100	ug/L	1700	ND	108	70-130			
Magnesium	18.5	1.0	mg/L	6.80	11.0	110	70-130			
Manganese	203	20	ug/L	200	ND	102	70-130			
Potassium	10.7	1.0	mg/L	7.60	3.41	96.1	70-130			
Sodium	30.9	1.0	mg/L	6.80	21.8	133	70-130			QM-01

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Metals (Drinking Water) by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AI63684 - EPA 200 Series										
Matrix Spike (AI63684-MS2)	**Source: 16I2059-01**			Prepared & Analyzed: 09/28/16						
Calcium	28.4	1.0	mg/L	6.80	21.9	96.1	70-130			
Iron	3360	100	ug/L	1700	1700	98.1	70-130			
Magnesium	23.2	1.0	mg/L	6.80	15.9	107	70-130			
Manganese	1030	20	ug/L	200	856	88.1	70-130			
Potassium	24.3	1.0	mg/L	7.60	17.6	88.4	70-130			
Sodium	60.2	1.0	mg/L	6.80	56.0	61.9	70-130			QM-4X
Matrix Spike Dup (AI63684-MSD1)	**Source: 16I1992-02**			Prepared & Analyzed: 09/23/16						
Calcium	42.3	1.0	mg/L	6.80	32.1	149	70-130	1.40	20	QM-4X
Iron	1770	100	ug/L	1700	ND	104	70-130	3.42	20	
Magnesium	19.2	1.0	mg/L	6.80	11.0	121	70-130	3.81	20	
Manganese	197	20	ug/L	200	ND	98.5	70-130	3.22	20	
Potassium	10.4	1.0	mg/L	7.60	3.41	91.6	70-130	3.30	20	
Sodium	30.6	1.0	mg/L	6.80	21.8	129	70-130	0.810	20	

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Metals by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AI63833 - General Preparation										
Blank (AI63833-BLK1)				Prepared & Analyzed: 09/28/16						
Chromium, hexavalent	ND	1.0	ug/L							
LCS (AI63833-BS1)				Prepared & Analyzed: 09/28/16						
Chromium, hexavalent	9.44	1.0	ug/L	10.0		94.4	90-110			
Duplicate (AI63833-DUP1)		**Source: 16I2059-05**		Prepared & Analyzed: 09/28/16						
Chromium, hexavalent	ND	1.0	ug/L		ND				20	
Matrix Spike (AI63833-MS1)		**Source: 16I2059-05**		Prepared & Analyzed: 09/28/16						
Chromium, hexavalent	9.54	1.0	ug/L	10.0	ND	95.4	90-110			
Matrix Spike (AI63833-MS2)		**Source: 16I2319-01**		Prepared & Analyzed: 09/28/16						
Chromium, hexavalent	14.2	1.0	ug/L	10.0	4.56	96.1	90-110			
Matrix Spike Dup (AI63833-MSD1)		**Source: 16I2059-05**		Prepared & Analyzed: 09/28/16						
Chromium, hexavalent	9.32	1.0	ug/L	10.0	ND	93.2	90-110	2.36	20	

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Metals by EPA Method 200.8 ICP/MS - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AI63725 - EPA 200 Series										
Blank (AI63725-BLK1)				Prepared & Analyzed: 09/26/16						
Arsenic	ND	1.6	ug/L							
Chromium	ND	8.0	ug/L							
LCS (AI63725-BS1)				Prepared & Analyzed: 09/26/16						
Arsenic	20.8	1.6	ug/L	20.0		104	85-115			
Chromium	21.1	8.0	ug/L	20.0		105	85-115			
Duplicate (AI63725-DUP1)	**Source: 16I2160-01**			Prepared & Analyzed: 09/26/16						
Arsenic	2.01	1.6	ug/L		2.05			2.09	20	
Chromium	ND	8.0	ug/L		ND				20	
Matrix Spike (AI63725-MS1)	**Source: 16I2160-01**			Prepared & Analyzed: 09/26/16						
Arsenic	107	1.6	ug/L	100	2.05	105	70-130			
Chromium	101	8.0	ug/L	100	ND	101	70-130			
Matrix Spike (AI63725-MS2)	**Source: 16I2162-01**			Prepared & Analyzed: 09/26/16						
Arsenic	106	1.6	ug/L	100	2.03	104	70-130			
Matrix Spike Dup (AI63725-MSD1)	**Source: 16I2160-01**			Prepared & Analyzed: 09/26/16						
Arsenic	106	1.6	ug/L	100	2.05	104	70-130	1.08	20	
Chromium	104	8.0	ug/L	100	ND	104	70-130	2.65	20	

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Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AI63778 - General Prep										
LCS (AI63778-BS1)				Prepared: 09/27/16 Analyzed: 09/28/16						
Total Kjeldahl Nitrogen	3.04	1.0	mg/L	2.98		102	80-120			
LCS Dup (AI63778-BSD1)				Prepared: 09/27/16 Analyzed: 09/28/16						
Total Kjeldahl Nitrogen	3.04	1.0	mg/L	2.98		102	80-120	0.00	20	
Matrix Spike (AI63778-MS1)		**Source: 16I2096-02**		Prepared: 09/27/16 Analyzed: 09/28/16						
Total Kjeldahl Nitrogen	3.13	1.0	mg/L	2.98	ND	105	75-125			
Matrix Spike Dup (AI63778-MSD1)		**Source: 16I2096-02**		Prepared: 09/27/16 Analyzed: 09/28/16						
Total Kjeldahl Nitrogen	3.13	1.0	mg/L	2.98	ND	105	75-125	0.00	20	
Batch AI63828 - General Preparation										
Duplicate (AI63828-DUP1)		**Source: 16I2104-01**		Prepared & Analyzed: 09/28/16						
Total Alkalinity as CaCO3	190	5.0	mg/L		190			0.00	20	
Batch AI63840 - General Preparation										
Blank (AI63840-BLK1)				Prepared & Analyzed: 09/28/16						
Silica	ND	1.0	mg/L							
LCS (AI63840-BS1)				Prepared & Analyzed: 09/28/16						
Silica	10.0	1.0	mg/L	10.0		100	85-115			
LCS Dup (AI63840-BSD1)				Prepared & Analyzed: 09/28/16						
Silica	9.98	1.0	mg/L	10.0		99.8	85-115	0.355	20	

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Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AI63857 - General Prep										
Blank (AI63857-BLK1)				Prepared & Analyzed: 09/29/16						
Phosphate, Total	ND	0.10	mg/L							
LCS (AI63857-BS1)				Prepared & Analyzed: 09/29/16						
Phosphate, Total	0.604	0.10	mg/L	0.600		101	85-115			
Duplicate (AI63857-DUP1)	**Source: 16I2098-01**			Prepared & Analyzed: 09/29/16						
Phosphate, Total	ND	0.10	mg/L		ND				20	
Matrix Spike (AI63857-MS1)	**Source: 16I2098-01**			Prepared & Analyzed: 09/29/16						
Phosphate, Total	0.600	0.10	mg/L	0.600	ND	100	70-130			
Matrix Spike Dup (AI63857-MSD1)	**Source: 16I2098-01**			Prepared & Analyzed: 09/29/16						
Phosphate, Total	0.604	0.10	mg/L	0.600	ND	101	70-130	0.672	20	

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Corporate: 208 Mason St., Ukiah, CA 95482 • Phone: (707) 468-0401 • Fax: (707) 468-5267
Bay Area: 6398 Dougherty Rd., Suite 35, Dublin, CA 94568 • Phone: (925) 828-6226 • Fax: (925) 828-6309
Central Valley: 9090 Union Park Way, Suite 113, Elk Grove, CA 95624 • Phone: (916) 686-5190 • Fax: (916) 686-5192

Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study - Weeks	Reported:
Windsor, CA 95492-0100	Project Number: 25-1310	09/30/16 14:14

