
# San Diego Bay National Wildlife Refuge Sweetwater Marsh Unit

## Operable Unit 1: Burn Ash Areas


# San Diego Bay National Wildlife Refuge Sweetwater Marsh Unit

# Operable Unit 2: Gunpowder Point


**Figure 1-3**
**Aerial View of the Sweetwater Marsh Unit**

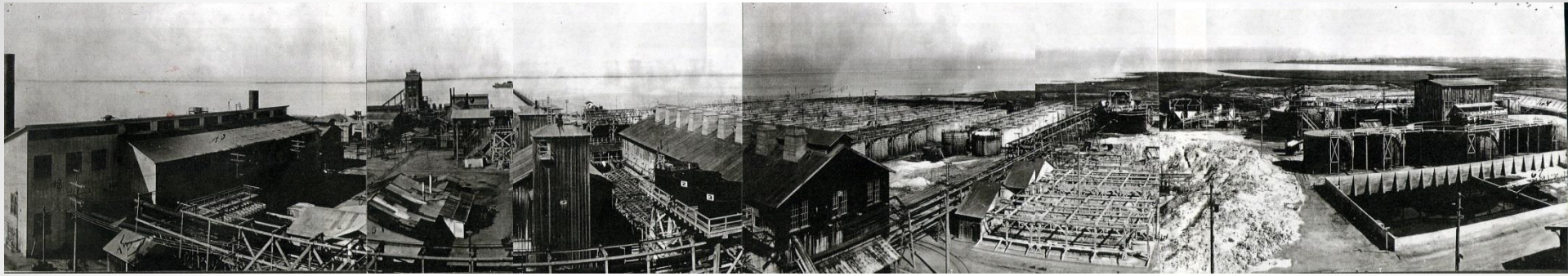

5
Operable Unit 1 (Paradise Marsh)
Operable Unit 1 (Marisma de Nacion)
Sweetwater Flood Control Channel
Operable Unit 1 (Connector Marsh)
Operable Unit 1 (Sweetwater Marsh)
San Diego Bay
Operable Unit 2 (Gunpowder Point)
Operable Unit 3 (F and G Street Marsh)
San Diego
Coronado
National City
San Diego Bay
Chula Vista
Pacific Ocean
Imperial Beach
Legend
Operable Units
N
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap
0
0.5
Miles
Operable Units of the Sweetwater Marsh Unit of the San Diego Bay National Wildlife Refuge
San Diego, California
Geosyntec consultants
Figure 1
Santa Barbara
August 2017

# Historical Land Use

Davies Dump was located at the north end of Paradise Marsh and operated from the 1920s to the 1950s.

In the 1980s, construction of the Highway 54 interchange, development of the Sweetwater River Flood Control Channel, and expansion of Interstate 5, distributed contaminated burn ash material into the Sweetwater Marsh.

# Historical Land Use



1916 -1920: Hercules Powder Company produced potash and acetone and were shipped to Great Britain to make smokeless gunpowder during World War I. There were 156 above-ground 50,000-gallon wooden fermentation tanks, nine 400,000-gallon storage tanks, settling basins, reservoir, fusing furnaces, crystallization tanks, railroad, laboratory, and storage buildings.


Burn ash
erosion


Time
Critical
Remedial
Action

# OU1: Soil and Sediment Removal Action Areas

The removal action areas were categorized into two areas:

| Burn Ash Areas | Hot Spots |
| --- | --- |
| The municipal solid waste and burn ash piles were visually delineated. | Chemicals of Potential Concern exceeded Preliminary Remediation Goals, but fell outside the vicinity of the burn ash. |

| COPC | Human Health | | Ecological | |
|---|---|---|---|---|
| | Soil | Wetland Soil/ Sediment | Soil | Wetland Soil/ Sediment |
| Antimony | | | • | • |
| Arsenic | • | • | • | • |
| Cadmium | • | • | • | • |
| Copper | • | • | • | • |
| Lead | • | • | • | • |
| Mercury | • | • | • | • |
| Molybdenum | | | • | • |
| Nickel | | | • | • |
| Selenium | | | • | • |
| Tin | | | | • |
| Zinc | • | • | • | • |
| Dioxin and Furans (TCDD TEQ mammalian) | • | • | • | |
| Dioxin and Furans (TCDD TEQ avian) | | | • | • |
| Dioxin and Furans (TCDD TEQ fish) | | | | • |
| DDT, DDD, DDE (DDXs) | | | • | • |
| PAHs (BaP EQs) | • | • | | |
| HPAHs | | | • | • |
| LPAHs | | | | • |
| PCBs | | • | • | • |

