SSFL Surface Water Expert Panel Site Tour

November 17, 2022

For more information, please find this year's annual report online here:

https://www.boeing.com/principles/environment/santa-susana/technical-reports.page

Legend

- NPDES Outfall
- Drainage
- Pond
- Outfall Drainage Area
- Property Boundary
- Administrative Boundary
- RCRA Feasibility Investigation Boundary
- Shooting Range Investigation Area
- Stormwater BMP
- Tour Route

0 750 1,500 3,000 Feet

Surface Water Expert Panel Site Tour Map

Santa Susana Field Laboratory
Ventura County, CA

November 2022

Geosyntec consultants

N

BUFFER
NASA
AREA I (BOEING)
AREA IV (BOEING/DOE)
AREA III (BOEING)
AREA II (NASA)
BUFFER
BUFFER

Front Gate

Tour Stop 3.
Bioswale & Biofilter Treatment Train

Tour Stop 2.
Silvernale Advanced Stormwater Treatment System (SWTS)

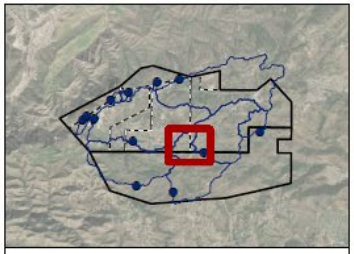
Tour Stop 1.
Area I Burn Pit (A1BP)

Silvernale Pond
R-1 Pond
R-2A Pond
Perimeter Pond

1 2 3 4 5 6 7 8 9 10 11 18

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
Sources: Esri, USGS, NOAA

Area 1 Burn Pit Subarea Stormwater Sampling



Legend

- Utility Pole
- Subarea Stormwater Monitoring Location
- Subarea Drainage Area
- NPDES Outfall
- Outfall Drainage Area

