Appendix D:
Analytical Methods

APPENDIX D - LABORATORY METHODS

A summary of analytical methods are presented in this section. Greater detail can be found in the project Quality Assurance Project Plan (QAPP) (King County 2016).

D.1 KCEL Analysis

The King County Environmental Laboratory (KCEL) analyzed the samples for all parameters except polychlorinated biphenyls (PCBs). Standard Method SM5310B was used for total organic carbon (TOC) and dissolved organic carbon (DOC) analysis, while Standard Method SM2540D was used for total suspended solids (TSS) analysis. Nutrients were analyzed using SM4500-P-F (orthophosphate phosphorus), SM4500-P-B, F (total phosphorus), SM4500-N-C (total nitrogen), SM4500-NO3-F (nitrate-nitrite nitrogen), and Kerouel & Aminot (1997; ammonia nitrogen). Bacteria was analyzed as fecal coliforms using Standard Method SM9222D.

Total and dissolved metals were analyzed and reported by EPA Method 200.8 (Inductively Coupled Plasma-Mass Spectrometry [ICP-MS]), KCEL SOP 624. The specific metals analyzed included: cadmium, copper, lead, and zinc.

Samples analyzed for polycyclic aromatic hydrocarbons (PAHs) were prepared by liquid-liquid extraction in general agreement with EPA method 3520C. Samples were analyzed by a modified EPA Method 8270 Gas Chromatography/Mass Spectrometry – Selected Ion Monitoring method (GC/MS-SIM; KCEL SOP 731v5). The specific PAHs included: 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(g,h,i)perylene, benzo(a)pyrene, benzo(b,j,k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluorene, fluoranthene, indeno (1,2,3-cd)perylene, naphthalene, phenanthrene, and pyrene.

Toxicity tests were conducted for ten events on samples collected at each site. For most events, two toxicity tests were conducted: (1) a 48-hour acute test with *Daphnia pulex* following KCEL SOP #412v2 and EPA Test Method 2021.0 (acute *Daphnia pulex*), and (2) a 7-day chronic test with *Ceriodaphnia dubia* following KCEL SOP #408v3 and EPA Method 1002.0 (chronic *Ceriodaphnia dubia*).

D.2 PCB Analysis

PCBs are found in up to 209 different chemical forms, called congeners, and were measured using high resolution PCB congener analysis. Analysis followed EPA Method 1668 Revision C (EPA 2010), which is a high-resolution gas chromatography/high-resolution mass spectroscopy (HRGC/HRMS) method using an isotope dilution internal standard quantification. This method provides reliable analyte identification and very low detection limits. An extensive suite of labeled surrogate standards are added before samples are extracted. Data are "recovery-corrected" for losses in extraction and cleanup, and analytes are quantified against their most similar labeled analogues. The analysis included all 209 PCB congeners. Pacific Rim Laboratories (PRL) performed the PCB congener analysis

according to their SOP LAB02. The samples were extracted followed by standard method clean-up, which includes clean up in an acid silica gel column. Analysis is performed with an SGE HT-8 column.

Appendix D References

EPA. 2010. Method 1668C, Chlorinated biphenyl congeners in water, soil, sediment, biosolids, and tissue by HRGC/HRMS. U.S. Environmental Protection Agency, Office of Water, Office Science and Technology, Washington, D.C. EPA-820-R-10-005.

King County. 2016. Quality Assurance Project Plan: Effectiveness Monitoring of the South 356th Street Retrofit and Expansion Project, Federal Way, WA. Prepared by Kate Macneale, Water and Land Resources Division. Seattle, Washington.