# OU1: Streamlined Human Health Risk Evaluation:

- Found potentially unacceptable human health risks associated with systemic (non-cancer) health effects for arsenic, cadmium, lead, and dioxins/furans.

- Excess lifetime cancer risk estimates for upland soil and sediment at OU1 were within the EPA acceptable risk range of 1x10-6 to 1x10-4.

# OU1: Streamlined Ecological Risk Assessment:

The potential for ecological risk to avian and mammalian wildlife was primarily observed to occur in insectivorous/omnivorous birds, mammals with small home ranges, and benthic invertebrates and fish:

- Ecological risk-based COPCs for soil include antimony, cadmium, copper, lead, mercury, molybdenum, nickel, selenium, zinc, Total DDXs, and dioxins/furans.

- Ecological risk-based COPCs for sediment for birds and mammals directly or indirectly exposed to sediment-borne contaminants, including arsenic, copper, lead, mercury, nickel, zinc, Total DDXs, PCBs, and dioxins/furans.

- Ecological risk-based COPCs for benthic invertebrates include antimony, copper, lead, nickel, and zinc.

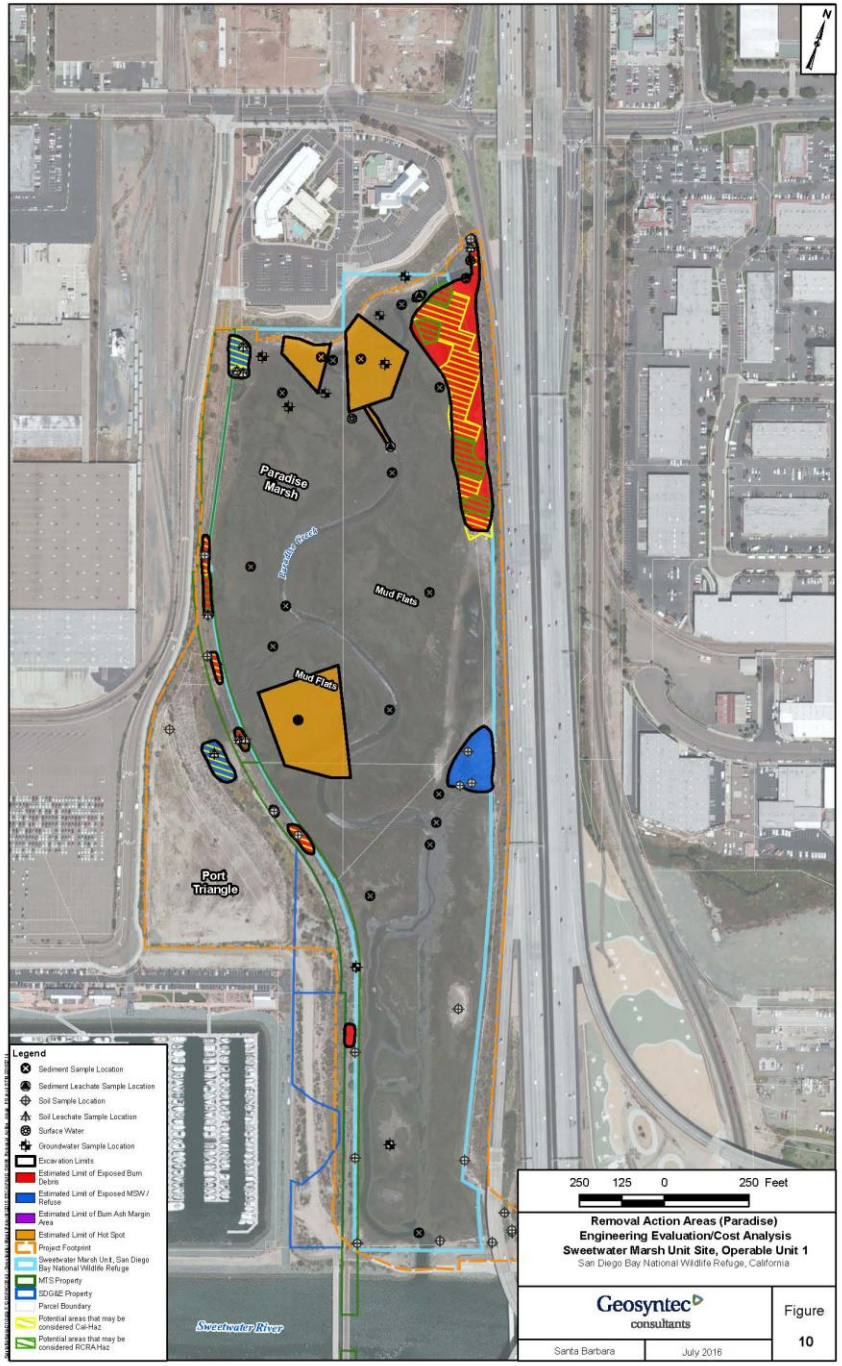
# OU1: EE/CA Cleanup Alternatives

- **Alternative 2 [Recommended]**– Excavation of Upland Soils and Sediments with Off-Site Disposal.
  - Removal of contaminated soils and sediments at the areas where COPC concentrations exceed the final cleanup levels and off-site disposal thereof. The volume of material to be excavated is approximately 44,000 cubic yards (61,600 tons). Excavations would be backfilled where determined by the Refuge Manager and replanted with native vegetation.
  - Estimated cost = $12,970,000.
  - Estimated time: ~ 4 to 6 months.
  - This is the highest rated alternative for addressing the existing soil contamination. It involves mechanical excavation and disposal of soils at an off-site facility. Completed excavations would be backfilled with clean borrow soil and affected areas would be replanted with native vegetation, providing for unrestricted future land use at OU1.