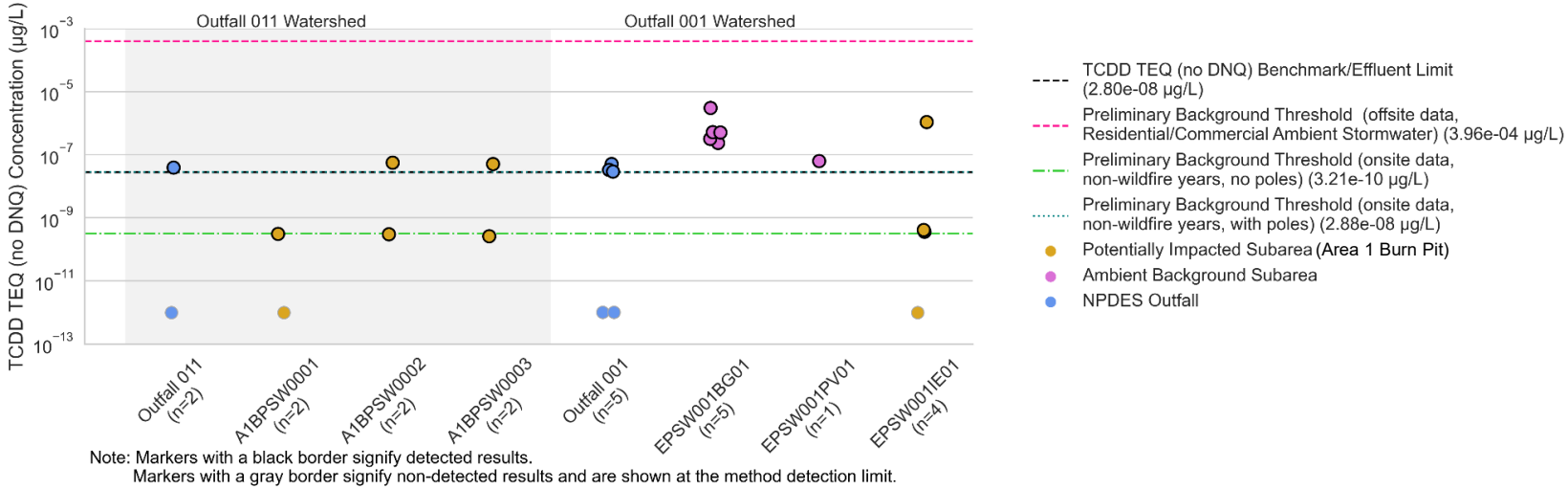
0 130 260 520 Feet

Area 1 Burn Pit Stormwater Monitoring Locations

Santa Susana Field Laboratory
Ventura County, CA

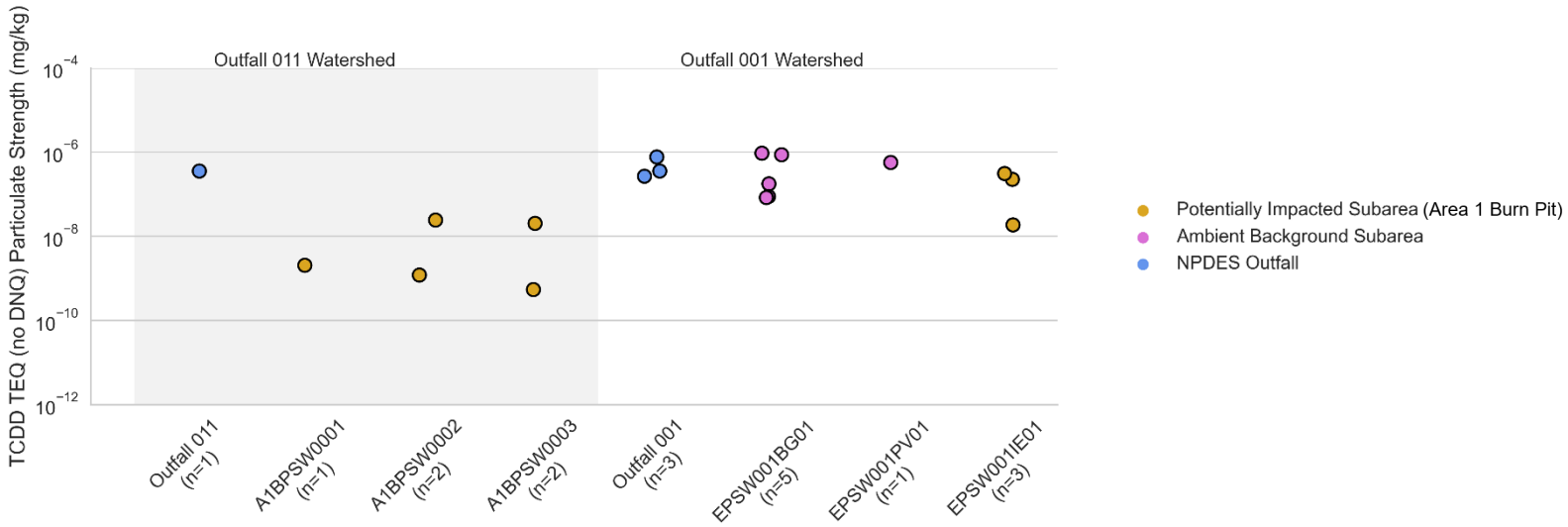
November 2022

Dioxin Concentrations at SSFL Area 1 Burn Pit and Outfall 001/011 Stormwater Monitoring 2019-2022



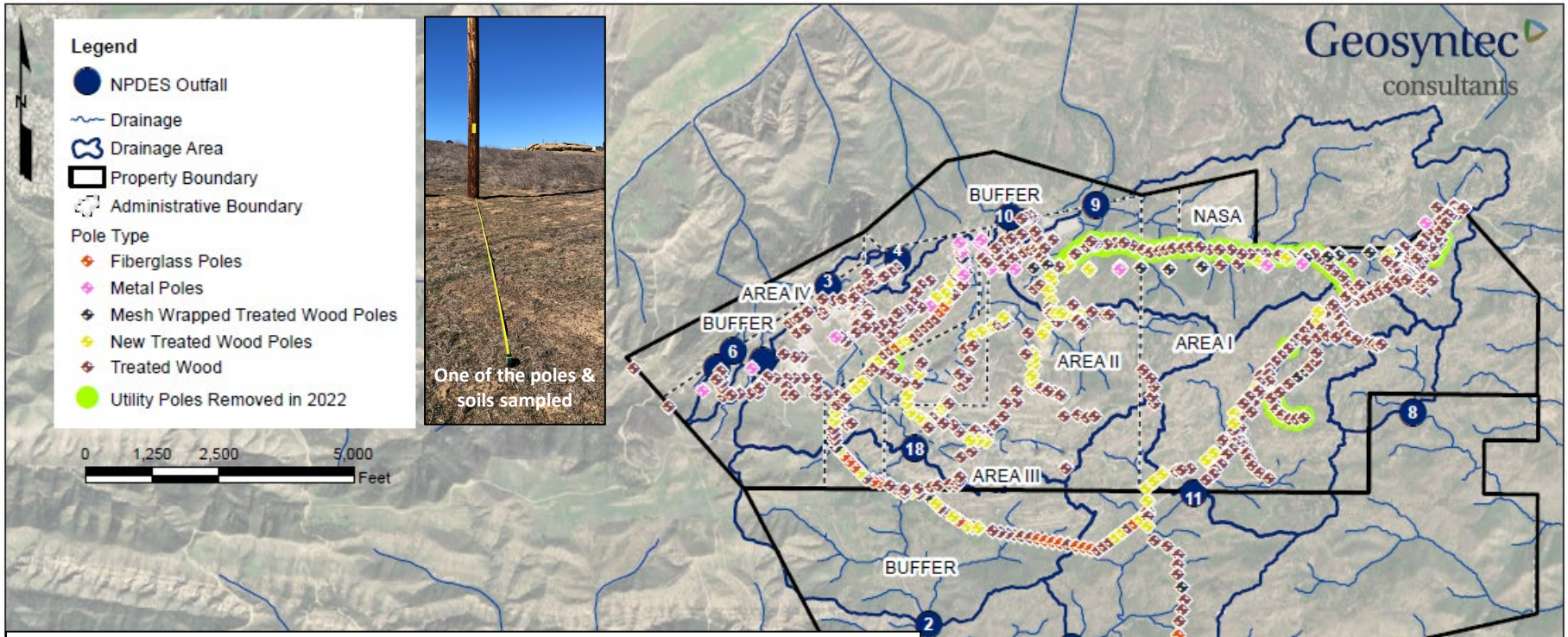
Note: Markers with a black border signify detected results.
Markers with a gray border signify non-detected results and are shown at the method detection limit.

