APPENDIX G

BMP SUBAREA RANKING ANALYSIS MEMORANDUM
2011/2012 RAINY SEASON

SANTA SUSANA SITE WATERSHED 008 AND 009 BMP SUBAREA RANKING ANALYSIS

August 31, 2012

Santa Susana Site Surface Water Expert Panel

Geosyntec Consultants

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LIST OF ACRONYMS

BEF	Bioaccumulation equivalency factors
BMP	Best management practice
Cd	Cadmium
CM	Culvert modification
COC	Constituent of concern
CV	Coefficient of variation
Cu	Copper
CWB	California Water Board
Det	Detected
DNQ	Detected not quantified
ISRA	Interim Source Removal Action
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
mg/L	milligram per liter
ND	Not detected
NPDES	National Pollutant Discharge Elimination System
Pb	Lead
PL	Permit limit
PS	Particulate strength
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigations
RWQCB	Regional Water Quality Control Board
SSS	Santa Susana Site
SW	Stormwater
Tc	Time of concentration
TCDD	Tetrachlorodibenzo-*p*-dioxin
TEQ	Toxic equivalence
TSS	Total suspended solids
USEPA	U.S. Environmental Protection Agency

EXECUTIVE SUMMARY

The Santa Susana Site (SSS) Surface Water Expert Panel (Expert Panel) was tasked by the Los Angeles Regional Water Quality Control Board (LARWQCB) with evaluating subareas within the SSS Outfall 008 and 009 watersheds for potential implementation of new Best Management Practices (BMPs). These BMPs may include source controls (such as removal of impacted surface soils), erosion and sediment controls (such as straw wattle and hydromulch, and instream measures such as bank stabilization and check dams), and/or treatment controls (such as sediment basins, media filters, and biofilters). The purpose of any new proposed BMPs would be to improve National Pollutant Discharge Elimination System (NPDES) permit compliance at Outfalls 008 and 009 (Order No. R4-2010-0090).

The purpose of this subarea ranking analysis is to rank subareas within Boeing's and NASA's 008 and 009 watersheds for potential implementation of new or enhanced stormwater controls and to evaluate existing measures, based on the most current available data and subarea specific considerations. The Expert Panel's recommended approach to this task is to rank potential BMP subarea monitoring locations based on the results of water quality sample comparisons between (a) stormwater concentrations and permit limits, and (b) stormwater particulate strengths[1] and stormwater background particulate strengths. A statistical methodology was developed to rank the subareas based on these comparison results, while accounting for the number of useable data available at each subarea as well as number of data observations that fall above these thresholds (i.e., reflecting statistical confidence in how frequently each subarea will exceed the comparison thresholds). This methodology relied on "weighting factors" that are calculated for each POC for each subarea. In the end, the pollutant-specific weighting factors were summed to produce a multi-constituent score to allow for relative ranking amongst the potential BMP subareas.

The data included in this analysis fell into the following categories and periods of record: 1) Interim Source Removal Action (ISRA) and culvert modification (CM) performance monitoring data (2009-2012), 2) NPDES outfall monitoring data (2004-2012), and 3) potential BMP subarea monitoring data (2010-2012). Where available, data from co-located ISRA subareas were combined with data from BMP subareas in order to provide a more robust dataset at potential BMP locations. The exact periods of record varied by dataset and by sample subarea. This ranking evaluation occurs annually during the term of the 008/009 BMP Work Plan (i.e., through 2014), therefore this is the second of four annual BMP data analysis and recommendation reports. The first was presented by the Expert Panel and Geosyntec in September, 2011.

[1] Particulate strength is determined by taking the total concentrations of the compound minus its dissolved concentrations and dividing by the total suspended solids. It then provides a measure of the mass of particulate form of the compound per mass of suspended sediment. These values are very useful when identifying erosion and other sources of the particulate-bound pollutants in the runoff.

Subarea Specific Evaluation of Top Ranked Subareas

Based on these analysis results, the following monitoring locations were identified as the highest ranked[2] subareas, with multi-constituent scores ranging from 0.43 to 0.94 (see Table ES-1[3]). Table ES-1 is limited to the top ranked subareas discussed below; a complete summary table is provided in the main report as Table 12. Besides their multi-constituent scores, the following list is also of significance because it included:

- All subareas that were ranked first through fourth for each of the pollutant categories (metals and dioxins);
- All of the top seven subareas with the highest observed dioxin concentrations (noting that the scores do not explicitly account for concentration *magnitude*s, but rather account for *frequency* of exceeding the concentration-based background and permit limit thresholds);
- All four subareas where 2,3,7,8-TCDD was detected (two of which are in the same flow path as the subareas listed below, albeit not the exact same IDs); and
- The highest ranked subarea for TSS, four of the top four ranked subareas for metals, and seven of the top seven ranked subareas for dioxins.

In some cases, these results reflect conditions prior to or following implementation of temporary measures or corrective actions and this is described in parentheses following the location designation (in bold). This list also includes all of the subareas that will receive runoff treatment by the new Boeing treatment control – the Lower Parking Lot sedimentation basin and biofilter – that is under construction and is scheduled to be completed in October 2012. Note that all 11 monitoring locations described below (the top-ranked locations based on available data) are located in the 009 drainage area, with none in the 008 drainage area. In fact, of 63 subareas evaluated, no locations in the 008 drainage area were ranked above 29. This, combined with existing plans for new erosion and sediment controls, allowed the Expert Panel to focus new BMP recommendations entirely on the 009 drainage area this year. Further, water quality at background locations was very good with no location ranked above 29 and very few exceedences of NPDES permit limits.

1. **EVBMP0003** (CM-1 influent west): This monitoring subarea reflects flow from approximately 11.8 acres including the ELV building and surrounding paved areas (including the NASA staging area), vegetated ELV hillside and ISRA areas (most of which are temporarily covered with tarps as of August, 2012), and the paved Area II (NASA) Road. ISRA area ELV-1C is located within this drainage area, and although the soil has not yet been removed, the ISRA area has been covered with a plastic tarp and sandbags to prevent contact with rainfall. Based on 14 events, this subarea ranks 1st overall (multi-constituent score = 0.94), 1st for dioxins, 1st for metals, and 32nd for TSS. CM-1, to which EVBMP0003 drains, is an existing CM that also treats runoff from a 53

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[2] In the case of ties, the average rank was assigned to both subareas.
[3] Subareas with zero samples have been excluded from table ES-1.

acre undisturbed subwatershed (estimated at around 7% capture[4]). Based on four events, the CM-1 effluent subarea (A2SW0002-A) is ranked 15.5 overall (multi-constituent score = 0.43), 19.5 for dioxins, 18.5 for lead, and 28.5 for TSS. The ELV areas currently drain to EVBMP0003 and CM-1 due to an existing broken asphalt channel below the ELV hillside that diverts runoff onto the road and toward CM-1. Working with the Expert Panel, NASA has developed initial plans to reconstruct the channel and to direct runoff from the paved ELV areas west of the helipad toward the helipad where asphalt will be removed and detention/infiltration basins will be created. The Expert Panel continues to recommend this plan, in addition to new actions, to address runoff from this subarea.

2. **B1BMP0004** (B-1 media filter inlet north): This monitoring subarea reflects runoff from approximately 3.7 acres of paved road and post-ISRA restored hillside. Based on 2 events, this subarea is ranked 2nd overall (multi-constituent score = 0.72), 5th for dioxins, 9th for metals, and 74th (lowest) for TSS. This subarea drains to a series of rock check dams and the B-1 media filter which, after filtering runoff, discharges to a natural vegetated drainage across the main entrance road. Based on four events, the B-1 media filter effluent (B1SW0014-B) is ranked 27th overall (multi-constituent score = 0.27), 19.5 for dioxins, 32.5 for metals, and 74th for TSS. Runoff from the paved area and road to the north, which otherwise enters a pipe that conveys runoff under the road and toward B1BMP0004, is slowed by sand bags surrounding the grate inlet. The Expert Panel recommends new actions (minor improvements and maintenance of existing features) to address runoff from this subarea.

3. **ILBMP0001** (Lower Parking Lot 24-inch storm drain): This monitoring subarea reflects flow from 23 acres of paved parking areas, building rooftops, paved storage areas, and undeveloped hillsides. Runoff from these areas is conveyed by a storm drain collection system to a 24-inch storm drain located beneath the Lower Parking Lot. This storm drain discharges via a concrete outlet spillway to the northern drainage on Sage Ranch property. Based on ten events, this subarea is ranked 3rd overall (multi-constituent score = 0.68), 4th for dioxins, 14th for metals, and 39.5 for TSS. The sedimentation basin and biofilter planned for the Lower Parking Lot will treat approximately 40% of the average annual runoff volume from this subarea. Additionally, the removal of building 1300 is complete (replaced by trailers), building 1436 is planned to be demolished in 2013, and a portion of the upper parking lot will be removed in 2013. In combination, these activities will reduce both the impervious area in this drainage area as well as the potential sources associated with building uses. In addition, the Expert Panel recommends new actions to further address runoff from this subarea, such as distributed treatment at the storm drain inlets and/or Low Impact Development (LID)-type features around the remaining buildings and lots.

4. **EVBMP0001-A** (composite of Helipad Road and lower ELV ditch): This monitoring subarea reflects flow from the 1.8 acre paved Area II (NASA) Helipad Road and ELV-1C and ELV-1D ISRA

[4] Overflows also get partial treatment through sedimentation.

areas, composited (50/50) with flow from the 0.7 acre portion of the ELV vegetated hillside that enters, and remains in, the ELV asphalt ditch. Based on five events, this subarea was ranked 4th overall (multi-constituent score = 0.67), 3rd for dioxins, 16.5 for metals, and 15th for TSS. The highest measured TCDD TEQ (no DNQ) concentration (2.1×10^{-4} µg/L) was found here, including the detection of the 2,3,7,8-TCDD congener (2.2×10^{-5} µg/L). Prior to compositing with flows from the lower ELV ditch (EVBMP0001), this subarea reflected runoff from only the Helipad Road gutter, and based on three events, was ranked 34th overall, 31.5 for dioxins, 25th for metals, and 15th for TSS, suggesting that flow from the lower ELV ditch contributes the majority of dioxins at this location. NASA had intended to remove soils at ISRA areas ELV-1C and ELV-1D in the summer of 2012 but determined it could not take action until DTSC approved use of use of the December 2011 EPA RTLs for the soils. Soil removal at ISRA areas ELV-1C and ELV-1D is planned for late 2012, or early 2013. The Expert Panel recommends new actions to address runoff from this subarea.

5. **EVBMP0002** (Helipad – pre sandbag berms): This monitoring subarea is in Area II (NASA) and reflects flow from the 4.1 acre paved helipad area. Based on six events, this subarea is ranked 5.5 overall (tied with ILBMP0002 with a multi-constituent score = 0.66), 6th for dioxins, 15th for metals, and 31st for TSS. This subarea's ranking dropped to 36th overall , 29.5 for dioxins, 40th for metals, and 74th for TSS after implementation of the temporary sandbag berm controls (EVBMP0002-A, based on five events), suggesting that long-term controls at this subarea are needed and are expected to further improve water quality. In the short term (planned for 2012), NASA intends to hole-punch the asphalt behind the berms (to encourage infiltration) and to heighten the existing sandbag berms. Long-term plans (2013) by NASA (with Expert Panel input) include the removal of 3.7 acres of asphalt, creation of scalloped depressions (to form detention/infiltration basins), and routing of runoff from paved ELV areas towards these basins. NASA had intended to implement BMPs here in the summer of 2012 but determined that it could not take action until DTSC approved use of the December 2011 EPA RTLs for the soils. If the recommended actions cannot be completed in 2012, the Expert Panel recommends extending the height of the sandbag berms to better capture runoff from larger rains from this subarea, which would cause overflows with the current berm height. Hole punching in the asphalt could also assist with some increased infiltration.

6. **ILBMP0002** (road runoff to CM-9): This subarea reflects runoff from a 2.5 acre drainage area including paved road and undeveloped hillsides. Based on seven events, this subarea is ranked 5.5 overall (tied with EVBMP0002 with a multi-constituent score = 0.66), 12th for dioxins, 3rd for metals, and 15th for TSS. ILBMP0002 drains to CM-9, which filters runoff through a horizontal media bed (estimated at 10% capture with the current culvert modification size). Based on four events, the effluent from CM-9 (A1SW0009-B) is ranked 15.5 overall, 19.5 for dioxins, 18.5 for metals, and 15th for TSS. The Expert Panel recommends new actions to address runoff from this subarea to increase the runoff capture and treatment.

7. **A1SW0009-A** (CM-9 downstream underdrain outlet, post-building 1324 parking lot asphalt removal, pre-filter fabric over weir boards): This subarea reflects treated runoff (estimated at 15% capture[5]) from a 16.4 acres drainage area, consisting of road runoff (ILBMP0002), a stabilized dirt road, rocky hillsides, and the AILF. Based on one event, this subarea is ranked 7th overall (multi-constituent score = 0.63), 19.5 for dioxins, 2nd for metals, and 74th for TSS. In January of 2012, filter fabric was installed over the weir boards to decrease the outflow rate and increase the residence time. Based on four events, this subarea (A1SW0009-B) is now ranked 15.5 (multi-constituent score = 0.43), 19.5 for dioxins, 18.5 for metals, and 15th for TSS after these improvements. The Expert Panel recommends new actions to address runoff from this subarea.

8. **APBMP0001-A** (Ash Pile culvert inlet/road runoff): This Area II (NASA) subarea reflects runoff from 34 acres, including several flat ISRA areas distributed throughout a relatively flat drainage area as well as the adjacent road, which was observed to be the only contributor to runoff at this subarea. Based on two events, this subarea is ranked 8th overall (multi-constituent score = 0.60), 19.5 for dioxins, 4th for metals, and 74th for TSS. Both samples were collected after the ISRA areas had been partially excavated and covered with plastic. It is anticipated that the AP/STP ISRA excavation will be completed in 2012. The Expert Panel recommends no new actions at this time to address runoff from this subarea.

9. **LPBMP0001-A** (Lower Parking Lot sheetflow, post-gravel bag berms): This subarea reflects runoff from 5.1 acres of mostly paved parking and road areas, after the gravel bag berms were installed in September of 2011 to slow runoff and allow for some detention. Soil management and contractor staging activities are also planned to occur here, but were not present during this most recent monitoring period. Based on six events, this subarea is ranked 9th overall (multi-constituent score = 0.52), 2nd for dioxins, 30th for metals, and 27th for TSS. This same subarea, based on two events prior to the installation of the gravel bag berms (LPBMP0001), was ranked 12.5 overall (multi-constituent score = 0.50), 19.5 for dioxins, 9th for metals, and 15th for TSS. This area will soon be treated with a sedimentation basin and biofilter BMP, in anticipation of increased soil stockpile activity, and as such, the Expert Panel currently recommends no new actions to address runoff from this subarea.

10. **B1BMP0003** (B-1 parking lot/road runoff to culvert inlet): This 5.2 acre subarea reflects runoff from an asphalt parking lot (0.8 acres), paved road, B-1 ISRA areas, and undeveloped hillsides. Based on 12 events, this subarea is ranked 17th overall (multi-constituent score = 0.43), 7th for dioxins, 38th for metals, and 33rd for TSS. Asphalt removal of the upper lot is planned for completion by 2013, and this is anticipated to significantly decrease the impervious area that drains toward this monitoring location, resulting in decreased runoff. The Expert Panel recommends no new actions at this time to address runoff from this subarea.

[5] Overflows also get partial treatment through sedimentation.

11. **LXBMP0004** (LOX southwest downstream of sandbag berm): This 10.6 acre subarea reflects runoff from the ISRA LOX area, downstream of the temporary sandbag berm. Based on five events, this site is ranked 28th overall (multi-constituent score = 0.26), 40.5 for dioxins, 9th for metals, and 1st for TSS. The northern drainage RMMP, planned for 2012, will stabilize this embankment and add slope drains. The LOX ISRA excavation is also tentatively planned for 2013. This is anticipated to reduce the TSS loading, and as such, the Expert Panel currently recommends no new actions to address runoff from this subarea.

Table ES-1. Subareas Ranked by Multi-Constituent Score (subareas recommended for new stormwater controls are highlighted)

Rank from Average Weights	Potential BMP Subarea (Co-location(s))	Watershed	Description	Approx. Upstream DA (ac)	Events Sampled	Multi-constituent Score	Rank from Max Metal Weight	Rank from Max Dioxin Weight	Rank from TSS Weight
1	**EVBMP0003 (A2SW0001)**[ab]	Outfall 009	ELV road runoff/CM-1 upstream west	11.8	14	0.94	1	1	32
2	**B1BMP0004 (B1SW0015)** [a]	Outfall 009	B-1 media filter inlet north	3.7	2	0.72	9	5	74
3	**ILBMP0001**[b]	Outfall 009	Lower parking lot 24" stormdrain	23	10	0.68	14	4	39.5
4	**EVBMP0001-A**[b]	Outfall 009	ELV culvert inlet (helipad road and ELV ditch, composite)	2.5	5	0.67	16.5	3	15
5.5	**EVBMP0002**[b]	Outfall 009	Helipad (pre-sandbag berms)	4.1	6	0.66	15	6	31
5.5	**ILBMP0002**[a]	Outfall 009	Road runoff to CM-9	2.5	7	0.66	3	12	15
7	**A1SW0009-A**	Outfall 009	CM-9 downstream-underdrain outlet (post-building 1324 parking lot asphalt removal, pre-filter fabric over weir boards)	16.4	1	0.63	2	19.5	74
8	**APBMP0001**	Outfall 009	Ashpile culvert inlet / road runoff	34	2	0.60	4	19.5	74
9	**LPBMP0001-A**[b]	Outfall 009	Lower Parking Lot sheetflow (post-gravel bag berms)	5.1	6	0.52	30	2	27
12.5	LPBMP0001[b]	Outfall 009	Lower Parking Lot sheetflow (pre-gravel bag berms)	5.1	2	0.50	9	19.5	15
15.5	**A2SW0002-A**	Outfall 009	CM1 effluent (post-filter fabric over weir boards)	52.8	4	0.43	18.5	19.5	28.5
15.5	A1SW0009-B	Outfall 009	CM-9 downstream-underdrain outlet (post-filter fabric over weir boards, post-building 1324 parking lot asphalt removal)	16.4	4	0.43	18.5	19.5	15
17	**B1BMP0003 (B1BMP0002)**	Outfall 009	B-1 parking lot / road runoff to culvert inlet	5.2	12	0.43	38	7	33
27	B1SW0014-B	Outfall 009	B-1 media filter effluent (post-media filter reconstruction)	4.7	4	0.27	32.5	19.5	74
28	LXBMP0004[b]	Outfall 009	LOX southwest downstream of sandbag berm	10.6	5	0.26	9	40.5	1
34	EVBMP0001[b]	Outfall 009	ELV culvert inlet (helipad road gutter)	1.8	3	0.11	25	31.5	15
36	EVBMP0002-A[ab]	Outfall 009	Helipad (post-sandbag berms)	4.1	5	0.09	40	29.5	74

Notes

1) Potential BMP subareas sorted by multi-constituent score, computed as described in Section 5.
2) ([a]) These potential BMP subarea monitoring subareas are upstream of existing stormwater quality treatment controls.
3) ([b])These potential BMP subarea monitoring subareas have new planned (i.e., designed and ready for construction) stormwater quality treatment controls.
4) (**) NPDES outfalls are included for comparison and method testing purposes only, stormwater controls are not being contemplated at these locations.
5) The rounding of weights may account for similar weights being ranked differently
6) Approximate drainage areas based on the cumulative drainage area of the SWMM catchment in which the monitoring location is located (Geosyntec, 2011). At locations where the monitoring point is upstream of the catchment outfall a "<" sign is used.
7) Bolded locations indicate that both the NPDES permit limit and 95th percentile background particulate strength threshold were exceeded for any one POC

Multi-constituent scores can be further used to evaluate water quality pre- and post-modification (where “modification” is used to describe new or enhanced stormwater quality management or source control activities) at specific subareas. As shown in Table ES-2, a clear improvement in rank is shown for the post-modification subareas CM-9 and the helipad subarea. Subareas sampled pre-modification are ranked from 8.5 to 30.5 positions higher than the same subareas sampled post-modification, demonstrating that the modifications in fact resulted in better water quality.

Table ES-2. Specific BMP Area Ranking Improvements

BMP Area	Modification	Rank Pre-Modification	Rank Post-Modification	Rank Change
CM-9	Filter fabric installed over weir boards, asphalt removed from building 1324 parking lot area	7.0	15.5	+8.5
Helipad	Temporary sand-bag berms installed	5.5	36.0	+30.5

Additionally, Table ES-3 summarizes instances where the monitored effluent is ranked lower than the monitored influent, demonstrating that treatment through the CM/media filters listed resulted in improved water quality. For example, four influent streams within the B-1 area (ranked 2 – 18) are all ranked higher than the B-1 effluent, which is ranked 27. A similar occurrence is observed for the influent/effluent ranks for CM-1, CM-9, CM-3, CM-8, and CM-11.

Table ES-3. Current Controlled Locations, Ranking Comparisons

BMP Area	Influent		Effluent		Rank Change
	Description	Rank	Description	Rank	
CM-1	ELV road runoff/CM-1 upstream west	1	CM-1 effluent (post-filter fabric over weir boards)	15.5	+14.5
CM-9	Road runoff to CM-9	5.5	CM-9 downstream-underdrain outlet (post-filter fabric over weir boards, post-building 1324 parking lot asphalt removal)	15.5	+10
B-1	B-1 media filter inlet north	2	B-1 media filter effluent	27	+25
B-1	B-1 combined media filter influent	10	B-1 media filter effluent	27	+17
B-1	B-1 north road runoff	12.5	B-1 media filter effluent	27	+14.5
B-1	B-1 media filter inlet south	18	B-1 media filter effluent	27	+9
CM-3	CM-3 upstream	37.5	CM-3 downstream (post-filter fabric over weir boards)	47	+9.5
CM-8	CM-8 upstream	48	CM-8 downstream (post-filter fabric over weir boards)	50	+2
CM-11	CM-11 upstream	42	CM-11 downstream (post-filter fabric over weir boards)	44	+2

New BMP Recommendations

Based on the above ranking results, and utilizing best professional judgment (including consideration of information on planned ISRA and demolition measures), the following new BMPs are recommended by the Expert Panel and observations during field visits. Additional detail on these BMP concepts and implementation schedule will be provided in the BMP Work Plan Addendum, which will be submitted to the RWQCB in September 2012. Since the majority of these improvements would be completed during the summer of 2013, these recommendations may be reevaluated based on monitoring data from the 2012/2013 rainy season.

1. **ELV/CM-1 (NASA):** The Expert Panel recommends that NASA proceed with repairing the ELV asphalt ditch, as recommended in the Expert Panel's 2011 BMP recommendation report (Geosyntec and Expert Panel, 2011). Additionally, the Expert Panel recommends consideration of a treatment BMP (e.g., sedimentation basin/media filter) to address runoff collected in the repaired ELV ditch; a potential location for this new BMP could be on the south side of the Area II road, at the former groundwater treatment system location or around the nearby AP/STP ISRA areas after soil removal. This would treat runoff from both the ELV hillside, which currently bypasses the ELV culvert inlet, as well as the 0.7 acre area which enters the lower ELV ditch and culvert beneath Helipad Road. Both subareas have been identified as high-priority. The Expert Panel also recommends improving the existing upstream CM-1 sandbag berm and CM-1 media filter. Bypassing runoff from the background eastern tributary around the CM-1 media bed (e.g., by reconstructing CM-1 at the base of ISRA area A2LF3), if feasible, would also allow for more focused treatment of the other high priority western drainage. The planned diversion of the upper paved ELV area to the helipad will also decrease flows to CM-1.
2. **24-inch drain beneath Lower Parking (Boeing):** The Expert Panel recommends biofiltration where possible, particularly around storm drain inlets near the surface storage areas. If space is limited, upflow media filters or equivalent above-ground natural treatment systems could also be installed. The Expert Panel also recommends a grass swale along the edge of the remaining upper parking lot, and biofilters or low impact development (LID) features around any new building trailers.
3. **B-1 Area (Boeing):** The Expert Panel recommends minor improvements and maintenance activities to enhance the performance of the existing media filter. The Expert Panel recommends curb cuts along the entrance road northwest of the existing rock check dams to allow runoff from the pavement to enter the north side of the B-1 media filter, rather than the south side, which has less sedimentation area compared to the north and would benefit from balancing loading between the north and south sides. Since the downslopes areas are steep, the curb cuts would need some energy dissipation in the form of rock placement. Similarly, the Expert Panel also recommends curb cuts along the top of the planted area across the road from the B-1 media filter to provide additional retention of runoff before entering the northern drainage. The Expert Panel also recommends that the existing pretreatment rock check dams be maintained and the B-1 hillside be reseeded, mulched and temporarily irrigated.

4. **CM-9 (Boeing):** The Expert Panel recommends that the steep roadside embankments on both sides of the Area II road be stabilized with toe wattles, hydroseed, and/or other methods, to hold these loose soils in place and reduce sediment delivery to the road gutter and to the downstream pipe at ILBMP0002. The Expert Panel also recommends wattles along the channel or dirt path below and west of the former building 1300. The Expert Panel recommends that the ILBMP0002 pipe be connected to a perforated pipe, and extended along the slope parallel to the contours, to the southwest, to distribute flows and allow for infiltration of low flows along the hillside. The addition of a pretreatment forebay in or near the drainage, and improvement of the CM-9 media filter (possibly reconfiguring to a vertical media filter similar to that at B-1 but with greater media thickness and/or contact time) are also recommended by the Expert Panel.

Additionally, the Expert Panel reviewed 2011/12 NPDES compliance monitoring results, including Outfall 008 where the only sample collected (the 008 drainage area produces far less runoff than the 009 area) slightly exceeded for lead and copper, and TSS was relatively high. Based on visual observations and ISRA/BMP monitoring results, the west tributary in the 008 area has very good water quality whereas the east tributary appears to be contributing greater sediment loads. Since the above priority BMP subareas do not address water quality in the 008 watershed, the Expert Panel recommends additional corrective actions here. These recommended measures, for both the dirt road and adjacent to the outfall flume, were communicated to Boeing and their consultants, and are currently (August 2012) being implemented.

Recommended measures for the dirt road include:

- Erosion controls on a steep section of an access road to an existing monitoring well;
- Extending the culvert inlet riser pipe to allow greater ponding depth; and
- Replacement of an existing hay bale barrier and silt fences near this monitoring well with riprap and gravel berms (along the eastern tributary).

Recommended measures in the vicinity of the outfall flume include:

- Replacement of existing silt fence near the outfall;
- Stabilization of loose sediment along the slopes surrounding the outfall flume;
- Installation of rock berms along the downstream outlet of the east tributary;
- Rebuilding the upstream entrance wing wall on the south side fo the channel, immediately above the flume, to prevent erosion; and
- Refreshing of the existing rock bed immediately upstream of the outfall flume.

Although this analysis primarily focuses on the selection of potential stormwater treatment control locations, the Expert Panel continues to strongly recommend the rigorous application of erosion and sediment control practices and stream channel stabilization measures throughout the 008 and 009 watersheds, including and especially at areas where substantial soil removal may be planned at steep areas and/or in proximity to drainage courses (such as at ELV, LOX, or the A2LF ISRA areas). The Expert

Panel also continues to recommend the stabilization of unpaved roads and the implementation of source controls (including source removal, such as through the ISRA and demo programs). Finally, it is important that routine maintenance be undertaken at all CM locations and where sedimentation basins have been constructed (e.g. above B-1).

The Expert Panel also specifically encourages progress on Boeing’s Lower Parking Lot biofilter, the ND RMMP, NASA’s helipad asphalt removal and infiltration basin BMP, and NASA’s ISRA activities in Area II.

The Expert Panel believes that these new and planned activities, taken together, will improve the likelihood of NPDES compliance at Outfalls 008 and 009, based on currently available information.

1. INTRODUCTION

The purpose of this analysis is to rank subareas in the Santa Susana Site (SSS) Outfall 008 and 009 watersheds for potential implementation of new or enhanced stormwater controls[6], to improve National Pollutant Discharge Elimination System (NPDES) permit compliance at Outfalls 008 and 009. The SSS Stormwater Expert Panel's (Panel) recommended approach[7] is to:

1. Compare potential BMP subarea[8] monitoring results with subarea-specific stormwater background[9] data and NPDES permit limits;
2. Determine pollutant-specific "weighting factors" for each potential BMP subarea monitoring subarea based on this comparison (using a statistical methodology that accounts for sample size and number of results that are above both of these thresholds), with the highest weighting factors assigned to subareas that most frequently exceed both of these thresholds;
3. Determine multi-constituent ranking "scores" for each subarea based on the pollutant-specific weighting factors; and
4. Rank the potential best management practices (BMP) subarea monitoring subareas based on these multi-constituent ranking scores.

This general approach is summarized in the flow chart included as Attachment 1. SSS stormwater background concentrations are established based on data from Interim Source Removal Action (ISRA) performance and potential BMP subarea monitoring locations that represent runoff from drainage areas with minimal to no RCRA Facility Investigations (RFI), ISRA, or developed (i.e., roof or pavement) areas. The selection of potential BMP subarea monitoring locations is described in the December 16, 2010

[6] For the purpose of this report, the overarching term "stormwater controls" will be used to describe the standard suite of passive control practices, including erosion controls, sediment controls, and treatment controls. For detailed definitions or examples of erosion and sediment controls, see the CASQA Construction BMP Handbook at http://www.cabmphandbooks.com; for a detailed definition or examples of treatment controls, see the Ventura County Technical Guidance Manual for Stormwater Quality Control Measures at http://www.vcstormwater.org/documents/workproducts/technicalguidancemanual/2010final/Ventura_TGM%2011-4-10.pdf. The more general term, "Best Management Practice" (or BMP), is used in this report as a synonym for "stormwater control" but is used only for referencing the "potential BMP subarea monitoring subareas," or monitoring locations where new stormwater controls are being contemplated based on a review of available monitoring results.

[7] The recommended approach outlined herein was developed jointly by the SSS Stormwater Expert Panel and Geosyntec Consultants, with review from The Boeing Company, NASA, and the Los Angeles Regional Water Quality Control Board.

[8] "Potential BMP subarea monitoring locations" are defined here as drainage areas with an outlet location for stormwater runoff sampling, and including land uses that include ISRA, RCRA Facility Investigation (RFI), and/or developed areas (i.e., subareas containing buildings, asphalt parking lots, roads, etc.) so that impacted runoff quality might be expected and/or treatment BMPs might be necessary, pending an evaluation of the monitoring results.

[9] "Stormwater background monitoring locations" are defined here as locations in these watersheds that generally represent stormwater runoff from unimpacted areas, or areas that do not include ISRA, RFI, or significant development, thereby representing subarea-specific background (or reference) stormwater quality.

sampling recommendations memo from the Expert Panel and Geosyntec (Geosyntec, 2010). Although this analysis is based on concentrations, and does not account for pollutant load or watershed size, monitoring locations were selected based on the goal of capturing runoff from nearly all known areas of potential anthropogenic pollutant sources within these two watersheds. In cases where the drainage areas are small, they generally include mostly paved surfaces so that runoff volumes are still significant.

The Outfall 008 and 009 watershed monitoring locations used for this BMP evaluation are shown in Table 1. The locations of the monitoring subareas listed in Table 1 are shown in the Attachment 2 map. In Table 1, each subarea is listed with its category (or data type), watershed, co-location (i.e., an alternate subarea identifier for the same location), a location description, and approximate drainage area. Potential BMP subareas include the letters “BMP” in the subarea identifier, while ISRA performance monitoring locations include the letters “SW” in the subarea identifier. At the Expert Panel’s recommendation, some ISRA and Culvert Modification (CM) performance monitoring locations are included here for BMP siting consideration, to verify/test the performance of some stormwater controls, and to verify that runoff from below an ISRA area is comparable to the runoff from above the ISRA area. NPDES compliance monitoring outfalls 008 and 009 were also included here for comparison and method testing purposes. The data summarized and their periods of record in this report are as follows:

- ISRA and culvert modification (CM) performance monitoring data: 12/2009 – 4/2012
- NPDES outfall monitoring data: 10/2004 – 4/2012
- Potential BMP subarea monitoring data: 12/2010 – 4/2012

The number of sampling event results currently available for each of the potential BMP subarea monitoring locations is relatively small -- generally one to sixteen storms sampled depending on the location – since this program has only been in place since late December 2010, and subareas on Sage Ranch property were not sampled until March 2011. In comparison, the ISRA performance monitoring program has been in place for nearly three wet seasons[10] (2009/10, 2010/11, and 2011/12), so these monitoring subareas have more stormwater sample event results available. As such, where available, data from co-located ISRA subareas were combined with data from BMP subarea subareas in order to provide a more robust dataset at potential BMP locations. Additionally, the number of samples collected from subareas within the 008 watershed is considerably fewer than the number of samples collected in the 009 watershed due in part to fewer events with sufficient runoff to enable sampling. The smaller frequency of runoff in the 008 watershed is likely due to the absence of directly connected impervious areas and hardened conveyance systems (e.g., paved roads, inlets, storm drains, and lined channels). As a result, there are currently significant limitations to the available stormwater background and potential BMP subarea monitoring datasets; consequently, only a limited number of stormwater control recommendations can be made at this point based on this initial round of data. This data collection and analysis process will be updated annually for the duration of the BMP work plan schedule

[10] Measured precipitation varied by wet season, with 15 inches recorded over 2009/2010, 26 inches recorded over 2010/2011, and 10 inches recorded over 2011/2012.

(presently scheduled through 2014), which will result in more robust datasets and the potential addition of new treatment control recommendations in the future.

All stormwater sampling data reported here were provided by MWH and select analytes were validated by qualified lab quality review professionals[11]. All TCDD TEQ results include Bioaccumulation Equivalency Factors (BEFs), consistent with NPDES reporting requirements (see Appendix A for more information on the effects of BEFs on calculated TEQ results). For all parameters, lab results that are estimated (or "J-flagged," or results that are above the detection limit but below the reporting limit) are included in the analysis since it is the Expert Panel's view that statistical confidence in these individual results is greater than confidence in the sample summary statistics due to the limited number of data available for many locations (and it is these summary statistics that serve as the basis for the Expert Panel's BMP recommendations).