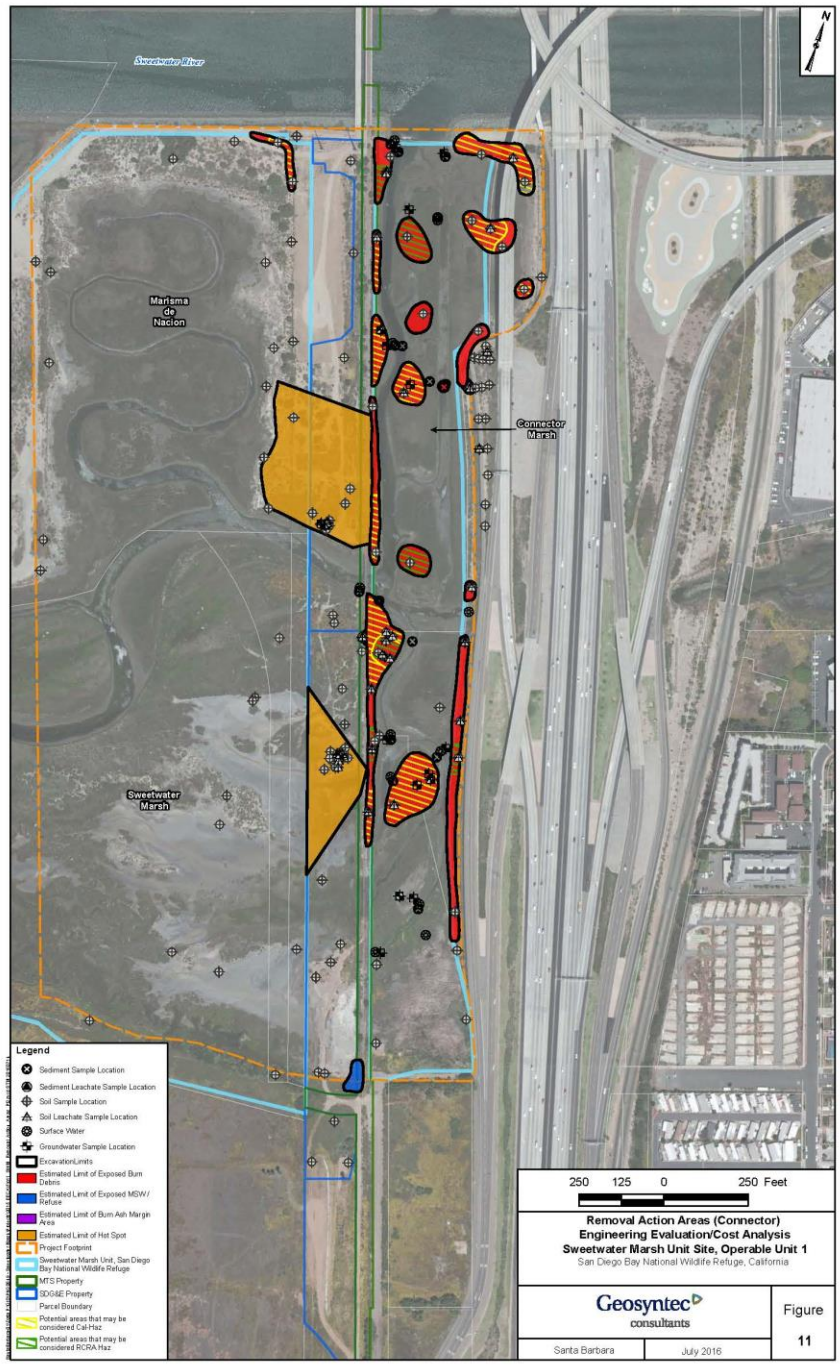
- **Alternative 3** – Excavation of Upland Soils and Sediments with Off-Site Disposal. Estimated lifetime cost = $11,020,000.

- **Alternative 4** – Excavation of Upland Soils with In-situ Treatment of Sediments. Estimated lifetime cost = $11,540,000.

# OU1: Paradise Marsh Area




OU 1 005949




OU 1 005950

# OU1: Connector Marsh Area

# OU2: Soil Removal Action Areas

The Soil Removal Action Areas was defined as an 80-foot diameter zone around each boring with metal(s), perchlorate, or dioxin/furan concentrations greater than the Preliminary Remediation Goals.

# OU2: Groundwater Removal Action Area

The Groundwater Removal Action Area includes the entire site based on the detection of perchlorate and metals at numerous locations and the lack of analytical data to potentially bound the extent of perchlorate in groundwater.

Human health Chemicals of Potential Concern (COPC) in soil:

- arsenic
- cadmium
- lead
- TCDD Toxicity Equivalence Quotient (“TEQ”)

Ecological receptors Chemicals of Potential Concern in soil:

antimony
arsenic
barium
boron
cadmium
chromium
copper
lead
mercury
nickel
selenium
vanadium
zinc
TCDD TEQs
perchlorate

# OU2: Human Health Risk Assessment

The following on-site potential human receptors are considered representative of human receptors that may potentially be exposed at OU2:

- Current and Future NWR Employees (adults);
- Future NWR Volunteer Workers (adults);
- Current and Future NWR Visitors (children and adults); and
- Current and Future NWR Volunteers (teens).