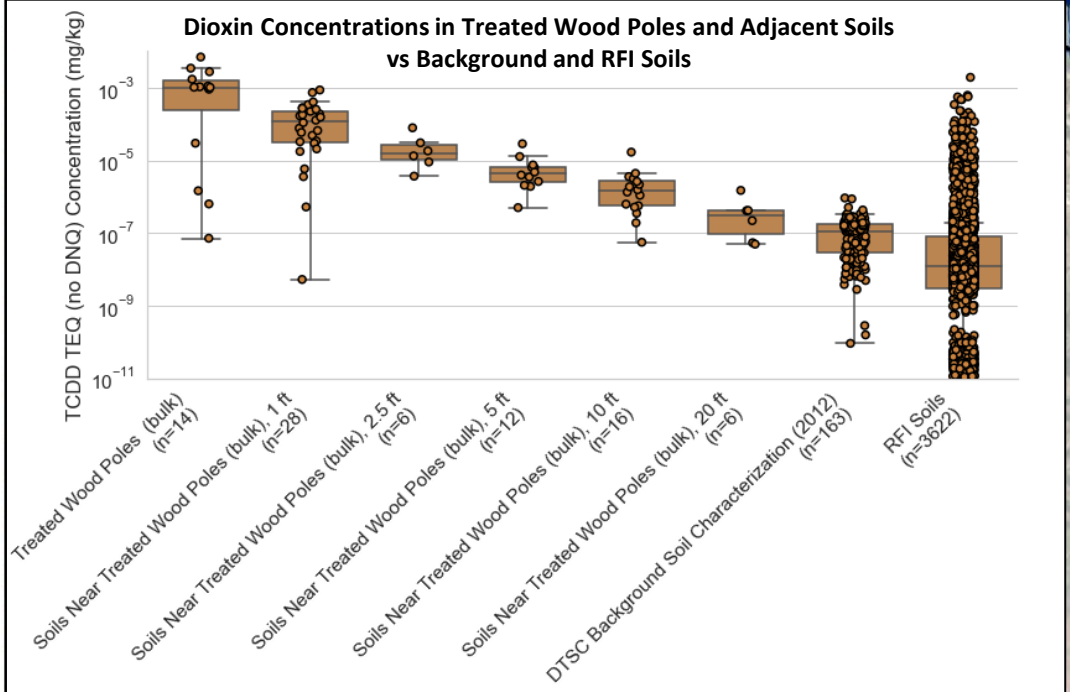
Dioxin Particulate Strengths at SSFL Area 1 Burn Pit and Outfall 001/011 Stormwater Monitoring 2019-2022



Note: Markers with a black border signify detected results. Markers with a gray border signify estimated particulate strengths calculated using the method detection limit for the non-detected filtered fraction results.
Particulate strengths are not shown for samples where the TSS or total concentrations were not detected.