Anions by EPA Method 300.0 - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AI63687 - General Preparation										
Blank (AI63687-BLK1)				Prepared & Analyzed: 09/23/16						
Nitrate as N	ND	0.20	mg/L							
Sulfate as SO4	ND	0.50	mg/L							
Nitrite as N	ND	0.20	mg/L							
Chloride	ND	0.50	mg/L							
LCS (AI63687-BS1)				Prepared & Analyzed: 09/23/16						
Chloride	11.4	0.50	mg/L	11.1		102	90-110			
Nitrate as N	5.91	0.20	mg/L	5.56		106	90-110			
Sulfate as SO4	22.6	0.50	mg/L	22.2		102	90-110			
Nitrite as N	5.23	0.20	mg/L	5.56		94.1	90-110			
Duplicate (AI63687-DUP1)	**Source: 16I2096-01**			Prepared & Analyzed: 09/23/16						
Chloride	5.34	0.50	mg/L		5.30			0.677	20	
Nitrite as N	ND	0.20	mg/L		ND				20	
Nitrate as N	ND	0.20	mg/L		ND				20	
Sulfate as SO4	11.3	0.50	mg/L		11.1			1.45	20	
Matrix Spike (AI63687-MS1)	**Source: 16I2096-01**			Prepared & Analyzed: 09/23/16						
Sulfate as SO4	34.1	0.50	mg/L	22.2	11.1	103	80-120			
Chloride	16.6	0.50	mg/L	11.1	5.30	102	80-120			
Nitrite as N	5.74	0.20	mg/L	5.56	ND	103	80-120			
Nitrate as N	6.02	0.20	mg/L	5.56	ND	108	80-120			
Matrix Spike (AI63687-MS2)	**Source: 16I2098-01**			Prepared & Analyzed: 09/24/16						
Sulfate as SO4	34.2	0.50	mg/L	22.2	10.8	105	80-120			
Chloride	16.7	0.50	mg/L	11.1	5.17	104	80-120			
Nitrate as N	6.19	0.20	mg/L	5.56	ND	111	80-120			
Nitrite as N	5.90	0.20	mg/L	5.56	ND	106	80-120			

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study - Weeks	Reported:
Windsor, CA 95492-0100	Project Number: 25-1310	09/30/16 14:14

Anions by EPA Method 300.0 - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AI63687 - General Preparation										
Matrix Spike Dup (AI63687-MSD1)	**Source: 16I2096-01**			Prepared & Analyzed: 09/24/16						
Nitrate as N	6.01	0.20	mg/L	5.56	ND	108	80-120	0.188	20	
Chloride	16.6	0.50	mg/L	11.1	5.30	102	80-120	0.107	20	
Nitrite as N	5.74	0.20	mg/L	5.56	ND	103	80-120	0.155	20	
Sulfate as SO4	34.1	0.50	mg/L	22.2	11.1	103	80-120	0.0554	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study - Weeks	Reported:
Windsor, CA 95492-0100	Project Number: 25-1310	09/30/16 14:14

Notes and Definitions

QM-01	The spike recovery for this QC sample is outside of established control limits possibly due to a sample matrix interference.
QM-4X	The spike recovery was outside of QC acceptance limits for the MS and/or MSD due to analyte concentration at 4 times or greater the spike concentration. The QC batch was accepted based on LCS and/or LCSD recoveries within the acceptance limits.
ND	Analyte NOT DETECTED at or above the reporting limit
dry	Sample results reported on a dry weight basis
REC	Recovery
RPD	Relative Percent Difference

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WECK LABORATORIES, INC.

Certificate of Analysis

FINAL REPORT

Work Orders: 6I27070

Project: 16I2059

Attn: Robbie Phillips

Client: Alpha Analytical Laboratories - Ukiah
208 Mason St
Ukiah, CA 95482

Report Date: 10/10/2016

Received Date: 9/27/2016

Turnaround Time: Normal

Phones: (925) 828-6226

Fax: (925) 828-6309

P.O. #:

Dear Robbie Phillips,

Enclosed are the results of analyses for samples received 9/27/16 with the Chain-of-Custody document. The samples were received in good condition, at 18.1 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Sample Results

Sample: 16I2059-05, Alias: ESW-921-15:00 — Sampled: 09/22/16 15:00 by Client

6I27070-01 (Water)

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Method: IC-ICP/MS **Batch ID:** W6J0393 **Instr:** Inst **Prepared:** 10/09/16 09:07 **Analyst:** apa							
Arsenic III	**20**	0.14	4.0	ug/l	10	10/10/16 15:29	
Arsenic V	**17**	0.14	4.0	ug/l	10	10/10/16 15:29	

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Quality Control Results

Metals by EPA 200 Series Methods

Analyte	Result	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W6J0393 - Direct Injection										
Blank (W6J0393-BLK1)				**Prepared: 10/09/16**	**Analyzed: 10/10/16**					
Arsenic III	ND	0.014	ug/l							
Arsenic V	0.177	0.014	ug/l							J
LCS (W6J0393-BS1)				**Prepared: 10/09/16**	**Analyzed: 10/10/16**					
Arsenic III	9.89	0.014	ug/l	8.94		111	85-115			
Arsenic V	9.29	0.014	ug/l	9.13		102	85-115			
Matrix Spike (W6J0393-MS1)	**Source: 6I15020-01**			**Prepared: 10/09/16**	**Analyzed: 10/10/16**					
Arsenic III	9.79	0.014	ug/l	8.94	0.276	106	70-130			
Arsenic V	10.2	0.014	ug/l	9.13	0.536	105	70-130			
Matrix Spike Dup (W6J0393-MSD1)	**Source: 6I15020-01**			**Prepared: 10/09/16**	**Analyzed: 10/10/16**					
Arsenic III	9.86	0.014	ug/l	8.94	0.276	107	70-130	0.7	30	
Arsenic V	10.2	0.014	ug/l	9.13	0.536	105	70-130	0.03	30	

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Notes and Definitions

Item	Definition
J	Estimated conc. detected <MRL and >MDL.
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
Dil	Dilution
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
% Rec	Percent Recovery
Source	Sample that was matrix spiked or duplicated.
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ) and Detection Limit for Reporting (DLR)
MDA	Minimum Detectable Activity
NR	Not Reportable
TIC	Tentatively Identified Compound (TIC) using mass spectrometry. The reported concentration is relative concentration based on the nearest internal standard. If the library search produces no matches at, or above 85%, the compound is reported as unknown.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.
An Absence of Total Coliform meets the drinking water standards as established by the California State Water Resources Control Board (SWRCB)
All results are expressed on wet weight basis unless otherwise specified.
All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS 002.

Not Certified Analyses Summary

Analyte	CAS #	Not Accredited By
IC-ICP/MS in Water		
Arsenic III	22541-54-4	NELAP
Arsenic V	17428-41-0	NELAP

Reviewed by:

Kim G. Tu
Project Manager

DoD-ELAP #L15-366 ● ELAP-CA #1132 ● EPA-UCMR #CA00211 ● HW-DOH # ● ISO 17025 #L15-365 ● LACSD #10143 ● NELAP-OR #4047 ● NJ-DEP #CA015 ● NV-DEP #NAC 445A ● SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

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Corporate Laboratory
208 Mason Street, Ukiah CA 95482
707-468-0401 F) 707-468-5267
clientservices@alpha-labs.com

Bay Area Laboratory
6398 Dougherty Road, #35, Dublin CA 94568
925-828-6226 F) 925-828-6309

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916-686-5190 F) 916-686-5192

Work Order
Chain of Custody Record

2.0

Lab No 16I2059 Page 1 of 1

Name: Town of Windsor - Drinking Water	**Project ID:** Esposti Well
Mailing Address: 9291 Old Redwood Highway Building 400, Windsor, CA 95492	**Phase:** Project ID: 25-1310
Project Contact (Hardcopy or PDF to): Elizabeth Cargay, ecargay@townofwindsor.com; Kent O'Brien, kobrien@hazenandsawyer.com	**PO#** 200336
	Bill to: SEE NOTE: WEEKS ? TOWN OF WINDSOR

Signature below authorizes work under terms stated on reverse side

Analysis Request

TAT: 24 hr ○ 48 hr ⊗ Lab Approval Required ○ 1 wk ○ 2 wk (standard) ⊗ — Lab Approval Required For Rush