Although this analysis focuses on the identification of subareas that may require new treatment controls, the Expert Panel continues to strongly recommend the rigorous application of erosion and sediment control practices and stream channel stabilization measures throughout the 008 and 009 watersheds. The Panel also continues to recommend the stabilization of roadways and the implementation of source controls, including source removal, such as through the successful ongoing ISRA program.

This analysis follows prior reports prepared by the Panel on dioxin and metals stormwater background sources at the SSS (SSS Stormwater Expert Panel, 2010; SSS Stormwater Expert Panel, 2009), and is based on the October 2011 BMP Plan for the Outfall 008 and 009 Watersheds (MWH et al, 2011). This analysis is the most refined of several generations of alternatives that were iteratively developed and tested by the Expert Panel and Geosyntec for the selection of potential BMP locations.

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[11] Data validation is the process of evaluating data for program, method and laboratory quality control compliance, and will determine the validity and usability of the data. A Level II validation was performed on all dioxin results for the BMP monitoring program and for dioxin results above the permit limit for the performance monitoring program. In addition, validation was performed to investigate anomalous results at a Level II and validation was performed to investigate the performance of the Dekaport Cone Splitter at a Level IV. A Level II validation involves a review of field methods and a high level review of laboratory methods. The primary purpose of performing a Level II validation on the dioxin results was to address blank contamination and estimated maximum possible concentration (EMPC) values. An EMPC value is assigned to a dioxin isomer when a peak is within the retention time window of a target dioxin or furan isomer; however, at least one of the identification criteria from the method was not met for that peak. Therefore this peak cannot be positively identified as a dioxin or furan. The Level II validation process would evaluate the EMPC values and revise these values to non-detects at either the level of interference or the reporting limit, whichever is higher. A Level IV validation is a definitive evaluation of the data and involves a very detailed review of the field and laboratory processes including the raw data files used to identify and quantitate dioxins and furan. This level of validation requires the validator to reproduce a percentage of the result from the raw data files to ensure that systemic errors or errors of omission or transcription errors are not present in the final reported data.

Table 1. SSS 008 and 009 Watershed BMP Evaluation Monitoring Subareas (See Attachment 2 for Location Map)

Subarea Identifier (and Co-location(s))	Subcategory	Prioritization Category	Watershed	Description	Approx. Upstream Drainage Area (ac)[1]
A1SW0002	Existing BMP Performance	Onsite SW Background	Outfall 009	Background - CM-8 upstream	2.5
A1SW0006	Existing BMP Performance	Onsite SW Background	Outfall 009	Background - CM-11 upstream	8.3
A2SW0003	ISRA Performance	Onsite SW Background	Outfall 009	A2LF1 upstream	432
B1SW0003	ISRA Performance	Onsite SW Background	Outfall 009	B-1 upstream	0.01
BGBMP0001 (A2SW0007)	Existing BMP Performance	Onsite SW Background	Outfall 009	Background - CM-1 upstream east tributary (new)	41.1
BGBMP0002 (LXSW0003)	Existing BMP Performance	Onsite SW Background	Outfall 009	Background - CM-3 upstream	17.2
BGBMP0003	Subarea for BMP Siting Analysis	Onsite SW Background	Outfall 009	Background - Sage Ranch near LOX	23.6
BGBMP0004	Subarea for BMP Siting Analysis	Onsite SW Background	Outfall 009	Background - Sage Ranch near CM-5	81.4
BGBMP0005	Subarea for BMP Siting Analysis	Onsite SW Background	Outfall 009	Background - Sage Ranch near entrance	25
BGBMP0007 (LXSW0001)	Existing BMP Performance	Onsite SW Background	Outfall 009	Background - CM-3 upstream - OLD	17.2
HZSW0006	ISRA Performance	Onsite SW Background	Outfall 008	CYN upstream	NA/small
HZSW0008	ISRA Performance	Onsite SW Background	Outfall 008	Background - Happy Valley upstream	NA/small
HZSW0011	ISRA Performance	Onsite SW Background	Outfall 008	Background - Happy Valley upstream	0.1
HZSW0012	ISRA Performance	Onsite SW Background	Outfall 008	Background - Happy Valley upstream	0.4
HZSW0020 (HZSW0017)	ISRA Performance	Onsite SW Background	Outfall 008	Background - Happy Valley upstream	0.2
LFSW0001	ISRA Performance	Onsite SW Background	Outfall 009	CTLI upstream	NA/small
A1BMP0001	Subarea for BMP Siting Analysis	Subarea for BMP Siting Analysis	Outfall 009	A1LF downstream - OLD	1.2
A1BMP0002 (A1SW0004)	Existing BMP Performance	Subarea for BMP Siting Analysis	Outfall 009	CM-9 upstream toward A1LF (pre-building 1324 parking lot asphalt removal)	6.3
A1BMP0002-A	Existing BMP Performance	Subarea for BMP Siting Analysis	Outfall 009	CM-9 upstream toward A1LF (post-building 1324 parking lot asphalt removal)	6.3
A1SW0003	Existing BMP Performance	Subarea for BMP Siting Analysis	Outfall 009	CM-8 downstream (pre-filter fabric over weir boards) - OLD	2.5
A1SW0003-A	Existing BMP Performance	Subarea for BMP Siting Analysis	Outfall 009	CM-8 downstream (post-filter fabric over weir boards)	2.5
A1SW0005	Existing BMP Performance	Subarea for BMP Siting Analysis	Outfall 009	CM-9 downstream (pre-filter fabric over weir boards) - OLD	16.4

Subarea Identifier (and Co-location(s))	Subcategory	Prioritization Category	Watershed	Description	Approx. Upstream Drainage Area (ac)[1]
A1SW0005-A	Existing BMP Performance	Subarea for BMP Siting Analysis	Outfall 009	CM-9 downstream (post-filter fabric over weir boards)	16.4
A1SW0007	Existing BMP Performance	Subarea for BMP Siting Analysis	Outfall 009	CM-11 downstream (pre-filter fabric over weir boards) - OLD	8.3
A1SW0007-A	Existing BMP Performance	Subarea for BMP Siting Analysis	Outfall 009	CM-11 downstream (post-filter fabric over weir boards)	8.3
A1SW0009	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	CM-9 downstream-underdrain outlet (pre-building 1324 parking lot asphalt removal, pre-filter fabric over weir boards)	16.4
A1SW0009-A	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	CM-9 downstream-underdrain outlet (post-building 1324 parking lot asphalt removal, pre-filter fabric over weir boards)	16.4
A1SW0009-B	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	CM-9 downstream-underdrain outlet (post-filter fabric over weir boards, post-building 1324 parking lot asphalt removal)	16.4
A2BMP0001	Subarea for BMP Siting Analysis	Subarea for BMP Siting Analysis	Outfall 009	A2 northeast	2.3
A2BMP0002	Subarea for BMP Siting Analysis	Subarea for BMP Siting Analysis	Outfall 009	A2 road runoff	3.6
A2BMP0003	Subarea for BMP Siting Analysis	Subarea for BMP Siting Analysis	Outfall 009	A2 u/s of ND confluence	100
A2BMP0004	Subarea for BMP Siting Analysis	Subarea for BMP Siting Analysis	Outfall 009	Helipad culvert outlet	4.2
A2BMP0005	Subarea for BMP Siting Analysis	Subarea for BMP Siting Analysis	Outfall 009	A2 u/s of CM-1 confluence	35
A2SW0002	Existing BMP Performance	Subarea for BMP Siting Analysis	Outfall 009	CM-1 effluent (pre-filter fabric over weir boards)	52.8
A2SW0002-A	Existing BMP Performance	Subarea for BMP Siting Analysis	Outfall 009	CM-1 effluent (post-filter fabric over weir boards)	52.8
A2SW0004	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	A2 downstream	432
APBMP0001	Subarea for BMP Siting Analysis	Subarea for BMP Siting Analysis	Outfall 009	Ashpile culvert inlet / road runoff	34
APSW0005	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	AP upstream	0.7
APSW0006	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	AP downstream (pre-ISRA excavation)	0.6
APSW0006-A	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	AP downstream (post-ISRA excavation)	0.6
APSW0011	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	AP downstream	1.8
APSW0012	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	AP upstream	1.6
APSW0013	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	AP downstream	34
B1BMP0001	Existing BMP Performance	Subarea for BMP Siting Analysis	Outfall 009	B-1 media filter inlet (no media filter) - OLD	3.7

Subarea Identifier (and Co-location(s))	Subcategory	Prioritization Category	Watershed	Description	Approx. Upstream Drainage Area (ac)[1]
B1SW0010	Existing BMP Performance	Subarea for BMP Siting Analysis	Outfall 009	B-1 upstream (post-ISRA exvacation)	4.5
B1BMP0003 (B1BMP0002)	Existing BMP Performance	Subarea for BMP Siting Analysis	Outfall 009	B-1 parking lot / road runoff to culvert inlet	5.2
B1BMP0004 (B1SW0015)	Existing BMP Performance	Subarea for BMP Siting Analysis	Outfall 009	B-1 media filter inlet north	3.7
B1BMP0004-5	Existing BMP Performance	Subarea for BMP Siting Analysis	Outfall 009	B-1 combined media filter influent	4.5
B1BMP0005 (B1SW0011, B1SW0013)	Existing BMP Performance	Subarea for BMP Siting Analysis	Outfall 009	B-1 media filter inlet south	0.8
B1SW0002	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	B-1 north road runoff	1.3
B1SW0004	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	B-1 downstream (pre-ISRA excavation)	0.08
B1SW0004-A	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	B-1 downstream (post-ISRA excavation)	0.08
B1SW0005	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	B-1 downstream (pre-ISRA excavation)	0.1
B1SW0005-A	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	B-1 downstream (post-ISRA excavation)	0.1
B1SW0006	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	B-1 downstream (pre-ISRA excavation)	0.54
B1SW0006-A	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	B-1 downstream (post-ISRA excavation)	0.54
B1SW0007	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	B-1 downstream	0.75
B1SW0008	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	B-1 upstream	0.79
B1SW0009	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	B-1 downstream	0.84
B1SW0012	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	B-1 north road runoff - OLD	0.05
B1SW0014	Existing BMP Performance	Subarea for BMP Siting Analysis	Outfall 009	B-1 culvert effluent (no media filter)	4.7
B1SW0014-A	Existing BMP Performance	Subarea for BMP Siting Analysis	Outfall 009	B-1 media filter effluent (pre-media filter reconstruction)	4.7
B1SW0014-B	Existing BMP Performance	Subarea for BMP Siting Analysis	Outfall 009	B-1 media filter effluent (post-media filter reconstruction)	4.7
BGBMP0006 (A2SW0006)	Existing BMP Performance	Subarea for BMP Siting Analysis	Outfall 009	Background - CM-1 upstream east tributary (ponded footprint) - OLD	41.1
EVBMP0001	Subarea for BMP Siting Analysis	Subarea for BMP Siting Analysis	Outfall 009	ELV culvert inlet (helipad road gutter)	1.8
EVBMP0001-A	Subarea for BMP Siting Analysis	Subarea for BMP Siting Analysis	Outfall 009	ELV culvert inlet (helipad road and ELV ditch, composite)	2.5
EVBMP0002	Subarea for BMP Siting Analysis	Subarea for BMP Siting Analysis	Outfall 009	Helipad (pre-sandbag berms)	4.1

Subarea Identifier (and Co-location(s))	Subcategory	Prioritization Category	Watershed	Description	Approx. Upstream Drainage Area (ac)[1]
EVBMP0002-A	Subarea for BMP Siting Analysis	Subarea for BMP Siting Analysis	Outfall 009	Helipad (post-sandbag berms)	4.1
EVBMP0003 (A2SW0001)	Existing BMP Performance	Subarea for BMP Siting Analysis	Outfall 009	ELV road runoff/CM-1 upstream west	11.8
HZBMP0001 (HZSW0007)	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 008	Happy Valley downstream	21.4
HZBMP0002 (HZSW0004)	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 008	DRG downstream	23.2
HZBMP0003 (HZSW0003)	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 008	DRG downstream (furthest downstream)	29.6
HZSW0001	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 008	Happy Valley downstream - OLD	<29
HZSW0002	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 008	Happy Valley downstream - OLD	<29
HZSW0005	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 008	DRG upstream	21
HZSW0009	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 008	Happy Valley downstream	0.2
HZSW0010	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 008	Happy Valley downstream	2.2
HZSW0013	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 008	Happy Valley downstream	0.3
HZSW0014	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 008	Happy Valley upstream	0.1
HZSW0015	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 008	Happy Valley downstream	0.4
HZSW0016	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 008	Happy Valley downstream	4.8
HZSW0018	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 008	Happy Valley downstream	1.4
HZSW0019	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 008	CYN downstream	2.6
ILBMP0001	Subarea for BMP Siting Analysis	Subarea for BMP Siting Analysis	Outfall 009	Lower parking lot 24" stormdrain	23
ILBMP0002	Subarea for BMP Siting Analysis	Subarea for BMP Siting Analysis	Outfall 009	Road runoff to CM-9	2.5
ILBMP0003	Subarea for BMP Siting Analysis	Subarea for BMP Siting Analysis	Outfall 009	A1LF parking lot - OLD	9.5
ILSW0001	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	IEL-3 upstream	0.1
ILSW0002	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	IEL-3 downstream (pre-ISRA excavation)	0.2
ILSW0002-A	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	IEL-1 downstream (post-ISRA excavation)	0.2
ILSW0003	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	IEL-2 upstream	2.4
ILSW0004	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	IEL-2 downstream (pre-ISRA excavation)	2.8
ILSW0004-A	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	IEL-2 downstream (post-ISRA excavation)	2.8

Subarea Identifier (and Co-location(s))	Subcategory	Prioritization Category	Watershed	Description	Approx. Upstream Drainage Area (ac)[1]
LFSW0002	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	CTLI downstream (pre-ISRA excavation)	5.1
LFSW0002-A	ISRA Performance	Subarea for BMP Siting Analysis	Outfall 009	CTLI downstream (post-ISRA excavation)	5.1
LPBMP0001	Subarea for BMP Siting Analysis	Subarea for BMP Siting Analysis	Outfall 009	Lower Parking Lot sheetflow (pre-gravel bag berms)	5.1
LPBMP0001-A	Subarea for BMP Siting Analysis	Subarea for BMP Siting Analysis	Outfall 009	Lower Parking Lot sheetflow (post-gravel bag berms)	5.1
LXBMP0001	Subarea for BMP Siting Analysis	Subarea for BMP Siting Analysis	Outfall 009	LOX west - OLD	1.5
LXBMP0002	Subarea for BMP Siting Analysis	Subarea for BMP Siting Analysis	Outfall 009	LOX mid - OLD	1.5
LXBMP0003	Subarea for BMP Siting Analysis	Subarea for BMP Siting Analysis	Outfall 009	LOX east tributary - OLD	0.4
LXBMP0004	Existing BMP Performance	Subarea for BMP Siting Analysis	Outfall 009	LOX southwest downstream of sandbag berm	10.6
LXBMP0005	Existing BMP Performance	Subarea for BMP Siting Analysis	Outfall 009	LOX southeast downstream of sandbag berm	2.5
LXBMP0006	Subarea for BMP Siting Analysis	Subarea for BMP Siting Analysis	Outfall 009	LOX east minor tributary	0.43
LXSW0002	Existing BMP Performance	Subarea for BMP Siting Analysis	Outfall 009	CM-3 downstream (pre-filter fabric over weir boards) - OLD	17.2
LXSW0002-A	Existing BMP Performance	Subarea for BMP Siting Analysis	Outfall 009	CM-3 downstream (post-filter fabric over weir boards)	17.2
Outfall 008*	NPDES	NPDES Outfall 008	Outfall 008	NPDES outfall 008	62
Outfall 009*	NPDES	NPDES Outfall 009	Outfall 009	NPDES outfall 009	536

<u>Notes</u>

[1] Drainage areas are approximate.

* NPDES outfall monitoring data are included in this analysis for comparison and method testing purposes only. New stormwater controls are not being contemplated at these locations.

2. DATA SUMMARY

Table 2A summarizes the various monitoring locations that were selected to be representative of stormwater background runoff quality because they represent locations that are not expected to be impacted by historic or ongoing subarea activities. Due to the varying objectives of each of the monitoring programs, not all pollutants of concern (POCs) were sampled at all subareas. For this BMP subarea ranking analysis, the POCs are defined as total suspended solids (TSS), cadmium (Cd), copper (Cu), lead (Pb), mercury (Hg), TCDD TEQ, and 2,3,7,8-TCDD because these constituents have periodically been measured at concentrations above the current NPDES permit limits at the 008 and 009 monitoring stations, with the exception of TSS and 2,3,7,8-TCDD which are without permit limits but are included here as alternative indicators of POC generation. The number of samples for each POC at each stormwater background subarea is summarized in Table 2A. Table 2B provides a similar summary for the locations where control practice needs are being evaluated, as well as Outfalls 008 and 009, which are included here for method testing purposes. A map that shows the locations of the stormwater monitoring subareas is included as Attachment 2.

Table 2A. Stormwater background locations and number of sample results for indicated parameters (locations denoted as 'OLD' were not monitored for the most recent 2011/2012 season)

SW Background Location (Co-location)	Description	Number of Sample Results for Indicated Parameters						
		TSS	Cd	Cu	Pb	Hg	TCDD TEQ	2,3,7,8-TCDD
A1SW0002	Background - CM-8 upstream	10	0	0	10	0	0	0
A1SW0006	Background - CM-11 upstream	12	0	0	0	0	12	12
A2SW0003	A2LF1 upstream	0	0	0	0	0	0	0
B1SW0003	B-1 upstream	0	0	0	0	0	0	0
BGBMP0001 (A2SW0007)	Background - CM-1 upstream east tributary (new)	4	4	4	4	4	4	4
BGBMP0002 (LXSW0003)	Background - CM-3 upstream	4	4	4	4	4	4	4
BGBMP0003	Background - Sage Ranch near LOX	5	5	5	5	5	5	5
BGBMP0004	Background - Sage Ranch near CM-5	3	3	3	3	3	3	3
BGBMP0005	Background - Sage Ranch near entrance	1	1	1	1	1	1	1
BGBMP0007 (LXSW0001)	Background - CM-3 upstream - OLD	7	7	7	7	7	7	7
HZSW0006	CYN upstream	0	0	0	0	0	0	0
HZSW0008	Background - Happy Valley upstream	1	0	0	1	0	1	1
HZSW0011	Background - Happy Valley upstream	2	0	2	0	0	2	2
HZSW0012	Background - Happy Valley upstream	1	0	0	1	0	0	0
HZSW0020 (HZSW0017)	Background - Happy Valley upstream	2	0	0	2	0	2	2
LFSW0001	CTLI upstream	0	0	0	0	0	0	0
	Total	52	24	26	38	24	41	41

Note: HZSW0005 and HZSW0014 were previously included as background locations but were determined not to be appropriate for this year's analysis.

Table 2B. Locations where control practices are being evaluated and number of sample results for indicated parameters

Location (Co-Location)	Description	Number of Sample Results for Indicated Parameters						
		TSS	Cd	Cu	Pb	Hg	TCDD TEQ	2,3,7,8-TCDD
A1BMP0001	A1LF downstream - OLD	5	5	5	5	4	5	5
A1BMP0002 (A1SW0004)	CM-9 upstream toward A1LF (pre-building 1324 parking lot asphalt removal)	15	15	15	15	15	8	8
A1BMP0002-A	CM-9 upstream toward A1LF (post-building 1324 parking lot asphalt removal)	3	3	3	3	3	2	2
A1SW0003	CM-8 downstream (pre-filter fabric over weir boards) - OLD	10	0	0	10	0	0	0
A1SW0003-A	CM-8 downstream (post-filter fabric over weir boards)	0	0	0	0	0	0	0
A1SW0005	CM-9 downstream (pre-filter fabric over weir boards) - OLD	10	10	10	10	10	5	5
A1SW0005-A	CM-9 downstream (post-filter fabric over weir boards)	0	0	0	0	0	0	0
A1SW0007	CM-11 downstream (pre-filter fabric over weir boards) - OLD	12	0	0	0	0	12	12
A1SW0007-A	CM-11 downstream (post-filter fabric over weir boards)	0	0	0	0	0	0	0
A1SW0009	CM-9 downstream-underdrain outlet (pre-building 1324 parking lot asphalt removal, pre-filter fabric over weir boards)	0	0	0	0	0	0	0
A1SW0009-A	CM-9 downstream-underdrain outlet (post-building 1324 parking lot asphalt removal, pre-filter fabric over weir boards)	1	1	1	1	1	1	1
A1SW0009-B	CM-9 downstream-underdrain outlet (post-filter fabric over weir boards, post-building 1324 parking lot asphalt removal)	4	4	4	4	4	3	3
A2BMP0001	A2 northeast	0	0	0	0	0	0	0
A2BMP0002	A2 road runoff	1	1	1	1	1	1	1
A2BMP0003	A2 u/s of ND confluence	5	5	5	5	5	5	5
A2BMP0004	Helipad culvert outlet	3	3	3	3	3	3	3
A2BMP0005	A2 u/s of CM-1 confluence	3	3	3	3	3	3	3
A2SW0002	CM-1 effluent (pre-filter fabric over weir boards)	16	0	0	16	0	16	16
A2SW0002-A	CM-1 effluent (post-filter fabric over weir boards)	4	0	0	4	0	4	4
A2SW0004	A2 downstream	0	0	0	0	0	0	0
APBMP0001	Ashpile culvert inlet / road runoff	2	2	2	2	2	2	2
APSW0005	AP upstream	0	0	0	0	0	0	0
APSW0006	AP downstream (pre-ISRA excavation)	0	0	0	0	0	0	0
APSW0006-A	AP downstream (post-ISRA excavation)	0	0	0	0	0	0	0
APSW0011	AP downstream	0	0	0	0	0	0	0
APSW0012	AP upstream	0	0	0	0	0	0	0
APSW0013	AP downstream	0	0	0	0	0	0	0

Location (Co-Location)	Description	Number of Sample Results for Indicated Parameters						
		TSS	Cd	Cu	Pb	Hg	TCDD TEQ	2,3,7,8-TCDD
B1BMP0001	B-1 media filter inlet (no media filter) - OLD	0	0	0	0	0	0	0
B1SW0010	B-1 upstream (post-ISRA excavation)	3	3	3	3	3	3	3
B1BMP0003 (B1BMP0002)	B-1 parking lot / road runoff to culvert inlet	12	12	12	12	12	12	12
B1BMP0004 (B1SW0015)	B-1 media filter inlet north	2	2	2	2	2	2	2
B1BMP0004-5	B-1 combined media filter influent	5	5	5	5	5	5	5
B1BMP0005 (B1SW0011, B1SW0013)	B-1 media filter inlet south	10	10	10	10	10	10	10
B1SW0002	B-1 north road runoff	2	2	2	2	2	2	2
B1SW0004	B-1 downstream (pre-ISRA excavation)	0	0	0	0	0	0	0
B1SW0004-A	B-1 downstream (post-ISRA excavation)	0	0	0	0	0	0	0
B1SW0005	B-1 downstream (pre-ISRA excavation)	0	0	0	0	0	0	0
B1SW0005-A	B-1 downstream (post-ISRA excavation)	0	0	0	0	0	0	0
B1SW0006	B-1 downstream (pre-ISRA excavation)	0	0	0	0	0	0	0
B1SW0006-A	B-1 downstream (post-ISRA excavation)	0	0	0	0	0	0	0
B1SW0007	B-1 downstream	0	0	0	0	0	0	0
B1SW0008	B-1 upstream	2	2	0	0	0	2	2
B1SW0009	B-1 downstream	0	0	0	0	0	0	0
B1SW0012	B-1 north road runoff - OLD	0	0	0	0	0	0	0
B1SW0014	B-1 culvert effluent (no media filter)	0	0	0	0	0	0	0
B1SW0014-A	B-1 media filter effluent (pre-media filter reconstruction)	1	1	1	1	1	1	1
B1SW0014-B	B-1 media filter effluent (post-media filter reconstruction)	4	4	4	4	4	3	3
BGBMP0006 (A2SW0006)	Background - CM-1 upstream east tributary (ponded footprint) - OLD	7	1	1	7	1	7	7
EVBMP0001	ELV culvert inlet (helipad road gutter)	3	3	3	3	3	3	3
EVBMP0001-A	ELV culvert inlet (helipad road and ELV ditch, composite)	5	5	5	5	5	5	5
EVBMP0002	Helipad (pre-sandbag berms)	6	6	6	6	6	6	6
EVBMP0002-A	Helipad (post-sandbag berms)	5	5	5	5	5	5	5
EVBMP0003 (A2SW0001)	ELV road runoff/CM-1 upstream west	14	6	6	14	6	14	14
HZBMP0001 (HZSW0007)	Happy Valley downstream	13	6	13	13	6	12	12
HZBMP0002 (HZSW0004)	DRG downstream	3	4	4	4	4	4	4
HZBMP0003 (HZSW0003)	DRG downstream (furthest downstream)	14	6	14	14	6	14	14
HZSW0001	Happy Valley downstream - OLD	0	0	0	0	0	0	0
HZSW0002	Happy Valley downstream - OLD	0	0	0	0	0	0	0

Location (Co-Location)	Description	Number of Sample Results for Indicated Parameters						
		TSS	Cd	Cu	Pb	Hg	TCDD TEQ	2,3,7,8-TCDD
HZSW0005	DRG upstream	1	0	0	0	0	1	1
HZSW0009	Happy Valley downstream	0	0	0	0	0	0	0
HZSW0010	Happy Valley downstream	0	0	0	0	0	0	0
HZSW0013	Happy Valley downstream	0	0	0	0	0	0	0
HZSW0014	Happy Valley upstream	3	0	3	3	0	0	0
HZSW0015	Happy Valley downstream	0	0	0	0	0	0	0
HZSW0016	Happy Valley downstream	0	0	0	0	0	0	0
HZSW0018	Happy Valley downstream	0	0	0	0	0	0	0
HZSW0019	CYN downstream	0	0	0	0	0	0	0
ILBMP0001	Lower parking lot 24" stormdrain	10	10	10	10	10	10	10
ILBMP0002	Road runoff to CM-9	7	7	7	7	7	7	7
ILBMP0003	A1LF parking lot - OLD	4	4	4	4	4	4	4
ILSW0001	IEL-3 upstream	0	0	0	0	0	0	0
ILSW0002	IEL-3 downstream (pre-ISRA excavation)	0	0	0	0	0	0	0
ILSW0002-A	IEL-1 downstream (post-ISRA excavation)	0	0	0	0	0	0	0
ILSW0003	IEL-2 upstream	2	2	0	2	2	0	0
ILSW0004	IEL-2 downstream (pre-ISRA excavation)	0	0	0	0	0	0	0
ILSW0004-A	IEL-2 downstream (post-ISRA excavation)	1	1	0	1	1	0	0
LFSW0002	CTLI downstream (pre-ISRA excavation)	0	0	0	0	0	0	0
LFSW0002-A	CTLI downstream (post-ISRA excavation)	3	0	3	3	0	3	3
LPBMP0001	Lower Parking Lot sheetflow (pre-gravel bag berms)	2	2	2	2	2	2	2
LPBMP0001-A	Lower Parking Lot sheetflow (post-gravel bag berms)	6	6	6	6	6	6	6
LXBMP0001	LOX west - OLD	0	0	0	0	0	0	0
LXBMP0002	LOX mid - OLD	2	2	2	2	2	2	2
LXBMP0003	LOX east tributary - OLD	6	6	6	6	6	6	6
LXBMP0004	LOX southwest downstream of sandbag berm	5	5	5	5	5	5	5
LXBMP0005	LOX southeast downstream of sandbag berm	5	5	5	5	5	5	5
LXBMP0006	LOX east minor tributary	1	1	1	1	1	1	1
LXSW0002	CM-3 downstream (pre-filter fabric over weir boards) - OLD	9	9	9	9	9	9	8
LXSW0002-A	CM-3 downstream (post-filter fabric over weir boards)	0	0	0	0	0	0	0

Table 3A summarizes the total samples, non-detects (NDs), and J-flagged (DNQ) numbers of observations, along with the minimum, median, and maximum concentration values for each of the POCs for the complete combined stormwater background dataset. TSS values are summarized by watershed as well as combined for both watersheds. All stormwater background mercury and 2,3,7,8-TCDD results are ND. Stormwater background concentration values for POCs that are higher than current permit limits (which apply only at the NPDES compliance outfalls) are highlighted in yellow. These results confirm previous observations by the Expert Panel and others regarding natural background stormwater quality at the SSS that occasionally exceeds NPDES permit limits for select metals (including copper and lead) as well as TCDD TEQ. Table 3B provides a similar summary for all locations combined where control practices are being evaluated as well as for Outfalls 008 and 009 data.

Table 3A. Stormwater background samples (all subareas combined) – Concentrations (mg/L for TSS, µg/L otherwise)

POC	# Samples	# NDs	# DNQ	Min	Median	95th Percentile	Max	Permit Limit for OF008 & OF009
TSS - 008	6	0	3	2	17.5	74	76	NA
TSS - 009	46	6	21	<1	6.5	75	750	NA
TSS	52	6	24	<1	7	79	750	NA
Cadmium	24	21	3	<0.1	<0.1	0.25	0.87	4
Copper	26	0	11	1	2.4	7.3	19	14
Lead	38	5	19	<0.2	0.77	14	64	5.2
Mercury	24	24	0	<0.1	<0.1	<0.1	<0.1	0.13
TCDD TEQ	41	12	0	<1.0e-10	4.9E-10	3.3E-07	8.5E-07	2.8E-08
2,3,7,8-TCDD	41	41	0	<5.0e-08	<8.8e-07	4.7E-06	<5.4e-06	NA

Notes

1) No substitution assumptions were made in the attempt to quantify NDs. For example, "< 0.20" refers to a non-detect with a detection limit of 0.20 µg/L.
2) RWQCB split sample results excluded. A separate analysis will be provided in the July ISRA/BMP report to compare split results versus primary sample results.
3) All data from 'PS_Trigger_Analysis.xlsx'.
4) Highlighted values exceed the permit limit for that POC.
5) J flagged/DNQ results are included for all POCs.
6) With the exception of cadmium, which had all ND or J-flagged/estimated results, assumptions regarding the treatment of J-flag (or DNQ) results do not impact the 95th percentile stormwater background thresholds for any POC.
7) Metals results shown here are for the total form only, consistent with the permit limits.

Table 3B. Locations where control practices are being evaluated (all subareas combined) – Concentrations (mg/L for TSS, µg/L otherwise)

POC	# Samples	# NDs	# DNQ	Min	Median	95th Percentile	Max	Permit Limit for OF008 & OF009
TSS - 008	34	5	8	<1	18	418	840	NA
TSS - 009	233	17	55	<1	18	340	1800	NA
TSS	267	22	63	<1	18	355	1800	NA
Cadmium	190	87	89	<0.1	0.12	0.63	1.4	4
Copper	206	0	19	0.6	5.1	20	59	14
Lead	253	26	60	<0.2	2.6	26	82	5.2
Mercury	187	182	3	<0.10	<0.10	0.10	1.7	0.13
TCDD TEQ	236	18	0	<1.0e-10	6.5E-08	1.8E-05	2.1E-04	2.8E-08
2,3,7,8-TCDD	235	229	5	<2.0e-08	<1.2e-06	7.3E-06	2.2E-05	NA

Notes

1) No substitution assumptions were made in the attempt to quantify NDs. For example, "< 0.20" refers to a non-detect with a detection limit of 0.20 µg/L.
2) RWQCB split sample results excluded. A separate analysis will be provided in the July ISRA/BMP report to compare split results versus primary sample results.
3) NA = No permit limit is defined for the given POC.
4) All data from 'PS_Trigger_Analysis.xlsx'.
5) Highlighted values exceed the permit limit for that POC.
6) J flagged/DNQ results are included for all POCs.
7) With the exception of cadmium, which had all ND or J-flagged/estimated results, assumptions regarding the treatment of J-flag (or DNQ) results do not impact the 95th percentile stormwater background thresholds for any POC.
8) Metals results shown here are for the total form only, consistent with the permit limits.

3. STORMWATER BACKGROUND SAMPLE DATA SUMMARY – PARTICULATE STRENGTH

Particulate strength (PS) is a means to normalize stormwater pollutant concentrations by TSS and also indicate the treatability of the constituents. Normalizing pollutant concentrations by TSS is helpful for evaluating locations that have high POC concentrations in the runoff as a result of high TSS concentrations[12]. This is especially true for the POCs that are highly associated with particulates and are not found in significant quantities in dissolved forms. This normalization with TSS was performed here to help identify critical POC source areas that may otherwise have mass discharges diluted by large flows. PS is computed as total POC concentration minus dissolved POC concentration divided by TSS concentration, or the estimated particulate POC mass per mass of suspended solids. PS values have been previously used by the Expert Panel to assess sources of metals in SSS NPDES outfall compliance monitoring data (SSFL Stormwater Expert Panel, 2009).

Calculations of PS are complicated by the fact that some of the dissolved metal data are not available (e.g., for ISRA samples since this monitoring program does not include analyses for dissolved metals); therefore procedures were established to make assumptions in lieu of missing information. These procedures also address situations where total, dissolved, or TSS results are not detected (ND, below the detection limit as reported by the analytical laboratory). Table 4 and Figure 1 summarize the procedures that were followed for this PS calculation analysis given these data limitations. It was not possible to calculate PS for sample events in which TSS or the total POC concentration was not available.