Dioxin Concentrations in Treated Wood Poles and Adjacent Soils



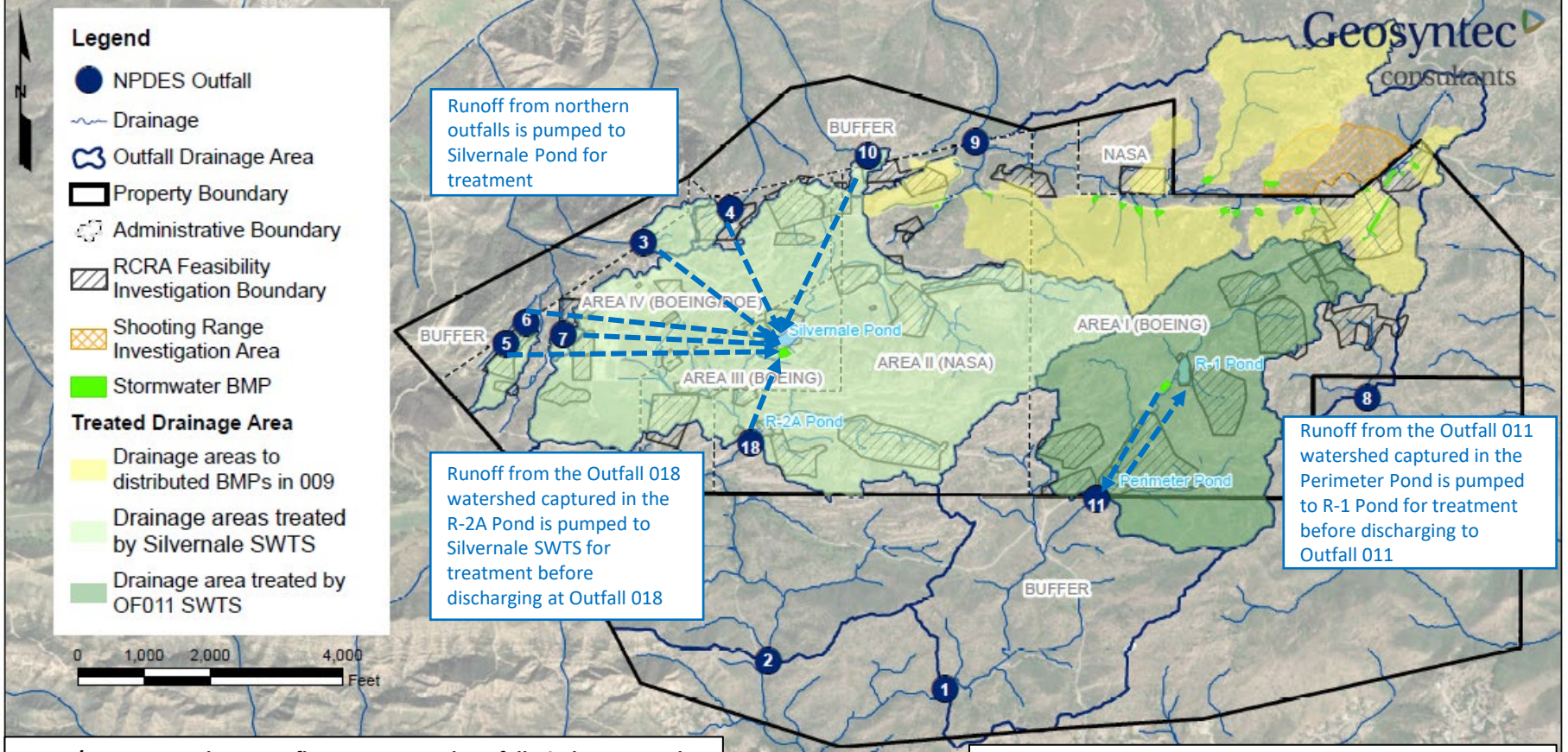


Key Findings:

- Distinct relationship between the dioxin concentration in soils and distance from the pole
- Dioxin concentrations at 1 ft from poles are as high as the highest observed RFI Soil concentrations
- Between April and June 2022, 42 unused treated wood utility poles were removed from Boeing property, and 12 unused treated wood poles were removed from NASA property. More are being evaluated for removal.
- Based on these sampling results, BMPs were recommended to be moved 10 ft out from poles to better capture pole-impacted soils

Service Layer Credits: Source: Esri, Maxar

Stormwater Treatment Systems (SWTSs)