Field Sampler - Print Name & Signature: RYAN CRAWFORD

Sample Identification	Sample Collection Date	Time	Container: 40ml VOA	Poly	Amber	Glass	Preservative: HCL	HNO3	H3PO4	Other	None	Matrix: Water	Soil	TSS	TOC	Gross Alpha	Tannins	200.8 As	200.7 Fe/Mn/Ca/Mg/K/Na	Alkalinity	Chloride	Nitrate / Nitrite as N	Sulfate	Total Nitrogen (TKN, UV, NO3)	Silica	Phosphate	As3+ and As5+	200.8 Cr6+	200.6 Cr6+
ESW - -			x	x					x		x	x		x	x	x	x													
ESW-9-21-7:01	9/21/16	7:01	X				X					X		X				X												
ESW-9-21-7:05		7:05	X				X					X		X				X												
ESW-9-21-8:00		8:00	X				X					X		X				X												
ESW-9-21-11:00		11:00	X				X					X		X				X												
ESW-9-21-15:00	↓	15:00	X	X			X		X			X		X				X												

GHD SUPPLIED BOTTLES

TSS, TOC, GA Tannins only w/ RPD

TSS/TOC/GROSS ALPHA/TANNINS BILL TO TOWN OF WINDSOR, REMAINING ANALYTES BILL TO WEEKS

Relinquished by: Ryan Crawford	Received by: David Poma	Date 9/22/16	Time 0815
Relinquished by: David Poma	Received by:	Date 9.22.16	Time 1600
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time

CDPH Write On EDT Report? Yes ○ No (x)

State System Number:

CA Geotracker EDF Report Yes ○ No ⊗

Sampling Company Log Code:

Global ID: EDF to (Email Address):

Travel and Site Time	Mileage	Misc. Supplies

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916-686-5190 F) 916-686-5192

questions call Kent O'Brien at 707-478-9559

Work Order
Chain of Custody Record

Lab No. 16I 2059 Page 1 of 1

Signature below authorizes work under terms stated on reverse side.

Revised COC per Robbie 9/23/16

Name: Town of Windsor - Drinking Water	**Project ID:** Esposti Well
Mailing Address: 9291 Old Redwood Highway Building 400, Windsor, CA 95492	**Phase:** Project ID: 25-1310
Project Contact (Hardcopy or PDF to): Elizabeth Cargay, ecargay@townofwindsor.com; Kent O'Brien, kobrien@hazenandsawyer.com	PO# 200336
	Bill to: SEE NOTE: WEEKS ? TOWN OF WINDSOR

TAT: 24 hr ○ 48 hr ⊗ Lab Approval Required ○ | 1 wk ○ | 2 wk (standard) ⊗ | Lab Approval Required For Rush

Analysis Request

Field Sampler - Print Name & Signature	Sample Identification	Sample Collection Date	Time	Container: 40ml VOA	Poly	Amber	Glass	Preservative: HCL	HNO3	H3PO4	Other	None	Matrix: Water	Soil	TSS	TOC	Gross Alpha	Tannins	200.8 As	200.7 Fe/Mn/Ca/Mg/K/Na	Alkalinity	Chloride	Nitrate / Nitrite as N	Sulfate	Total Nitrogen (TKN, NO2, NO3)	Silica	Phosphate	As3+ and As5+	200.8 Cr	200.6 Cr
RYAN CRAWFORD	ESW			×	×					×		×	×		×	×	×	×												
	ESW-9-21-7:01	9/21/16	7:01	X				X					X						X	X	X									
	ESW-9-21-7:05		7:05	X				X					X						X	X	X									
	ESW-9-21-8:00		8:00	X				X					X						X	X	X									
	ESW-9-21-11:00		11:00	X				X					X						X	X	X									
	ESW-9-21-15:00	↓	15:00	XX				X	X				X																	

Mn/Fe only, no Ca/Mg/K or Na, for these four samples

48-hour TAT for As/Mn/Fe Only

GHD SUPPLIED BOTTLES

TSS/TOC/GROSS ALPHA/TANNINS BILL TO TOWN OF WINDSOR, REMAINING ANALYTES BILL TO WEEKS

Relinquished by:	Received by:	Date	Time
Ryan Crawford		9/22/16	0815
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time
Relinquished by:	Received by:	Date	Time

CDPH Write On EDT Report? Yes ○ No (x)

State System Number:

CA Geotracker EDF Report Yes ○ No ⊗

Sampling Company Log Code:

Global ID: EDF to (Email Address)

Travel and Site Time: | Mileage: | Misc. Supplies:

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ELAP Certificates 1551, 2728, and 2922

07 October 2016

Town Of Windsor - Drinking Water
Attn: Elizabeth Cargay
8400 Windsor Rd.
Windsor, CA 95492-0100
RE: Esposti Feasibility Study
Work Order: 16I2103

Enclosed are the results of analyses for samples received by the laboratory on 09/22/16 16:06. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jeanette Poplin

Jeanette L. Poplin For Robbie C. Phillips
Project Manager

Alpha Analytical Laboratories Inc.
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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: 25-1310	10/07/16 08:13

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
ESW-9-21-15:00	16I2103-01	Water	09/21/16 15:00	09/22/16 16:06

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: 25-1310	10/07/16 08:13

	Result	Reporting Limit	Dilution	Batch	Prepared	Analyzed	Method	Note
ESW-9-21-15:00 (16I2103-01)		**Sample Type: Water**				**Sampled: 09/21/16 15:00**		
Conventional Chemistry Parameters by APHA/EPA Methods								
Tannins & Lignins	ND mg/L	0.50	1	AJ63130	10/03/16 09:00	10/03/16 11:45	SM5550B	
Total Suspended Solids	**3.5 mg/L**	**1.0**	1	AI63813	09/27/16 13:30	09/29/16 10:59	SM2540D	
Total Organic Carbon	ND mg/L	0.300	1	AI63861	09/29/16 06:58	09/29/16 14:37	SM5310C	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: 25-1310	10/07/16 08:13

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AI63813 - General Preparation										
Blank (AI63813-BLK1)				Prepared: 09/27/16 Analyzed: 09/29/16						
Total Suspended Solids	ND	1.0	mg/L							
Duplicate (AI63813-DUP1)	**Source: 16I2071-01**			Prepared: 09/27/16 Analyzed: 09/29/16						
Total Suspended Solids	157	1.0	mg/L		154			1.98	30	
Duplicate (AI63813-DUP2)	**Source: 16I2148-01**			Prepared: 09/27/16 Analyzed: 09/29/16						
Total Suspended Solids	243	1.0	mg/L		247			1.74	30	
Batch AI63861 - General Prep										
Blank (AI63861-BLK1)				Prepared & Analyzed: 09/29/16						
Total Organic Carbon	ND	0.300	mg/L							
LCS (AI63861-BS1)				Prepared & Analyzed: 09/29/16						
Total Organic Carbon	10.4	0.300	mg/L	10.0		104	85-115			
LCS Dup (AI63861-BSD1)				Prepared & Analyzed: 09/29/16						
Total Organic Carbon	10.6	0.300	mg/L	10.0		106	85-115	1.96	20	
Duplicate (AI63861-DUP1)	**Source: 16I2213-02**			Prepared & Analyzed: 09/29/16						
Total Organic Carbon	0.916	0.300	mg/L		0.866			5.60	20	
Matrix Spike (AI63861-MS1)	**Source: 16I2213-02**			Prepared & Analyzed: 09/29/16						
Total Organic Carbon	21.5	0.600	mg/L	20.0	0.866	103	70-130			
Matrix Spike Dup (AI63861-MSD1)	**Source: 16I2213-02**			Prepared & Analyzed: 09/29/16						
Total Organic Carbon	21.7	0.600	mg/L	20.0	0.866	104	70-130	1.09	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: 25-1310	10/07/16 08:13