Table 4. Methods used in determining particulate strength

Measurement Result			
Total	**Dissolved**	**TSS**	**PS Calculation Approach**
Det	Det	Det	Compute PS normally
Det	Det	ND	Compute PS with TSS detection limit
Det	ND	ND	Compute PS with TSS & dissolved DLs if dissolved DL is < 30% of the total result. Otherwise use average dissolved fraction from NPDES OF008 and OF009 data to computer PS.
ND	ND	ND	Report PS result as "ND"
ND	ND	Det	Report PS result as "ND"
ND	Det	Det	Report PS result as "ND"
Det	ND	Det	Assume DL for dissolved concentration to get PS if dissolved DL is < 30% of the total result. Otherwise use average dissolved fraction from NPDES OF008 and OF009 data.
ND	Det	ND	Report PS result as "ND"
ND	Null	ND	Report PS result as "ND"
ND	Null	Det	Report PS result as "ND"
Det	Null	Det	Use average dissolved fraction from NPDES OF008 or OF009 data
Det	Null	ND	Compute PS with TSS DL. Use average dissolved fraction from NPDES OF008 or OF009 data

Notes
1) Det = Detected, a measured result was obtained
2) Null = Not sampled, measurement not taken

[12] By applying particulate strengths, the Panel is not suggesting that stormwater at SSS be regulated using such metrics, but rather the Panel is recommending the use of this solely as a diagnostic metric for the identification of source areas and for the ranking of potential BMP monitoring subareas for placement of new stormwater controls.

3) The 30% threshold for determination of the dissolved value to use in the PS calculations was selected based on best professional judgment.
4) ND = non-detected measurement result – the POC was not detected. Detection limits in these cases are often used to determine the range of possible particulate strengths. In 'PS Calculation Approach' column, ND encompasses all situations where the particulate strength either reflects a non-detect in the concentration, or is non-determinate for other reasons. This distinction is used in all particulate strength columns throughout the rest of this report.

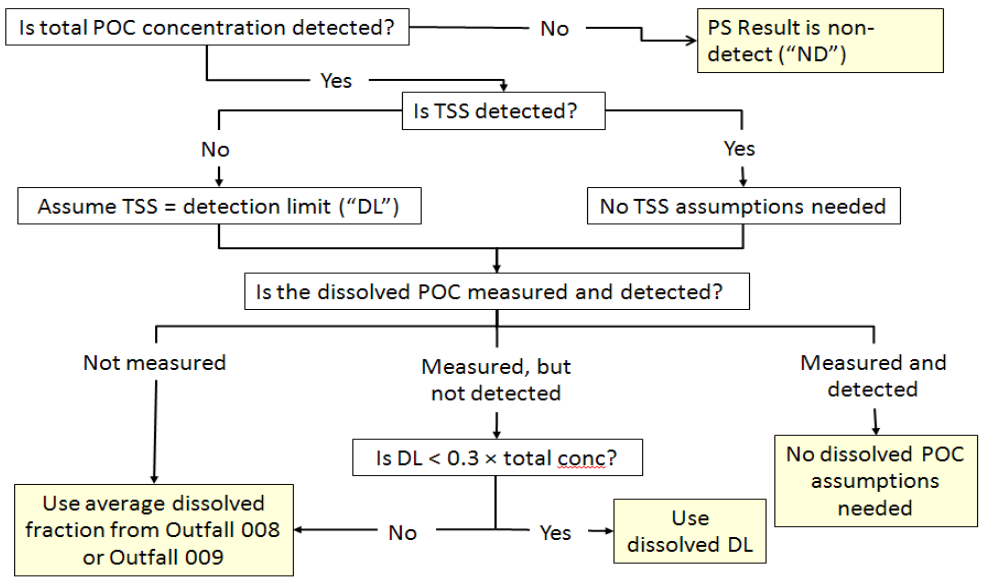

Figure 1. Particulate strength calculation flow chart

Dissolved metals were only analyzed at 6 of the 16 stormwater background monitoring locations since the other 10 locations are ISRA performance (upstream) sample locations. Therefore, to obtain PS estimates for the ISRA stormwater background locations, as described in Table 4, dissolved concentrations were estimated by assuming that dissolved fractions (i.e., percentage of the total metal concentration) for each sample was equal to the average dissolved fraction at Outfalls 008 or 009. Dissolved concentrations were then estimated for ISRA stormwater background subareas based on the watershed in which each subarea is located. This methodology was not necessary for the stormwater background subareas, since dissolved metal measurements were available for those locations. The following example calculation demonstrates this method for a theoretical sampling point (X) located in Outfall 009:

TSS_X = 100 mg/L

Total Pb_X = 10 µg/L

Dissolved Pb_X = Sample not collected, so value estimated based on Table 5 = 10 µg/L * 0.18 = 1.8 µg/L

Estimated PS_X = (10 µg/L – 1.8 µg/L) / 100 mg/L = 8.2 µg/L / 100 mg/L = 82 mg/kg

Only samples at Outfalls 008 and 009, where both the total and dissolved concentrations were detectable, were used to determine the average dissolved fractions. These average dissolved fractions used in the PS calculations are shown in Table 5. TCDD TEQ and 2,3,7,8-TCDD are assumed to have a dissolved fraction of zero because of their extremely low solubility and high affinity for solids. Dissolved cadmium was detected once at a single sampling event in the Outfall 008 watershed. At the recommendation of the Expert Panel, the average dissolved fraction of cadmium in the Outfall 008 watershed was computed using the detection limits of the total cadmium analyses as a conservative estimate for dissolved cadmium. Future data will include additional dissolved and total analyses for these metals and these fractions will then be re-evaluated during the subsequent annual subarea ranking analyses.

Table 5. Average dissolved fraction of POCs based on all available monitoring data in defined watershed; used in determination of particulate strength when dissolved POC not measured (e.g., ISRA and CM performance monitoring datasets)

POC	Outfall 008			Outfall 009		
	% Dissolved	# Samples	CV	% Dissolved	# Samples	CV
Copper	58	24	0.48	58	138	0.46
Lead	22	12	0.82	16	109	0.91
Cadmium	40	19	NA	57	17	0.44

Notes

1) CV = Coefficient of variation
2) # samples = samples with both total and dissolved detected and total > dissolved (results with total < dissolved were excluded from the analysis)
3) Only one sample in the Outfall 008 watershed was analyzed for dissolved cadmium as of March 2011. Dissolved fraction was estimated based on the detection limits of the total cadmium analyses.

Stormwater background sample PS estimates were computed for the POCs using the method described above. Results are shown in Table 6 for all stormwater background data combined. The 95th percentile and maximum values are generally unaffected by the ND or missing dissolved data assumptions that were made for the PS estimates.

Table 6. Stormwater background results - particulate strength (mg/kg)

POC	# PS results	# NDs	Min	Median	95th Percentile	Max
Cadmium	23	21	ND	ND	ND	9.9
Copper	21	0	0	81	310	630
Mercury	24	24	ND	ND	ND	ND
Lead	37	5	ND	67	240	350
TCDD TEQ	41	12	ND	5.80E-08	2.90E-05	4.80E-05
2,3,7,8-TCDD	41	41	ND	ND	ND	ND

Notes

1) Cells with ND refer to values based on total concentration non-detect results per Table 4.
2) RWQCB split sample results excluded
3) All data from 'PS_Trigger_Analysis.xlsx'
4) # NDs reflect the number of non-detects in the total concentration.
5) Particulate strength computation: PS = (Total concentration – Dissolved concentration) / Total Suspended Solids
6) Five copper samples were reported as having dissolved concentrations greater than total concentrations. These samples were omitted from the analysis.
7) One lead sample was reported as having dissolved concentrations greater than total concentrations. This sample was omitted from the analysis.

4. DATA SUMMARY CHARTS

To allow for a visual and probabilistic comparison of the available stormwater sampling data, Figures 3 through 12 show probability plots of the POCs at locations grouped into the following categories:

- Stormwater background
- Potential BMP subarea
- Outfall 008 (for comparison)
- Outfall 009 (for comparison)
  Note: Outfall 008 and 009 results have been separated into pre-2009 and post-2009. Pre-2009 results represent grab samples and post-2009 results represent flow-weighted composite samples.

The x-axes show POC concentrations or PS and the y-axes show the probability of non-exceedance (or probability that values are below) the given x-axis values. The Cunnane equation (Helsel and Hirsch, 1992) was used to compute the plotting positions, and a best-fit line (assuming a lognormal distribution) is shown for the stormwater background data. Note that non-detect results were included in computing the plotting positions, but are not actually plotted (the other data observations are offset in their plotting position to appropriately consider the non-detect data in order to accurately estimate probability values). In general, these plots show that stormwater background concentrations frequently exceed[13] NPDES permit limits for lead (~20% probability) and TCDD TEQ (~18% probability, although this estimated probability is zero when DNQ results are excluded), and somewhat frequently for copper (~2% probability), but do not exceed the NPDES permit limits for cadmium. The 2,3,7,8-TCDD charts show very few data points because this congener is so rarely detected. Also, most of these 2,3,7,8-TCDD detections are lab estimates (i.e., DNQ) and not quantified at high reliability values. 2,3,7,8-TCDD also was never detected in a stormwater background sample, although it was detected in one RWQCB split at A1SW0006, or CM-11 upstream. Furthermore, **dioxin congener DNQ results are included for this analysis in contrast to NPDES reporting practice which does not include DNQs, therefore the NPDES outfall results that are shown above the permit limit here do not reflect past NPDES exceedances at concentrations shown.**

Figure 2 provides a key for the POC probability charts. The yellow-orange area includes observations that were less than background conditions, but still exceeded the permit limits. The blue area includes observations that were less than both the stormwater background best-fit line and the permit limit. The red area includes data that exceeded both the stormwater background conditions and permit limits, while the purple area includes observations that exceeded the stormwater background conditions but not the permit limits. Fundamentally, the question is which subareas contribute to downstream permit limit exceedances as a result of elevated POC concentrations that are most likely due to particulate

[13] The term "exceed" is being used here as a statistical term only of the likely probability of occurrence. It is only accurate if the data perfectly matched the statistical distribution, which is rare. It indicates values that are greater than a given threshold. It is not intended to have regulatory or non-compliance implications. This is particularly true for TCDD TEQ data which include DNQ results here for statistical analysis purposes, in contrast to NPDES compliance assessment procedures, which require greater reliability for reporting and do not include DNQ results.

strengths that are above subarea-specific background levels? These subareas will be identified by potential BMP subarea stormwater sampling results that fall to the right of the Permit limit in the concentration chart (red and orange areas) **and** fall to the right of the stormwater background best-fit line on the particulate strength chart (in the purple and red areas), or in other words, those samples and subareas which may contribute to downstream permit limit exceedances but their elevated POC concentrations are most likely due to particulate strengths that are above subarea-specific stormwater background levels. As will be discussed later in this report, the subareas with data that fall within the red area will receive the highest scores for prioritizing subareas for new or enhanced stormwater controls. Depending on the results for other POCs at an evaluation location, data within the purple and yellow-orange areas may also become a factor in prioritizing potential BMP subareas.

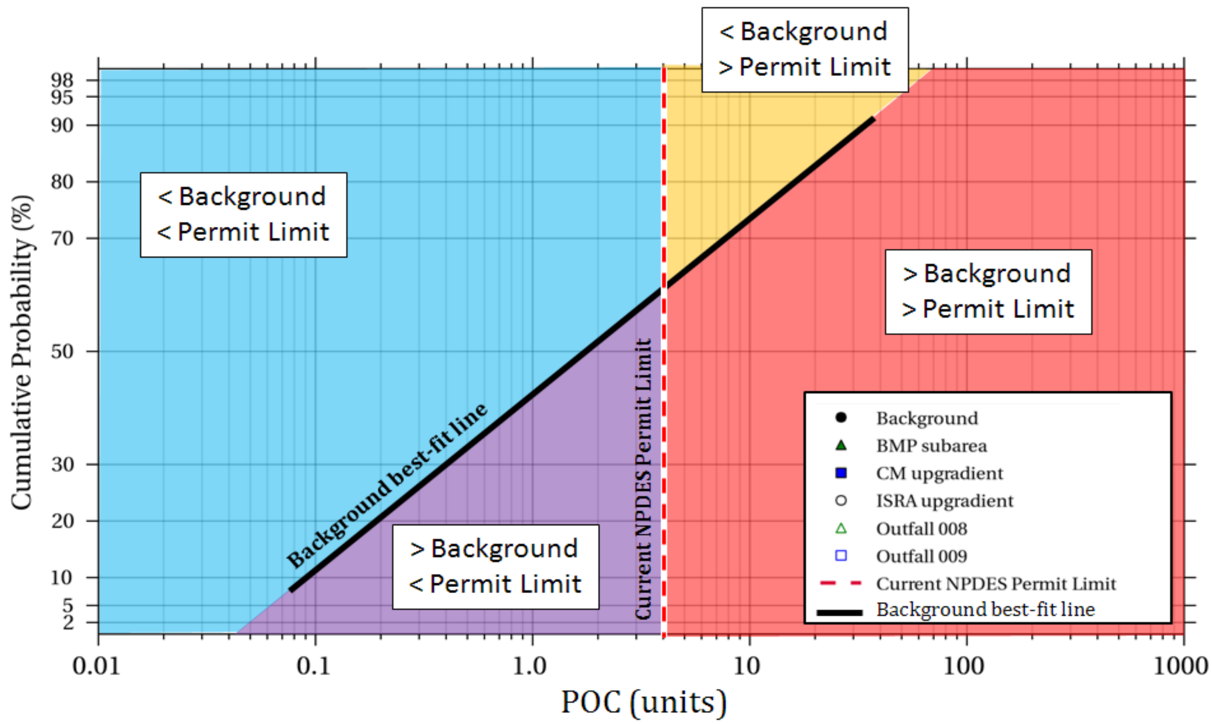

Figure 2. Probability plot key

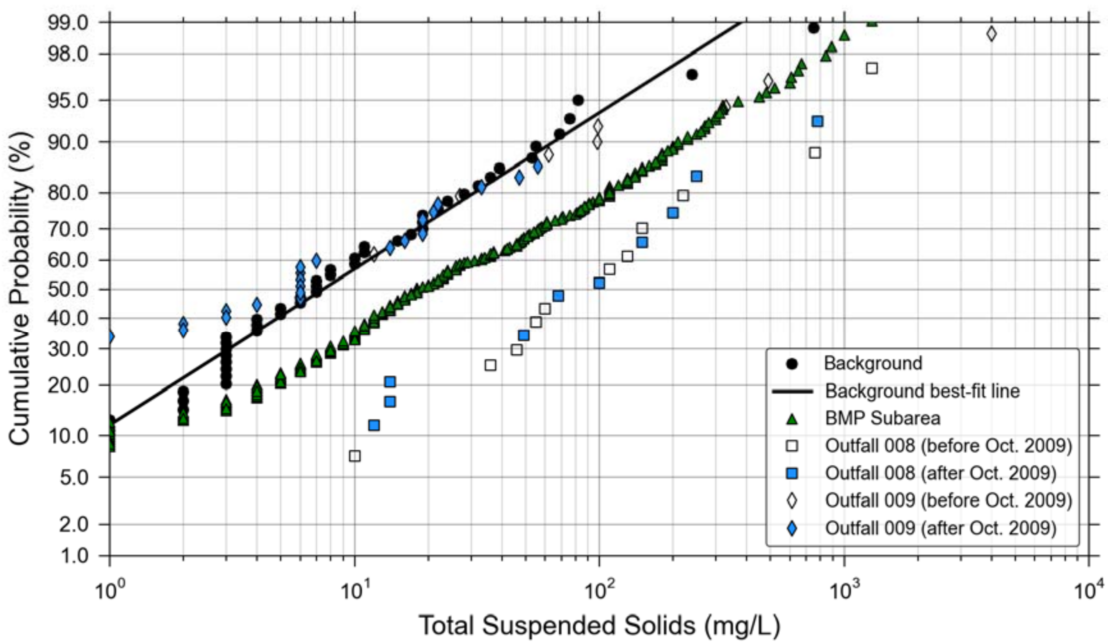

Figure 3. Probability plot for TSS concentrations[14]

[14] Note: Following the 2005 wildfire, an uncharacteristically high TSS value (4000 mg/L) was measured at Outfall 009 on 10/17/2005. This data point is shown near the upper right corner of Figure 3.

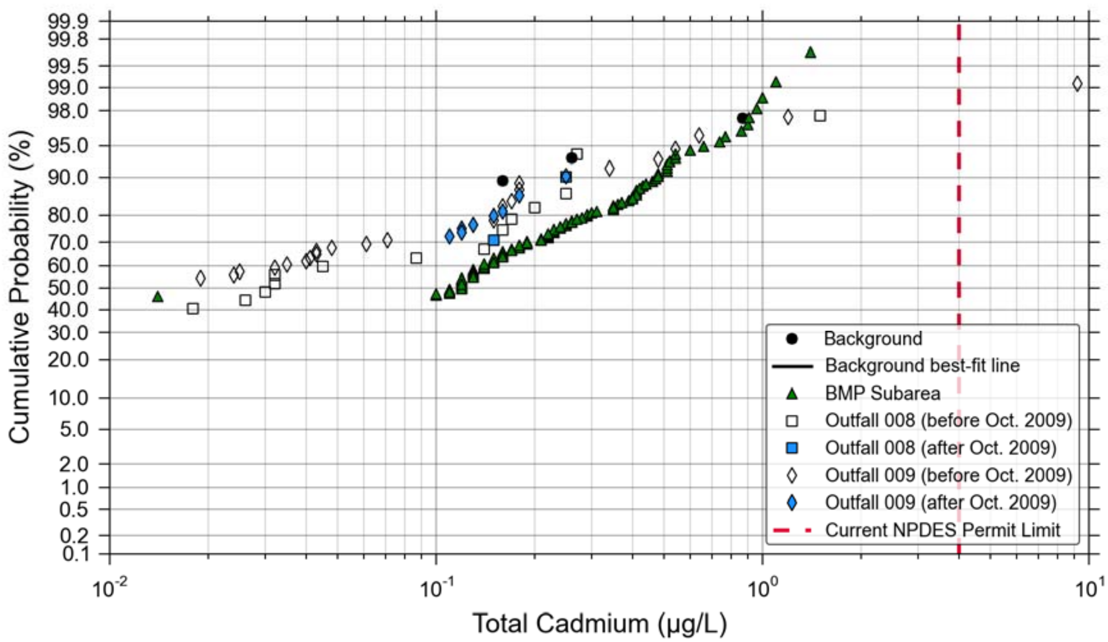

Figure 4. Probability plot for cadmium concentrations[15, 16]

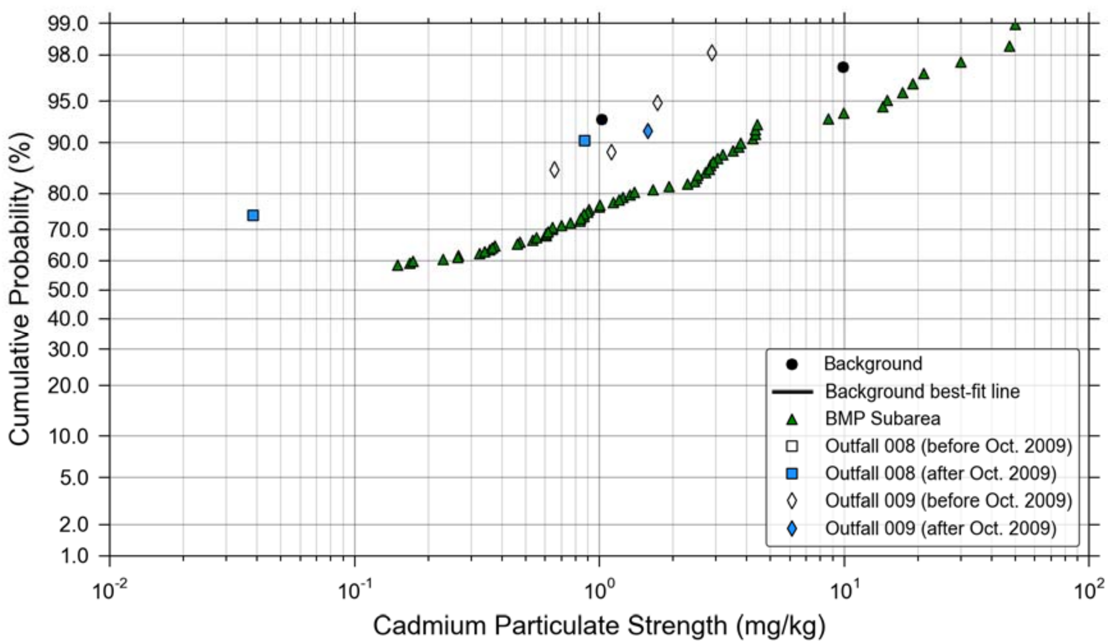

Figure 5. Probability plot for cadmium particulate strengths

[15] Following the 2005 wildfires, an uncharacteristically high cadmium concentration (9.2 µg/L) was measured at Outfall 009 on 10/17/2005. This data point is shown in the upper right corner of Figure 4.

[16] A background best-fit line was not provided for total cadmium due to the limited number of detected results.

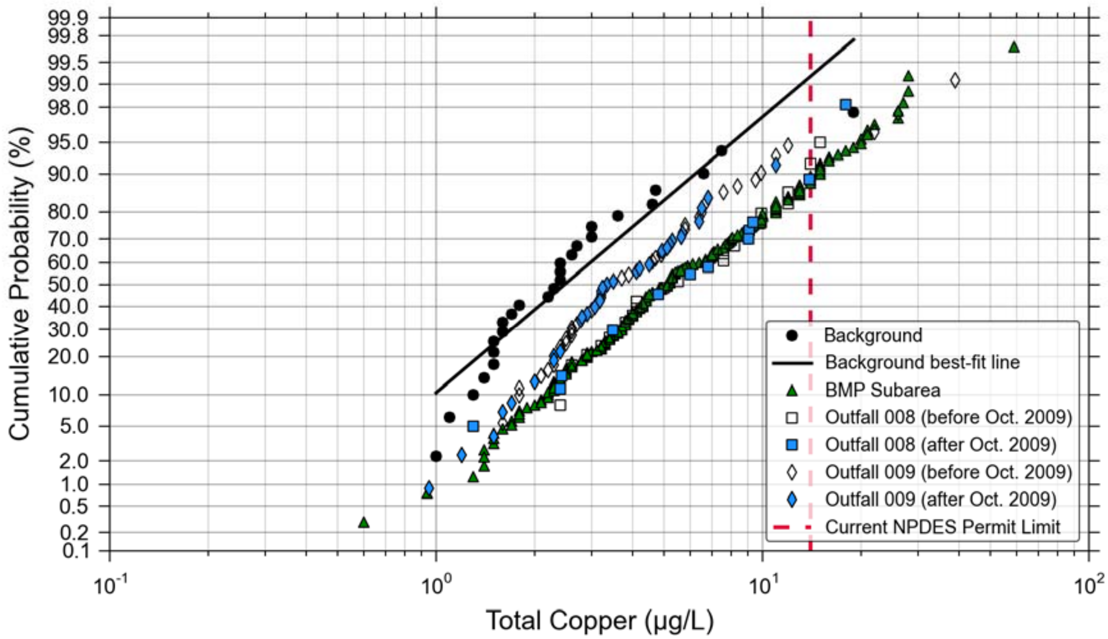

Figure 6. Probability plot for copper concentrations[17]

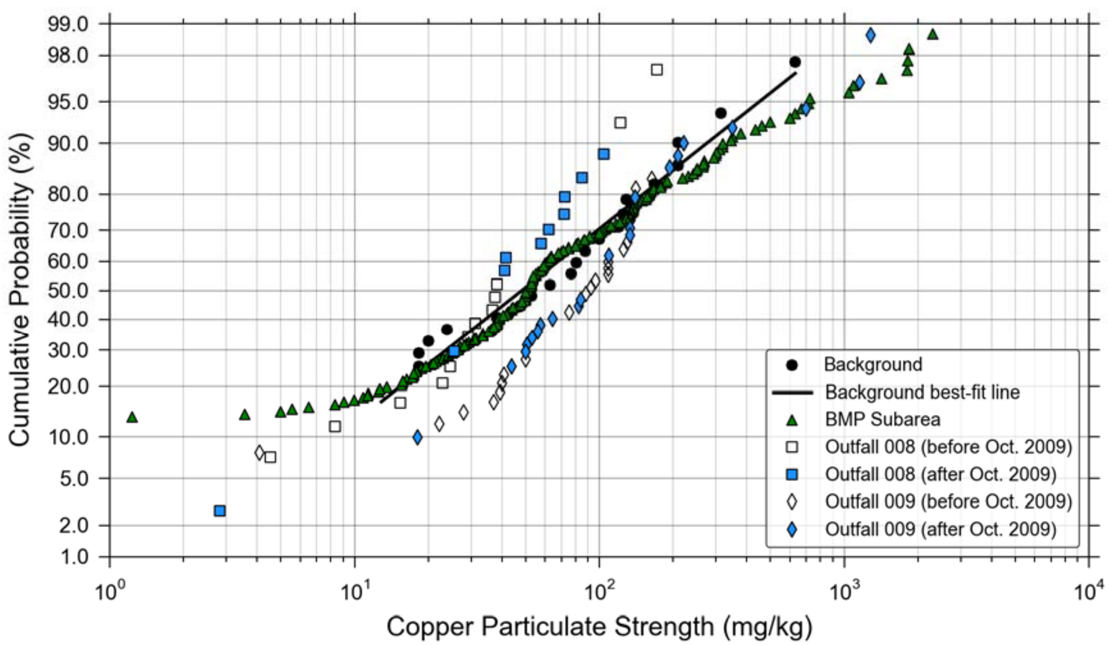

Figure 7. Probability plot for copper particulate strengths

[17] Following the 2005 wildfires, an uncharacteristically high copper concentration (212 µg/L) was measured at Outfall 009 on 10/17/2005. This data point is shown near the upper right corner of Figure 6.

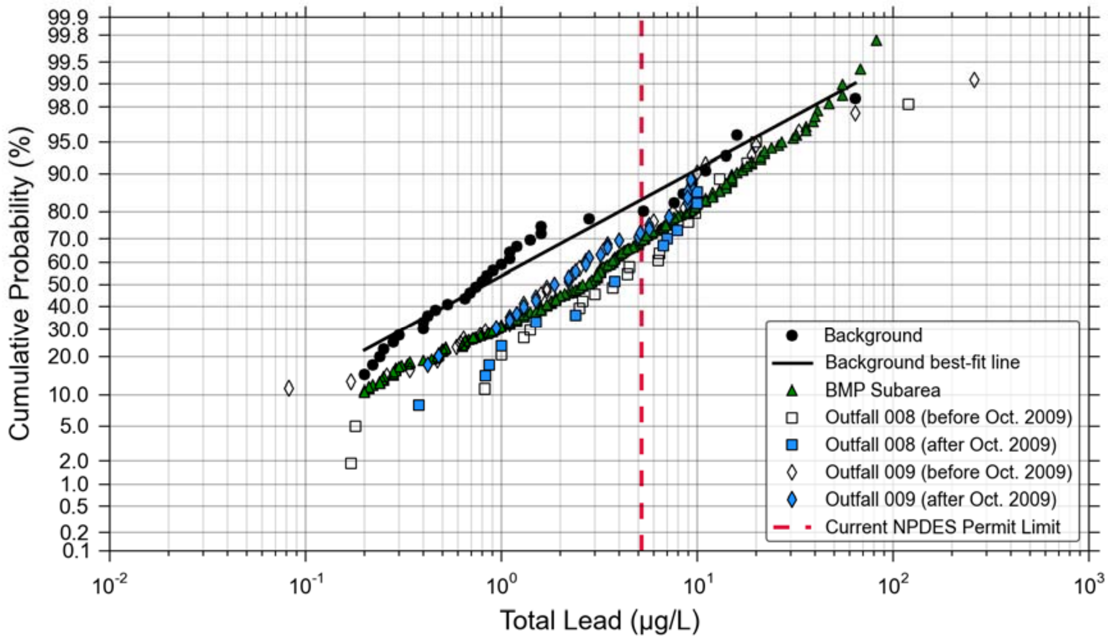

Figure 8. Probability plot for lead concentrations[18]

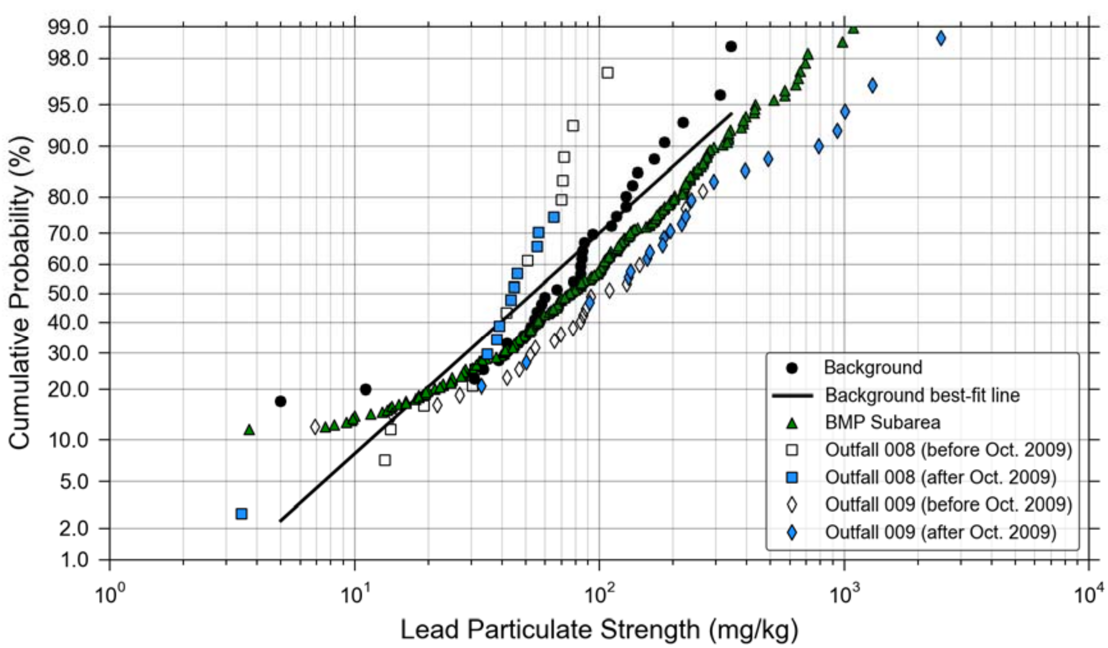

Figure 9. Probability plot for lead particulate strengths

[18] Following the 2005 wildfires, an uncharacteristically high lead concentration (260 µg/L) was measured at Outfall 009 on 10/17/2005. This data point is shown near the upper right corner of Figure 8.

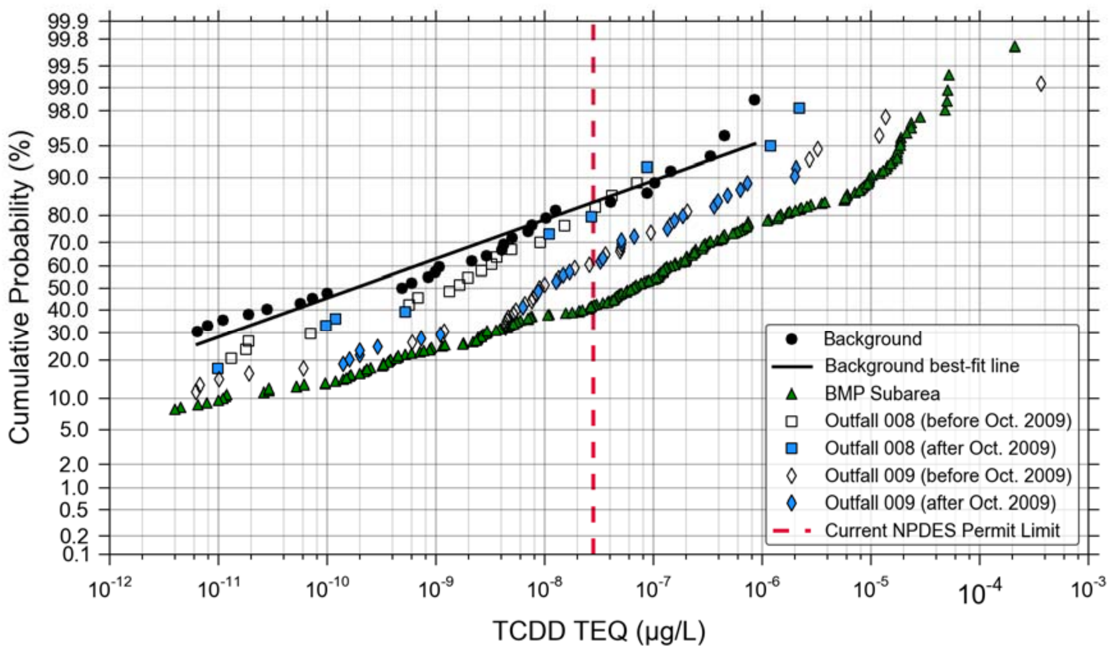

Figure 10. Probability plot for TCDD TEQ concentrations[19]

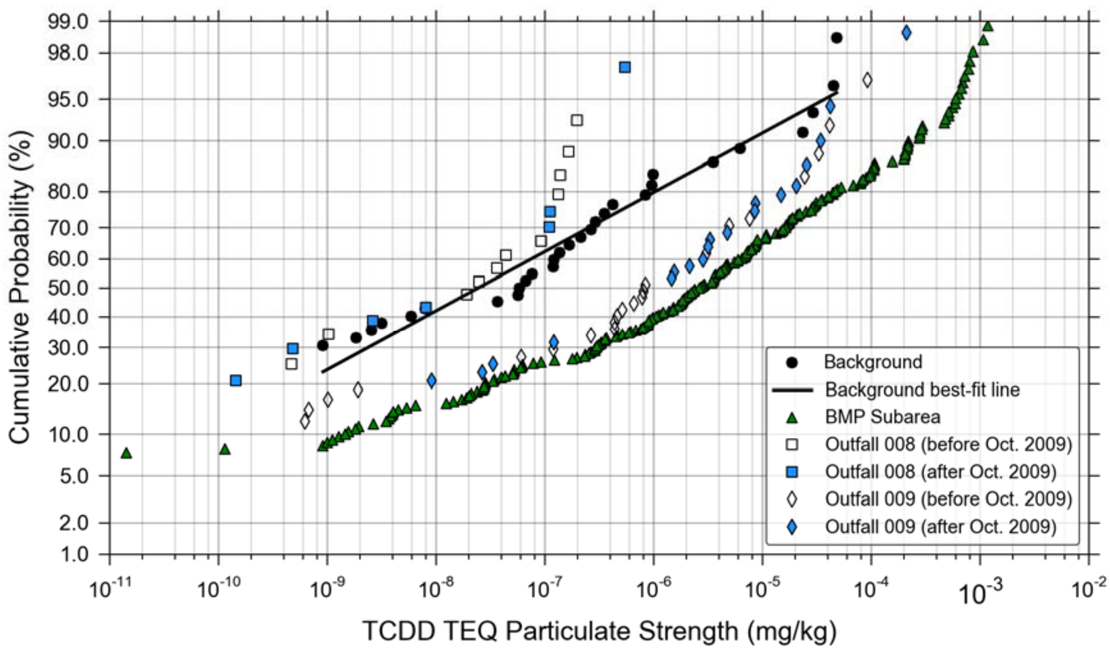

Figure 11. Probability plot for TCDD TEQ particulate strengths

[19] Following the 2005 wildfires, an uncharacteristically high TCDD TEQ concentration (3.6×10^{-4} µg/L) was measured at Outfall 009 on 10/17/2005. This data point is shown in the upper right corner of Figure 10.