2021/22 Untreated SWTS Influent vs Treated Outfall Discharge Results

Analyte	Units	Daily Maximum Permit Limit	Outfall 018 Untreated SWTS Influent Sample 12/25/2021	Outfall 018 Treated Discharge Sample 12/26/2021	Outfall 011 Untreated SWTS Influent Sample 1/10/2022	Outfall 011 Treated Discharge Sample 1/18/2022
Oil & Grease	mg/L	15	0.74 J	ND < 0.54	710	ND < 0.53
Mercury	µg/L	0.1	0.11 J	ND < 0.12	ND < 0.12	ND < 0.12
Lead	µg/L	5.2	3.2	ND < 0.5	0.87	ND < 0.5
Iron	mg/L	0.3	2.2	ND < 0.05	1.2	0.092
Manganese	µg/L	50	77	15	19 J	25
Perchlorate	µg/L	6.0	ND < 9.1	ND < 0.91	3.9	ND < 0.95
Trichloroethene (TCE)	µg/L	5	ND < 0.17	ND < 0.17	ND < 0.17	ND < 0.17
Gross Alpha	pCi/L	15	4.46+/-2.73	2.1+/-1.82	1.92+/-1.27	0.55+/-1.39
Gross Beta	pCi/L	50	4.17+/-1.75	4.07+/-1.12	3.68+/-0.904	2.81+/-1.01
TCDD TEQ (no DNQ)	µg/L	2.8E-08	6.1E-08	ND	1.3E-08	ND

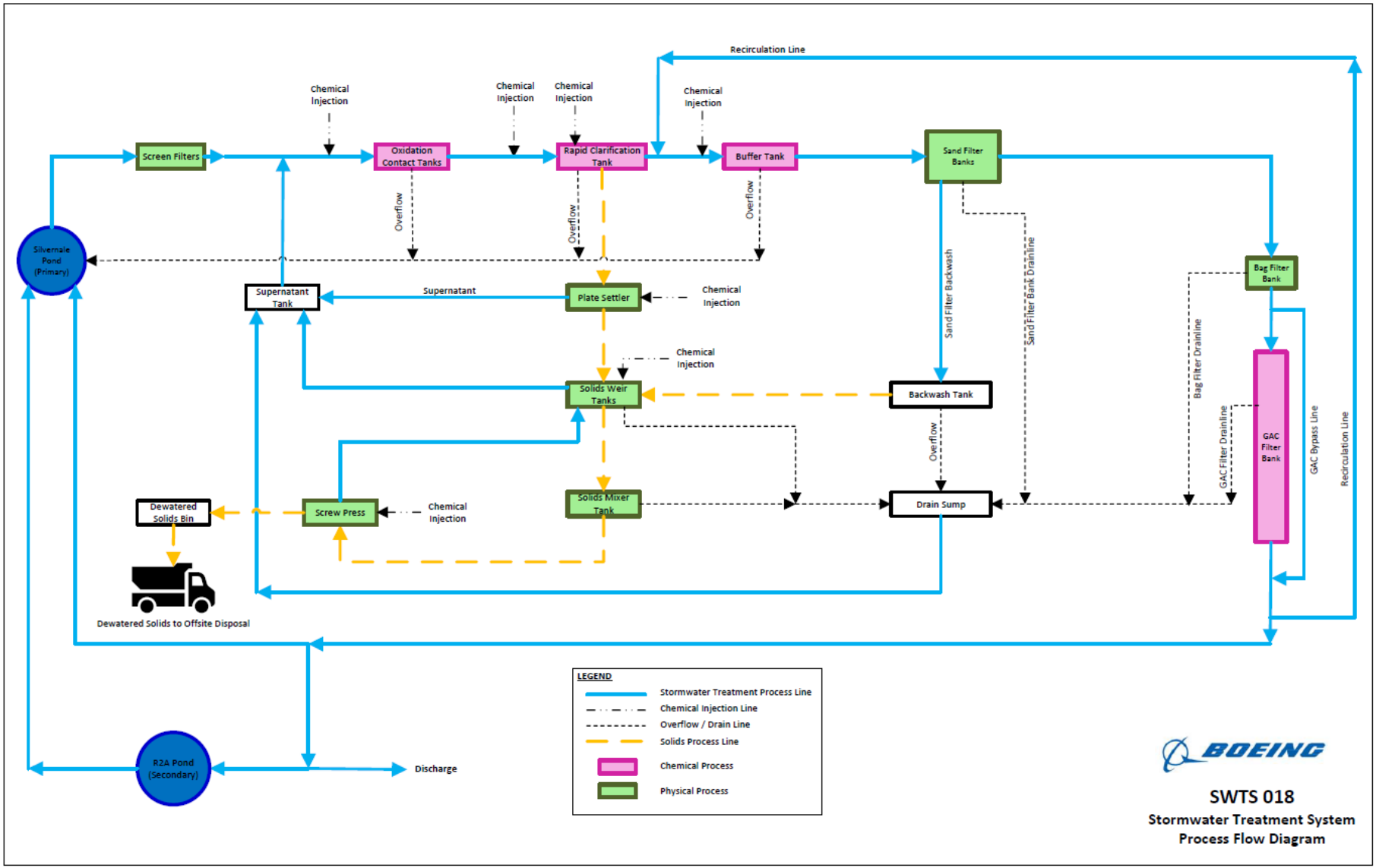
Key Findings:

- Oil & Grease, mercury, iron, manganese, and TCDD TEQ (no DNQ) were detected above the Permit Limit in the untreated influent samples at one or both SWTSs
- Most radionuclides* were not detected, and those that were detected were well below Permit Limits
- ***No analytes were detected above CA Primary MCLs in the untreated influent samples***

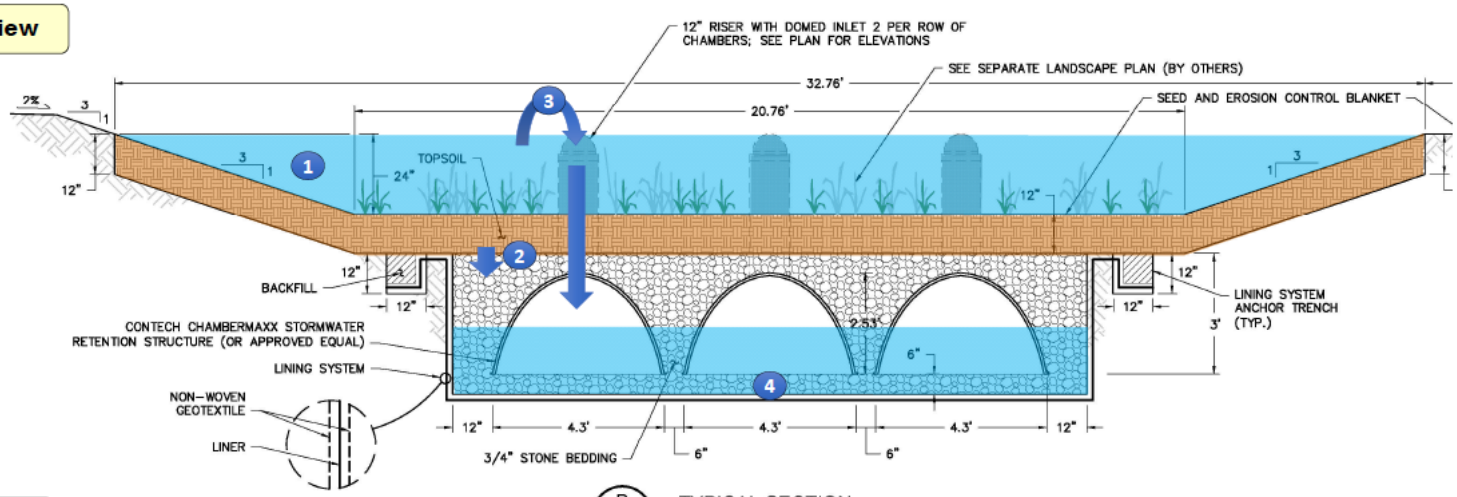
*Radionuclides analyzed were Gross Alpha, Gross Beta, Combined Radium-226 & Radium-228, Strontium-90, Tritium, Cesium-137, Uranium, and Potassium-40

In the table to the left, ND indicates the analyte was not detected above the method detection limit, and J indicates the concentration was detected but not quantified (estimated)