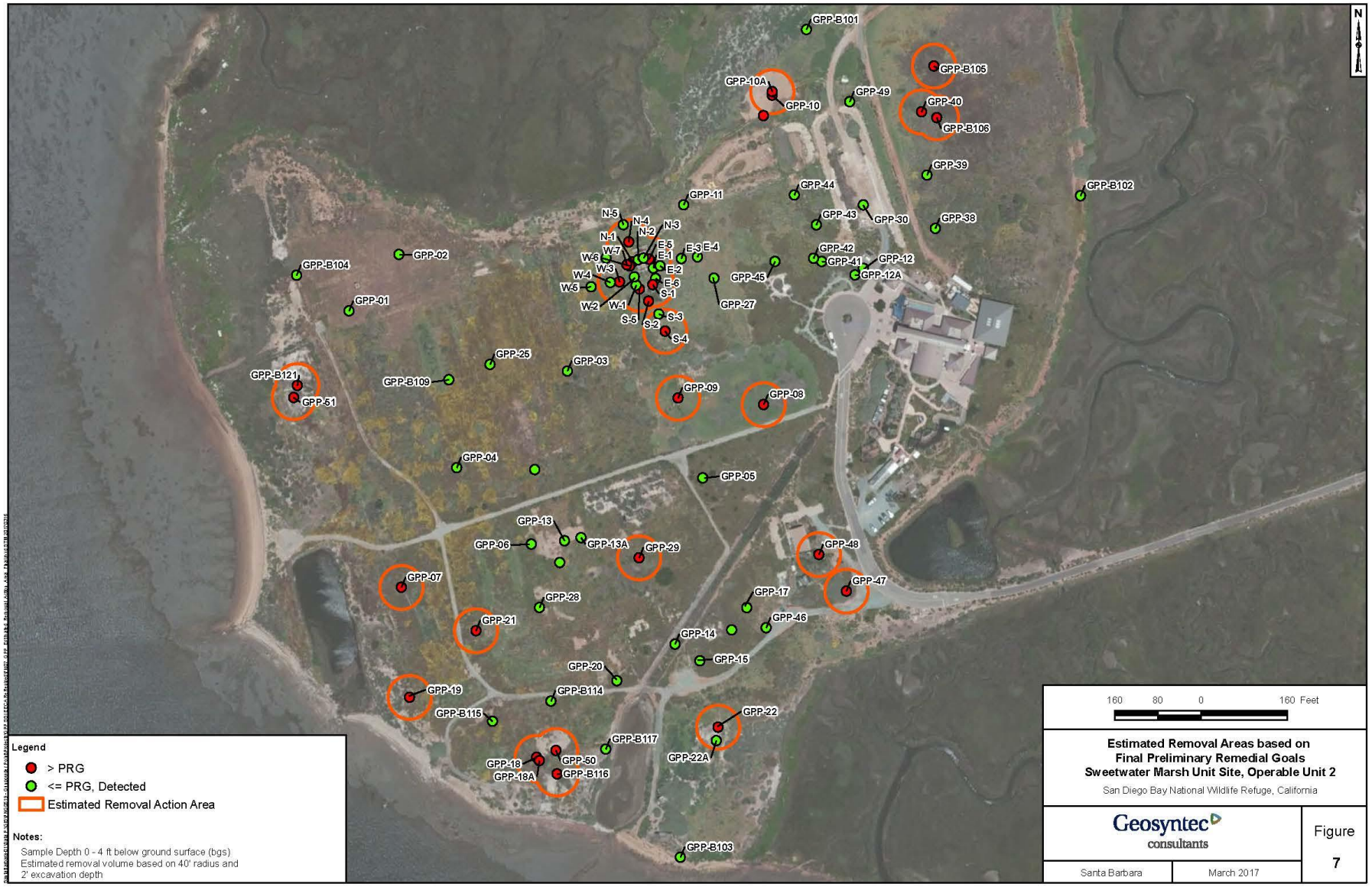
Arsenic was the only carcinogen for which there was an estimated increased in lifetime risk of cancer that exceeded 1 x 10-6, but at slightly over 1x10-5, it is within the EPA acceptable risk range of 1x10-6 to 1 x 10-4. The risk estimate is for Refuge workers which are the potentially most exposed individuals, and risks to other groups such as visitors and volunteers are lower.

Based on preliminary screening, the following chemicals were identified as human health COPCs in soil.