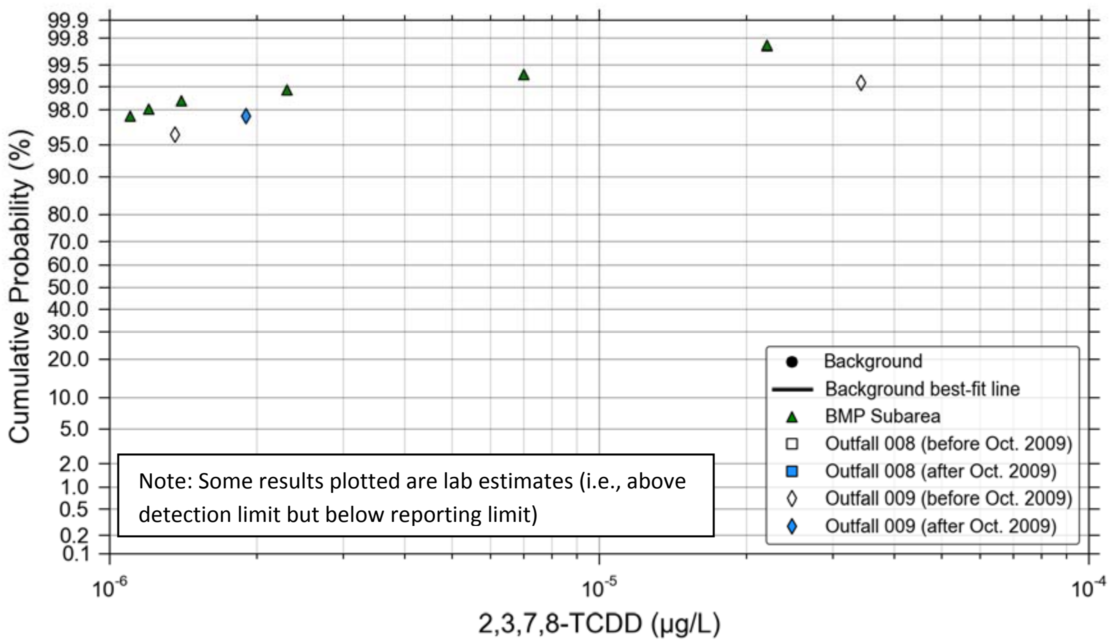

Figure 12. Probability plot for 2,3,7,8-TCDD concentrations[20]

[20] Following the 2005 wildfires, an uncharacteristically high 2,3,7,8-TCDD concentration (3.4×10^{-5} µg/L) was measured at Outfall 009 on 10/17/2005. This data point is shown in the upper right corner of Figure 12.

5. SUBAREA RANKING ANALYSIS

Subareas were ranked based on the results of comparisons between (a) stormwater concentrations and permit limits, and (b) stormwater particulate strengths and stormwater background particulate strengths to identify potential stormwater control locations. A statistical methodology was developed to rank the subareas based on these comparison results, while accounting for the number of useable data available at each subarea as well as number of data observations that fall above these thresholds (i.e., reflecting statistical confidence in how frequently each subarea will exceed the comparison thresholds). This methodology relies on “weighting factors” that are calculated for each POC for each subarea. In the end, the pollutant-specific weighting factors are summed to produce a multi-constituent score to allow for relative ranking amongst the potential BMP subareas. The highest ranked subareas are then recommended for consideration for new or enhanced stormwater control placement. In the case of ties, the average of the ranks is assigned to both subareas.

The potential BMP subareas have been weighted based on general guidelines for small sample sets, provided by Dr. Pitt and included as Appendix C. These guidelines are based on the binomial distribution (single-tailed) corrected for use with small sample sets. This two-tiered method for determining the weighting factor helps identify significant differences between sets having different numbers of “critical” observations (“m”, defined as the sum of the number of results exceeding either the permit limit or the 95th percentile stormwater background[21]) and different numbers of total observations (“n”, defined as the number of particulate strength results plus the number of concentration results). This allows a statistically-based weighting factor to be applied to each subarea for each POC to reflect the number of observations simultaneously with the number of critical observations. As an example, a location having 20 critical observations out of 20 total observations has more confidence compared to a location only having 3 critical observations out of 3 total observations. The larger number of total observations results in a greater confidence of the findings. Similarly, if only 1 out of 10 observations are critical, that subarea has less confidence in a critical determination compared to a subarea that has 8 out of 10 critical observations. The weighting factors for small sample sets used in this part of the analysis are summarized in Table 7.

[21] The 95th percentile threshold was recommended by the Panel based on best professional judgment as well as a review of relevant surface water regulations and guidance (WWE, 2011, attached as Appendix D).

Table 7. Weighting Factors for Small Sample Sets (WF, %) (divided by 100 for use in the ranking analyses)

Total Number of Observations (n)	Total Number of Critical Values in Data Set (m)													
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
1	50													
2	50	75												
3	50	50	87											
4	31	50	69	94										
5	19	50	50	81	97									
6	11	34	50	66	89	98								
7	6	23	50	50	77	94	99							
8	4	14	36	50	64	86	98	99						
9	2	9	25	50	50	75	96	98	99					
10	1	5	17	38	50	63	83	95	99	99				
11	1	3	11	27	50	50	73	89	97	99	99			
12	0	2	7	19	39	50	63	81	93	98	99	99		
13	0	1	5	13	29	50	50	71	87	95	99	99	99	
14	0	1	3	9	21	40	50	61	79	91	97	99	99	99
15	0	0	2	6	15	30	50	50	70	85	94	98	99	99

Where the total number of observations was greater than 15[22] and the number of critical values in the dataset was greater than 14, the weight was computed as the unadjusted value of the cumulative distribution function (CDF) of a binomial distribution with p = 0.5:

$$WF = \sum_{i=0}^{m} \binom{n}{i} p^{i} (1-p)^{n-i}$$

Where,

$P = 0.5$

$n = n_C + n_{PS}$, where

n_C = Number of concentration sample results

n_{PS} = Number of PS results

$m = m_C + m_{PS,}$, where

m_C = Number of concentrations sample results that exceed the Permit Limits

m_{PS} = Number of PS results that exceed the 95th percentile stormwater background PS results threshold

[22] This situation only occurs for Outfalls 008 and 009 which have several years of NPDES monitoring data available and are included here for method testing and results comparison purposes only (i.e., treatment controls are not being contemplated at these locations). The large sample sizes at these locations exceed the statistical capability of the methods used to determine the weighting factor. In future BMP subarea ranking analysis reports, this can be corrected by an adjustment that has been recommended by Dr Pitt.

The benefits of this statistically rigorous approach is that when comparing potential BMP subarea monitoring datasets with a combination of stormwater background and permit limit thresholds, this process allows for the accounting of both the size of the dataset (number of samples) and the number of samples that are above a stormwater background threshold, resulting in a more robust and defensible weight for ranking potential BMP subareas based on need for treatment, and one that can be reevaluated in the future as the available data sets grow. Typical arbitrary (but possibly simpler) weighting factors, such as having fixed stormwater background threshold levels and a number of samples that are allowed to be exceeded before making a BMP decision, can be difficult to defend or update when more data become available, and likely do not appropriately consider the number of samples used in the analysis.

As shown in the example below, the ranking analysis calculated a single score for each POC for each potential BMP subarea and background subarea. The highest score across all metals at a single subarea is assumed representative of the multi-constituent "metals score" for each subarea. The highest score between TCDD TEQ and 2,3,7,8-TCDD at a single subarea is assumed representative of the multi-constituent "dioxin score" for each subarea. A multi-constituent score is then calculated as the average of the maximum metal and dioxin WF values. The TSS weighting factor and score are the same.

The following Table 8 example demonstrates this method for a theoretical monitoring location. Actual results for each BMP subarea and background monitoring subarea are summarized in Tables 9, 10, and 11 (subareas are organized by weight, ranked highest to lowest) and illustrated in Attachments 3 and 4.

Table 8. Example Weighting Factor (WF) and Multi-C onstituent Score Calculation

	Subarea X									
	Metals						Dioxins			
	TPb		TCu		TCd		TCDD		2,3,7,8-TCDD	TSS
Calculation Step	**>PL**	**>95%B**	**>PL**	**>95%B**	**>PL**	**>95%B**	**>PL**	**>95%B**	**>95%B**	**>95%B**
Sample 1	**Y**	N	N	N	N	N	N	N	N	N
Sample 2	N	N	N	N	N	N	N	N	**Y**	N
Sample 3	**Y**	N	**Y**	N	N	N	**Y**	N	N	N
Sample 4	**Y**	**Y**	N	N	N	N	--	--	N	**Y**
Sample 5	N	--	N	--	N	N	--	--	N	N
Sample 6	N	--	**Y**	--	N	N	--	--	--	N
# Y / # samples	3/6	1/4	2/6	0/4	0/6	0/6	1/3	0/3	1/5	1/6
(sum Y) / (sum n)	4/10		2/10		0/12		1/6		1/5	1/6
WF	0.38		0.05		0		0.11		0.19	0.11
Max WF	0.38						0.19			0.11
Multi Pollutant Score	0.29									0.11
Exceeds Both PL&B?	**Y**		N		N		N		NA	NA

Notes

>PL = greater than Permit Limit concentration, >95%B = greater than 95th percentile stormwater background particulate strength (or concentration for TSS), **Y** = yes, N = no, WF = weighting factor, -- = no data.

Table 9. Metals Weighting Factor Results, by Subarea

Rank	Potential BMP Subarea (Co-location)	Watershed	Description	Max Metal Weight
1	**EVBMP0003 (A2SW0001)[ab]**	Outfall 009	ELV road runoff/CM-1 upstream west	0.91
2	**A1SW0009-A**	Outfall 009	CM-9 downstream-underdrain outlet (post-building 1324 parking lot asphalt removal, pre-filter fabric over weir boards)	0.75
3	**ILBMP0002[a]**	Outfall 009	Road runoff to CM-9	0.71
4	**APBMP0001**	Outfall 009	Ashpile culvert inlet / road runoff	0.69
9	**B1SW0002[a]**	Outfall 009	B-1 north road runoff	0.50
9	LXBMP0004[b]	Outfall 009	LOX southwest downstream of sandbag berm	0.50
9	LPBMP0001[b]	Outfall 009	Lower Parking Lot sheetflow (pre-gravel bag berms)	0.50
9	HZSW0020 (HZSW0017)	Outfall 008	Background - Happy Valley upstream	0.50
9	A1BMP0001[a]	Outfall 009	A1LF downstream - OLD	0.50
9	**B1BMP0004 (B1SW0015)[a]**	Outfall 009	B-1 media filter inlet north	0.50
9	B1SW0014-A	Outfall 009	B-1 media filter effluent (pre-media filter reconstruction)	0.50
9	LXBMP0006[b]	Outfall 009	LOX east minor tributary	0.50
9	B1SW0010[a]	Outfall 009	B-1 upstream (post-ISRA excavation)	0.50
14	**ILBMP0001[b]**	Outfall 009	Lower parking lot 24" stormdrain	0.41
15	**EVBMP0002[b]**	Outfall 009	Helipad (pre-sandbag berms)	0.39
16.5	B1BMP0004-5[a]	Outfall 009	B-1 combined media filter influent	0.38
16.5	**EVBMP0001-A[b]**	Outfall 009	ELV culvert inlet (helipad road and ELV ditch, composite)	0.38
18.5	A1SW0009-B	Outfall 009	CM-9 downstream-underdrain outlet (post-filter fabric over weir boards, post- building 1324 parking lot asphalt removal)	0.36
18.5	**A2SW0002-A**	Outfall 009	CM-1 effluent (post-filter fabric over weir boards)	0.36
20	A1BMP0002-A[a]	Outfall 009	CM-9 upstream toward A1LF (post- building 1324 parking lot asphalt removal)	0.34
21.5	HZSW0011	Outfall 008	Background - Happy Valley upstream	0.31
21.5	LXBMP0002[b]	Outfall 009	LOX mid - OLD	0.31
25	EVBMP0001[b]	Outfall 009	ELV culvert inlet (helipad road gutter)	0.11
25	BGBMP0004	Outfall 009	Background - Sage Ranch near CM-5	0.11
25	A2BMP0004[b]	Outfall 009	Helipad culvert outlet	0.11
25	A2BMP0005	Outfall 009	A2 u/s of CM-1 confluence	0.11
25	LFSW0002-A	Outfall 009	CTLI downstream (post-ISRA excavation)	0.11
28	BGBMP0002 (LXSW0003)[a]	Outfall 009	Background - CM-3 upstream	0.06
30	**LXBMP0005[b]**	Outfall 009	LOX southeast downstream of sandbag berm	0.05
30	LPBMP0001-A[b]	Outfall 009	Lower Parking Lot sheetflow (post-gravel bag berms)	0.05

Rank	Potential BMP Subarea (Co-location)	Watershed	Description	Max Metal Weight
30	A2BMP0003	Outfall 009	A2 u/s of ND confluence	0.05
32.5	B1SW0014-B	Outfall 009	B-1 media filter effluent (post-media filter reconstruction)	0.04
32.5	BGBMP0001 (A2SW0007)[a]	Outfall 009	Background - CM-1 upstream east tributary (new)	0.04
34.5	**BGBMP0006 (A2SW0006)[a]**	Outfall 009	Background - CM-1 upstream east tributary (ponded footprint) - OLD	0.03
34.5	**LXBMP0003[ab]**	Outfall 009	LOX east tributary - OLD	0.03
36.5	**HZBMP0001 HZSW0007)**	Outfall 008	Happy Valley downstream	0.02
36.5	B1BMP0005 (B1SW0011, B1SW0013)[a]	Outfall 009	B-1 media filter inlet south	0.02
38	B1BMP0003 (B1BMP0002)	Outfall 009	B-1 parking lot / road runoff to culvert inlet	0.01
40	**BGBMP0007 (LXSW0001)**	Outfall 009	Background - CM-3 upstream - OLD	0.01
40	**A2SW0002**	Outfall 009	CM-1 effluent (pre-filter fabric over weir boards)	0.01
40	EVBMP0002-A[ab]	Outfall 009	Helipad (post-sandbag berms)	0.01
42	**A1SW0002**	Outfall 009	Background - CM-8 upstream	0.01
43	LXSW0002	Outfall 009	CM-3 downstream (pre-filter fabric over weir boards) - OLD	3.80E-03
44	**A1BMP0002 (A1SW0004)[a]**	Outfall 009	CM-9 upstream toward A1LF (pre-A1LF asphalt removal)	2.60E-03
45.5	**A1SW0003**	Outfall 009	CM-8 downstream (pre-filter fabric over weir boards) - OLD	1.30E-03
45.5	**A1SW0005**	Outfall 009	CM-9 downstream (pre-filter fabric over weir boards) - OLD	1.30E-03
47	**HZBMP0003 (HZSW0003)**	Outfall 008	DRG downstream (furthest downstream)	3.00E-04
48	Outfall 008**	Outfall 008	NPDES outfall 008	1.00E-04
77.5	**Outfall 009****	Outfall 009	NPDES outfall 009	0.00
77.5	ILBMP0003[a]	Outfall 009	A1LF parking lot - OLD	0.00
77.5	HZSW0005	Outfall 008	DRG upstream	0.00
77.5	HZSW0008	Outfall 008	Background - Happy Valley upstream	0.00
77.5	HZBMP0002 (HZSW0004)	Outfall 008	DRG downstream	0.00
77.5	HZSW0012	Outfall 008	Background - Happy Valley upstream	0.00
77.5	HZSW0014	Outfall 008	Happy Valley upstream	0.00
77.5	A1SW0006[a]	Outfall 009	Background - CM-11 upstream	0.00
77.5	BGBMP0003	Outfall 009	Background - Sage Ranch near LOX	0.00
77.5	BGBMP0005	Outfall 009	Background - Sage Ranch near entrance	0.00
77.5	A1SW0007	Outfall 009	CM-11 downstream (pre-filter fabric over weir boards) - OLD	0.00
77.5	A2BMP0002	Outfall 009	A2 road runoff	0.00

Rank	Potential BMP Subarea (Co-location)	Watershed	Description	Max Metal Weight
77.5	B1SW0008[a]	Outfall 009	B-1 upstream	0.00
77.5	ILSW0003	Outfall 009	IEL-2 upstream	0.00
77.5	ILSW0004-A	Outfall 009	IEL-2 downstream (post-ISRA excavation)	0.00

<u>Notes</u>

1) Potential BMP subareas sorted by maximum weight for the POC group, computed as described in Section 5.
2) ([a]) These potential BMP subarea monitoring subareas are upstream of existing stormwater quality treatment controls
3) ([b])These potential BMP subarea monitoring subareas have new planned (i.e., designed and ready for construction) stormwater quality treatment controls.
4) (**)NPDES outfalls are included for comparison and method testing purposes only; stormwater controls are not being contemplated at these locations.
5) The rounding of weights may account for similar weights being ranked differently.
6) Bolded locations indicate that both the metals NPDES permit limit and 95th percentile background particulate strength threshold were exceeded (for at least one metals POC).

Table 10. Dioxin Weighting Factor Results, by Subarea

Rank	Potential BMP Subarea (Co-location)	Watershed	Description	Max Dioxin Weight
1	**EVBMP0003 (A2SW0001)[ab]**	Outfall 009	ELV road runoff/CM-1 upstream west	0.98
2	**LPBMP0001-A[b]**	Outfall 009	Lower Parking Lot sheetflow (post-gravel bag berms)	0.98
3	**EVBMP0001-A[b]**	Outfall 009	ELV culvert inlet (helipad road and ELV ditch, composite)	0.95
4	**ILBMP0001[b]**	Outfall 009	Lower parking lot 24" stormdrain	0.94
5	**B1BMP0004 (B1SW0015)[a]**	Outfall 009	B-1 media filter inlet north	0.94
6	**EVBMP0002[b]**	Outfall 009	Helipad (pre-sandbag berms)	0.93
7	**B1BMP0003 (B1BMP0002)**	Outfall 009	B-1 parking lot / road runoff to culvert inlet	0.85
8	**B1BMP0005 (B1SW0011, B1SW0013)[a]**	Outfall 009	B-1 media filter inlet south	0.83
9	**B1SW0008[a]**	Outfall 009	B-1 upstream	0.69
10	**A2BMP0005**	Outfall 009	A2 u/s of CM-1 confluence	0.66
11	**B1BMP0004-5[a]**	Outfall 009	B-1 combined media filter influent	0.63
12	**ILBMP0002[a]**	Outfall 009	Road runoff to CM-9	0.61
13	**A2SW0002**	Outfall 009	CM-1 effluent (pre-filter fabric over weir boards)	0.57
19.5	APBMP0001	Outfall 009	Ashpile culvert inlet / road runoff	0.50
19.5	**B1SW0002[a]**	Outfall 009	B-1 north road runoff	0.50
19.5	LPBMP0001[b]	Outfall 009	Lower Parking Lot sheetflow (pre-gravel bag berms)	0.50
19.5	LXBMP0002[b]	Outfall 009	LOX mid - OLD	0.50
19.5	LXBMP0006[b]	Outfall 009	LOX east minor tributary	0.50
19.5	A1BMP0002-A[a]	Outfall 009	CM-9 upstream toward A1LF (post- building 1324 parking lot asphalt removal)	0.50
19.5	A1SW0009-A	Outfall 009	CM-9 downstream-underdrain outlet (post-building 1324 parking lot asphalt removal, pre-filter fabric over weir boards)	0.50
19.5	**A2SW0002-A**	Outfall 009	CM-1 effluent (post-filter fabric over weir boards)	0.50
19.5	B1SW0014-A	Outfall 009	B-1 media filter effluent (pre-media filter reconstruction)	0.50
19.5	A1SW0009-B	Outfall 009	CM-9 downstream-underdrain outlet (post-filter fabric over weir boards, post- building 1324 parking lot asphalt removal)	0.50
19.5	B1SW0014-B	Outfall 009	B-1 media filter effluent (post-media filter reconstruction)	0.50
19.5	**LFSW0002-A**	Outfall 009	CTLI downstream (post-ISRA excavation)	0.50
26	**A2BMP0003**	Outfall 009	A2 u/s of ND confluence	0.38
27.5	A2BMP0004[b]	Outfall 009	Helipad culvert outlet	0.34
27.5	B1SW0010[a]	Outfall 009	B-1 upstream (post-ISRA excavation)	0.34

Rank	Potential BMP Subarea (Co-location)	Watershed	Description	Max Dioxin Weight
29.5	**LXBMP0005**[b]	Outfall 009	LOX southeast downstream of sandbag berm	0.17
29.5	EVBMP0002-A[ab]	Outfall 009	Helipad (post-sandbag berms)	0.17
31.5	EVBMP0001[b]	Outfall 009	ELV culvert inlet (helipad road gutter)	0.11
31.5	BGBMP0004	Outfall 009	Background - Sage Ranch near CM-5	0.11
33	LXBMP0003[ab]	Outfall 009	LOX east tributary - OLD	0.07
34.5	**A1BMP0001**[a]	Outfall 009	A1LF downstream - OLD	0.05
34.5	**A1SW0005**	Outfall 009	CM-9 downstream (pre-filter fabric over weir boards) - OLD	0.05
36	BGBMP0002 (LXSW0003)[a]	Outfall 009	Background - CM-3 upstream	0.04
37	**A1SW0006**[a]	Outfall 009	Background - CM-11 upstream	0.03
38	**BGBMP0006 (A2SW0006)**[a]	Outfall 009	Background - CM-1 upstream east tributary (ponded footprint) - OLD	0.03
39	**A1SW0007**	Outfall 009	CM-11 downstream (pre-filter fabric over weir boards) - OLD	0.01
40.5	BGBMP0003	Outfall 009	Background - Sage Ranch near LOX	0.01
40.5	LXBMP0004[b]	Outfall 009	LOX southwest downstream of sandbag berm	0.01
42	**LXSW0002**	Outfall 009	CM-3 downstream (pre-filter fabric over weir boards) - OLD	3.80E-03
43	A1BMP0002 (A1SW0004)[a]	Outfall 009	CM-9 upstream toward A1LF (pre-A1LF asphalt removal)	2.10E-03
44	**HZBMP0001 (HZSW0007)**	Outfall 008	Happy Valley downstream	8.00E-04
45	**HZBMP0003 (HZSW0003)**	Outfall 008	DRG downstream (furthest downstream)	5.00E-04
76	HZSW0005	Outfall 008	DRG upstream	0.00
76	HZSW0008	Outfall 008	Background - Happy Valley upstream	0.00
76	HZSW0011	Outfall 008	Background - Happy Valley upstream	0.00
76	HZSW0012	Outfall 008	Background - Happy Valley upstream	0.00
76	HZSW0014	Outfall 008	Happy Valley upstream	0.00
76	HZSW0020 (HZSW0017)	Outfall 008	Background - Happy Valley upstream	0.00
76	HZBMP0002 (HZSW0004)	Outfall 008	DRG downstream	0.00
76	ILBMP0003[a]	Outfall 009	A1LF parking lot - OLD	0.00
76	Outfall 008**	Outfall 008	NPDES outfall 008	0.00
76	**Outfall 009****	Outfall 009	NPDES outfall 009	0.00
76	A1SW0003	Outfall 009	CM-8 downstream (pre-filter fabric over weir boards) - OLD	0.00
76	A1SW0002	Outfall 009	Background - CM-8 upstream	0.00
76	BGBMP0001 (A2SW0007)[a]	Outfall 009	Background - CM-1 upstream east tributary (new)	0.00
76	BGBMP0005	Outfall 009	Background - Sage Ranch near entrance	0.00
76	BGBMP0007	Outfall 009	Background - CM-3 upstream - OLD	0.00

Rank	Potential BMP Subarea (Co-location)	Watershed	Description	Max Dioxin Weight
	(LXSW0001)			
76	A2BMP0002	Outfall 009	A2 road runoff	0.00
76	ILSW0003	Outfall 009	IEL-2 upstream	0.00
76	ILSW0004-A	Outfall 009	IEL-2 downstream (post-ISRA excavation)	0.00

Notes

1) Potential BMP subareas sorted by maximum weight for the POC group, computed as described in Section 5.
2) ([a]) These potential BMP subarea monitoring subareas are upstream of existing stormwater quality treatment controls
3) ([b])These potential BMP subarea monitoring subareas have new planned (i.e., designed and ready for construction) stormwater quality treatment controls.
4) (**)NPDES outfalls are included for comparison and method testing purposes only; stormwater controls are not being contemplated at these locations.
5) The rounding of weights may account for similar weights being ranked differently.
6) Bolded locations indicate that both the dioxin NPDES permit limit and 95th percentile background particulate strength threshold were exceeded (for at least one dioxin POC).

Table 11. TSS Weighting Factor Results, by Subarea

Rank	Potential BMP Subarea (Co-location)	Watershed	Description	TSS Weight
1	LXBMP0004[b]	Outfall 009	LOX southwest downstream of sandbag berm	0.97
2	B1SW0010[a]	Outfall 009	B-1 upstream (post-ISRA excavation)	0.87
3	Outfall 008**	Outfall 008	NPDES outfall 008	0.58
15	LXBMP0002[b]	Outfall 009	LOX mid - OLD	0.50
15	LXBMP0003[ab]	Outfall 009	LOX east tributary - OLD	0.50
15	ILBMP0002[a]	Outfall 009	Road runoff to CM-9	0.50
15	LPBMP0001[b]	Outfall 009	Lower Parking Lot sheetflow (pre-gravel bag berms)	0.50
15	HZBMP0001 (HZSW0007)	Outfall 008	Happy Valley downstream	0.50
15	HZSW0020 (HZSW0017)	Outfall 008	Background - Happy Valley upstream	0.50
15	B1BMP0004-5[a]	Outfall 009	B-1 combined media filter influent	0.50
15	BGBMP0004	Outfall 009	Background - Sage Ranch near CM-5	0.50
15	EVBMP0001[b]	Outfall 009	ELV culvert inlet (helipad road gutter)	0.50
15	A2BMP0003	Outfall 009	A2 u/s of ND confluence	0.50
15	A2BMP0004[b]	Outfall 009	Helipad culvert outlet	0.50
15	A2BMP0005	Outfall 009	A2 u/s of CM-1 confluence	0.50
15	B1SW0008[a]	Outfall 009	B-1 upstream	0.50
15	EVBMP0001-A[b]	Outfall 009	ELV culvert inlet (helipad road and ELV ditch, composite)	0.50
15	A1SW0009-B	Outfall 009	CM-9 downstream-underdrain outlet (post-filter fabric over weir boards, post- building 1324 parking lot asphalt removal)	0.50
15	ILSW0004-A	Outfall 009	IEL-2 downstream (post-ISRA excavation)	0.50
15	LFSW0002-A	Outfall 009	CTLI downstream (post-ISRA excavation)	0.50
15	B1SW0014-A	Outfall 009	B-1 media filter effluent (pre-media filter reconstruction)	0.50
15	LXBMP0005[b]	Outfall 009	LOX southeast downstream of sandbag berm	0.50
15	LXBMP0006[b]	Outfall 009	LOX east minor tributary	0.50
15	A1BMP0002-A[a]	Outfall 009	CM-9 upstream toward A1LF (post- building 1324 parking lot asphalt removal)	0.50
15	B1SW0002[a]	Outfall 009	B-1 north road runoff	0.50
15	ILSW0003	Outfall 009	IEL-2 upstream	0.50
27	LPBMP0001-A[b]	Outfall 009	Lower Parking Lot sheetflow (post-gravel bag berms)	0.34
28.5	A2SW0002-A	Outfall 009	CM-1 effluent (post-filter fabric over weir boards)	0.31
28.5	BGBMP0002 (LXSW0003)[a]	Outfall 009	Background - CM-3 upstream	0.31
30	B1BMP0005 (B1SW0011, B1SW0013)[a]	Outfall 009	B-1 media filter inlet south	0.19
31	EVBMP0002[b]	Outfall 009	Helipad (pre-sandbag berms)	0.11

Rank	Potential BMP Subarea (Co-location)	Watershed	Description	TSS Weight
32	EVBMP0003 (A2SW0001)[ab]	Outfall 009	ELV road runoff/CM-1 upstream west	0.09
33	B1BMP0003 (B1BMP0002)	Outfall 009	B-1 parking lot / road runoff to culvert inlet	0.07
34	BGBMP0006 (A2SW0006)[a]	Outfall 009	Background - CM-1 upstream east tributary (ponded footprint) - OLD	0.06
35	A1SW0005	Outfall 009	CM-9 downstream (pre-filter fabric over weir boards) - OLD	0.05
36	HZBMP0003 (HZSW0003)	Outfall 008	DRG downstream (furthest downstream)	0.03
37.5	A1BMP0002 (A1SW0004)[a]	Outfall 009	CM-9 upstream toward A1LF (pre-A1LF asphalt removal)	0.02
37.5	LXSW0002	Outfall 009	CM-3 downstream (pre-filter fabric over weir boards) - OLD	0.02
39.5	A1SW0002	Outfall 009	Background - CM-8 upstream	0.01
39.5	ILBMP0001[b]	Outfall 009	Lower parking lot 24" stormdrain	0.01
41	A2SW0002	Outfall 009	CM-1 effluent (pre-filter fabric over weir boards)	3.0E-04
74	APBMP0001	Outfall 009	Ashpile culvert inlet / road runoff	0.00
74	A1SW0007	Outfall 009	CM-11 downstream (pre-filter fabric over weir boards) - OLD	0.00
74	A2BMP0001	Outfall 009	A2 northeast	0.00
74	HZBMP0002 (HZSW0004)	Outfall 008	DRG downstream	0.00
74	HZSW0005	Outfall 008	DRG upstream	0.00
74	HZSW0008	Outfall 008	Background - Happy Valley upstream	0.00
74	HZSW0011	Outfall 008	Background - Happy Valley upstream	0.00
74	HZSW0012	Outfall 008	Background - Happy Valley upstream	0.00
74	HZSW0014	Outfall 008	Happy Valley upstream	0.00
74	ILBMP0003[a]	Outfall 009	A1LF parking lot - OLD	0.00
74	Outfall 009**	Outfall 009	NPDES outfall 009	0.00
74	A1SW0006[a]	Outfall 009	Background - CM-11 upstream	0.00
74	B1BMP0004 (B1SW0015)[a]	Outfall 009	B-1 media filter inlet north	0.00
74	BGBMP0001 (A2SW0007)[a]	Outfall 009	Background - CM-1 upstream east tributary (new)	0.00
74	BGBMP0007 (LXSW0001)	Outfall 009	Background - CM-3 upstream - OLD	0.00
74	BGBMP0003	Outfall 009	Background - Sage Ranch near LOX	0.00
74	BGBMP0005	Outfall 009	Background - Sage Ranch near entrance	0.00
74	A1SW0009-A	Outfall 009	CM-9 downstream-underdrain outlet (post-building 1324 parking lot asphalt removal, pre-filter fabric over weir boards)	0.00
74	A1SW0003	Outfall 009	CM-8 downstream (pre-filter fabric over weir boards) - OLD	0.00

Rank	Potential BMP Subarea (Co-location)	Watershed	Description	TSS Weight
74	EVBMP0002-A[ab]	Outfall 009	Helipad (post-sandbag berms)	0.00
74	B1SW0014-B	Outfall 009	B-1 media filter effluent (post-media filter reconstruction)	0.00
74	A1BMP0001[a]	Outfall 009	A1LF downstream - OLD	0.00

Notes

1) ([a]) These potential BMP subarea monitoring subareas are upstream of existing stormwater quality treatment controls
2) ([b])These potential BMP subarea monitoring subareas have new planned (i.e., designed and ready for construction) stormwater quality treatment controls.
3) (**)NPDES outfalls are included for comparison and method testing purposes only, stormwater controls are not being contemplated at these locations.
4) The rounding of weights may account for similar weights being ranked differently.

A “multi-constituent” score was then calculated for each potential BMP subarea monitoring subarea by taking the arithmetic mean of the maximum metals and the maximum dioxin weighting factor values (Table 12). These two pollutant category values were weighted equally for the multi-constituent score based on their very roughly comparable relative exceedance probabilities at Outfalls 008 and 009 -- the dioxin permit limit exceedance probability is approximately 5% at Outfall 008 and approximately 30% at Outfall 009, while the lead (most problematic metal) permit limit exceedance probability is approximately 15% at Outfall 008 and approximately 35% at Outfall 009.

A complete summary of the weights computed by potential BMP subarea monitoring subarea (including number of samples, number of NDs, median, maximum, comparison to background percentiles, weight, and rank) is included as Appendix E.

