

APPENDIX A: PRE-SEPTEMBER 2009 ENVIRONMENTAL GROUNDWATER SAMPLING

BASELINE collected fourteen grab-groundwater samples from soil borings and four groundwater samples from piezometers within Contract areas 3, 4, and 5 of the DDRP between December 2008 and April 2009 to characterize groundwater quality across the entire project alignment and the cemetery area. These groundwater samples were collected during drilling of environmental borings in accordance with the scope of work outlined in the *Doyle Drive Replacement Project, License to Enter and Conduct Geotechnical Investigations, Exhibit No. 3, Soil and Groundwater Sampling Work Plan* and subsequent discussions with Caltrans staff. The work plan was prepared by Caltrans and Arup PB Joint Venture and submitted to the Presidio Trust in October 2008.

Grab groundwater samples were collected from most of the environmental soil borings in which groundwater was encountered. Grab groundwater samples were not collected from borings that were drilled using mud rotary drilling methods. In addition, it was determined that not all of the borings in the low-lying Halleck Street area needed to be sampled to allow adequate characterization of groundwater quality in this area. One groundwater sample was collected from an existing piezometer (piezometer 34-0157SB-B3L-PZ) to provide groundwater quality data in an area that groundwater was not encountered in environmental soil borings. Three of the piezometer samples were collected at Caltrans' request to further investigate possible groundwater contamination near boring E078 in the Presidio Cemetery area, where an odor was detected in the groundwater sample.

METHODOLOGY

Grab groundwater samples were collected from environmental soil borings between 15 December 2008 and 15 April 2009. The boring logs for each of the borings and piezometers sampled are included in Appendix AA.

Water samples were collected from the borings when the drillers had reached the target depth for hollow-stem auger drilling for the soil quality investigation.¹ Water samples were collected through the hollow-stem augers using a new disposable bailer (for locations with faster recharge) or a peristaltic pump fitted with new disposable polyethylene tubing (for locations with slower recharge). These borings were not "developed," and therefore the grab groundwater samples exhibited varying levels of turbidity. None of the samples were filtered in the field or by the laboratory prior to analysis. Water quality parameters, including turbidity, of the samples were not measured in the field.

Groundwater samples from the piezometers were collected using a low-flow sampling method developed by the U.S. Environmental Protection Agency.² Groundwater was

¹ In some cases, the borings were extended deeper using a mud rotary drilling method, but the water sample was collected prior to the switch to mud rotary.

² USEPA, 1996, Low-Flow (Minimal Drawdown Ground-Water Sampling Procedure), by Robert Puls and Michael Barcelona in Ground Water Issue, EPA/540/S-95/504, April.

purged at a slow rate from the piezometers using a peristaltic pump equipped with new disposable polyethylene tubing. Water quality indicator parameters (temperature, pH, DO, oxygen-reduction potential, electrical conductivity, and turbidity) were measured in the field with portable equipment. Purging continued until pH and electrical conductivity stabilized. Water level measurements and monitoring details for each piezometer are provided on groundwater sampling forms included in Appendix BB. Purge water generated during sampling activities was placed in properly labeled 55-gallon drums and was disposed of properly along with soil cuttings from the environmental drilling program.

Groundwater samples were decanted either directly from a bailer or from the pump tubing into glass sample bottles supplied by the analytical laboratory. Immediately following sample collection, the sample containers were labeled with the project name, date and time of collection, samplers' initials, unique sample identification, and stored in a cooler containing ice. One duplicate sample was collected for quality control purposes. The groundwater samples were submitted to Curtis & Tompkins, Ltd., a California-certified analytical laboratory, under chain-of-custody procedures. All samples collected from soil borings and piezometer 34-0157SB-B3L-PZ were analyzed for:

- Total Petroleum Hydrocarbons (“TPH-“) Purgeables and/or BTXE (EPA 8015B)
- TPH-Extractables (EPA 8015B) with Silica Gel Cleanup
- Volatile Organics (EPA 8260B)
- Semivolatile Organics (EPA 8270C)
- PCBs (EPA 8082)
- Metals (EPA 6020 and EPA 7470A)
- Ion Chromatography (EPA 300.0)
- Dissolved Sulfide (SM4500S2-D)
- Total Suspended Solids (“TSS”) (SM2540D)
- pH (EPA 9040C)
- Chemical Oxygen Demand (SM5220D)

The samples collected from piezometers BTSB-R1(I), BTSB-R3(I), BTSB-R3(D) were analyzed for:

- TPH-Purgeables and/or BTXE (EPA 8015B)
- TPH-Extractables (EPA 8015B) with Silica Gel Cleanup
- Volatile Organics (EPA 8260B)

- Metals (EPA 6020 and EPA 7470)

DATA EVALUATION METHODOLOGY

Water quality data were screened against EPA Maximum Contaminant Levels (“MCLs”), California Regional Water Quality Control Board, San Francisco Bay Region (“Water Board”) Environmental Screening Levels (“ESLs”) for groundwater and marine surface waters, Water Board Basin Plan Water Quality Objectives, National Pollutant Discharge Elimination System (“NPDES”) trigger compounds, San Francisco Public Utilities Commission (“SFPUC”) batch wastewater discharge requirements, and Presidio Trust surface water, seep, and groundwater cleanup levels, as applicable.

ANALYTICAL RESULTS

Analytical results for all the water samples are summarized in Tables A1 through A6. Various screening levels and thresholds, as requested by Caltrans, are also listed in the tables for compounds with established values. Concentrations that exceed any of the screening levels or thresholds are shaded in the tables. Only applicable screening levels with relevant values are shown on the tables (e.g., there are no ESLs or MCLs for the miscellaneous parameters sampled, so these are not included in the table). Screening levels and thresholds are partially shaded when at least one sample equaled or exceeded the screening level or threshold.

Some of the samples were found to contain metals (Table A2), petroleum hydrocarbons (Table A3), volatile organic compounds (Table A4) and semi-volatile organic compounds (Table A5) above one or more of the applicable screening levels or thresholds. None of the miscellaneous parameters (Table A6) were identified in the samples above applicable screening levels or thresholds (or in the case of pH, outside the acceptable range). None of the samples contained PCBs above laboratory reporting limits and therefore no summary table was prepared for PCBs. Laboratory reports for all samples collected are included in Appendix CC.

APPENDIX AA
BORING LOGS

APPENDIX BB
GROUNDWATER SAMPLING FORMS FOR PIEZOMETERS

APPENDIX CC
LABORATORY REPORTS