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AJ63130 - General Preparation										
Blank (AJ63130-BLK1)				Prepared & Analyzed: 10/03/16						
Tannins & Lignins	ND	0.50	mg/L							
LCS (AJ63130-BS1)				Prepared & Analyzed: 10/03/16						
Tannins & Lignins	4.20	0.50	mg/L	4.00		105	80-120			
LCS Dup (AJ63130-BSD1)				Prepared & Analyzed: 10/03/16						
Tannins & Lignins	4.27	0.50	mg/L	4.00		107	80-120	1.70	20	
Duplicate (AJ63130-DUP1)		Source: 16I2103-01		Prepared & Analyzed: 10/03/16						
Tannins & Lignins	ND	0.50	mg/L		ND				200	
Matrix Spike (AJ63130-MS1)		Source: 16I2103-01		Prepared & Analyzed: 10/03/16						
Tannins & Lignins	3.60	0.50	mg/L	4.00	ND	90.0	80-120			
Matrix Spike Dup (AJ63130-MSD1)		Source: 16I2103-01		Prepared & Analyzed: 10/03/16						
Tannins & Lignins	3.57	0.50	mg/L	4.00	ND	89.1	80-120	1.01	20	

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Alpha Analytical Laboratories Inc.
e-mail: clientservices@alpha-labs.com
Corporate: 208 Mason St., Ukiah, CA 95482 • Phone: (707) 468-0401 • Fax: (707) 468-5267
Bay Area: 6398 Dougherty Rd., Suite 35, Dublin, CA 94568 • Phone: (925) 828-6226 • Fax: (925) 828-6309
Central Valley: 9090 Union Park Way, Suite 113, Elk Grove, CA 95624 • Phone: (916) 686-5190 • Fax: (916) 686-5192

Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: 25-1310	10/07/16 08:13

Notes and Definitions

P-04	This analysis was run from a plastic container because a glass container was not provided.
ND	Analyte NOT DETECTED at or above the reporting limit
dry	Sample results reported on a dry weight basis
REC	Recovery
RPD	Relative Percent Difference

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October 12, 2016

Alpha Analytical Laboratories, Inc.
208 Mason St.
Ukiah, CA 95482

Lab ID : SP 1611469
Customer : 2-20626

Laboratory Report

Introduction: This report package contains total of 3 pages divided into 3 sections:

Case Narrative	(1 pages)	: An overview of the work performed at FGL.
Sample Results	(1 page)	: Results for each sample submitted.
Quality Control	(1 page)	: Supporting Quality Control (QC) results.

Case Narrative

This Case Narrative pertains to the following samples:

Sample Description	Date Sampled	Date Received	FGL Lab ID #	Matrix
16I2103-01 ESW-9-21-15:00	09/21/2016	09/27/2016	SP 1611469-001	W

Sampling and Receipt Information: All samples were received in acceptable condition and within temperature requirements, unless noted on the Condition Upon Receipt (CUR) form. All samples arrived at 6 °C. All samples were prepared and analyzed within the method specified hold time. All samples were checked for pH if acid or base preservation is required (except for VOAs). For details of sample receipt information, please see the attached Chain of Custody and Condition Upon Receipt Form.

Quality Control: All samples were prepared and analyzed according to the following tables:

Radio QC

900.0	10/06/2016:214631 All analysis quality controls are within established criteria.
	10/04/2016:211974 All preparation quality controls are within established criteria, except: The following note applies to Gross Alpha: 435 Sample matrix may be affecting this analyte. Data was accepted based on the LCS or CCV recovery.

Certification:: I certify that this data package is in compliance with ELAP standards, both technically and for completeness, except for any conditions listed above. Release of the data contained in this data package is authorized by the Laboratory Director or his designee, as verified by the following electronic signature.

KD:DMB

Approved By **Kelly A. Dunnahoo, B.S.** Digitally signed by Kelly A. Dunnahoo, B.S.
Title: Laboratory Director
Date: 2016-10-12

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA ELAP Certification No. 1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-8435
CA ELAP Certification No. 2810

October 12, 2016

Alpha Analytical Laboratories, Inc.
208 Mason St.
Ukiah, CA 95482

Lab ID : SP 1611469-001
Customer ID : 2-20626

Sampled On : September 21, 2016-15:00
Sampled By : Not Available
Received On : September 27, 2016-11:40
Matrix : Water

Description : 16I2103-01 ESW-9-21-15:00
Project : 16I2103

Sample Result - Radio

Constituent	Result ± Error	MDA	Units	MCL/AL	Sample Preparation Method	Sample Preparation Date/ID	Sample Analysis Method	Sample Analysis Date/ID
Radio Chemistry[P:1]								
Gross Alpha	0.844 ± 1.40	1.75	pCi/L	15/5	900.0	10/04/16-14:55 2P1611974	900.0	10/06/16-14:00 2A1614631

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (P) Plastic Preservatives: N/A * PQL adjusted for dilution.

MDA = Minimum Detectable Activity (Calculated at the 95% confidence level) = Data utilized by DHS to determine matrix interference.
MCL / AL = Maximum Contamination Level / Action Level. Alpha's Action Level of 5 pCi/L is based on the Assigned Value (AV).
AV = Assigned Value(Gross Alpha Result + (0.84 x Error)). CCR Section 64442: Drinking Water Compliance Note: Do the following
If Gross Alpha's (AV) exceeds 5 pCi/L run Uranium. If Gross Alpha's (AV) minus Uranium exceeds 5 pCi/L run Radium 226.

Drinking Water Compliance:
Gross Alpha (AV) minus Uranium is less than or equal to 15 pCi/L
Uranium is less than or equal to 20 pCi/L
Radium 226 + Radium 228 is less than or equal to 5 pCi/L

Note: Samples are held for 3-6 months prior to disposal.

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Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)783-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
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October 12, 2016 Lab ID : SP 1611469
Alpha Analytical Laboratories, Inc. Customer : 2-20626

Quality Control - Radio

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Radio								
Alpha	900.0	10/06/16:214631caa	CCV	cpm	8567	42.4 %	39 - 48	
			CCB	cpm		0.100	0.14	
Gross Alpha	900.0	10/04/16:211974ELC	Blank	pCi/L		0.93	3	
			LCS	pCi/L	107.4	95.6 %	75-125	
			MS	pCi/L	107.4	148 %	60-140	435
		(SP 1611307-001)	MSD	pCi/L	107.4	132 %	60-140	
			MSRPD	pCi/L	107.4	11.6%	≤30	

Definition

CCV	: Continuing Calibration Verification - Analyzed to verify the instrument calibration is within criteria.
CCB	: Continuing Calibration Blank - Analyzed to verify the instrument baseline is within criteria.
Blank	: Method Blank - Prepared to verify that the preparation process is not contributing contamination to the samples.
LCS	: Laboratory Control Standard/Sample - Prepared to verify that the preparation process is not affecting analyte recovery.
MS	: Matrix Spikes - A random sample is spiked with a known amount of analyte. The recoveries are an indication of how that sample matrix affects analyte recovery.
MSD	: Matrix Spike Duplicate of MS/MSD pair - A random sample duplicate is spiked with a known amount of analyted. The recoveries are an indication of how that sample matrix affects analyte recovery.
MSRPD	: MS/MSD Relative Percent Difference (RPD) - The MS relative percent difference is an indication of precision for the preparation and analysis.
DQO	: Data Quality Objective - This is the criteria against which the quality control data is compared.

Explanation

435	: Sample matrix may be affecting this analyte. Data was accepted based on the LCS or CCV recovery.