Table 12. Subareas Ranked by Multi-constituent Score

Rank from Average Weights	Potential BMP Subarea (Co-location(s))	Watershed	Description	Approx. Upstream DA (ac)	Events Sampled	Multi-Constituent Score	Rank from Max Metal Weight	Rank from Max Dioxin Weight	Rank from TSS Weight
1	**EVBMP0003 (A2SW0001)**[ab]	Outfall 009	ELV road runoff/CM-1 upstream west	11.8	14	0.94	1	1	32
2	**B1BMP0004 (B1SW0015)** [a]	Outfall 009	B-1 media filter inlet north	3.7	2	0.72	9	5	74
3	**ILBMP0001**[b]	Outfall 009	Lower parking lot 24" stormdrain	23	10	0.68	14	4	39.5
4	**EVBMP0001-A**[b]	Outfall 009	ELV culvert inlet (helipad road and ELV ditch, composite)	2.5	5	0.67	16.5	3	15
5.5	**EVBMP0002**[b]	Outfall 009	Helipad (pre-sandbag berms)	4.1	6	0.66	15	6	31
5.5	**ILBMP0002**[a]	Outfall 009	Road runoff to CM-9	2.5	7	0.66	3	12	15
7	**A1SW0009-A**	Outfall 009	CM-9 downstream-underdrain outlet (post- building 1324 parking lot asphalt removal, pre-filter fabric over weir boards)	16.4	1	0.63	2	19.5	74
8	**APBMP0001**	Outfall 009	Ashpile culvert inlet / road runoff	34	2	0.60	4	19.5	74
9	**LPBMP0001-A**[b]	Outfall 009	Lower Parking Lot sheetflow (post-gravel bag berms)	5.1	6	0.52	30	2	27
10	**B1BMP0004-5**[a]	Outfall 009	B-1 combined media filter influent	4.5	5	0.51	16.5	11	15
12.5	**B1SW0002**[a]	Outfall 009	B-1 north road runoff	1.3	2	0.50	9	19.5	15
12.5	LPBMP0001[b]	Outfall 009	Lower Parking Lot sheetflow (pre-gravel bag berms)	5.1	2	0.50	9	19.5	15
12.5	LXBMP0006[b]	Outfall 009	LOX east minor tributary	0.43	1	0.50	9	19.5	15
12.5	B1SW0014-A	Outfall 009	B-1 media filter effluent (pre-media filter reconstruction)	4.7	1	0.50	9	19.5	15
15.5	**A2SW0002-A**	Outfall 009	CM-1 effluent (post-filter fabric over weir boards)	52.8	4	0.43	18.5	19.5	28.5
15.5	A1SW0009-B	Outfall 009	CM-9 downstream-underdrain outlet (post-filter fabric over weir boards, post- building 1324 parking lot asphalt removal)	16.4	4	0.43	18.5	19.5	15
17	**B1BMP0003 (B1BMP0002)**	Outfall 009	B-1 parking lot / road runoff to culvert inlet	5.2	12	0.43	38	7	33
18	**B1BMP0005 (B1SW0011, B1SW0013)**[a]	Outfall 009	B-1 media filter inlet south	0.8	5	0.43	36.5	8	30

Rank from Average Weights	Potential BMP Subarea (Co-location(s))	Watershed	Description	Approx. Upstream DA (ac)	Events Sampled	Multi-Constituent Score	Rank from Max Metal Weight	Rank from Max Dioxin Weight	Rank from TSS Weight
19.5	A1BMP0002-A[a]	Outfall 009	CM-9 upstream toward A1LF (post-building 1324 parking lot asphalt removal)	6.3	3	0.42	20	19.5	15
19.5	B1SW0010 [a]	Outfall 009	B-1 upstream (post-ISRA excavation)	4.5	3	0.42	9	27.5	2
21	LXBMP0002[b]	Outfall 009	LOX mid - OLD	1.5	2	0.41	21.5	19.5	15
22	**A2BMP0005**	Outfall 009	A2 u/s of CM-1 confluence	35	3	0.39	25	10	15
23	**B1SW0008[a]**	Outfall 009	B-1 upstream	0.79	2	0.35	77.5	9	15
24	**LFSW0002-A**	Outfall 009	CTLI downstream (post-ISRA excavation)	5.1	3	0.31	25	19.5	15
25	**A2SW0002**	Outfall 009	CM-1 effluent (pre-filter fabric over weir boards)	52.8	16	0.29	40	13	41
26	**A1BMP0001[a]**	Outfall 009	A1LF downstream - OLD	1.2	5	0.28	9	34.5	74
27	B1SW0014-B	Outfall 009	B-1 media filter effluent (post-media filter reconstruction)	4.7	4	0.27	32.5	19.5	74
28	LXBMP0004[b]	Outfall 009	LOX southwest downstream of sandbag berm	10.6	5	0.26	9	40.5	1
29	HZSW0020 (HZSW0017)	Outfall 008	Background - Happy Valley upstream	0.2	2	0.25	9	76	15
30	A2BMP0004[b]	Outfall 009	Helipad culvert outlet	4.2	3	0.23	25	27.5	15
31	**A2BMP0003**	Outfall 009	A2 u/s of ND confluence	100	5	0.22	30	26	15
32	HZSW0011	Outfall 008	Background - Happy Valley upstream	0.1	2	0.16	21.5	76	74
34	**LXBMP0005[b]**	Outfall 009	LOX southeast downstream of sandbag berm	2.5	5	0.11	30	29.5	15
34	EVBMP0001[b]	Outfall 009	ELV culvert inlet (helipad road gutter)	1.8	3	0.11	25	31.5	15
34	BGBMP0004	Outfall 009	Background - Sage Ranch near CM-5	81.4	3	0.11	25	31.5	15
36	EVBMP0002-A[ab]	Outfall 009	Helipad (post-sandbag berms)	4.1	5	0.09	40	29.5	74
37.5	**LXBMP0003[ab]**	Outfall 009	LOX east tributary - OLD	0.4	6	0.05	34.5	33	15
37.5	BGBMP0002 (LXSW0003)[a]	Outfall 009	Background - CM-3 upstream	17.2	4	0.05	28	36	28.5

Rank from Average Weights	Potential BMP Subarea (Co-location(s))	Watershed	Description	Approx. Upstream DA (ac)	Events Sampled	Multi-Constituent Score	Rank from Max Metal Weight	Rank from Max Dioxin Weight	Rank from TSS Weight
39	**BGBMP0006 (A2SW0006)** [a]	Outfall 009	Background - CM-1 upstream east tributary (ponded footprint) - OLD	41.1	7	0.03	34.5	38	34
40	**A1SW0005**	Outfall 009	CM-9 downstream (pre-filter fabric over weir boards) - OLD	16.4	10	0.03	45.5	34.5	35
41	BGBMP0001 (A2SW0007)[a]	Outfall 009	Background - CM-1 upstream east tributary (new)	41.1	4	0.02	32.5	76	74
42	**A1SW0006**[a]	Outfall 009	Background - CM-11 upstream	8.3	12	0.02	77.5	37	74
43	**HZBMP0001 (HZSW0007)**	Outfall 008	Happy Valley downstream	21.4	13	0.01	36.5	44	15
44	**A1SW0007**	Outfall 009	CM-11 downstream (pre-filter fabric over weir boards) - OLD	8.3	12	0.01	77.5	39	74
45.5	BGBMP0003	Outfall 009	Background - Sage Ranch near LOX	23.6	5	0.01	77.5	40.5	74
45.5	**BGBMP0007 (LXSW0001)**	Outfall 009	Background - CM-3 upstream - OLD	17.2	7	0.01	40	76	74
47	**LXSW0002**	Outfall 009	CM-3 downstream (pre-filter fabric over weir boards) - OLD	17.2	9	3.80E-03	43	42	37.5
48	**A1SW0002**	Outfall 009	Background - CM-8 upstream	2.5	10	2.95E-03	42	76	39.5
49	**A1BMP0002 (A1SW0004)** [a]	Outfall 009	CM-9 upstream toward A1LF (pre-A1LF asphalt removal)	6.3	15	2.35E-03	44	43	37.5
50	**A1SW0003**	Outfall 009	CM-8 downstream (pre-filter fabric over weir boards) - OLD	2.5	10	6.50E-04	45.5	76	74
51	**HZBMP0003 (HZSW0003)**	Outfall 008	DRG downstream (furthest downstream)	29.6	14	4.00E-04	47	45	36
52	Outfall 008**	Outfall 008	NPDES outfall 008	62	32	5.00E-05	48	76	3
79.5	HZSW0005	Outfall 008	DRG upstream	21	1	0.00	77.5	76	74
79.5	HZSW0008	Outfall 008	Background - Happy Valley upstream	NA/small	1	0.00	77.5	76	74
79.5	HZSW0012	Outfall 008	Background - Happy Valley upstream	0.4	1	0.00	77.5	76	74
79.5	HZSW0014	Outfall 008	Happy Valley upstream	0.1	3	0.00	77.5	76	74
79.5	HZBMP0002 (HZSW0004)	Outfall 008	DRG downstream	23.2	4	0.00	77.5	76	74
79.5	ILBMP0003[a]	Outfall 009	A1LF parking lot - OLD	9.5	4	0.00	77.5	76	74
79.5	**Outfall 009****	Outfall 009	NPDES outfall 009	536	67	0.00	77.5	76	74

Rank from Average Weights	Potential BMP Subarea (Co-location(s))	Watershed	Description	Approx. Upstream DA (ac)	Events Sampled	Multi-Constituent Score	Rank from Max Metal Weight	Rank from Max Dioxin Weight	Rank from TSS Weight
79.5	BGBMP0005	Outfall 009	Background - Sage Ranch near entrance	25	1	0.00	77.5	76	74
79.5	A2BMP0002	Outfall 009	A2 road runoff	3.6	1	0.00	77.5	76	74
79.5	ILSW0003	Outfall 009	IEL-2 upstream	2.4	2	0.00	77.5	76	15
79.5	ILSW0004-A	Outfall 009	IEL-2 downstream (post-ISRA excavation)	2.8	1	0.00	77.5	76	15

<u>Notes</u>

1) Potential BMP subareas sorted by multi-constituent score, computed as described in Section 5
2) ([a]) These potential BMP subarea monitoring subareas are upstream of existing stormwater quality treatment controls.
3) ([b])These potential BMP subarea monitoring subareas have new planned (i.e., designed and ready for construction) stormwater quality treatment controls.
4) (**) NPDES outfalls are included for comparison and method testing purposes only, stormwater controls are not being contemplated at these locations.
5) The rounding of weights may account for similar weights being ranked differently
6) Approximate drainage areas based on the cumulative drainage area of the SWMM catchment in which the monitoring location is located (Geosyntec, 2011). At locations where the monitoring point is upstream of the catchment outfall a “<” sign is used.
7) Bolded locations indicate that both the NPDES permit limit and 95th percentile background particulate strength threshold were exceeded for any one POC.

6. RESULTS DISCUSSION

- Dioxin TCDD TEQ and lead are the POCs most frequently responsible for producing high dioxin and metals weighting factors, respectively. Permit limit exceedances were only observed at Outfall 009 for these same parameters.
- Multi-constituent scores can be further used to evaluate water quality pre- and post-modification (where “modification” is used to describe new or enhanced stormwater quality management or source control activities) at specific subareas. As shown in Table 13, a clear improvement in rank is shown for the post-modification subareas CM-9 and the helipad subarea. Subareas sampled pre-modification are ranked from 8.5 to 30.5 positions higher than the same subareas sampled post-modification, demonstrating that the modifications in fact resulted in better water quality.

Table 13. Specific BMP Area Ranking Improvements

BMP Area	Modification	Rank Pre-Modification	Rank Post-Modification	Rank Change
CM-9	Filter fabric installed over weir boards, asphalt removed from building 1324 parking lot area	7.0	15.5	+8.5
Helipad	Temporary sand-bag berms installed	5.5	36.0	+30.5

- Additionally, Table 14 summarizes instances where the monitored effluent is ranked lower than the monitored influent, demonstrating that treatment through the CM/media filters listed resulted in improved water quality. For example, four influent streams within the B-1 area (ranked 2 – 18) are all ranked higher than the B-1 effluent, which is ranked 27. A similar occurrence is observed for the influent/effluent ranks for CM1, CM-9, CM-3, CM-8, and CM-11.

Table 14. Current Controlled Locations, Ranking Comparisons

BMP Area	Influent		Effluent		Rank Change
	Description	Rank	Description	Rank	
CM-1	ELV road runoff/CM-1 upstream west	1	CM-1 effluent (post-filter fabric over weir boards)	15.5	+14.5
CM-9	Road runoff to CM-9	5.5	CM-9 downstream-underdrain outlet (post-filter fabric over weir boards, post-building 1324 parking lot asphalt removal)	15.5	+10
B-1	B-1 media filter inlet north	2	B-1 media filter effluent	27	+25
B-1	B-1 combined media filter influent	10	B-1 media filter effluent	27	+17
B-1	B-1 north road runoff	12.5	B-1 media filter effluent	27	+14.5
B-1	B-1 media filter inlet south	18	B-1 media filter effluent	27	+9
CM-3	CM-3 upstream	37.5	CM-3 downstream (post-filter fabric over weir boards)	47	+9.5
CM-8	CM-8 upstream	48	CM-8 downstream (post-filter fabric over weir boards)	50	+2
CM-11	CM-11 upstream	42	CM-11 downstream (post-filter fabric over weir boards)	44	+2

- All CM effluent monitoring locations are ranked lower (i.e., better water quality) than their most impacted influent streams (i.e., where two influent streams enter a CM, the effluent ranking is lower than that of the poorer quality influent), indicating that the CMs are performing well. This finding is consistent with the conclusions of the statistical analysis of influent/effluent data in the 2012 Performance Evaluation Memorandum (Geosyntec and Expert Panel, 2012). However, this finding may also be associated with dilution with the less impacted influent stream.

- The most highly ranked subareas for TSS include LOX downstream of the sandbag berm (LXBMP0004), the B-1 area post-ISRA excavation (B1SW0010), and Outfall 008. The LOX area is planned to be addressed by the ND RMMP which will stabilize the area and reduce the TSS load. The Expert Panel also recommends repairing the split sand bags which have been damaged by truck traffic. The other two sites are immediately downstream of bare slopes that were affected by ISRA removal activities and are now stabilized with erosion controls.

- All of the top six and eight of the top nine ranked subareas represent drainage areas with significant runoff contributions from paved surfaces (mostly parking lots and roads). This may indicate that elevated POC concentrations in the 009 watershed may be derived from asphalt or atmospheric deposition onto asphalt.

- TCDD TEQ (no DNQ) was detected at the highest concentration yet measured, 2.1x10-4 ug/L, at EVBMP0001 in March 2012. This result represented a composite sample from the Helipad Road gutter (1.8 acres) and the ELV asphalt ditch (0.7 acres).

- 2,3,7,8-TCDD – a dioxin congener that is typically associated with anthropogenic sources -- was only detected three times in this 2011/2012 monitoring season, and two of the three were at J-flagged (estimated) levels. 2,3,7,8-TCDD was detected once (not flagged) at EVBMP0001-A (ELV culvert inlet, helipad road and ELV ditch, composite) on the same date that the 2.1x10-4 TCDD TEQ (no DNQ) result was recorded. The J-flagged results were at A2SW0002-A during observed weir overtopping (CM-1 effluent, post filter fabric over the weir boards) and HZSW0007 (Happy Valley downgradient, east). The ELV composite sample and the CM-1 subarea both receive a significant quantity of road runoff. The reason for the Happy Valley result is unknown. BMPs are planned downstream of the HZBMP0007 subarea for 2012/2013.

- The nine most highly ranked subareas based on the multi-constituent score include five subareas on Boeing property – B1BMP0004 (the B-1 media filter inlet north), ILBMP0001 (the lower parking lot 24-inch drain), ILBMP0002 (road runoff to CM-9), A1SW0009-A (CM-9 downstream underdrain outlet – post- building 1324 parking lot asphalt removal, pre-filter fabric over weir boards), and LPBMP0001-A (Lower Parking Lot sheetflow – post-gravel bag berms). Two of these sites, ILBMP0001 and LPBMP0001-A, already have robust treatment controls planned for construction in 2012 (in the case of ILBMP0001 this will be treatment of low flows only).

- Four subareas in the top nine are located on NASA property and include, in order of rank, EVBMP0003 (ELV road runoff/CM-1 upstream west), EVBMP0001-A (ELV culvert inlet – helipad road and ELV ditch composite), EVBMP0002 (helipad – pre-sandbag berms), and APBMP0001 (ashpile culvert inlet/road runoff). Of these subareas, EVBMP0003 was ranked highest for dioxins.

- Very similar rankings resulted from previously tested approaches, suggesting that results are robust and not highly sensitive to the particular statistical methodology employed. This methodology has the advantage of considering the number of observations available, and can be updated as more data become available. In addition, this method also helps determine when sufficient data have been collected to satisfy statistically based confidence and power objectives which would then enable reduced future sampling efforts.

- The subareas weighted first through fourth highest (ranked #1 - #4) based on maximum metals and dioxins weighting factors are included in the top nine subareas based on the multi-constituent score, suggesting once again that rankings are robust and not highly sensitive to the particular methodology employed (or to the pollutants used to calculate the rankings).

- As shown in Figure 3, channel processes appear to be a significant source of TSS for Watershed 008 and less so for Watershed 009 (near background). Northern drainage improvements and stabilization measures are expected to provide further water quality benefit to the 009 drainage area.

- While the analysis approach is concentration based rather than load based, because such a large percentage of the watersheds (and of the watersheds developed or known impacted areas) are represented by the monitoring locations, the approach roughly addresses load reduction aspects, noting that actual runoff coefficients do vary between subareas.

7. BMP RECOMMENDATIONS

Subarea Specific Evaluation of Top Ranked Subarea

Based on these analysis results, the following monitoring locations were identified as the highest ranked[23] subareas, with multi-constituent scores ranging from 0.43 to 0.94 (see Table 12[24]). Besides their multi-constituent scores, the following list is also of significance because it included:

- All subareas that were ranked first through fourth for each of the pollutant categories (metals and dioxins);
- All of the top seven subareas with the highest observed dioxin concentrations (noting that the scores do not explicitly account for concentration *magnitude*s, but rather account for *frequency* of exceeding the concentration-based background and permit limit thresholds);
- All four subareas where 2,3,7,8-TCDD was detected (two of which are in the same flow path as the subareas listed below, albeit not the exact same IDs); and
- The highest ranked subarea for TSS, four of the top four ranked subareas for metals, and seven of the top seven ranked subareas for dioxins.

In some cases, these results reflect conditions prior to or following implementation of temporary measures or corrective actions and this is described in parentheses following the location designation (in bold). This list also includes all of the subareas that will receive runoff treatment by the new Boeing treatment control – the Lower Parking Lot sedimentation basin and biofilter – that is under construction and is scheduled to be completed in October 2012. Note that all 11 monitoring locations described below (the top-ranked locations based on available data) are located in the 009 drainage area, with none in the 008 drainage area. In fact, of 63 subareas evaluated, no locations in the 008 drainage area were ranked above 29. This, combined with existing plans for new erosion and sediment controls, allowed the Expert Panel to focus new BMP recommendations entirely on the 009 drainage area this year. Further, water quality at background locations was very good with no location ranked above 29 and very few exceedences of NPDES permit limits.

1. **EVBMP0003** (CM-1 influent west): This monitoring subarea reflects flow from approximately 11.8 acres including the ELV building and surrounding paved areas (including the NASA staging area), vegetated ELV hillside and ISRA areas (most of which are temporarily covered with tarps as of August, 2012), and the paved Area II (NASA) Road. ISRA area ELV-1C is located within this drainage area, and although the soil has not yet been removed, the ISRA area has been covered with a plastic tarp and sandbags to prevent contact with rainfall. Based on 14 events, this subarea ranks 1st overall (multi-constituent score = 0.94), 1st for dioxins, 1st for metals, and 32nd for TSS. CM-1, to which EVBMP0003 drains, is an existing CM that also treats runoff from a 53

[23] In the case of ties, the average rank was assigned to both subareas.
[24] Subareas with zero samples have been excluded from table ES-1.

acre undisturbed subwatershed (estimated at around 7% capture[25]). Based on four events, the CM-1 effluent subarea (A2SW0002-A) is ranked 15.5 overall (multi-constituent score = 0.43), 19.5 for dioxins, 18.5 for lead, and 28.5 for TSS. The ELV areas currently drain to EVBMP0003 and CM-1 due to an existing broken asphalt channel below the ELV hillside that diverts runoff onto the road and toward CM-1. Working with the Expert Panel, NASA has developed initial plans to reconstruct the channel and to direct runoff from the paved ELV areas west of the helipad toward the helipad where asphalt will be removed and detention/infiltration basins will be created. The Expert Panel continues to recommend this plan, in addition to new actions, to address runoff from this subarea.

2. **B1BMP0004** (B-1 media filter inlet north): This monitoring subarea reflects runoff from approximately 3.7 acres of paved road and post-ISRA restored hillside. Based on 2 events, this subarea is ranked 2nd overall (multi-constituent score = 0.72), 5th for dioxins, 9th for metals, and 74th (lowest) for TSS. This subarea drains to a series of rock check dams and the B-1 media filter which, after filtering runoff, discharges to a natural vegetated drainage across the main entrance road. Based on four events, the B-1 media filter effluent (B1SW0014-B) is ranked 27th overall (multi-constituent score = 0.27), 19.5 for dioxins, 32.5 for metals, and 74th for TSS. Runoff from the paved area and road to the north, which otherwise enters a pipe that conveys runoff under the road and toward B1BMP0004, is slowed by sand bags surrounding the grate inlet. The Expert Panel recommends new actions (minor improvements and maintenance of existing features) to address runoff from this subarea.

3. **ILBMP0001** (Lower Parking Lot 24-inch storm drain): This monitoring subarea reflects flow from 23 acres of paved parking areas, building rooftops, paved storage areas, and undeveloped hillsides. Runoff from these areas is conveyed by a storm drain collection system to a 24-inch storm drain located beneath the Lower Parking Lot. This storm drain discharges via a concrete outlet spillway to the northern drainage on Sage Ranch property. Based on ten events, this subarea is ranked 3rd overall (multi-constituent score = 0.68), 4th for dioxins, 14th for metals, and 39.5 for TSS. The sedimentation basin and biofilter planned for the Lower Parking Lot will treat approximately 40% of the average annual runoff volume from this subarea. Additionally, the removal of building 1300 is complete (replaced by trailers), building 1436 is planned to be demolished in 2013, and a portion of the upper parking lot will be removed in 2013. In combination, these activities will reduce both the impervious area in this drainage area as well as the potential sources associated with building uses. In addition, the Expert Panel recommends new actions to further address runoff from this subarea, such as distributed treatment at the storm drain inlets and/or Low Impact Development (LID)-type features around the remaining buildings and lots.

4. **EVBMP0001-A** (composite of Helipad Road and lower ELV ditch): This monitoring subarea reflects flow from the 1.8 acre paved Area II (NASA) Helipad Road and ELV-1C and ELV-1D ISRA

[25] Overflows also get partial treatment through sedimentation.

areas, composited (50/50) with flow from the 0.7 acre portion of the ELV vegetated hillside that enters, and remains in, the ELV asphalt ditch. Based on five events, this subarea was ranked 4th overall (multi-constituent score = 0.67), 3rd for dioxins, 16.5 for metals, and 15th for TSS. The highest measured TCDD TEQ (no DNQ) concentration (2.1×10^{-4} µg/L) was found here, including the detection of the 2,3,7,8-TCDD congener (2.2×10^{-5} µg/L). Prior to compositing with flows from the lower ELV ditch (EVBMP0001), this subarea reflected runoff from only the Helipad Road gutter, and based on three events, was ranked 34th overall, 31.5 for dioxins, 25th for metals, and 15th for TSS, suggesting that flow from the lower ELV ditch contributes the majority of dioxins at this location. NASA had intended to remove soils at ISRA areas ELV-1C and ELV-1D in the summer of 2012 but determined it could not take action until DTSC approved use of use of the December 2011 EPA RTLs for the soils. Soil removal at ISRA areas ELV-1C and ELV-1D is planned for late 2012, or early 2013. The Expert Panel recommends new actions to address runoff from this subarea.

5. **EVBMP0002** (Helipad – pre sandbag berms): This monitoring subarea is in Area II (NASA) and reflects flow from the 4.1 acre paved helipad area. Based on six events, this subarea is ranked 5.5 overall (tied with ILBMP0002 with a multi-constituent score = 0.66), 6th for dioxins, 15th for metals, and 31st for TSS. This subarea's ranking dropped to 36th overall , 29.5 for dioxins, 40th for metals, and 74th for TSS after implementation of the temporary sandbag berm controls (EVBMP0002-A, based on five events), suggesting that long-term controls at this subarea are needed and are expected to further improve water quality. In the short term (planned for 2012), NASA intends to hole-punch the asphalt behind the berms (to encourage infiltration) and to heighten the existing sandbag berms. Long-term plans (2013) by NASA (with Expert Panel input) include the removal of 3.7 acres of asphalt, creation of scalloped depressions (to form detention/infiltration basins), and routing of runoff from paved ELV areas towards these basins. NASA had intended to implement BMPs here in the summer of 2012 but determined that it could not take action until DTSC approved use of the December 2011 EPA RTLs for the soils. If the recommended actions cannot be completed in 2012, the Expert Panel recommends extending the height of the sandbag berms to better capture runoff from larger rains from this subarea, which would cause overflows with the current berm height. Hole punching in the asphalt could also assist with some increased infiltration.
6. **ILBMP0002** (road runoff to CM-9): This subarea reflects runoff from a 2.5 acre drainage area including paved road and undeveloped hillsides. Based on seven events, this subarea is ranked 5.5 overall (tied with EVBMP0002 with a multi-constituent score = 0.66), 12th for dioxins, 3rd for metals, and 15th for TSS. ILBMP0002 drains to CM-9, which filters runoff through a horizontal media bed (estimated at 10% capture with the current culvert modification size). Based on four events, the effluent from CM-9 (A1SW0009-B) is ranked 15.5 overall, 19.5 for dioxins, 18.5 for metals, and 15th for TSS. The Expert Panel recommends new actions to address runoff from this subarea to increase the runoff capture and treatment.

7. **A1SW0009-A** (CM-9 downstream underdrain outlet, post-building 1324 parking lot asphalt removal, pre-filter fabric over weir boards): This subarea reflects treated runoff (estimated at 15% capture[26]) from a 16.4 acres drainage area, consisting of road runoff (ILBMP0002), a stabilized dirt road, rocky hillsides, and the AILF. Based on one event, this subarea is ranked 7th overall (multi-constituent score = 0.63), 19.5 for dioxins, 2nd for metals, and 74th for TSS. In January of 2012, filter fabric was installed over the weir boards to decrease the outflow rate and increase the residence time. Based on four events, this subarea (A1SW0009-B) is now ranked 15.5 (multi-constituent score = 0.43), 19.5 for dioxins, 18.5 for metals, and 15th for TSS after these improvements. The Expert Panel recommends new actions to address runoff from this subarea.

8. **APBMP0001-A** (Ash Pile culvert inlet/road runoff): This Area II (NASA) subarea reflects runoff from 34 acres, including several flat ISRA areas distributed throughout a relatively flat drainage area as well as the adjacent road, which was observed to be the only contributor to runoff at this subarea. Based on two events, this subarea is ranked 8th overall (multi-constituent score = 0.60), 19.5 for dioxins, 4th for metals, and 74th for TSS. Both samples were collected after the ISRA areas had been partially excavated and covered with plastic. It is anticipated that the AP/STP ISRA excavation will be completed in 2012. The Expert Panel recommends no new actions at this time to address runoff from this subarea.

9. **LPBMP0001-A** (Lower Parking Lot sheetflow, post-gravel bag berms): This subarea reflects runoff from 5.1 acres of mostly paved parking and road areas, after the gravel bag berms were installed in September of 2011 to slow runoff and allow for some detention. Soil management and contractor staging activities are also planned to occur here, but were not present during this most recent monitoring period. Based on six events, this subarea is ranked 9th overall (multi-constituent score = 0.52), 2nd for dioxins, 30th for metals, and 27th for TSS. This same subarea, based on two events prior to the installation of the gravel bag berms (LPBMP0001), was ranked 12.5 overall (multi-constituent score = 0.50), 19.5 for dioxins, 9th for metals, and 15th for TSS. This area will soon be treated with a sedimentation basin and biofilter BMP, in anticipation of increased soil stockpile activity, and as such, the Expert Panel currently recommends no new actions to address runoff from this subarea.

10. **B1BMP0003** (B-1 parking lot/road runoff to culvert inlet): This 5.2 acre subarea reflects runoff from an asphalt parking lot (0.8 acres), paved road, B-1 ISRA areas, and undeveloped hillsides. Based on 12 events, this subarea is ranked 17th overall (multi-constituent score = 0.43), 7th for dioxins, 38th for metals, and 33rd for TSS. Asphalt removal of the upper lot is planned for completion by 2013, and this is anticipated to significantly decrease the impervious area that drains toward this monitoring location, resulting in decreased runoff. The Expert Panel recommends no new actions at this time to address runoff from this subarea.

[26] Overflows also get partial treatment through sedimentation.

11. **LXBMP0004** (LOX southwest downstream of sandbag berm): This 10.6 acre subarea reflects runoff from the ISRA LOX area, downstream of the temporary sandbag berm. Based on five events, this site is ranked 28th overall (multi-constituent score = 0.26), 40.5 for dioxins, 9th for metals, and 1st for TSS. The northern drainage RMMP, planned for 2012, will stabilize this embankment and add slope drains. The LOX ISRA excavation is also tentatively planned for 2013. This is anticipated to reduce the TSS loading, and as such, the Expert Panel currently recommends no new actions to address runoff from this subarea

New BMP Recommendations

Based on the above ranking results, and utilizing best professional judgment (including consideration of information on planned ISRA and demolition measures), the following new BMPs are recommended by the Expert Panel and observations during field visits. Additional detail on these BMP concepts and implementation schedule will be provided in the BMP Work Plan Addendum, which will be submitted to the RWQCB in September 2012. Since the majority of these improvements would be completed during the summer of 2013, these recommendations may be reevaluated based on monitoring data from the 2012/2013 rainy season.

1. **ELV/CM-1 (NASA):** The Expert Panel recommends that NASA proceed with repairing the ELV asphalt ditch, as recommended in the Expert Panel's 2011 BMP recommendation report (Geosyntec and Expert Panel, 2011). Additionally, the Expert Panel recommends consideration of a treatment BMP (e.g., sedimentation basin/media filter) to address runoff collected in the repaired ELV ditch; a potential location for this new BMP could be on the south side of the Area II road, at the former groundwater treatment system location or around the nearby AP/STP ISRA areas after soil removal. This would treat runoff from both the ELV hillside, which currently bypasses the ELV culvert inlet, as well as the 0.7 acre area which enters the lower ELV ditch and culvert beneath Helipad Road. Both subareas have been identified as high-priority. The Expert Panel also recommends improving the existing upstream CM-1 sandbag berm and CM-1 media filter. Bypassing runoff from the background eastern tributary around the CM-1 media bed (e.g., by reconstructing CM-1 at the base of ISRA area A2LF3), if feasible, would also allow for more focused treatment of the other high priority western drainage. The planned diversion of the upper paved ELV area to the helipad will also decrease flows to CM-1.
2. **24-inch drain beneath Lower Parking (Boeing):** The Expert Panel recommends biofiltration where possible, particularly around storm drain inlets near the surface storage areas. If space is limited, upflow media filters or equivalent above-ground natural treatment systems could also be installed. The Expert Panel also recommends a grass swale along the edge of the remaining upper parking lot, and biofilters or low impact development (LID) features around any new building trailers.
3. **B-1 Area (Boeing):** The Expert Panel recommends minor improvements and maintenance activities to enhance the performance of the existing media filter. The Expert Panel

recommends curb cuts along the entrance road northwest of the existing rock check dams to allow runoff from the pavement to enter the north side of the B-1 media filter, rather than the south side, which has less sedimentation area compared to the north and would benefit from balancing loading between the north and south sides. Since the downslopes areas are steep, the curb cuts would need some energy dissipation in the form of rock placement. Similarly, the Expert Panel also recommends curb cuts along the top of the planted area across the road from the B-1 media filter to provide additional retention of runoff before entering the northern drainage. The Expert Panel also recommends that the existing pretreatment rock check dams be maintained and the B-1 hillside be reseeded, mulched and temporarily irrigated.

4. **CM-9 (Boeing):** The Expert Panel recommends that the steep roadside embankments on both sides of the Area II road be stabilized with toe wattles, hydroseed, and/or other methods, to hold these loose soils in place and reduce sediment delivery to the road gutter and to the downstream pipe at ILBMP0002. The Expert Panel also recommends wattles along the channel or dirt path below and west of the former building 1300. The Expert Panel recommends that the ILBMP0002 pipe be connected to a perforated pipe, and extended along the slope parallel to the contours, to the southwest, to distribute flows and allow for infiltration of low flows along the hillside. The addition of a pretreatment forebay in or near the drainage, and improvement of the CM-9 media filter (possibly reconfiguring to a vertical media filter similar to that at B-1 but with greater media thickness and/or contact time) are also recommended by the Expert Panel.

Additionally, the Expert Panel reviewed 2011/12 NPDES compliance monitoring results, including Outfall 008 where the only sample collected (the 008 drainage area produces far less runoff than the 009 area) slightly exceeded for lead and copper, and TSS was relatively high. Based on visual observations and ISRA/BMP monitoring results, the west tributary in the 008 area has very good water quality whereas the east tributary appears to be contributing greater sediment loads. Since the above priority BMP subareas do not address water quality in the 008 watershed, the Expert Panel recommends additional corrective actions here. These recommended measures, for both the dirt road and adjacent to the outfall flume, were communicated to Boeing and their consultants, and are currently (August 2012) being implemented.

Recommended measures for the dirt road include:

- Erosion controls on a steep section of an access road to an existing monitoring well;
- Extending the culvert inlet riser pipe to allow greater ponding depth; and
- Replacement of an existing hay bale barrier and silt fences near this monitoring well with riprap and gravel berms (along the eastern tributary).

Recommended measures in the vicinity of the outfall flume include:

- Replacement of existing silt fence near the outfall;
- Stabilization of loose sediment along the slopes surrounding the outfall flume;

- Installation of rock berms along the downstream outlet of the east tributary;
- Rebuilding the upstream entrance wing wall on the south side fo the channel, immediately above the flume, to prevent erosion; and
- Refreshing of the existing rock bed immediately upstream of the outfall flume.