SWTS Process Flow Diagram

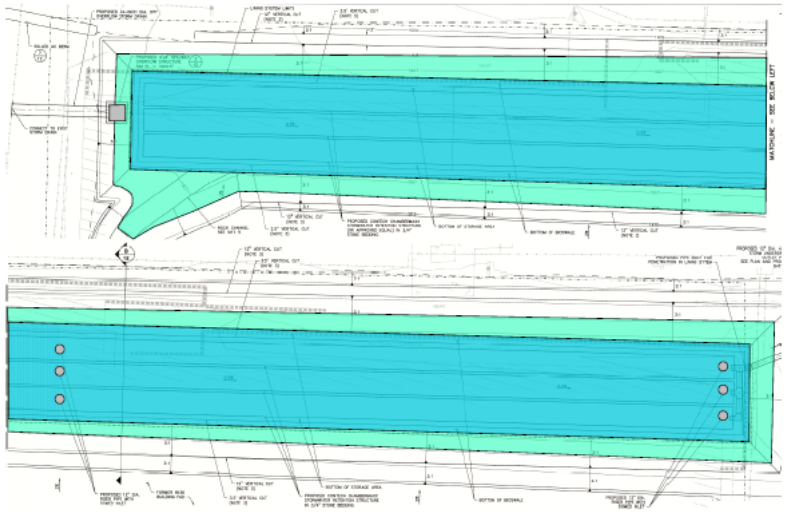


Profile View



B/6 TYPICAL SECTION
DETENTION BIOSWALE 1
SCALE: N.T.S.
XREF: SB0363T-X014 Details.dwg

Plan View



Detention Bioswales

Objective

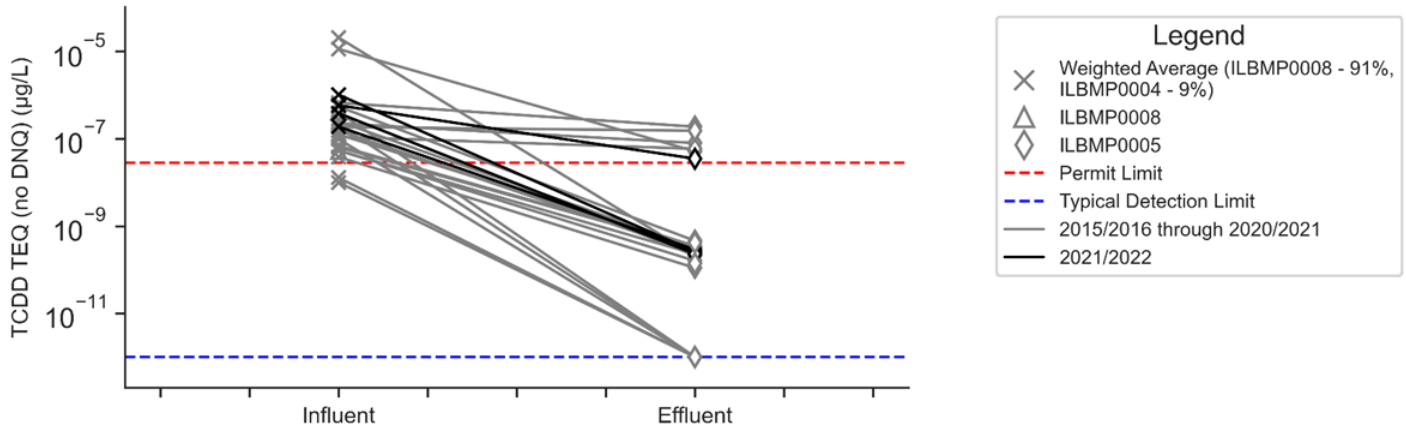
Hold and provide pretreatment of runoff from upper lot and contractor laydown area until lower lot runoff is treated, then slowly release for downstream treatment by sedimentation basin and biofilter.

How it Works

1. Stormwater enters the bioswales and ponds on the surface.
2. Stormwater infiltrates through the media, receiving some initial filtration treatment, and into the chambers below, allowing some initial sedimentation treatment.
3. When water ponding exceeds the height of the risers, stormwater flows directly into subsurface chambers.
4. The chambers slowly drain (using outlet control valves) to the existing catch basin and then a 24" storm drain, where a low flow diversion weir under the lower parking lot diverts this to the biofilter.