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Alpha Analytical Laboratories Inc
www.alpha-labs.com
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Corporate Laboratory
208 Mason Street, Ukiah CA 95482
707-468-0401 F) 707-468-5267
clientservices@alpha-labs.com

Bay Area Laboratory
6398 Dougherty Road, #35, Dublin, CA 94568
925-828-6226 F) 925-828-6309

Central Valley Laboratory
9090 Union Park Wy #113, Elk Grove, CA 95624
916-686-5190 F) 916-686-5192

Work Order
Chain of Custody Record

Lab No 16I2103 Page 1 of 1

2.0

Signature below authorizes work under terms stated on reverse side

Name: Town of Windsor - Drinking Water	Project ID: Esposti Well
Mailing Address: 9291 Old Redwood Highway Building 400, Windsor, CA 95492	Phase: Project ID: 25-1310
Project Contact (Hardcopy or PDF to): Elizabeth Cargay, ecargay@townofwindsor.com; Kent O'Brien, kobrien@hazenandsawyer.com	PO# 200336
	Bill to: SEE NOTE: WEEKS ? TOWN OF WINDSOR

TAT: 24 hr ◯ 48 hr ⊗ (Lab Approval Required) 1 wk ◯ 2 wk (standard) ⊗ — Lab Approval Required For Rush

Field Sampler - Print Name & Signature: RYAN CRAWFORD

Sample Identification	Sample Collection Date	Time	Container: 40ml VOA	Poly	Amber	Glass	Preservative: HCL	HNO3	H3PO4	Other	None	Matrix: Water	Soil	TSS	TOC	Gross Alpha	Tannins	200.8 As	200.7 Fe/Mn/Ca/Mg/K/Na	Alkalinity	Chloride	Nitrate/Nitrite as N	Sulfate	Total Nitrogen (TKN, NO2, NO3)	Silica	Phosphate	As3+ and As5+	200.8 Cr6+	200.6 Cr6+
ESW - -			x	x					x		x	x		x	x	x	x												
ESW-9-21-7:01	9/21/16	7:01																											
ESW-9-21-7:05	↓	7:05																											
ESW-9-21-8:00		8:00																											
ESW-9-21-11:00		11:00																											
ESW-9-21-15:00	↓	15:00																											

GHD SUPPLIED BOTTLES

TSS/TOC/GROSS ALPHA/TANNINS BILL TO TOWN OF WINDSOR, REMAINING ANALYTES BILL TO WEEKS

weeks billing analysis on sep w/o RC

Relinquished by	Received by	Date	Time
Ryan Crawford	David Poma	9/22/16	0815
David Poma		9-22-16	1600

CDPH Write On EDT Report? Yes ◯ No (x)

State System Number:

CA Geotracker EDF Report Yes ◯ No (⊗)

Sampling Company Log Code:

Global ID: EDF to (Email Address):

Travel and Site Time	Mileage	Misc. Supplies

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ELAP Certificates 1551, 2728, and 2922

22 September 2016

Town Of Windsor - Drinking Water
Attn: Elizabeth Cargay
8400 Windsor Rd.
Windsor, CA 95492-0100
RE: Esposti Feasibility Study
Work Order: 16I0423

Enclosed are the results of analyses for samples received by the laboratory on 09/06/16 16:00. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jeanette Poplin

Jeanette L. Poplin For Robbie C. Phillips
Project Manager

Alpha Analytical Laboratories Inc.
e-mail: clientservices@alpha-labs.com
Corporate: 208 Mason St., Ukiah, CA 95482 • Phone: (707) 468-0401 • Fax: (707) 468-5267
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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: #25-1310	09/22/16 13:21

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Esposti Irrigation Well	16I0423-01	Water	09/06/16 10:45	09/06/16 16:00

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: #25-1310	09/22/16 13:21

	Result	Reporting Limit	Dilution	Batch	Prepared	Analyzed	Method	Note
Esposti Irrigation Well (16I0423-01)		**Sample Type: Water**				**Sampled: 09/06/16 10:45**		
Metals (Drinking Water) by EPA 200 Series Methods								
Calcium	**19 mg/L**	**1.0**	1	AI63409	09/20/16 08:00	09/20/16 17:49	EPA 200.7	
Iron	ND ug/L	100	1	AI63409	09/20/16 08:00	09/20/16 17:49	EPA 200.7	
Magnesium	**19 mg/L**	**1.0**	1	AI63409	09/20/16 08:00	09/20/16 17:49	EPA 200.7	
Manganese	**1500 ug/L**	**20**	1	AI63409	09/20/16 08:00	09/20/16 17:49	EPA 200.7	
Potassium	**7.1 mg/L**	**1.0**	1	AI63409	09/20/16 08:00	09/20/16 17:49	EPA 200.7	
Sodium	**31 mg/L**	**1.0**	1	AI63409	09/20/16 08:00	09/20/16 17:49	EPA 200.7	
Metals by EPA 200 Series Methods								
Chromium, hexavalent	ND ug/L	1.0	1	AI63521	09/19/16 15:44	09/19/16 15:44	EPA 218.6	
Metals by EPA Method 200.8 ICP/MS								
Arsenic	**13 ug/L**	**2.0**	4	AI63407	09/19/16 06:35	09/20/16 12:21	EPA 200.8	
Chromium	ND ug/L	10	4	AI63407	09/19/16 06:35	09/20/16 12:21	EPA 200.8	R-01
Vanadium	ND ug/L	3.0	4	AI63407	09/19/16 06:35	09/20/16 12:21	EPA 200.8	R-01
Conventional Chemistry Parameters by APHA/EPA Methods								
Phosphate, Total	**0.95 mg/L**	**0.10**	1	AI63455	09/19/16 07:45	09/19/16 12:57	SM4500-P E	
Silica	**85 mg/L**	**5.0**	5	AI63462	09/19/16 08:14	09/19/16 11:30	SM4500-SiO2 C	
Total Alkalinity as CaCO3	**150 mg/L**	**5.0**	1	AI63242	09/13/16 08:00	09/13/16 16:13	SM2320B	
Total Kjeldahl Nitrogen	ND mg/L	1.0	1	AI63268	09/14/16 06:19	09/15/16 09:57	SM4500-Norg B	
Total Nitrogen	ND mg/L	1.0	1	AI63246	09/12/16 10:47	09/19/16 16:38	SM4500-N	
Anions by EPA Method 300.0								
Chloride	**27 mg/L**	**2.5**	5	AI63111	09/08/16 03:04	09/08/16 03:04	EPA 300.0	
Nitrate as N	ND mg/L	0.20	1	AI63111	09/08/16 03:20	09/08/16 03:20	EPA 300.0	
Nitrite as N	ND mg/L	0.20	1	AI63111	09/08/16 03:04	09/08/16 03:04	EPA 300.0	
Sulfate as SO4	**9.2 mg/L**	**0.50**	1	AI63111	09/08/16 03:20	09/08/16 03:20	EPA 300.0	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: #25-1310	09/22/16 13:21

Metals (Drinking Water) by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AI63409 - Metals Digest										
Blank (AI63409-BLK1)				Prepared & Analyzed: 09/20/16						
Calcium	ND	1.0	mg/L							
Iron	ND	100	ug/L							
Magnesium	ND	1.0	mg/L							
Manganese	ND	20	ug/L							
Potassium	ND	1.0	mg/L							
Sodium	ND	1.0	mg/L							
LCS (AI63409-BS1)				Prepared & Analyzed: 09/20/16						
Calcium	7.31	1.0	mg/L	8.00		91.4	85-115			
Iron	1930	100	ug/L	2000		96.5	85-115			
Magnesium	7.39	1.0	mg/L	8.00		92.4	85-115			
Manganese	192	20	ug/L	200		96.1	85-115			
Potassium	7.74	1.0	mg/L	8.00		96.8	85-115			
Sodium	6.88	1.0	mg/L	8.00		86.0	85-115			
Duplicate (AI63409-DUP1)		**Source: 16I0351-01**		Prepared & Analyzed: 09/20/16						
Calcium	24.8	1.0	mg/L		24.3			1.77	20	
Iron	ND	100	ug/L		ND			3.83	20	
Magnesium	17.2	1.0	mg/L		17.1			0.696	20	
Manganese	ND	20	ug/L		ND			4.49	20	
Potassium	32.1	1.0	mg/L		31.7			1.28	20	
Sodium	93.5	1.0	mg/L		91.8			1.86	20	
Matrix Spike (AI63409-MS1)		**Source: 16I0351-01**		Prepared & Analyzed: 09/20/16						
Calcium	32.5	1.0	mg/L	8.00	24.3	103	70-130			
Iron	2020	100	ug/L	2000	ND	97.5	70-130			
Magnesium	24.5	1.0	mg/L	8.00	17.1	92.2	70-130			
Manganese	203	20	ug/L	200	ND	98.6	70-130			
Potassium	38.4	1.0	mg/L	8.00	31.7	83.8	70-130			
Sodium	98.7	1.0	mg/L	8.00	91.8	86.7	70-130			