Although this analysis primarily focuses on the selection of potential stormwater treatment control locations, the Expert Panel continues to strongly recommend the rigorous application of erosion and sediment control practices and stream channel stabilization measures throughout the 008 and 009 watersheds, including and especially at areas where substantial soil removal may be planned at steep areas and/or in proximity to drainage courses (such as at ELV, LOX, or the A2LF ISRA areas). The Expert Panel also continues to recommend the stabilization of unpaved roads and the implementation of source controls (including source removal, such as through the ISRA and demo programs). Finally, it is important that routine maintenance be undertaken at all CM locations and where sedimentation basins have been constructed (e.g. above B-1).

The Expert Panel also specifically encourages progress on Boeing's Lower Parking Lot biofilter, the ND RMMP, NASA's helipad asphalt removal and infiltration basin BMP, and NASA's ISRA activities in Area II.

The Expert Panel believes that these new and planned activities, taken together, will improve the likelihood of NPDES compliance at Outfalls 008 and 009, based on currently available information.

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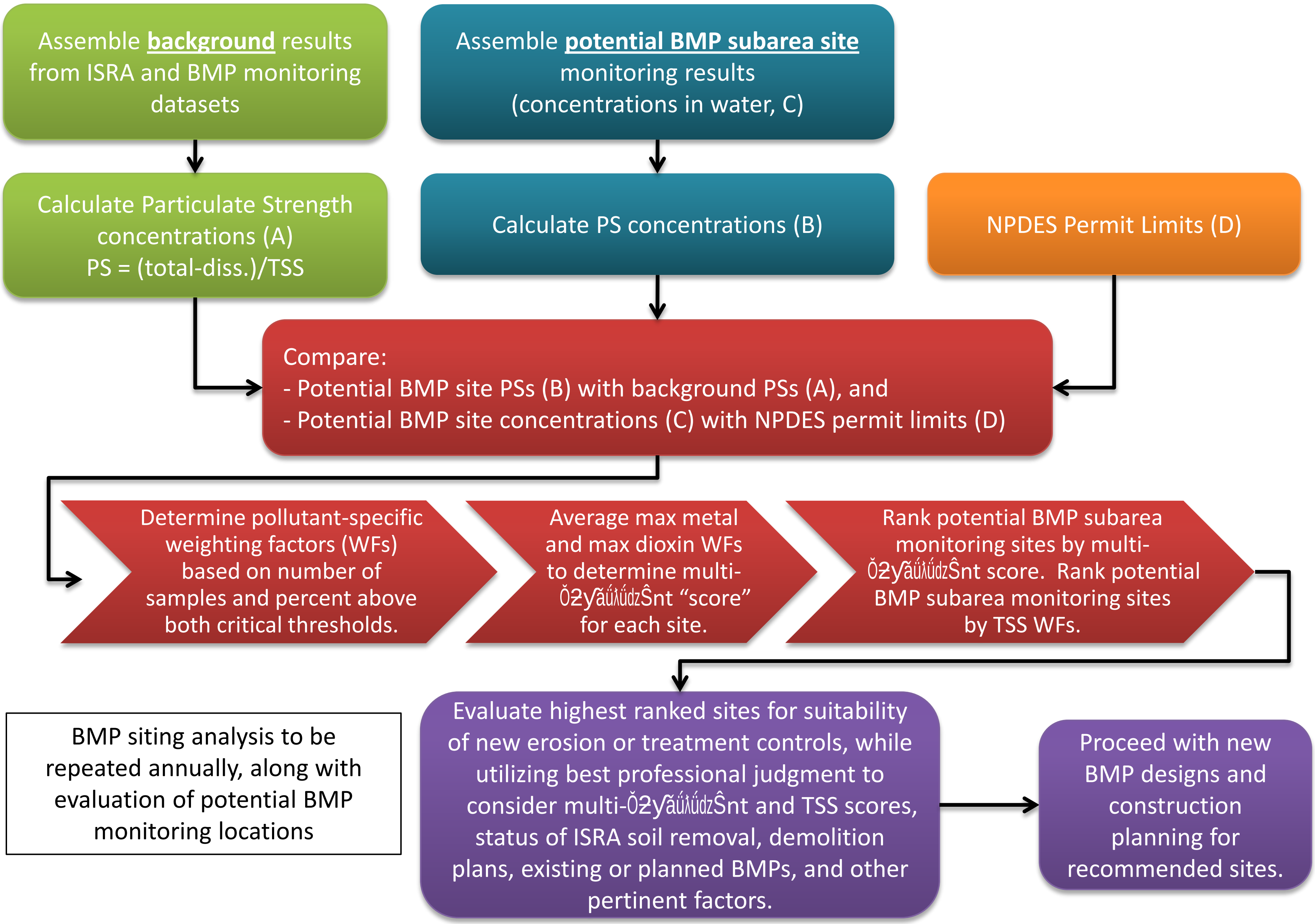
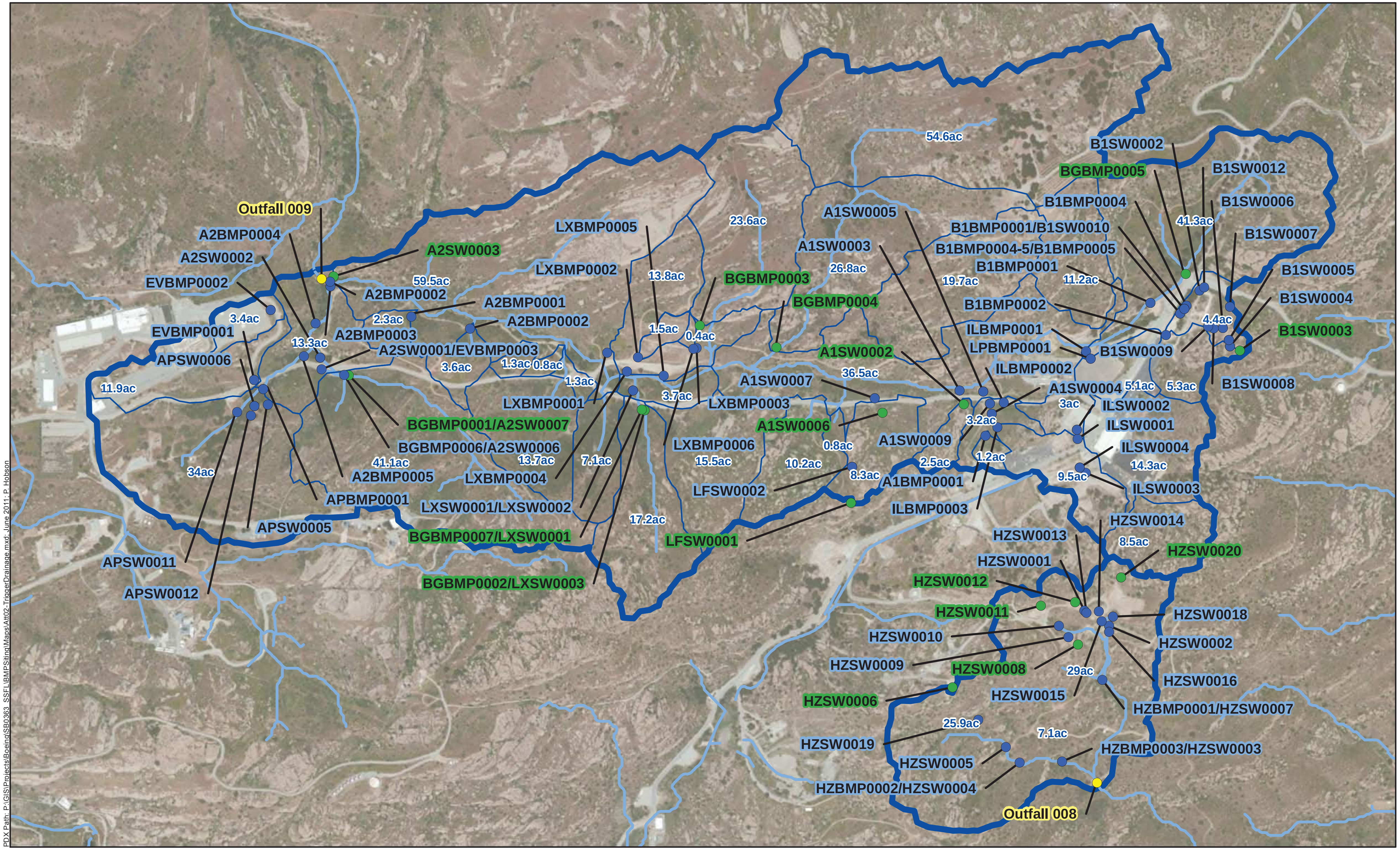
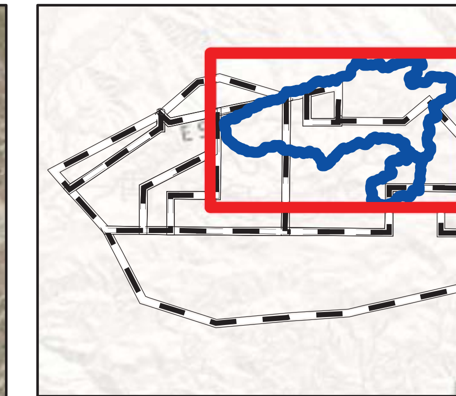
Attachment 1. Summary Flowchart for BMP Site Ranking Analysis Approach







N

Legend

- BMP Subarea
- Background
- NPDES
- Stream
- Outfall watershed boundary

Site Legend

Potential BMP subarea site

Stormwater background site

Outfalls

800 400 0 800

Feet

ATTACHMENT 2
Locations Used in Site Ranking Analysis Outfall 008/009 Watersheds

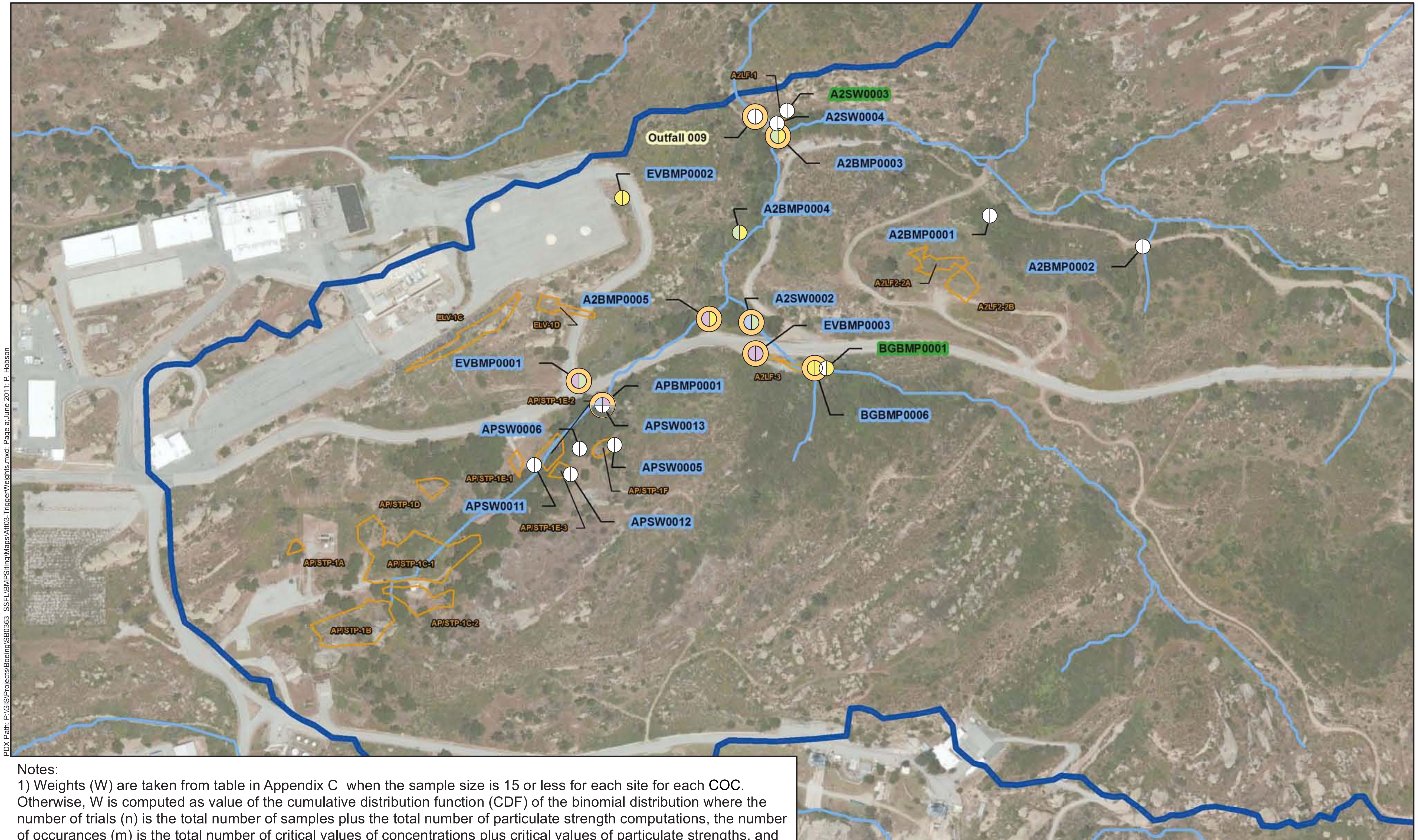
Santa Susana Site
Ventura County, CA

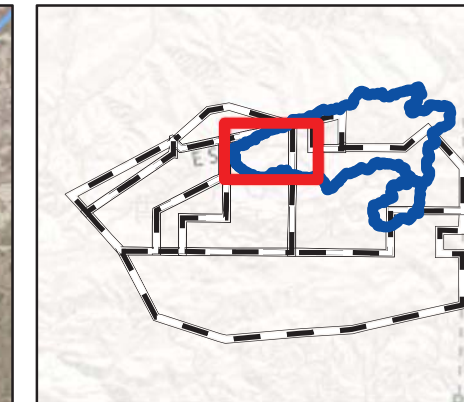
Geosyntec consultants

Portland, OR | July 2012

PDX Path: P:\GIS\Projects\Boeing\SB0363_SSFL\BMPSiting\Maps\Att02-TriggerDrainage.mxd; June 2011; P. Hobson

Notes:
1) NPDES outfalls are included for comparison and method testing purposes only. Stormwater controls are not being contemplated at these locations.





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Features Legend

Dioxins

Max. Dioxin Weight

- 0.0
- 0.0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 1.0

Max. Metals Weight

- 0.0
- 0.0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 1.0

Dual exceedance (note 6)

ISRA boundary

Stream

Outfall watershed boundary

Site Legend

BMP subarea site
Outfalls
Stormwater background site

Notes:
1) Weights (W) are taken from table in Appendix C when the sample size is 15 or less for each site for each COC. Otherwise, W is computed as value of the cumulative distribution function (CDF) of the binomial distribution where the number of trials (n) is the total number of samples plus the total number of particulate strength computations, the number of occurances (m) is the total number of critical values of concentrations plus critical values of particulate strengths, and the probability of occurance is 0.5.
2) For all COCs except 2,3,7,8-TCDD, critical values are defined as either a concentration exceeding the permit limit or a particulate strength computation exceeding the 95th percentile background value.
3) For 2,3,7,8-TCDD, any detection is considered a critical value and particulate strengths are not considered.
4) The weights shown on the map are maximum weight of cadmium, copper, and lead for the metals layer and the maximum weight of TCDD TEQ or 2,3,7,8-TCDD for the dioxins layer.
5) NPDES outfalls are included for comparison and method testing purposes only. Stormwater controls are not being contemplated at these locations.
6) Orange halos underneath locations indicate dual exceedances: sites where at least one COC exceeded both the permit limit and 95th percentile background particulate strength.
7) Some sites have been divided up into two or three time periods based on maintenance or upgrades to the BMPs. In these instances, only results from the most recent time period are shown.

300 150 0 300
Feet

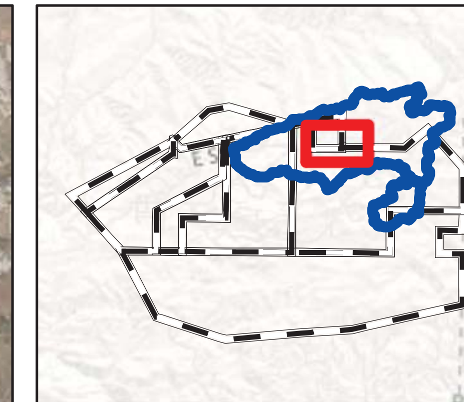
N

ATTACHMENT 3a
Site Ranking Analysis: Metals and Dioxins in Outfall 009 Watershed (West)

Santa Susana Site
Ventura County, CA

Geosyntec consultants

Portland, OR	August 2012



Features Legend

Dioxins

Max. Dioxin Weight
- 0.0
- 0.0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 1.0

Max. Metals Weight
- 0.0
- 0.0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 1.0

Dual exceedance (note 6)

ISRA boundary

Stream

Outfall watershed boundary

Site Legend

BMP subarea site

Outfalls

Stormwater background site

Notes:
1) Weights (W) are taken from table in Appendix C when the sample size is 15 or less for each site for each COC. Otherwise, W is computed as value of the cumulative distribution function (CDF) of the binomial distribution where the number of trials (n) is the total number of samples plus the total number of particulate strength computations, the number of occurances (m) is the total number of critical values of concentrations plus critical values of particulate strengths, and the probability of occurance is 0.5.
2) For all COCs except 2,3,7,8-TCDD, critical values are defined as either a concentration exceeding the permit limit or a particulate strength computation exceeding the 95th percentile background value.
3) For 2,3,7,8-TCDD, any detection is considered a critical value and particulate strengths are not considered.
4) The weights shown on the map are maximum weight of cadmium, copper, and lead for the metals layer and the maximum weight of TCDD TEQ or 2,3,7,8-TCDD for the dioxins layer.
5) NPDES outfalls are included for comparison and method testing purposes only. Stormwater controls are not being contemplated at these locations.
6) Orange halos underneath locations indicate dual exceedances: sites where at least one COC exceeded both the permit limit and 95th percentile background particulate strength.
7) Some sites have been divided up into two or three time periods based on maintenance or upgrades to the BMPs. In these instances, only results from the most recent time period are shown.

200 100 0 200

Feet

N

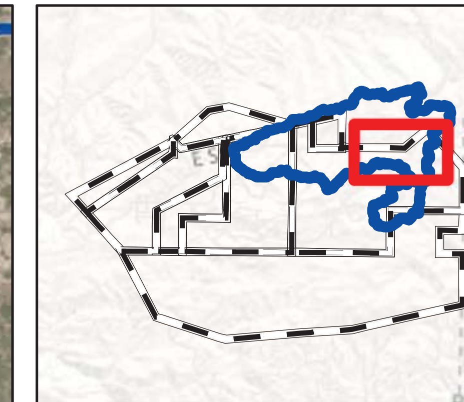
ATTACHMENT 3b
Site Ranking Analysis: Metals and Dioxins in Outfall 009 Watershed (Central)

Santa Susana Site
Ventura County, CA

Geosyntec consultants

Portland, OR	August 2012

PDX Path: P:\GIS\Projects\Boeing\SB0363_SSFL\BMPSiting\Maps\Att03-TriggerWeights.mxd; Page b;June 2011; P. Hobson



Features Legend

Dioxins

Max. Dioxin Weight

- 0.0
- 0.0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 1.0

Max. Metals Weight

- 0.0
- 0.0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 1.0

Dual exceedance (note 6)

ISRA boundary

Stream

Outfall watershed boundary

Site Legend

BMP subarea site

Outfalls

Stormwater background site

Notes:

1) Weights (W) are taken from table in Appendix C when the sample size is 15 or less for each site for each COC Otherwise, W is computed as value of the cumulative distribution function (CDF) of the binomial distribution where the number of trials (n) is the total number of samples plus the total number of particulate strength computations, the number of occurances (m) is the total number of critical values of concentrations plus critical values of particulate strengths, and the probability of occurance is 0.5.

2) For all COCs except 2,3,7,8-TCDD, critical values are defined as either a concentration exceeding the permit limit or a particulate strength computation exceeding the 95th percentile background value.

3) For 2,3,7,8-TCDD, any detection is considered a critical value and particulate strengths are not considered.

4) The weights shown on the map are maximum weight of cadmium, copper, and lead for the metals layer and the maximum weight of TCDD TEQ or 2,3,7,8-TCDD for the dioxins layer.

5) NPDES outfalls are included for comparison and method testing purposes only. Stormwater controls are not being contemplated at these locations.

6) Orange halos underneath locations indicate dual exceedances: sites where at least one COC exceeded both the permit limit and 95th percentile background particulate strength.

7) Some sites have been divided up into two or three time periods based on maintenance or upgrades to the BMPs. In these instances, only results from the most recent time period are shown.

300 150 0 300

Feet

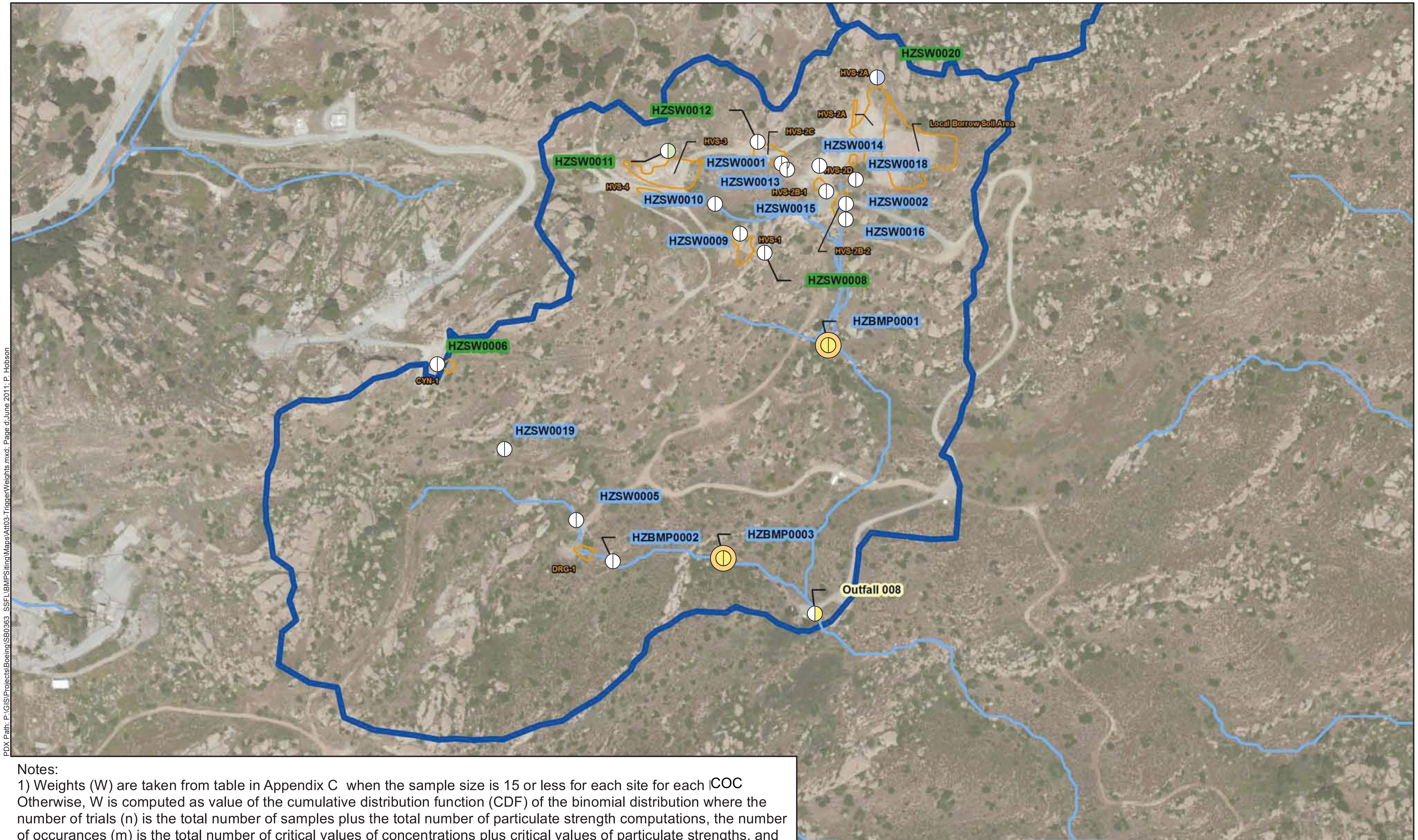
N

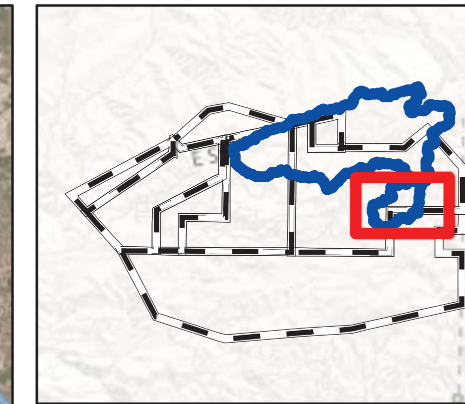
ATTACHMENT 3c
Site Ranking Analysis: Metals and Dioxins in Outfall 009 Watershed (East)

Santa Susana Site
Ventura County, CA

Geosyntec consultants

Portland, OR	August 2012





Notes:

1) Weights (W) are taken from table in Appendix C when the sample size is 15 or less for each site for each COC Otherwise, W is computed as value of the cumulative distribution function (CDF) of the binomial distribution where the number of trials (n) is the total number of samples plus the total number of particulate strength computations, the number of occurances (m) is the total number of critical values of concentrations plus critical values of particulate strengths, and the probability of occurance is 0.5.

2) For all COCs except 2,3,7,8-TCDD, critical values are defined as either a concentration exceeding the permit limit or a particulate strength computation exceeding the 95th percentile background value.

3) For 2,3,7,8-TCDD, any detection is considered a critical value and particulate strengths are not considered.

4) The weights shown on the map are maximum weight of cadmium, copper, and lead for the metals layer and the maximum weight of TCDD TEQ or 2,3,7,8-TCDD for the dioxins layer.

5) NPDES outfalls are included for comparison and method testing purposes only. Stormwater controls are not being contemplated at these locations.

6) Orange halos underneath locations indicate dual exceedances: sites where at least one COC exceeded both the permit limit and 95th percentile background particulate strength.

7) Some sites have been divided up into two or three time periods based on maintenance or upgrades to the BMPs. In these instances, only results from the most recent time period are shown.

300 150 0 300

Feet

N

Features Legend

Dioxins

Max. Dioxin Weight

- 0.0
- 0.0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 1.0

Max. Metals Weight

- 0.0
- 0.0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 1.0

Dual exceedance (note 6)

ISRA boundary

Stream

Outfall watershed boundary

Site Legend

BMP subarea site

Outfalls

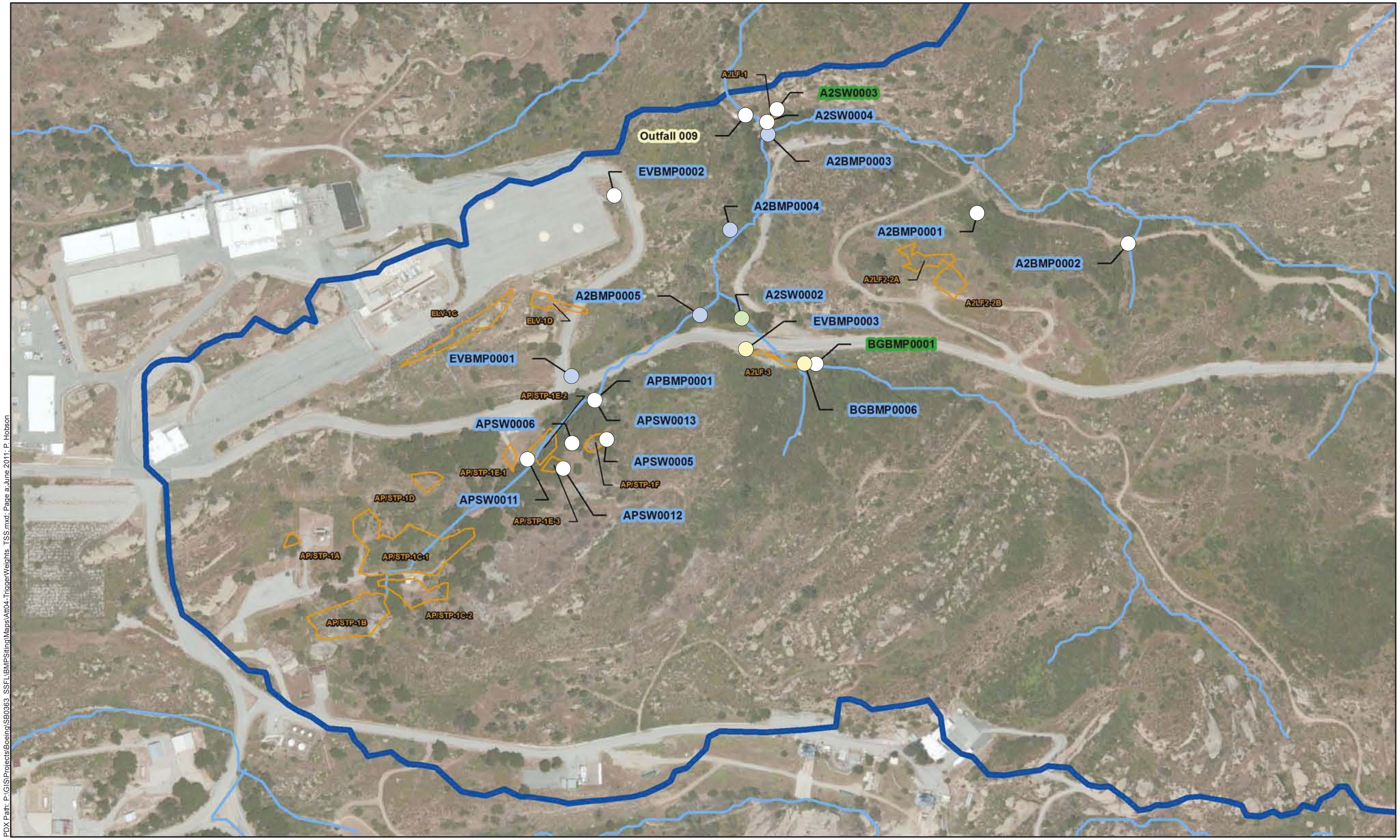
Stormwater background site

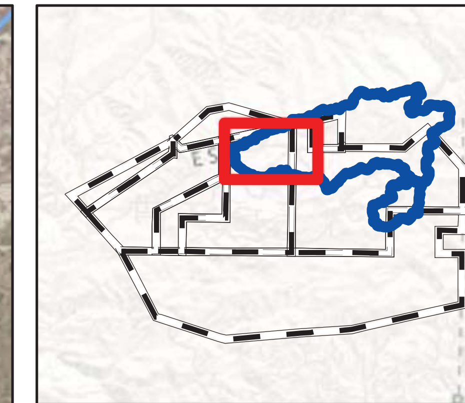
ATTACHMENT 3d
Site Ranking Analysis: Metals and Dioxins in Outfall 008 Watershed

Santa Susana Site
Ventura County, CA

Geosyntec consultants

Portland, OR	August 2012





PDX Path: P:\GIS\Projects\Boeing\SB0363_SSFL\BMPSiting\Maps\Att04-TriggerWeights_TSS.mxd; Page a; June 2011; P. Hobson

Features Legend

TSS Weight

- 0.0
- 0.0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 1.0
- ISRA boundary
- Stream
- Outfall watershed boundary

Site Legend

BMP subarea site Outfalls
Stormwater background site

Notes:
1) Weights (W) are taken from table in Appendix C when the sample size is 14 or less for each site for each COC. Otherwise, W is computed as value of the cumulative distribution function (CDF) of the binomial distribution where the number of trials (n) is the total number of samples; the number of occurances (m) is the total number of critical values of concentrations; and the probability of occurance is 0.5.
2) Critical values are defined as a concentration exceeding the exceeding the 95th percentile background value.
3) NPDES outfalls are included for comparison and method testing purposes only. Stormwater controls are not being contemplated at these locations.
4) Some sites have been divided up into two or three time periods based on maintenance or upgrades to the BMPs. In these instances, only results from the most recent time period are shown.