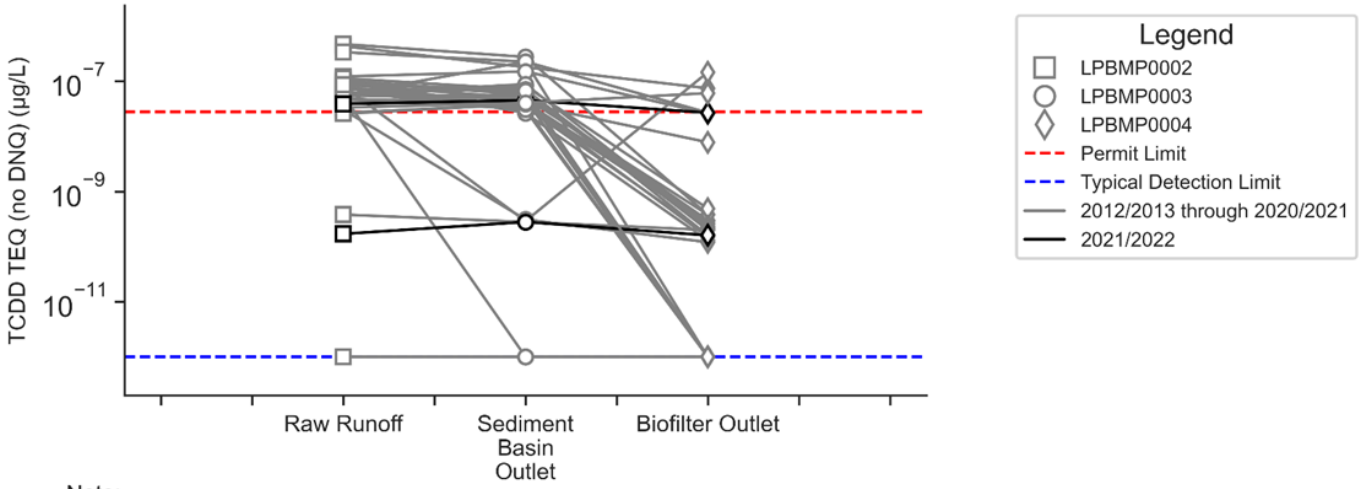
BOEING | SSFL Surface Water Expert Panel | Geosyntec consultants

Bioswale Dioxins Removal Performance



Note:
- 1E-12 ug/L is shown for ND TEQ results as this is in the range of the lowest reported TEQ results with DNQ excluded.

Lower Lot Biofilter Dioxins Removal Performance



Note:
- 1E-12 ug/L is shown for ND TEQ results as this is in the range of the lowest reported TEQ results with DNQ excluded.

Notes:
1. Proposed Erosion/Sediment Control BMPs will be determined in the field by the QSP and may include, but are not limited to: silt fencing, gravel bag berms, sand bag berms, and/or fiber rolls.
2. When installing silt fence BMPs, also install a coir log/fiber roll along the base and on the upgradient side of the fence.

Install sediment control BMPs at topographic low points upgradient of DUs.
Slow and divert upslope surface flow from crossing into disturbed areas and avoid concentrated flows where possible.

MRCA - Sage Ranch

Former Shooting Range

QSP to identify the best locations along drainage pathway to install erosion/sediment control BMPs. Refer to SWPPP Attachment K for additonal guidance on swale and slope BMPs.

At CM-12, implement BMPs to divert water and prevent sediment from entering the CM during construction.

Post 505/Guard Shack

Facility Road

SSFL

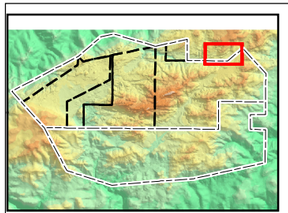
Excavation Boundary Along Drainage
Where possible, the excavation boundary adjacent to the Northern Drainage will be set back at least 10 feet from the drainage bank. No excavation activities will occur in the drainage.

Protect the trench drain inlet and associated curb to the Lower Lot BMP cistern

Northern Drainage

Service Area Road

CM-11 CM-12 CM-8 CM-9



- SSFL Property Boundary
- Decision Unit (DU) Boundaries
- SSFL Lower Lot Waste Storage and Staging Area
- Outfall 009 Sub-Watershed Boundaries
- Removal Action Area
- Rip Rap
- Rip Rap Check Dam
- Stabilized Construction Entrance/Exit
- Inlet Protection
- Gravel
- Rip Rap
- CMs
- B1436 Bioswale
- Biofilter
- Cistern
- Sediment Basin
- Trench Drain
- Silt Fence
- Fiber Roll
- Sand Bags
- Gravel Bags
- Rip Rap Berm
- Water Bar
- Sage Ranch Trail
- Paved Road
- Drainage
- SW Flow Direction
- Proposed E/S Control BMP
- Vernal Pool Buffer
- Santa Susana Tarplant Buffer
- Plummer's Mariposa Lily Avoidance Buffer
- Environmentally Sensitive Areas

Former Shooting Range
BMP Plan - Remedial Action Areas
SAGE RANCH PARK

Path: D:\Rocketdyne\Shooting_Range_Order\MXD\Fig_E_B3_SWPPP_BMP_Plan.mxd

Date: 8/17/2022

1 inch = 150 feet

0 75 150 225 300 Feet

Stantec

Figure B-3