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: #25-1310	09/22/16 13:21

Metals (Drinking Water) by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AI63409 - Metals Digest										
Matrix Spike (AI63409-MS2)	**Source: 16I0318-01**			Prepared & Analyzed: 09/20/16						
Calcium	48.0	1.0	mg/L	8.00	37.1	135	70-130			QM-4X
Iron	32300	100	ug/L	2000	30200	107	70-130			
Magnesium	36.2	1.0	mg/L	8.00	27.1	113	70-130			
Manganese	6030	20	ug/L	200	5760	137	70-130			QM-4X
Potassium	9.63	1.0	mg/L	8.00	1.14	106	70-130			
Sodium	28.2	1.0	mg/L	8.00	18.5	121	70-130			
Matrix Spike Dup (AI63409-MSD1)	**Source: 16I0351-01**			Prepared & Analyzed: 09/20/16						
Calcium	33.3	1.0	mg/L	8.00	24.3	112	70-130	2.22	20	
Iron	2160	100	ug/L	2000	ND	105	70-130	6.72	20	
Magnesium	24.8	1.0	mg/L	8.00	17.1	96.4	70-130	1.34	20	
Manganese	217	20	ug/L	200	ND	106	70-130	6.75	20	
Potassium	38.7	1.0	mg/L	8.00	31.7	87.7	70-130	0.806	20	
Sodium	102	1.0	mg/L	8.00	91.8	123	70-130	2.89	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: #25-1310	09/22/16 13:21

Metals by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AI63521 - General Preparation										
Blank (AI63521-BLK1)				Prepared & Analyzed: 09/19/16						
Chromium, hexavalent	ND	1.0	ug/L							
LCS (AI63521-BS1)				Prepared & Analyzed: 09/19/16						
Chromium, hexavalent	9.93	1.0	ug/L	10.0		99.3	90-110			
Duplicate (AI63521-DUP1)	**Source: 16I0423-01**			Prepared & Analyzed: 09/19/16						
Chromium, hexavalent	ND	1.0	ug/L		ND				20	
Matrix Spike (AI63521-MS1)	**Source: 16I0423-01**			Prepared & Analyzed: 09/19/16						
Chromium, hexavalent	9.72	1.0	ug/L	10.0	ND	97.2	90-110			
Matrix Spike (AI63521-MS2)	**Source: 16I1463-01**			Prepared & Analyzed: 09/19/16						
Chromium, hexavalent	9.83	1.0	ug/L	10.0	ND	98.3	90-110			
Matrix Spike Dup (AI63521-MSD1)	**Source: 16I0423-01**			Prepared & Analyzed: 09/19/16						
Chromium, hexavalent	9.60	1.0	ug/L	10.0	ND	96.0	90-110	1.15	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: #25-1310	09/22/16 13:21

Metals by EPA Method 200.8 ICP/MS - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AI63407 - EPA 200.8										
Blank (AI63407-BLK1)				Prepared: 09/19/16 Analyzed: 09/20/16						
Arsenic	ND	2.0	ug/L							
Chromium	ND	10	ug/L							
Vanadium	ND	3.0	ug/L							
LCS (AI63407-BS1)				Prepared: 09/19/16 Analyzed: 09/20/16						
Arsenic	21.9	2.0	ug/L	20.0		110	85-115			
Chromium	20.9	10	ug/L	20.0		104	85-115			
Vanadium	21.0	3.0	ug/L	20.0		105	85-115			
Duplicate (AI63407-DUP1)	**Source: 16I0351-01**			Prepared: 09/19/16 Analyzed: 09/20/16						
Arsenic	6.08	2.0	ug/L		6.63			8.57	20	
Chromium	ND	10	ug/L		ND				20	
Vanadium	ND	30	ug/L		ND				20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: #25-1310	09/22/16 13:21

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AI63242 - General Preparation										
Duplicate (AI63242-DUP1)		**Source: 16I0603-01**		Prepared & Analyzed: 09/13/16						
Total Alkalinity as CaCO3	11.0	5.0	mg/L		11.0			0.00	20	
Batch AI63268 - General Prep										
LCS (AI63268-BS1)				Prepared: 09/13/16 Analyzed: 09/14/16						
Total Kjeldahl Nitrogen	2.95	1.0	mg/L	2.98		99.0	80-120			
LCS Dup (AI63268-BSD1)				Prepared: 09/13/16 Analyzed: 09/14/16						
Total Kjeldahl Nitrogen	2.95	1.0	mg/L	2.98		99.0	80-120	0.00	20	
Matrix Spike (AI63268-MS1)		**Source: 16I0737-03**		Prepared: 09/13/16 Analyzed: 09/14/16						
Total Kjeldahl Nitrogen	3.13	1.0	mg/L	2.98	ND	105	75-125			
Matrix Spike Dup (AI63268-MSD1)		**Source: 16I0737-03**		Prepared: 09/13/16 Analyzed: 09/14/16						
Total Kjeldahl Nitrogen	3.13	1.0	mg/L	2.98	ND	105	75-125	0.00	20	
Batch AI63455 - General Prep										
Blank (AI63455-BLK1)				Prepared & Analyzed: 09/19/16						
Phosphate, Total	ND	0.10	mg/L							
LCS (AI63455-BS1)				Prepared & Analyzed: 09/19/16						
Phosphate, Total	0.590	0.10	mg/L	0.600		98.4	85-115			
Duplicate (AI63455-DUP1)		**Source: 16I1150-01**		Prepared & Analyzed: 09/19/16						
Phosphate, Total	ND	0.10	mg/L		ND			6.35	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: #25-1310	09/22/16 13:21

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AI63455 - General Prep										
Matrix Spike (AI63455-MS1)	**Source: 16I1150-01**			Prepared & Analyzed: 09/19/16						
Phosphate, Total	0.607	0.10	mg/L	0.600	ND	90.7	70-130			
Matrix Spike Dup (AI63455-MSD1)	**Source: 16I1150-01**			Prepared & Analyzed: 09/19/16						
Phosphate, Total	0.607	0.10	mg/L	0.600	ND	90.7	70-130	0.00	20	
Batch AI63462 - General Preparation										
Blank (AI63462-BLK1)				Prepared & Analyzed: 09/19/16						
Silica	ND	1.0	mg/L							
LCS (AI63462-BS1)				Prepared & Analyzed: 09/19/16						
Silica	9.57	1.0	mg/L	10.0		95.7	85-115			
LCS Dup (AI63462-BSD1)				Prepared & Analyzed: 09/19/16						
Silica	9.61	1.0	mg/L	10.0		96.1	85-115	0.411	20	
Duplicate (AI63462-DUP1)	**Source: 16I0685-01**			Prepared & Analyzed: 09/19/16						
Silica	34.3	5.0	mg/L		35.8			4.50	20	
Matrix Spike (AI63462-MS1)	**Source: 16I0685-01**			Prepared & Analyzed: 09/19/16						
Silica	56.1	5.0	mg/L	25.0	35.8	81.3	80-120			
Matrix Spike Dup (AI63462-MSD1)	**Source: 16I0685-01**			Prepared & Analyzed: 09/19/16						
Silica	56.5	5.0	mg/L	25.0	35.8	82.8	80-120	0.700	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: #25-1310	09/22/16 13:21