300 150 0 300
Feet

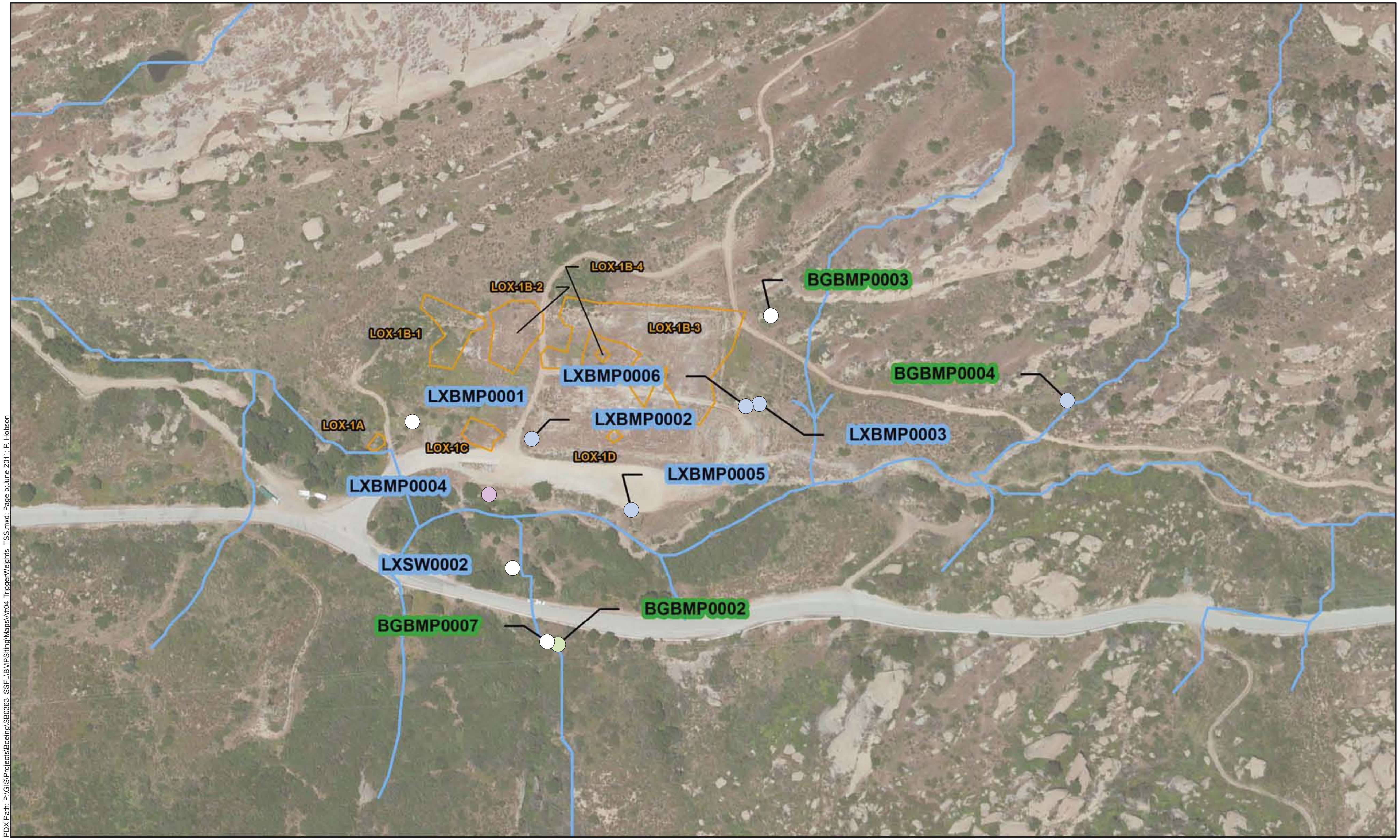
N

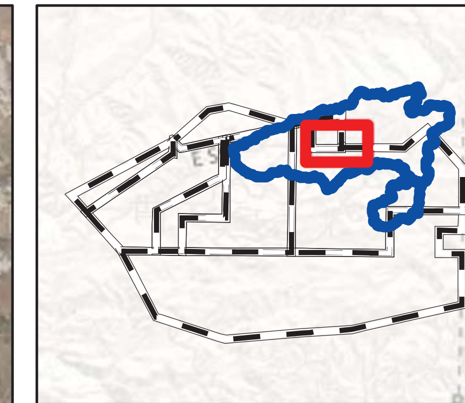
ATTACHMENT 4a
Site Ranking Analysis: Total Suspended Solids in Outfall 009 Watershed (West)

Santa Susana Site
Ventura County, CA

Geosyntec consultants

Portland, OR	August 2012





Features Legend

TSS Weight

- 0.0
- 0.0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 1.0
- ISRA boundary
- Stream
- Outfall watershed boundary

Site Legend

BMP subarea site
Outfalls
Stormwater background site

Notes:
1) Weights (W) are taken from table in Appendix C when the sample size is 14 or less for each site for each COC. Otherwise, W is computed as value of the cumulative distribution function (CDF) of the binomial distribution where the number of trials (n) is the total number of samples; the number of occurances (m) is the total number of critical values of concentrations; and the probability of occurance is 0.5.
2) Critical values are defined as a concentration exceeding the exceeding the 95th percentile background value.
3) NPDES outfalls are included for comparison and method testing purposes only. Stormwater controls are not being contemplated at these locations.
4) Some sites have been divided up into two or three time periods based on maintenance or upgrades to the BMPs. In these instances, only results from the most recent time period are shown.

200 100 0 200
Feet

N

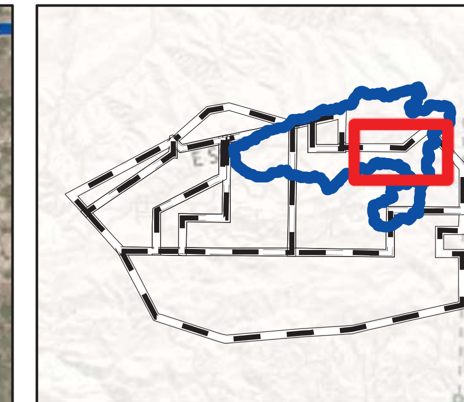
ATTACHMENT 4b
Site Ranking Analysis: Total Suspended Solids in Outfall 009 Watershed (Central)

Santa Susana Site
Ventura County, CA

Geosyntec consultants

Portland, OR | August 2012

PDX Path: P:\GIS\Projects\Boeing\SB0363_SSFL\BMPSiting\Maps\Att04-TriggerWeights_TSS.mxd; Page b; June 2011; P. Hobson



Features Legend

TSS Weight

- 0.0
- 0.0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 1.0
- ISRA boundary
- Stream
- Outfall watershed boundary

Site Legend

BMP subarea site
Outfalls
Stormwater background site

Notes:
1) Weights (W) are taken from table in Appendix C when the sample size is 14 or less for each site for each COC. Otherwise, W is computed as value of the cumulative distribution function (CDF) of the binomial distribution where the number of trials (n) is the total number of samples; the number of occurances (m) is the total number of critical values of concentrations; and the probability of occurance is 0.5.
2) Critical values are defined as a concentration exceeding the exceeding the 95th percentile background value.
3) NPDES outfalls are included for comparison and method testing purposes only. Stormwater controls are not being contemplated at these locations.
4) Some sites have been divided up into two or three time periods based on maintenance or upgrades to the BMPs. In these instances, only results from the most recent time period are shown.

300 150 0 300
Feet

N

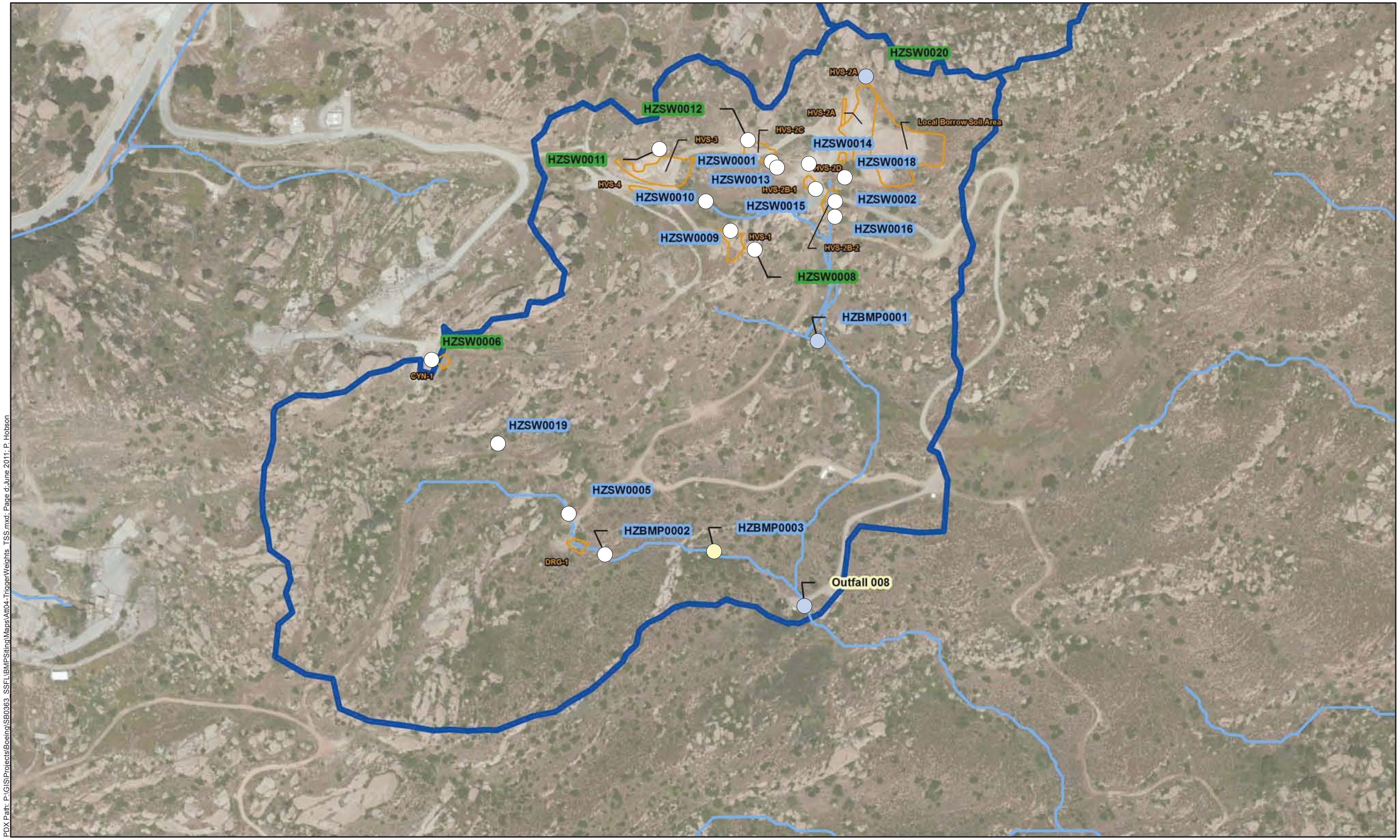
ATTACHMENT 4c
Site Ranking Analysis: Total Suspended Solids in Outfall 009 Watershed (East)

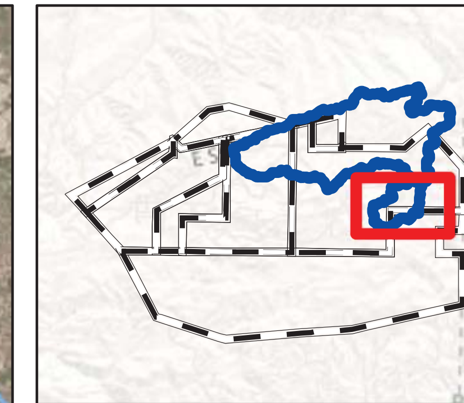
Santa Susana Site
Ventura County, CA

Geosyntec consultants

Portland, OR | August 2012

PDX Path: P:\GIS\Projects\Boeing\SB0363_SSFL\BMPSiting\Maps\Att04-TriggerWeights_TSS.mxd; Page c; June 2011; P. Hobson





Features Legend

TSS Weight

- 0.0
- 0.0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 1.0
- ISRA boundary
- Stream
- Outfall watershed boundary

Site Legend

BMP subarea site Outfalls
Stormwater background site

Notes:
1) Weights (W) are taken from table in Appendix C when the sample size is 14 or less for each site for each COC
Otherwise, W is computed as value of the cumulative distribution function (CDF) of the binomial distribution where the number of trials (n) is the total number of samples; the number of occurances (m) is the total number of critical values of concentrations; and the probability of occurance is 0.5.
2) Critical values are defined as a concentration exceeding the exceeding the 95th percentile background value.
3) NPDES outfalls are included for comparison and method testing purposes only. Stormwater controls are not being contemplated at these locations.
4) Some sites have been divided up into two or three time periods based on maintenance or upgrades to the BMPs. In these instances, only results from the most recent time period are shown.

300 150 0 300
Feet

N

ATTACHMENT 4d
Site Ranking Analysis: Total Suspended Solids in Outfall 008 Watershed

Santa Susana Site
Ventura County, CA

Geosyntec consultants

Portland, OR	August 2012

PDX Path: P:\GIS\Projects\Boeing\SB0363_SSFL\BMPSiting\Maps\Att04-TriggerWeights_TSS.mxd; Page d; June 2011; P. Hobson

Technical Appendix A

Application of BEFs to TCDD TEQ Results

All TCDD TEQ results in the BMP Subarea Evaluation Analysis exclude congener detected but not quantified (DNQ), or estimated, results as well as bioaccumulation equivalency factors (BEFs). The use of BEFs is consistent with NPDES reporting requirements (LARWQCB, 2011 and SFRWQCB, 2010) and the SSFL Stormwater Expert Panel's Dioxin Memorandum (2010).

To demonstrate how the NPDES results change with the BEFs applied, a comparison of the TCDD TEQ results with and without BEFs are shown in Figure 1 and 2 for Outfalls 008 and 009, respectively. In general, applying the BEFs to the TCDD TEQ calculation reduces the TEQ by a factor ranging from 20x to 100x (corresponding to the BEFs for the hepta- and octa-chlorinated congeners which are the ones most often detected at SSFL) and results in less frequent exceedances of the NPDES permit limit (2.8E-8 µg/L TCDD TEQ without DNQs). A TEQ value of 1.0e-10 ug/L is plotted here for any sample with all congener results below the reporting limit, or a TEQ (without DNQ) result of ND.

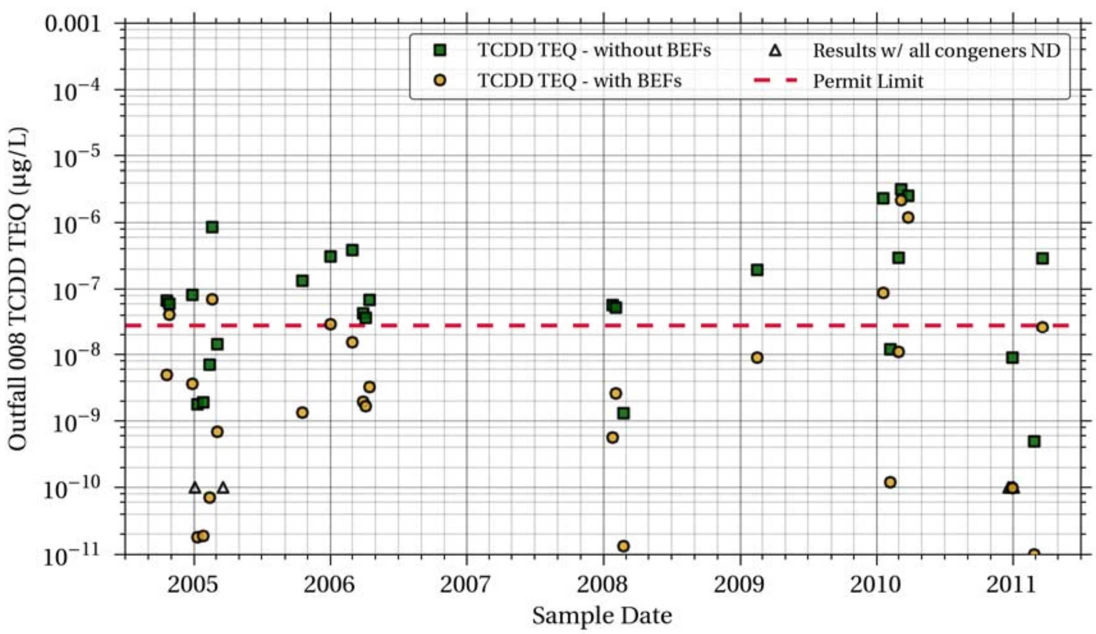


Figure 1. Comparison of TCDD TEQ, No DNQ results with and without BEFs at Outfall 008

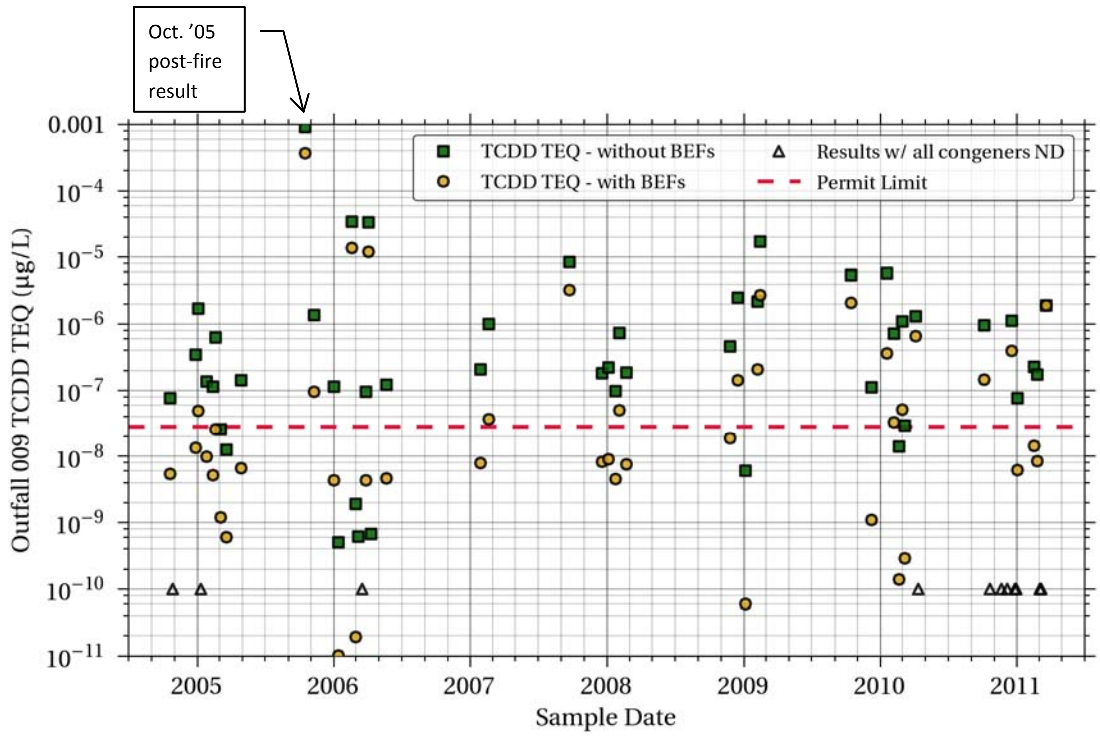


Figure 2. Comparison of TCDD TEQ,No DNQ results with and without BEFs at Outfall 009

REFERENCES

Los Angeles Regional Water Quality Control Board (LARWQCB), 2010. Order No. R4-2010-0090. NPDES No. CA0001309. Waste Discharge Requirements for The Boeing Company, Santa Susana Field Laboratory.
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San Francisco Regional Water Quality Control Board (SFRWQCB), 2010. Order No. R2-2010-0054. Amendment of Waste Discharge Requirements for Municipal and Industrial Dischargers.
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SSFL Stormwater Expert Panel, 2010. *SSFL Stormwater Background Dioxin Report*. March 30.
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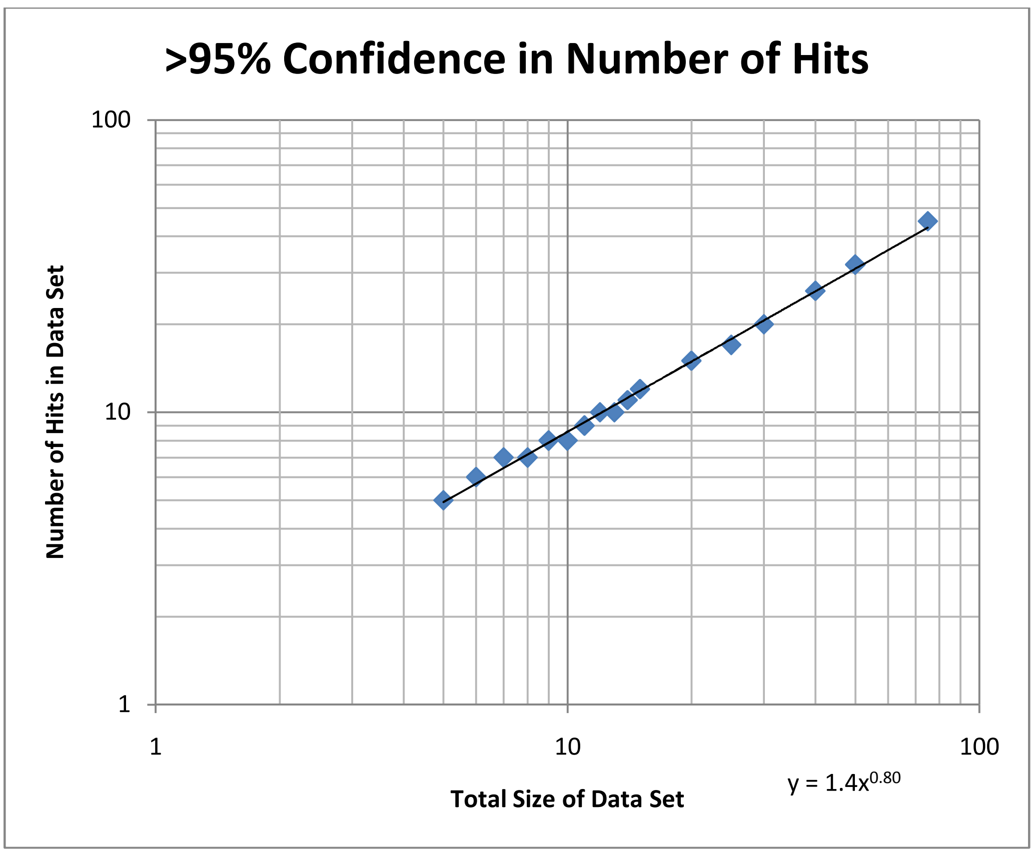
R. Pitt
May 6, 2011

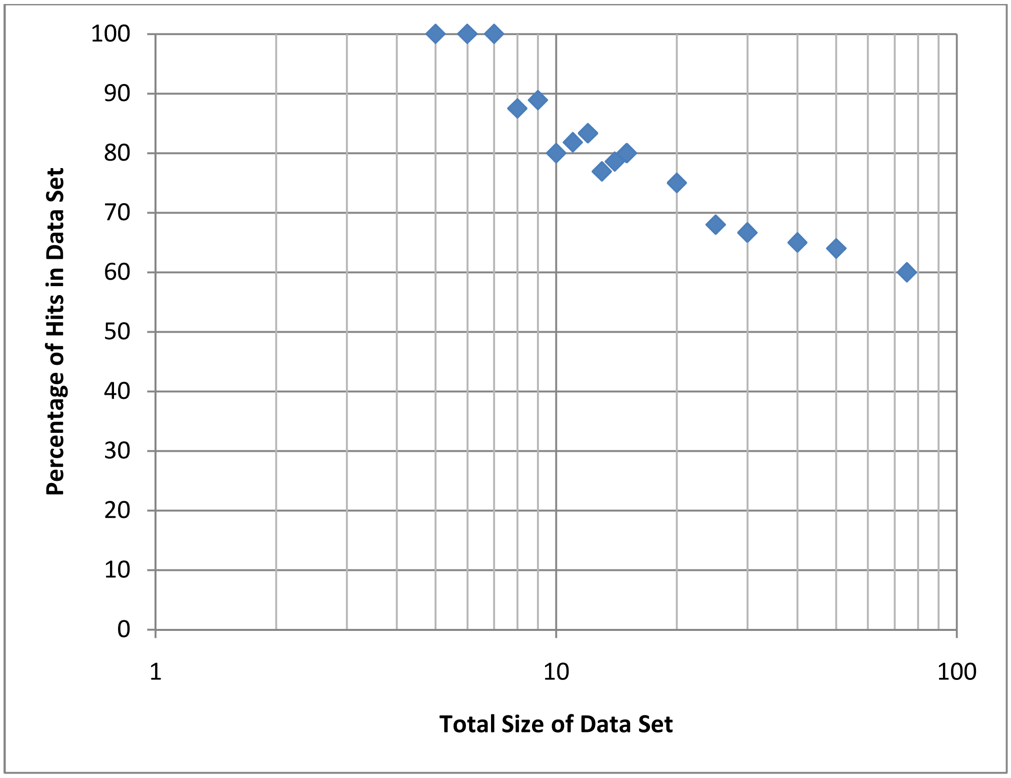
Technical Appendix B

Data Reliability in Ranking Analyses

During our conference call this morning, I was thinking out loud on how to establish some measure of statistical relevance to the ranking (trigger) analysis, especially with few data observations for some of the locations. The following figure (similar to what I used in my Nov 21, 2010 memo, but reformatted), shows the number of hits out of the total data set for a 95% confidence level. This figure shows the relative change in required hits with increasing sample size. The first figure is a plot of the number of hits needed per sample size. 95% confidence levels cannot be reached until at least 5 observations are available (and then all would have to be critical). For small data sets (5 to 7 samples), all of the observations would need to be critical for the 95%, or higher, confidence level; as the number of observations increases, some data may not be critical for the high confidence levels.



The next figure is a plot of the percentage of the total data set that would need to be critical, for different sample sizes, for the 95% confidence level to be reached. When the sample data set approaches 20 or 30 samples, only 65 to 75% of the samples would need to be critical, for example.



Therefore, as discussed this morning, with few data, almost all of the observations would have to indicate critical conditions; as the data numbers increase, larger fractions of the observations can be less critical.

The following table is the binomial distribution (single-tailed) and indicates the specific confidence levels for critical values for few data observations. Even though the confidence is not at the 95% level for the small data sets in many cases, they may be high enough to provide a suitable level of confidence for the ranking analyses. As an example, these confidence levels could be used as weighting factors during the ranking of the sites, based on the number of observations and the number of critical values observed. As an example, for three total observations and if all there were critical, the weighting factor would be 0.87, if two of the three were critical, then a weighting factor of 0.5 could be used; if 7 out of 9 were critical, then a weighting factor of 0.96 could be used.

Other Confidence Levels for Small Sample Sets:

Total Number of Critical Values in Data Set:

Total Number of Observations	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	50													
2	50	75												
3	50	50	87											
4	31	50	69	94										
5	19	50	50	81	97									
6	11	34	50	66	89	98								
7	6	23	50	50	77	94	99							
8	4	14	36	50	64	86	98	99						
9	2	9	25	50	50	75	96	98	99					
10	1	5	17	38	50	63	83	95	99	99				
11	1	3	11	27	50	50	73	89	97	99	99			
12	0	2	7	19	39	50	63	81	93	98	99	99		
13	0	1	5	13	29	50	50	71	87	95	99	99	99	
14	0	1	3	9	21	40	50	61	79	91	97	99	99	99
15	0	0	2	6	15	30	50	50	70	85	94	98	99	99

Technical Appendix c
Summary of Results by Site

Note: All median and maximum values in µg/L except TSS, which is in mg/L.

Location	Rank	POC	Concentration					Particulate Strength					Weight	Both Criteria Exceeded?
			Number of Samples	Number of NDs	Median	Maximum	N > PL	Number of PS	Number of NDs	Median PS	Maximum	N > 95th		
A1BMP0001	1	Cadmium	5	0	0.48	0.51	0	4	0	9.3	50.0	4	0.50	no
	2	TCDD TEQ	5	0	8.8E-10	5.6E-07	1	5	0	4.0E-08	5.6E-04	1	0.05	yes
	3	Lead	5	2	0.28	2.5	0	5	2	45.0	236	0	0	no
	3	Copper	5	0	4.2	5.3	0	5	0	90.9	300	0	0	no
	3	Total Suspended Solids	5	0	11.0	22.0	0	--	--	--	--	--	0	no
	3	2,3,7,8-TCDD	5	5	<2.3e-06	<4.4e-06	0	--	--	--	--	--	0	no
A1BMP0002	1	Total Suspended Solids	15	3	8.0	180	3	--	--	--	--	--	0.02	no
	2	Copper	15	0	4.4	20.0	1	15	0	180	2310	6	2.6E-03	yes
	3	TCDD TEQ	8	0	1.3E-08	2.4E-07	2	8	0	3.6E-06	2.1E-05	0	2.1E-03	no
	4	Cadmium	15	0	0.25	0.96	0	1	0	0.70	0.70	1	3.0E-04	no
	5	Lead	15	3	0.63	11.0	3	15	3	104	268	1	0	yes
	5	2,3,7,8-TCDD	8	8	<7e-07	<3.6e-06	0	--	--	--	--	--	0	no
A1BMP0002-A	1	TCDD TEQ	2	0	1.4E-07	2.0E-07	2	2	0	3.8E-06	7.4E-06	0	0.50	no
	1	Total Suspended Solids	3	0	300	320	2	--	--	--	--	--	0.50	no
	2	Cadmium	3	1	0.52	1.4	0	3	1	1.0	4.2	2	0.34	no
	3	Copper	3	0	7.1	15.0	1	1	0	38.3	38.3	0	0.31	no
	4	Lead	3	1	4.7	15.0	1	3	1	14.0	45.7	0	0.11	no
	5	2,3,7,8-TCDD	2	2	<4.7e-06	<4.7e-06	0	--	--	--	--	--	0	no
A1SW0002	1	Total Suspended Solids	10	1	3.0	82.0	1	--	--	--	--	--	1.0E-02	no
	2	Lead	10	1	0.58	11.0	3	10	1	115	312	1	5.9E-03	yes
	3	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	3	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	3	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	3	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
A1SW0003	1	Lead	10	2	0.29	7.0	1	10	2	177	261	2	1.3E-03	yes
	2	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	2	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	2	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	2	Total Suspended Solids	10	2	5.5	33.0	0	--	--	--	--	--	0	no
	2	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
A1SW0003-A	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
A1SW0005	1	TCDD TEQ	5	0	5.5E-09	4.5E-08	1	5	0	1.4E-06	4.5E-05	1	0.05	yes
	1	Total Suspended Solids	10	1	11.5	100	2	--	--	--	--	--	0.05	no
	2	Lead	10	1	0.61	15.0	2	10	1	81.6	278	1	1.3E-03	yes
	3	Copper	10	0	4.3	11.0	0	9	0	104	1810	2	4.0E-04	no
	4	Cadmium	10	2	0.12	0.43	0	3	2	ND	2.9	1	0	no
	4	2,3,7,8-TCDD	5	5	<6.5e-07	<3.8e-06	0	--	--	--	--	--	0	no

			Concentration					Particulate Strength						
Location	Rank	POC	Number of Samples	Number of NDs	Median	Maximum	N > PL	Number of PS	Number of NDs	Median PS	Maximum	N > 95th	Weight	Both Criteria Exceeded?
A1SW0005-A	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
A1SW0006	1	TCDD TEQ	12	2	5.9E-09	8.5E-07	4	12	2	9.0E-07	4.8E-05	3	0.03	yes
	2	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	2	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	2	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	2	Total Suspended Solids	12	2	3.5	19.0	0	--	--	--	--	--	0	no
	2	2,3,7,8-TCDD	12	12	<5.4e-07	<2.8e-06	0	--	--	--	--	--	0	no
A1SW0007	1	TCDD TEQ	12	0	4.5E-09	1.4E-06	4	12	0	3.0E-06	6.9E-04	2	0.01	yes
	2	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	2	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	2	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	2	Total Suspended Solids	12	3	2.5	24.0	0	--	--	--	--	--	0	no
	2	2,3,7,8-TCDD	12	12	<6.9e-07	<1.8e-05	0	--	--	--	--	--	0	no
A1SW0007-A	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
A1SW0009	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
A1SW0009-A	1	Lead	1	0	9.1	9.1	1	1	0	697	697	1	0.75	yes
	2	TCDD TEQ	1	0	1.8E-07	1.8E-07	1	1	0	1.6E-05	1.6E-05	0	0.50	no
	3	Copper	1	0	7.9	7.9	0	1	0	302	302	0	0	no
	3	Cadmium	1	1	<0.1	<0.1	0	1	1	ND	ND	0	0	no
	3	Total Suspended Solids	1	0	11.0	11.0	0	--	--	--	--	--	0	no
	3	2,3,7,8-TCDD	1	1	<2.6e-06	<2.6e-06	0	--	--	--	--	--	0	no
A1SW0009-B	1	TCDD TEQ	3	0	1.1E-07	3.9E-07	3	3	0	2.9E-06	3.5E-06	0	0.50	no
	1	Total Suspended Solids	4	0	79.0	450	2	--	--	--	--	--	0.50	no
	2	Lead	4	0	12.1	36.0	3	4	0	95.0	144	0	0.36	no
	3	Copper	4	0	8.0	22.0	1	4	0	45.5	160	0	0.04	no
	4	Cadmium	4	2	<0.11	0.39	0	2	2	ND	ND	0	0	no
	4	2,3,7,8-TCDD	3	3	<9.2e-07	<8.5e-06	0	--	--	--	--	--	0	no

Location	Rank	POC	Concentration					Particulate Strength					Weight	Both Criteria Exceeded?
			Number of Samples	Number of NDs	Median	Maximum	N > PL	Number of PS	Number of NDs	Median PS	Maximum	N > 95th		
A2BMP0001	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
A2BMP0002	1	TCDD TEQ	1	0	1.1E-11	1.1E-11	0	1	0	3.7E-09	3.7E-09	0	0	no
	1	Lead	1	0	0.29	0.29	0	1	0	81.5	81.5	0	0	no
	1	Copper	1	0	2.4	2.4	0	1	0	133	133	0	0	no
	1	Cadmium	1	1	<0.1	<0.1	0	1	1	ND	ND	0	0	no
	1	Total Suspended Solids	1	0	3.0	3.0	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	1	1	<3.4e-06	<3.4e-06	0	--	--	--	--	--	0	no
A2BMP0003	1	Total Suspended Solids	5	0	18.0	1400	2	--	--	--	--	--	0.50	no
	2	TCDD TEQ	5	0	6.7E-07	9.6E-06	3	5	0	9.9E-07	8.7E-04	1	0.38	yes
	3	Lead	5	0	0.85	68.0	2	5	0	48.4	92.9	0	0.05	no
	3	Cadmium	5	3	<0.1	1.0	0	5	3	ND	0.64	2	0.05	no
	4	Copper	5	0	2.5	28.0	1	3	0	13.6	18.8	0	0.04	no
	5	2,3,7,8-TCDD	5	5	<1.3e-06	<2.2e-06	0	--	--	--	--	--	0	no
A2BMP0004	1	Total Suspended Solids	3	0	31.0	130	1	--	--	--	--	--	0.50	no
	2	TCDD TEQ	3	0	5.7E-08	7.2E-07	2	3	0	1.8E-06	5.5E-06	0	0.34	no
	3	Lead	3	0	4.2	10.0	1	3	0	75.2	121	0	0.11	no
	3	Cadmium	3	2	<0.1	0.16	0	3	2	ND	0.55	1	0.11	no
	4	Copper	3	0	6.7	7.8	0	3	0	47.7	161	0	0	no
	4	2,3,7,8-TCDD	3	3	<1.4e-06	<2.1e-06	0	--	--	--	--	--	0	no
A2BMP0005	1	TCDD TEQ	3	0	2.3E-07	1.9E-05	3	3	0	3.7E-06	2.2E-04	1	0.66	yes
	2	Total Suspended Solids	3	0	61.0	86.0	1	--	--	--	--	--	0.50	no
	3	Lead	3	0	4.3	11.0	1	3	0	63.3	119	0	0.11	no
	3	Cadmium	3	2	<0.2	0.12	0	3	2	ND	0.63	1	0.11	no
	4	Copper	3	0	5.4	8.7	0	3	0	42.6	50.0	0	0	no
	4	2,3,7,8-TCDD	3	3	<1.2e-06	<1.6e-06	0	--	--	--	--	--	0	no
A2SW0002	1	TCDD TEQ	16	0	9.6E-08	1.0E-05	10	16	0	1.3E-05	5.1E-04	6	0.57	yes
	2	Lead	16	4	1.5	39.0	4	16	4	175	1100	5	1.0E-02	yes
	3	Total Suspended Solids	16	3	8.5	610	1	--	--	--	--	--	3.0E-04	no
	3	2,3,7,8-TCDD	16	15	<1.1e-06	1.4E-06	1	--	--	--	--	--	3.0E-04	no
	4	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	4	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
A2SW0002-A	1	TCDD TEQ	4	0	3.7E-07	4.8E-05	3	4	0	1.2E-05	6.4E-04	1	0.50	yes
	2	Lead	4	0	6.6	14.0	2	4	0	221	337	1	0.36	yes
	3	Total Suspended Solids	4	0	25.0	76.0	1	--	--	--	--	--	0.31	no
	3	2,3,7,8-TCDD	4	3	<7.6e-06	7.0E-06	1	--	--	--	--	--	0.31	no
	4	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	4	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no