Anions by EPA Method 300.0 - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AI63111 - General Preparation										
Blank (AI63111-BLK1)				Prepared & Analyzed: 09/07/16						
Nitrate as N	ND	0.20	mg/L							
Sulfate as SO4	ND	0.50	mg/L							
Nitrite as N	ND	0.20	mg/L							
Chloride	ND	0.50	mg/L							
LCS (AI63111-BS1)				Prepared & Analyzed: 09/07/16						
Sulfate as SO4	23.4	0.50	mg/L	22.2		105	90-110			
Nitrite as N	5.85	0.20	mg/L	5.56		105	90-110			
Nitrate as N	5.86	0.20	mg/L	5.56		105	90-110			
Chloride	11.6	0.50	mg/L	11.1		104	90-110			
Duplicate (AI63111-DUP1)	**Source: 16I0425-04**			Prepared & Analyzed: 09/08/16						
Nitrate as N	ND	0.20	mg/L		ND				20	
Nitrite as N	ND	0.20	mg/L		ND				20	
Chloride	ND	0.50	mg/L		ND				20	
Sulfate as SO4	ND	0.50	mg/L		ND				20	
Matrix Spike (AI63111-MS1)	**Source: 16I0425-04**			Prepared & Analyzed: 09/08/16						
Nitrite as N	5.58	0.20	mg/L	5.56	ND	100	80-120			
Chloride	11.4	0.50	mg/L	11.1	ND	102	80-120			
Nitrate as N	5.76	0.20	mg/L	5.56	ND	104	80-120			
Sulfate as SO4	22.8	0.50	mg/L	22.2	ND	103	80-120			
Matrix Spike (AI63111-MS2)	**Source: 16I0362-03**			Prepared & Analyzed: 09/08/16						
Chloride	15.9	2.5	mg/L	11.1	5.03	98.2	80-120			
Nitrate as N	5.32	1.0	mg/L	5.56	ND	95.7	80-120			
Nitrite as N	5.29	1.0	mg/L	5.56	ND	95.2	80-120			
Sulfate as SO4	32.0	2.5	mg/L	22.2	11.1	93.9	80-120			

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: #25-1310	09/22/16 13:21

Anions by EPA Method 300.0 - Quality Control

Analyte(s)	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AI63111 - General Preparation										
Matrix Spike Dup (AI63111-MSD1)	**Source: 16I0425-04**			Prepared & Analyzed: 09/08/16						
Chloride	11.6	0.50	mg/L	11.1	ND	104	80-120	1.65	20	
Nitrate as N	5.85	0.20	mg/L	5.56	ND	105	80-120	1.65	20	
Nitrite as N	5.59	0.20	mg/L	5.56	ND	101	80-120	0.139	20	
Sulfate as SO4	23.1	0.50	mg/L	22.2	ND	104	80-120	1.48	20	

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Town Of Windsor - Drinking Water	Project Manager: Elizabeth Cargay	
8400 Windsor Rd.	Project: Esposti Feasibility Study	Reported:
Windsor, CA 95492-0100	Project Number: #25-1310	09/22/16 13:21

Notes and Definitions

QM-4X	The spike recovery was outside of QC acceptance limits for the MS and/or MSD due to analyte concentration at 4 times or greater the spike concentration. The QC batch was accepted based on LCS and/or LCSD recoveries within the acceptance limits.
R-01	The Reporting Limit for this analyte has been raised to account for matrix interference.
ND	Analyte NOT DETECTED at or above the reporting limit
dry	Sample results reported on a dry weight basis
REC	Recovery
RPD	Relative Percent Difference

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WECK LABORATORIES, INC.

Certificate of Analysis

FINAL REPORT

Work Orders: 6I09025

Project: 16I0423

Report Date: 9/13/2016

Received Date: 9/9/2016

Turnaround Time: Normal

Phones: (925) 828-6226

Fax: (925) 828-6309

P.O. #:

Attn: Robbie Phillips

Client: Alpha Analytical Laboratories - Ukiah
208 Mason St
Ukiah, CA 95482

Dear Robbie Phillips,

Enclosed are the results of analyses for samples received 9/09/16 with the Chain-of-Custody document. The samples were received in good condition, at 3.3 °C and on ice. All analyses met the method criteria except as noted in the case narrative or in the report with data qualifiers.

Sample Results

Sample: 16I0423-01, Alias: Esposti Irrigation Well — Sampled: 09/06/16 10:45 by Client

6I09025-01 (Water)

Analyte	Result	MRL	Units	Dil	Analyzed	Qualifier
Method: IC-ICP/MS **Batch ID:** W6I0467 **Instr:** Inst				**Prepared:** 09/11/16 08:36		**Analyst:** apa
Arsenic III	**0.52**	0.40	ug/l	1	09/11/16 16:57	
Arsenic V	**13**	4.0	ug/l	10	09/11/16 16:57	

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Quality Control Results

Metals by EPA 200 Series Methods

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch: W6I0467 - Direct Injection										
Blank (W6I0467-BLK1)				**Prepared & Analyzed: 09/11/16**						
Arsenic III	ND	0.40	ug/l							
Arsenic V	ND	0.40	ug/l							
LCS (W6I0467-BS1)				**Prepared & Analyzed: 09/11/16**						
Arsenic III	9.56	0.40	ug/l	10.0		96	85-115			
Arsenic V	8.92	0.40	ug/l	10.0		89	85-115			
Matrix Spike (W6I0467-MS1)	**Source: 6H26026-01**			**Prepared & Analyzed: 09/11/16**						
Arsenic III	118	4.0	ug/l	100	ND	118	70-130			
Arsenic V	119	4.0	ug/l	100	5.42	114	70-130			
Matrix Spike (W6I0467-MS2)	**Source: 6I08004-01**			**Prepared & Analyzed: 09/11/16**						
Arsenic III	112	4.0	ug/l	100	0.260	112	70-130			
Arsenic V	139	4.0	ug/l	100	28.7	110	70-130			
Matrix Spike Dup (W6I0467-MSD1)	**Source: 6H26026-01**			**Prepared & Analyzed: 09/11/16**						
Arsenic III	109	4.0	ug/l	100	ND	109	70-130	8	30	
Arsenic V	114	4.0	ug/l	100	5.42	108	70-130	4	30	
Matrix Spike Dup (W6I0467-MSD2)	**Source: 6I08004-01**			**Prepared & Analyzed: 09/11/16**						
Arsenic III	110	4.0	ug/l	100	0.260	110	70-130	2	30	
Arsenic V	140	4.0	ug/l	100	28.7	112	70-130	1	30	

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Notes and Definitions

Item	Definition
ND	NOT DETECTED at or above the Method Reporting Limit (MRL). If Method Detection Limit (MDL) is reported, then ND means not detected at or above the MDL.
Dil	Dilution
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
% Rec	Percent Recovery
Source	Sample that was matrix spiked or duplicated.
MDL	Method Detection Limit
MRL	The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The MRL is also known as Limit of Quantitation (LOQ) and Detection Limit for Reporting (DLR)
MDA	Minimum Detectable Activity
NR	Not Reportable
TIC	Tentatively Identified Compound (TIC) using mass spectrometry. The reported concentration is relative concentration based on the nearest internal standard. If the library search produces no matches at, or above 85%, the compound is reported as unknown.

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.
An Absence of Total Coliform meets the drinking water standards as established by the California State Water Resources Control Board (SWRCB)
All results are expressed on wet weight basis unless otherwise specified.
All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS 002.

Not Certified Analyses Summary

Analyte	CAS #	Not Accredited By
IC-ICP/MS in Water		
Arsenic III	22541-54-4	NELAP
Arsenic V	17428-41-0	NELAP

Reviewed by:

Kim G. Tu
Project Manager

DoD-ELAP #L15-366 ● ELAP-CA #1132 ● EPA-UCMR #CA00211 ● HW-DOH # ● ISO 17025 #L15-365 ● NELAP-OR #4047 ● NJ-DEP #CA015 ● NV-DEP #NAC 445A ● SCAQMD #93LA1006

This is a complete final report. The information in this report applies to the samples analyzed in accordance with the chain-of-custody document. Weck Laboratories certifies that the test results meet all requirements of TNI unless noted by qualifiers or written in the Case Narrative. This analytical report must be reproduced in its entirety.

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Corporate Laboratory
208 Mason Street, Ukiah, CA 95482
707-468-0401 F) 707-468-5267
clientservices@alpha-labs.com

Bay Area Laboratory
6398 Dougherty Road, #35, Dublin, CA 94568
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916-686-5190 F) 916-686-5192

Work Order
Chain of Custody Record

Lab No. 16I0423 Page 1 of 1

Name: Town of Windsor - ~~Drinking Water~~ FEASIBILITY STUDY	**Project ID:** #25-1310
Mailing Address: 9291 Old Redwood Highway Building 400, Windsor, CA 95492	**Phase:** Esposti Well
Project Contact (Hardcopy or PDF to): Elizabeth Cargay, ecargay@townofwindsor.com AND KOBRIEN@HAZENANDSAWYER.COM	**PO#** 200336
	Bill to: month end billing

Signature below authorizes work under terms stated on reverse side.