Location	Rank	POC	Concentration					Particulate Strength					Weight	Both Criteria Exceeded?
			Number of Samples	Number of NDs	Median	Maximum	N > PL	Number of PS	Number of NDs	Median PS	Maximum	N > 95th		
A2SW0003	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
A2SW0004	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
APBMP0001	1	Lead	2	0	18.8	31.0	2	2	0	370	635	1	0.69	yes
	2	TCDD TEQ	2	0	5.2E-07	6.3E-07	2	2	0	9.8E-06	1.1E-05	0	0.50	no
	2	Cadmium	2	0	0.21	0.30	0	2	0	1.9	2.8	2	0.50	no
	3	Copper	2	0	6.6	9.9	0	2	0	45.9	62.5	0	0	no
	3	Total Suspended Solids	2	0	53.0	58.0	0	--	--	--	--	--	0	no
	3	2,3,7,8-TCDD	2	2	<9.8e-07	<9.8e-07	0	--	--	--	--	--	0	no
APSW0005	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
APSW0006	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
APSW0006-A	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
APSW0011	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no

			Concentration					Particulate Strength						
Location	Rank	POC	Number of Samples	Number of NDs	Median	Maximum	N > PL	Number of PS	Number of NDs	Median PS	Maximum	N > 95th	Weight	Both Criteria Exceeded?
APSW0012	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
APSW0013	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
B1BMP0001	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
B1BMP0003	1	TCDD TEQ	12	1	8.3E-07	1.4E-05	9	12	1	1.5E-05	5.9E-04	5	0.85	yes
	2	Total Suspended Solids	12	1	29.5	110	3	--	--	--	--	--	0.07	no
	3	Cadmium	12	6	<0.13	0.22	0	12	6	<0.787	3.3	6	0.01	no
	4	Lead	12	1	2.3	7.3	3	12	1	49.4	127	0	1.0E-04	no
	5	Copper	12	0	5.8	16.0	1	11	0	52.7	162	0	0	no
	5	2,3,7,8-TCDD	12	12	<1.6e-06	<6.3e-06	0	--	--	--	--	--	0	no
B1BMP0004	1	TCDD TEQ	2	0	8.8E-06	1.7E-05	2	2	0	2.5E-04	4.7E-04	2	0.94	yes
	2	Lead	2	0	4.1	5.9	1	2	0	189	244	1	0.50	yes
	3	Copper	2	0	6.2	9.0	0	2	0	86.9	102	0	0	no
	3	Cadmium	2	1	<0.22	0.22	0	1	1	ND	ND	0	0	no
	3	Total Suspended Solids	2	0	22.0	37.0	0	--	--	--	--	--	0	no
	3	2,3,7,8-TCDD	2	2	<3e-06	<3e-06	0	--	--	--	--	--	0	no
B1BMP0004-5	1	TCDD TEQ	5	0	2.3E-07	1.9E-05	4	5	0	1.6E-05	2.1E-04	2	0.63	yes
	2	Total Suspended Solids	5	0	91.0	170	3	--	--	--	--	--	0.50	no
	3	Cadmium	5	1	0.14	0.24	0	5	1	0.63	3.8	4	0.38	no
	4	Lead	5	0	5.0	9.6	1	5	0	46.7	196	0	1.0E-02	no
	5	Copper	5	0	5.2	8.4	0	5	0	30.6	129	0	0	no
	5	2,3,7,8-TCDD	5	5	<2.1e-06	<1e-05	0	--	--	--	--	--	0	no

Location	Rank	POC	Concentration: Number of Samples	Number of NDs	Median	Maximum	N > PL	Particulate Strength: Number of PS	Number of NDs	Median PS	Maximum	N > 95th	Weight	Both Criteria Exceeded?
B1BMP0005	1	TCDD TEQ	5	0	4.3E-07	5.2E-05	5	5	0	1.9E-05	1.1E-03	2	0.83	yes
	2	Total Suspended Solids	5	1	43.0	110	1	--	--	--	--	--	0.19	no
	2	2,3,7,8-TCDD	5	4	<2.4e-06	1.2E-06	1	--	--	--	--	--	0.19	no
	3	Cadmium	5	3	<0.13	0.23	0	4	3	ND	0.49	1	0.02	no
	4	Lead	5	0	2.3	3.9	0	5	0	45.1	219	0	0	no
	4	Copper	5	0	3.6	5.9	0	5	0	50.7	269	0	0	no
B1SW0002	1	TCDD TEQ	2	1	<2.34e-05	2.3E-05	1	2	1	<2.1e-4	2.1E-04	1	0.50	yes
	1	Lead	2	0	6.8	12.0	1	2	0	215	337	1	0.50	yes
	1	Total Suspended Solids	2	0	57.0	110	1	--	--	--	--	--	0.50	no
	2	Copper	2	0	6.7	10.0	0	2	0	193	347	1	0.31	no
	3	Cadmium	2	0	0.17	0.24	0	0	0	--	--	0	0	no
	3	2,3,7,8-TCDD	2	2	<8e-06	<8e-06	0	--	--	--	--	--	0	no
B1SW0003	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
B1SW0004	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
B1SW0004-A	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
B1SW0005	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
B1SW0005-A	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no

Location	Rank	POC	Concentration: Number of Samples	Concentration: Number of NDs	Concentration: Median	Concentration: Maximum	Concentration: N > PL	Particulate Strength: Number of PS	Particulate Strength: Number of NDs	Particulate Strength: Median PS	Particulate Strength: Maximum	Particulate Strength: N > 95th	Weight	Both Criteria Exceeded?
B1SW0006	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
B1SW0006-A	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
B1SW0007	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
B1SW0008	1	TCDD TEQ	2	0	8.3E-06	1.6E-05	2	2	0	1.4E-04	2.8E-04	1	0.69	yes
	2	Total Suspended Solids	2	0	169	280	1	--	--	--	--	--	0.50	no
	3	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	3	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	3	Cadmium	2	1	<0.22	0.22	0	1	1	ND	ND	0	0	no
	3	2,3,7,8-TCDD	2	2	<9.8e-07	<9.8e-07	0	--	--	--	--	--	0	no
B1SW0009	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
B1SW0010	1	Total Suspended Solids	3	0	270	650	3	--	--	--	--	--	0.87	no
	2	Lead	3	0	11.0	15.0	3	3	0	31.2	53.2	0	0.50	no
	2	Cadmium	3	0	0.54	0.77	0	3	0	0.82	0.90	3	0.50	no
	3	TCDD TEQ	3	0	4.8E-08	1.1E-06	2	3	0	1.8E-07	1.8E-06	0	0.34	no
	3	Copper	3	0	16.0	27.0	2	3	0	22.8	49.6	0	0.34	no
	4	2,3,7,8-TCDD	3	3	<3.2e-06	<8.8e-06	0	--	--	--	--	--	0	no
B1SW0012	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
B1SW0014	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no

			Concentration					Particulate Strength						
Location	Rank	POC	Number of Samples	Number of NDs	Median	Maximum	N > PL	Number of PS	Number of NDs	Median PS	Maximum	N > 95th	Weight	Both Criteria Exceeded?
B1SW0014-A	1	TCDD TEQ	1	0	2.8E-07	2.8E-07	1	1	0	3.5E-06	3.5E-06	0	0.50	no
	1	Lead	1	0	6.9	6.9	1	1	0	72.7	72.7	0	0.50	no
	1	Total Suspended Solids	1	0	80.0	80.0	1	--	--	--	--	--	0.50	no
	2	Copper	1	0	5.9	5.9	0	1	0	31.0	31.0	0	0	no
	2	Cadmium	1	1	<0.1	<0.1	0	1	1	ND	ND	0	0	no
	2	2,3,7,8-TCDD	1	1	<1.9e-06	<1.9e-06	0	--	--	--	--	--	0	no
B1SW0014-B	1	TCDD TEQ	3	0	3.3E-07	5.9E-07	3	3	0	1.1E-05	2.2E-05	0	0.50	no
	2	Lead	4	0	2.7	6.7	1	4	0	67.0	79.6	0	0.04	no
	3	Copper	4	0	3.8	4.1	0	4	0	44.0	56.7	0	0	no
	3	Cadmium	4	4	<0.1	<0.2	0	4	4	ND	ND	0	0	no
	3	Total Suspended Solids	4	0	36.5	71.0	0	--	--	--	--	--	0	no
	3	2,3,7,8-TCDD	3	3	<3.9e-06	<5.1e-06	0	--	--	--	--	--	0	no
BGBMP0001	1	Cadmium	4	3	<0.1	0.16	0	4	3	ND	10.2	1	0.04	no
	2	TCDD TEQ	4	2	<6.4e-12	7.9E-12	0	4	2	<9.14e-10	7.9E-09	0	0	no
	2	Lead	4	1	0.59	0.80	0	4	1	70.8	137	0	0	no
	2	Copper	4	0	2.5	3.6	0	3	0	100	314	0	0	no
	2	Total Suspended Solids	4	1	5.5	8.0	0	--	--	--	--	--	0	no
	2	2,3,7,8-TCDD	4	4	<8.7e-07	<2.1e-06	0	--	--	--	--	--	0	no
BGBMP0002	1	Total Suspended Solids	4	0	20.5	750	1	--	--	--	--	--	0.31	no
	2	Copper	4	0	1.6	19.0	1	3	0	23.9	38.2	0	0.06	no
	3	TCDD TEQ	4	2	<6e-10	1.0E-07	1	4	2	<1.2e-07	1.4E-07	0	0.04	no
	3	Lead	4	0	1.3	64.0	1	4	0	53.6	85.0	0	0.04	no
	3	Cadmium	4	3	<0.2	0.87	0	4	3	ND	1.0	1	0.04	no
	4	2,3,7,8-TCDD	4	4	<1.8e-06	<3.4e-06	0	--	--	--	--	--	0	no
BGBMP0003	1	TCDD TEQ	5	3	<1e-10	3.3E-07	1	5	3	ND	6.3E-06	0	1.0E-02	no
	2	Lead	5	1	0.69	2.8	0	5	1	49.1	94.0	0	0	no
	2	Copper	5	0	3.0	4.7	0	4	0	86.4	125	0	0	no
	2	Cadmium	5	5	<0.1	<0.2	0	5	5	ND	ND	0	0	no
	2	Total Suspended Solids	5	2	5.0	53.0	0	--	--	--	--	--	0	no
	2	2,3,7,8-TCDD	5	5	<1.9e-06	<4.7e-06	0	--	--	--	--	--	0	no
BGBMP0004	1	Total Suspended Solids	3	0	17.0	240	1	--	--	--	--	--	0.50	no
	2	TCDD TEQ	3	0	4.9E-10	4.0E-08	1	3	0	1.2E-07	1.7E-07	0	0.11	no
	2	Lead	3	1	0.91	7.6	1	3	1	30.8	38.8	0	0.11	no
	3	Copper	3	0	2.4	6.6	0	2	0	32.7	47.1	0	0	no
	3	Cadmium	3	3	<0.1	<0.2	0	3	3	ND	ND	0	0	no
	3	2,3,7,8-TCDD	3	3	<1e-06	<4e-06	0	--	--	--	--	--	0	no
BGBMP0005	1	TCDD TEQ	1	0	2.8E-11	2.8E-11	0	1	0	2.6E-09	2.6E-09	0	0	no
	1	Lead	1	0	0.84	0.84	0	0	0	--	--	0	0	no
	1	Copper	1	0	2.4	2.4	0	0	0	--	--	0	0	no
	1	Cadmium	1	1	<0.1	<0.1	0	1	1	ND	ND	0	0	no
	1	Total Suspended Solids	1	0	11.0	11.0	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	1	1	<3.9e-06	<3.9e-06	0	--	--	--	--	--	0	no

Location	Rank	POC	Concentration					Particulate Strength					Weight	Both Criteria Exceeded?
			Number of Samples	Number of NDs	Median	Maximum	N > PL	Number of PS	Number of NDs	Median PS	Maximum	N > 95th		
BGBMP0006	1	Total Suspended Solids	7	1	3.0	250	1	--	--	--	--	--	0.06	no
	2	TCDD TEQ	7	0	1.6E-08	2.0E-07	2	7	0	2.3E-06	2.0E-04	1	0.03	yes
	2	Lead	7	1	1.5	17.0	1	7	1	87.1	1260	2	0.03	yes
	3	Copper	1	0	2.9	2.9	0	1	0	5.6	5.6	0	0	no
	3	Cadmium	1	1	<0.1	<0.1	0	1	1	ND	ND	0	0	no
	3	2,3,7,8-TCDD	7	7	<6.2e-07	<1.8e-06	0	--	--	--	--	--	0	no
BGBMP0007	1	Lead	7	0	1.0	16.0	1	7	0	84.3	346	1	1.0E-02	yes
	2	TCDD TEQ	7	3	1.1E-11	1.0E-08	0	7	3	1.8E-09	3.5E-07	0	0	no
	2	Copper	7	0	1.5	7.5	0	7	0	80.9	210	0	0	no
	2	Cadmium	7	6	<0.1	0.26	0	6	6	ND	ND	0	0	no
	2	Total Suspended Solids	7	0	7.0	39.0	0	--	--	--	--	--	0	no
	2	2,3,7,8-TCDD	7	7	<8.1e-07	<5.4e-06	0	--	--	--	--	--	0	no
EVBMP0001	1	Total Suspended Solids	3	0	10.0	150	1	--	--	--	--	--	0.50	no
	2	TCDD TEQ	3	1	7.1E-10	7.7E-08	1	3	1	3.6E-07	5.1E-07	0	0.11	no
	2	Lead	3	1	1.9	13.0	1	3	1	68.0	161	0	0.11	no
	2	Cadmium	3	2	<0.1	0.16	0	3	2	ND	0.48	1	0.11	no
	3	Copper	3	0	2.5	11.0	0	2	0	43.3	60.0	0	0	no
	3	2,3,7,8-TCDD	3	3	<9e-07	<2.4e-06	0	--	--	--	--	--	0	no
EVBMP0001-A	1	TCDD TEQ	5	0	2.1E-05	2.1E-04	5	5	0	1.1E-04	3.5E-03	3	0.95	yes
	2	Total Suspended Solids	5	0	60.0	480	2	--	--	--	--	--	0.50	no
	3	Lead	5	0	8.8	41.0	3	5	0	84.3	320	1	0.38	yes
	4	2,3,7,8-TCDD	5	4	<2.1e-06	2.2E-05	1	--	--	--	--	--	0.19	no
	5	Cadmium	5	3	<0.1	0.41	0	5	3	ND	0.65	2	0.05	no
	6	Copper	5	0	5.2	15.0	1	4	0	24.0	55.0	0	0.02	no
EVBMP0002	1	TCDD TEQ	6	0	4.4E-07	2.8E-06	6	6	0	4.3E-05	1.4E-03	3	0.93	yes
	2	Cadmium	6	1	0.16	0.28	0	6	1	3.1	30.0	5	0.39	no
	3	Lead	6	0	3.4	26.0	1	5	0	284	1090	3	0.27	yes
	4	Total Suspended Solids	6	0	12.0	120	1	--	--	--	--	--	0.11	no
	5	Copper	6	0	4.6	13.0	0	5	0	121	600	2	0.03	no
	6	2,3,7,8-TCDD	6	6	<2.4e-06	<4e-06	0	--	--	--	--	--	0	no
EVBMP0002-A	1	TCDD TEQ	5	0	3.8E-08	7.0E-08	3	5	0	6.2E-07	7.0E-06	0	0.17	no
	2	Lead	5	0	3.8	4.8	0	5	0	194	344	1	1.0E-02	no
	2	Cadmium	5	4	<0.1	0.13	0	5	4	ND	2.5	1	1.0E-02	no
	3	Copper	5	0	3.6	7.7	0	3	0	44.3	150	0	0	no
	3	Total Suspended Solids	5	0	12.0	61.0	0	--	--	--	--	--	0	no
	3	2,3,7,8-TCDD	5	5	<1.1e-06	<5.3e-06	0	--	--	--	--	--	0	no
EVBMP0003	1	TCDD TEQ	14	0	6.4E-07	1.7E-05	13	14	0	2.9E-05	5.2E-04	6	0.98	yes
	2	Lead	14	0	8.7	55.0	9	14	0	264	664	8	0.91	yes
	3	Cadmium	6	2	0.14	0.27	0	6	2	2.2	4.5	4	0.19	no
	4	Total Suspended Solids	14	0	32.0	890	4	--	--	--	--	--	0.09	no
	5	Copper	6	0	6.0	10.0	0	6	0	118	167	0	0	no
	5	2,3,7,8-TCDD	14	13	<1.8e-06	2.3E-06	1	--	--	--	--	--	0	no

			Concentration					Particulate Strength						
Location	Rank	POC	Number of Samples	Number of NDs	Median	Maximum	N > PL	Number of PS	Number of NDs	Median PS	Maximum	N > 95th	Weight	Both Criteria Exceeded?
HZBMP0001	1	Total Suspended Solids	13	0	140	600	7	--	--	--	--	--	0.50	no
	2	Cadmium	6	4	<0.2	0.60	0	6	4	ND	3.5	2	0.02	no
	3	TCDD TEQ	12	3	3.5E-09	2.4E-05	3	12	3	5.1E-08	3.9E-05	1	8.0E-04	yes
	4	Lead	13	1	2.1	19.0	2	13	1	24.9	110	0	0	no
	4	Copper	13	0	5.7	15.0	1	13	0	33.3	1090	1	0	yes
	4	2,3,7,8-TCDD	12	11	<2.1e-06	1.1E-06	1	--	--	--	--	--	0	no
HZBMP0002	1	TCDD TEQ	4	3	<1e-10	6.5E-12	0	3	2	ND	6.5E-09	0	0	no
	1	Lead	4	2	<0.65	0.90	0	3	2	ND	57.5	0	0	no
	1	Copper	4	0	1.8	2.3	0	1	0	33.3	33.3	0	0	no
	1	Cadmium	4	4	<0.1	<0.1	0	3	3	ND	ND	0	0	no
	1	Total Suspended Solids	3	1	1.0	12.0	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	4	4	<2.4e-06	<5.6e-06	0	--	--	--	--	--	0	no
HZBMP0003	1	Total Suspended Solids	14	4	7.5	840	3	--	--	--	--	--	0.03	no
	2	TCDD TEQ	14	3	4.1E-11	8.0E-06	4	14	3	2.0E-08	8.0E-04	1	5.0E-04	yes
	3	Copper	14	0	2.0	19.0	1	12	0	51.6	3450	3	3.0E-04	yes
	4	Lead	14	6	0.46	19.0	2	14	6	16.2	397	1	0	yes
	4	Cadmium	6	5	<0.1	0.12	0	6	5	ND	69.6	1	0	no
	4	2,3,7,8-TCDD	14	14	<1e-06	<3.7e-06	0	--	--	--	--	--	0	no
HZSW0001	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
HZSW0002	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
HZSW0005	1	TCDD TEQ	1	0	5.6E-09	5.6E-09	0	1	0	1.1E-06	1.1E-06	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	1	0	5.0	5.0	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	1	1	<4e-07	<4e-07	0	--	--	--	--	--	0	no
HZSW0006	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no

Location	Rank	POC	Concentration					Particulate Strength					Weight	Both Criteria Exceeded?
			Number of Samples	Number of NDs	Median	Maximum	N > PL	Number of PS	Number of NDs	Median PS	Maximum	N > 95th		
HZSW0008	1	TCDD TEQ	1	0	2.1E-09	2.1E-09	0	1	0	7.6E-08	7.6E-08	0	0	no
	1	Lead	1	0	0.40	0.40	0	1	0	11.1	11.1	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	1	0	28.0	28.0	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	1	1	<6.2e-07	<6.2e-07	0	--	--	--	--	--	0	no
HZSW0009	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
HZSW0010	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
HZSW0011	1	Copper	2	0	2.7	3.0	0	2	0	399	631	1	0.31	no
	2	TCDD TEQ	2	0	3.5E-09	7.0E-09	0	2	0	1.8E-06	3.5E-06	0	0	no
	2	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	2	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	2	Total Suspended Solids	2	0	4.0	6.0	0	--	--	--	--	--	0	no
	2	2,3,7,8-TCDD	2	2	<5.2e-06	<5.2e-06	0	--	--	--	--	--	0	no
HZSW0012	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	1	1	<0.2	<0.2	0	1	1	ND	ND	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	1	0	7.0	7.0	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
HZSW0013	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
HZSW0014	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	3	0	3.1	3.7	0	3	0	34.5	111	0	0	no
	1	Copper	3	0	6.4	7.9	0	3	0	38.4	128	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	3	0	61.0	70.0	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no

			Concentration					Particulate Strength						
Location	Rank	POC	Number of Samples	Number of NDs	Median	Maximum	N > PL	Number of PS	Number of NDs	Median PS	Maximum	N > 95th	Weight	Both Criteria Exceeded?
HZSW0015	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
HZSW0016	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
HZSW0018	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
HZSW0019	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
HZSW0020	1	Lead	2	0	9.7	14.0	2	2	0	102	144	0	0.50	no
	1	Total Suspended Solids	2	0	72.5	76.0	1	--	--	--	--	--	0.50	no
	2	TCDD TEQ	2	0	4.5E-09	5.0E-09	0	2	0	6.2E-08	6.6E-08	0	0	no
	2	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	2	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	2	2,3,7,8-TCDD	2	2	<2.6e-06	<2.6e-06	0	--	--	--	--	--	0	no
ILBMP0001	1	TCDD TEQ	10	0	4.3E-07	2.9E-05	8	10	0	3.2E-05	6.8E-04	5	0.94	yes
	2	Lead	10	0	4.4	12.0	5	10	0	178	710	4	0.41	yes
	3	Cadmium	10	1	0.42	0.90	0	8	1	9.4	47.5	7	0.24	no
	4	Copper	10	0	9.7	21.0	3	8	0	124	725	2	0.05	yes
	5	Total Suspended Solids	10	0	22.5	150	1	--	--	--	--	--	1.0E-02	no
	6	2,3,7,8-TCDD	10	10	<1.9e-06	<7.9e-06	0	--	--	--	--	--	0	no
ILBMP0002	1	Lead	7	0	17.0	82.0	5	6	0	279	988	3	0.71	yes
	2	TCDD TEQ	7	0	1.5E-06	1.7E-05	5	7	0	7.9E-06	7.2E-04	3	0.61	yes
	3	Total Suspended Solids	7	0	42.0	1800	3	--	--	--	--	--	0.50	no
	4	Copper	7	0	11.0	59.0	3	6	0	60.2	266	0	0.05	no
	5	Cadmium	7	4	<0.1	1.1	0	7	4	ND	3.1	3	0.03	no
	6	2,3,7,8-TCDD	7	7	<9.6e-07	<5.3e-06	0	--	--	--	--	--	0	no

			Concentration					Particulate Strength						
Location	Rank	POC	Number of Samples	Number of NDs	Median	Maximum	N > PL	Number of PS	Number of NDs	Median PS	Maximum	N > 95th	Weight	Both Criteria Exceeded?
ILBMP0003	1	TCDD TEQ	4	0	2.5E-09	2.7E-08	0	4	0	6.3E-07	9.0E-06	0	0	no
	1	Lead	4	0	0.67	0.92	0	3	0	70.0	132	0	0	no
	1	Copper	4	0	3.9	4.8	0	3	0	100	267	0	0	no
	1	Cadmium	4	4	<0.1	<0.1	0	4	4	ND	ND	0	0	no
	1	Total Suspended Solids	4	0	4.0	10.0	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	4	4	<1.7e-06	<6.7e-06	0	--	--	--	--	--	0	no
ILSW0001	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
ILSW0002	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
ILSW0002-A	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
ILSW0003	1	Total Suspended Solids	2	0	52.5	83.0	1	--	--	--	--	--	0.50	no
	2	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	2	Lead	2	0	2.8	3.5	0	2	0	77.7	134	0	0	no
	2	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	2	Cadmium	2	0	0.46	0.54	0	0	0	--	--	0	0	no
	2	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
ILSW0004	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
ILSW0004-A	1	Total Suspended Solids	1	0	110	110	1	--	--	--	--	--	0.50	no
	2	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	2	Lead	1	0	2.6	2.6	0	1	0	19.9	19.9	0	0	no
	2	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	2	Cadmium	1	0	0.35	0.35	0	0	0	--	--	0	0	no
	2	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no

Location	Rank	POC	Concentration					Particulate Strength					Weight	Both Criteria Exceeded?
			Number of Samples	Number of NDs	Median	Maximum	N > PL	Number of PS	Number of NDs	Median PS	Maximum	N > 95th		
LFSW0001	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
LFSW0002	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
LFSW0002-A	1	TCDD TEQ	3	0	9.9E-08	9.4E-06	2	3	0	1.5E-06	2.0E-04	1	0.50	yes
	1	Total Suspended Solids	3	0	66.0	87.0	1	--	--	--	--	--	0.50	no
	2	Lead	3	0	3.7	6.7	1	3	0	64.9	67.8	0	0.11	no
	3	Copper	3	0	4.3	7.3	0	3	0	35.3	39.3	0	0	no
	3	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	3	2,3,7,8-TCDD	3	3	<2.4e-06	<8.8e-06	0	--	--	--	--	--	0	no
LPBMP0001	1	TCDD TEQ	2	0	2.2E-07	2.4E-07	2	2	0	3.0E-06	4.4E-06	0	0.50	no
	1	Cadmium	2	0	0.32	0.48	0	2	0	2.1	2.9	2	0.50	no
	1	Total Suspended Solids	2	0	92.0	130	1	--	--	--	--	--	0.50	no
	2	Lead	2	0	9.8	15.0	1	2	0	93.8	112	0	0.31	no
	3	Copper	2	0	9.3	14.0	0	2	0	76.3	91.5	0	0	no
	3	2,3,7,8-TCDD	2	2	<5.2e-07	<5.2e-07	0	--	--	--	--	--	0	no
LPBMP0001-A	1	TCDD TEQ	6	0	5.0E-06	5.0E-05	6	6	0	1.8E-04	1.2E-03	4	0.98	yes
	2	Total Suspended Solids	6	0	37.5	180	2	--	--	--	--	--	0.34	no
	3	Copper	6	0	11.1	21.0	2	4	0	62.9	242	0	0.05	no
	4	Lead	6	0	2.6	32.0	2	6	0	114	172	0	0.02	no
	5	Cadmium	6	4	<0.1	0.35	0	5	4	ND	1.4	1	1.0E-02	no
	6	2,3,7,8-TCDD	6	6	<1.8e-06	<4.4e-06	0	--	--	--	--	--	0	no
LXBMP0001	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
LXBMP0002	1	TCDD TEQ	2	0	7.6E-08	1.1E-07	2	2	0	2.2E-06	4.1E-06	0	0.50	no
	1	Total Suspended Solids	2	0	156	300	1	--	--	--	--	--	0.50	no
	2	Lead	2	0	3.8	6.9	1	2	0	31.6	40.9	0	0.31	no
	2	Cadmium	2	1	<0.12	0.12	0	2	1	<0.179	0.18	1	0.31	no
	3	Copper	2	0	9.7	14.0	0	2	0	45.8	63.6	0	0	no
	3	2,3,7,8-TCDD	2	2	<5.1e-06	<5.1e-06	0	--	--	--	--	--	0	no

			Concentration					Particulate Strength						
Location	Rank	POC	Number of Samples	Number of NDs	Median	Maximum	N > PL	Number of PS	Number of NDs	Median PS	Maximum	N > 95th	Weight	Both Criteria Exceeded?
LXBMP0003	1	Total Suspended Solids	6	0	78.5	1000	3	--	--	--	--	--	0.50	no
	2	TCDD TEQ	6	3	<4.35e-08	1.2E-07	3	6	3	<1.23e-07	1.5E-05	0	0.07	no
	3	Copper	6	0	3.9	20.0	1	5	0	17.9	2970	1	0.03	yes
	4	Cadmium	6	4	<0.1	0.44	0	6	4	ND	17.9	2	0.02	no
	5	Lead	6	1	0.81	18.0	1	6	1	13.8	70.3	0	0	no
	5	2,3,7,8-TCDD	6	6	<8.8e-07	<8.3e-06	0	--	--	--	--	--	0	no
LXBMP0004	1	Total Suspended Solids	5	0	260	520	5	--	--	--	--	--	0.97	no
	2	Lead	5	0	8.8	14.0	5	5	0	44.3	102	0	0.50	no
	3	Cadmium	5	1	0.12	0.19	0	5	1	0.27	0.64	4	0.38	no
	4	TCDD TEQ	5	0	4.5E-10	2.4E-07	1	5	0	3.8E-09	7.7E-07	0	1.0E-02	no
	4	Copper	5	0	11.0	15.0	1	5	0	40.6	86.9	0	1.0E-02	no
	5	2,3,7,8-TCDD	5	5	<2.3e-06	<6e-06	0	--	--	--	--	--	0	no
LXBMP0005	1	Total Suspended Solids	5	0	54.0	180	2	--	--	--	--	--	0.50	no
	2	TCDD TEQ	5	0	2.5E-10	5.8E-06	2	5	0	4.1E-09	2.9E-04	1	0.17	yes
	3	Lead	5	0	4.4	5.5	1	5	0	31.5	265	1	0.05	yes
	3	Cadmium	5	3	<0.1	0.13	0	5	3	ND	2.9	2	0.05	no
	4	Copper	5	0	8.4	12.0	0	5	0	59.3	435	1	1.0E-02	no
	5	2,3,7,8-TCDD	5	5	<1.5e-06	<7.3e-06	0	--	--	--	--	--	0	no
LXBMP0006	1	TCDD TEQ	1	0	5.6E-08	5.6E-08	1	1	0	4.3E-08	4.3E-08	0	0.50	no
	1	Lead	1	0	24.0	24.0	1	1	0	18.3	18.3	0	0.50	no
	1	Copper	1	0	26.0	26.0	1	1	0	17.5	17.5	0	0.50	no
	1	Cadmium	1	0	0.40	0.40	0	1	0	0.23	0.23	1	0.50	no
	1	Total Suspended Solids	1	0	1300	1300	1	--	--	--	--	--	0.50	no
	2	2,3,7,8-TCDD	1	1	<5.1e-07	<5.1e-07	0	--	--	--	--	--	0	no
LXSW0002	1	Total Suspended Solids	9	2	4.0	190	1	--	--	--	--	--	0.02	no
	2	TCDD TEQ	9	3	1.2E-09	1.9E-05	2	9	3	3.0E-07	9.8E-05	1	3.8E-03	yes
	2	Copper	9	0	1.8	13.0	0	9	0	253	1820	3	3.8E-03	no
	3	Lead	9	0	0.34	27.0	1	9	0	105	236	0	1.0E-04	no
	4	Cadmium	9	8	<0.1	0.91	0	8	8	ND	ND	0	0	no
	4	2,3,7,8-TCDD	8	8	<1.2e-06	<8.8e-06	0	--	--	--	--	--	0	no
LXSW0002-A	1	TCDD TEQ	0	0	--	--	0	0	0	--	--	0	0	no
	1	Lead	0	0	--	--	0	0	0	--	--	0	0	no
	1	Copper	0	0	--	--	0	0	0	--	--	0	0	no
	1	Cadmium	0	0	--	--	0	0	0	--	--	0	0	no
	1	Total Suspended Solids	0	0	--	--	0	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	0	0	--	--	0	--	--	--	--	--	0	no
Outfall 008	1	Total Suspended Solids	22	1	84.0	1300	11	--	--	--	--	--	0.58	no
	2	Lead	32	0	3.8	120	13	22	0	44.3	108	0	1.0E-04	no
	3	TCDD TEQ	32	5	1.5E-09	2.2E-06	6	22	4	2.2E-08	5.5E-07	0	0	no
	3	Copper	32	1	5.3	18.0	2	22	0	37.8	172	0	0	no
	3	Cadmium	26	10	0.03	1.5	0	6	4	ND	0.87	2	0	no
	3	2,3,7,8-TCDD	32	32	<9.52e-07	<4.7e-06	0	--	--	--	--	--	0	no
Outfall 009	1	TCDD TEQ	67	7	9.0E-09	3.7E-04	26	46	5	8.2E-07	2.1E-04	6	0	yes
	1	Lead	67	7	1.9	260	18	46	5	101	2500	10	0	yes
	1	Copper	67	0	3.3	39.0	3	43	0	96.3	1290	4	0	yes
	1	Cadmium	67	36	<0.11	9.2	1	31	26	ND	3.0	5	0	yes
	1	Total Suspended Solids	46	15	6.0	4000	5	--	--	--	--	--	0	no
	1	2,3,7,8-TCDD	67	63	<9.57e-07	3.4E-05	3	--	--	--	--	--	0	no