Analysis Request

TAT: 24 hr ○ 48 hr ○ (Lab Approval Required) 1 wk ○ 2 wk (standard) ⊗ — Lab Approval Required For Rush

Field Sampler - Print Name & Signature	Sample Identification	Sample Collection Date	Sample Collection Time	Container: 40ml VOA	Container: Poly	Container: Amber	Container: Glass	Preservative: HCL	Preservative: HNO3	Preservative: H2SO4	Preservative: Other	Preservative: None	Matrix: Water	Matrix: Soil	X 200.8 As5	X 200.7 Fe/Mn	200.8 Cr	218.6 Cr6	200.7 Ca, Mg, K, Na	Alkalinity	Chloride		Sulfate	Total Nitrogen (includes TKN, NO2, NO3)	Silica	200.8 Vanadium - total	Phosphate	As3 & As5 - sub Weck			
RYAN CRAWFORD Ryan Crawford	Esposti Irrigation Well ~~09-6169~~	9/6/16	1045		x				x	x	x	x	x		X	X	x	x	x	x	x		x	x	x	x	x	x			

BOTTLE KIT ORDER for Esposti Irrigation Well placed 9/1/2016, deliver kit on Friday 9/2/20016 in a cooler to:
Ryan Crawford
2235 Mercury Way, Suite 150,
Santa Rosa, CA 95407

Relinquished by:	Received by:	Date	Time	Global ID:	EDF to (Email Address):
Ryan Crawford	[illegible]	9/6/16	1430	Travel and Site Time:	Mileage: / Misc. Supplies:
[illegible]	[illegible]	9/6/16	1600		

2.2

Appendix K – Comprehensive Analytical Table A

Table A - Comprehesive Analytical Results

Constituent	Analytical Method	Entire Well Pumping at 800 gpm for 28 Hours May 17, 2016 (mg/L[1])	Upper Zone Pumping at 300 gpm for 8 Hours September 21, 2016 (mg/L[1])	Irrigation Well September 6, 2016 (mg/L[1])	State MCL Drinking Water Standard Units in mg/L (Unless Otherwise Noted)
Aluminum	EPA 200.8	<0.050	NA	NA	1.0
Antimony	EPA 200.8	<0.006	NA	NA	0.006
Arsenic	EPA 200.8	**0.057**	**0.035**	**0.013**	0.010
Barium	EPA 200.8	0.150	NA	NA	1.0
Beryllium	EPA 200.8	<0.001	NA	NA	0.004
Boron	EPA 200.7	NA	NA	NA	1 (NL)
Cadmium	EPA 200.8	<0.001	NA	NA	0.005
Calcium	EPA 200.7	22	23	19	
Chromium (Total)	EPA 200.8	<0.010	<0.008	<0.010	0.05
Chromium (Hexavalent)	EPA 200	<0.001	<0.001	<0.001	0.01
Copper	EPA 200.8	<0.050	NA	NA	1.0 (SMCL)
Iron	EPA 200.7	<0.100	0.140	<0.10	0.3 (SMCL)
Lead	EPA 200.7	<0.005	NA	NA	0.015
Magnesium	EPA 200.7	16	18	19	
Manganese	EPA 200.8	**0.860**	**0.910**	**1.5**	0.05 (SMCL)
Mercury	EPA 245.1	<0.001	NA	NA	0.002
Nickel	EPA 200.8	<0.010	NA	NA	0.1
Potassium	EPA 200.7	NA	14	7.1	
Selenium	EPA 200.8	<0.005	NA	NA	0.05
Silver	EPA 200.8	<0.010	NA	NA	0.1 (SMCL)
Sodium	EPA 200.7	53	52	31	
Thallium	EPA 200.8	<0.001	NA	NA	0.002
Gross Alpha	EPA 900.0	0.818 ± 1.44 pCi/L	0.844 ± 1.40 pCi/L	NA	15 pCi/L
Ra 228	Ra - 05	0.049 ± 0.560 pCi/L	NA	NA	2 pCi/L
Uranium	EPA 200.8	<1.0 pCi/L	NA	NA	20 pCi/L
Vanadium	EPA 200.8	<0.003	NA	<0.003	0.05 (NL)
Zinc	EPA 200.8	<0.050	NA	NA	5.0 (SMCL)
Aggressive Index	AWWA	11.68 NU	NA	NA	
Ammonia as NH_3	SM4500/H3N	<0.50	NA	NA	
Bicarbonate	SM2320B	270	NA	NA	
Carbonate	SM2320B	<5.0	NA	NA	
Color	SM2120B	<5.0 CU	NA	NA	15 Units (SMCL)
Cyanide (Total)	10-204-001X	<0.10	NA	NA	0.2
Hydroxide	SM2320B	<5.0	NA	NA	
MBAS, calculated as LAS, mw 340	SM5540C	<0.050	NA	NA	0.5 (SMCL)
Odor	EPA 140.1	<1.0 T.O.N.	NA	NA	
Perchlorate	EPA 314.0	<0.004	NA	NA	0.006
pH	SM4500-H+B	7.60 pH Units	NA	NA	
Phosphate (Total)	SM4500-PE	1.4	1.2	0.95	
Specific Conductance (EC)	SM2510B	520 uS/cm	NA	NA	900 uS/cm (SMCL)
Sulfide	SM4500SD	<0.10	NA	NA	

Constituent	Analytical Method	Entire Well Pumping at 800 gpm for 28 Hours May 17, 2016 (mg/L[1])	Upper Zone Pumping at 300 gpm for 8 Hours September 21, 2016 (mg/L[1])	Irrigation Well September 6, 2016 (mg/L[1])	State MCL Drinking Water Standard Units in mg/L (Unless Otherwise Noted)
Silica	SM4500-SiO2 C	50	86	85	
Total Dissolved Solids	SM2540C	350	NA	NA	500 (SMCL)
Turbidity	SM2130B	0.26 NTU	NA	NA	5 NTU (SMCL)
Total Alkalinity as $CaCO_3$	SM2320B	220	220	150	
Hardness, Total	SM2340B	120	NA	NA	
Chloride	EPA 300.0	21	22	27	250 (SMCL)
Fluoride	EPA 300.0	**0.15**	NA	NA	
Nitrate as N	EPA 300.0	<0.40	<0.20	<0.20	10
Nitrite as N	EPA 300.0	<0.40	<0.20	<0.20	1.0
Total Nitrogen	SM4500-N	NA	<1.0	<1.0	
Total Kjeldahl Nitrogen	SM4500-NorgB	NA	<1.0	<1.0	
Sulfate as SO_4	EPA 300.0	14	14	9.2	250 (SMCL)
Volatile Organic Compounds	EPA 524.2	<0.0005 to <0.010	NA	NA	
Chlorinated Pesticides and PCBs	EPA 508	NA	NA	NA	
Nitrogen- and Phosphorus- Pesticides	EPA 507	<0.0005 to <0.002	NA	NA	
1,2-Dibromo-3-chloropropane	EPA 504.1	<1E-05	NA	NA	
1,2-Dibromoethane (EDB)	EPA 504.1	<2E-05	NA	NA	
Chlorinated Acids	EPA 515.1	<0.0002 to <0.010	NA	NA	
Semivolatile Organic Compounds	EPA 525.2	<0.0001 to <0.005	NA	NA	
Carbofuran	EPA 531.1	NA	NA	NA	0.018
Oxamyl	EPA 531.1	NA	NA	NA	0.05
Glphosate	EPA 547	<0.025	NA	NA	0.7
Endothall	EPA 548.1	NA	NA	NA	0.1
Diquat	EPA 549.2	<0.004	NA	NA	0.02
Tannins & Lignins	SM5550B	NA	<0.50	NA	
Total Suspended Solids	SM2540D	NA	3.5	NA	
Total Organic Carbon	SM5310C	NA	<0.300	NA	

Notes:
1 = Some analytical results are reported in units of µg/L these have been converted to mg/L for ease of comparison with water quality standards
NA = Not analyzed
MCL = Maximum Contaminant Level
SMCL = Secondary Maximum Contaminant Level
NL = Notification Level

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