- arsenic
- cadmium
- lead
- TCDD Toxicity Equivalence Quotient

# OU2: Screening Level Ecological Risk Assessment

- The Screening Level Ecological Risk Assessment indicated no unacceptable risk to plants and invertebrates.
- Screening-level Hazard Quotients indicate the potential for ecological risk, primarily to insectivorous birds and mammals with small home ranges for dioxin/furans and for 13 metals: antimony, arsenic, barium, boron, cadmium, chromium, copper, mercury, lead, nickel, selenium, vanadium, and zinc.


GPP-B101
GPP-B105
GPP-10A
GPP-10
GPP-49
GPP-40
GPP-B106
GPP-39
GPP-B102
GPP-44
GPP-11
GPP-43
GPP-30
GPP-38
GPP-42
GPP-41
GPP-12
GPP-12A
GPP-45
GPP-27
GPP-02
GPP-B104
GPP-01
GPP-25
GPP-03
GPP-B121
GPP-51
GPP-B109
GPP-09
GPP-08
GPP-04
GPP-05
GPP-13
GPP-06
GPP-13A
GPP-29
GPP-48
GPP-47
GPP-07
GPP-28
GPP-17
GPP-21
GPP-46
GPP-14
GPP-15
GPP-20
GPP-19
GPP-B114
GPP-B115
GPP-22
GPP-22A
GPP-B117
GPP-18
GPP-50
GPP-18A
GPP-B116
GPP-B103
N-5
N-4
N-3
N-2
N-1
W-7
W-6
W-3
W-4
W-5
W-2
W-1
E-5
E-1
E-3
E-4
E-2
E-6
S-1
S-5
S-2
S-3
S-4
N
Legend
> PRG
<= PRG, Detected
Estimated Removal Action Area
Notes:
Sample Depth 0 - 4 ft below ground surface (bgs)
Estimated removal volume based on 40' radius and 2' excavation depth
160 80 0 160 Feet
Estimated Removal Areas based on
Final Preliminary Remedial Goals
Sweetwater Marsh Unit Site, Operable Unit 2
San Diego Bay National Wildlife Refuge, California
Geosyntec consultants
Figure
7
Santa Barbara
March 2017

OU 2 002482

# OU2: Soil Removal Action Alternatives

**Alternative 2 [Preferred]:** Soil Excavation with Off-Site Disposal

- Remove soils at the areas where contamination (metals and dioxins/furans and perchlorate) exceeds screening levels and disposal of removed soils off-site. Excavated areas would be backfilled with clean fill.
- Estimated cost = $1,810,600

**Alternative 3:** Soil Excavation with On-Site Disposal

Remove contaminated soils, however contaminated soils would be consolidated and placed in an on-site repository.

- Estimated cost= $1,104,500

**Alternative 4:** Soil Capping and Irrigation and Institutional Controls

- Place a clean fill cap over those areas of OU2 where metals and dioxins/furans concentrations in soil exceed screening levels. Administrative institutional controls (ICs) would be implemented to preserve cap integrity. Contaminated soils would be irrigated to mobilize perchlorate and transport it to groundwater in order to facilitate natural attenuation.
- Estimated cost = $828,300

# OU2: Groundwater Removal Action Alternatives

**Alternative 2 [Preferred]:** Drinking Water Restriction and Site-Wide Monitored Natural Attenuation.

- This would restrict the development of any drinking water facility as well as long-term monitoring to determine if groundwater migration may be a future concern.
- Institutional Controls would administratively be implemented to restrict groundwater use for human consumption. Projections indicate perchlorate and metal contamination in groundwater at OU2 would meet screening levels after 20 years of natural attenuation.
- Estimated cost = $341,900

**Alternative 3** – Future Well-Head Treatment and Site-Wide Monitored Natural Attenuation.

- Monitoring well network would be used to monitor the natural degradation of perchlorate, metals, and nitrate at OU2 and along the perimeter of the Refuge as described in Alternative 2, and by establishing an institutional control requiring treatment of drinking water prior to use.
- Estimated cost = $374,100.

# Public Outreach

- The 45-day public comment period begins September 1, 2017 and closes on October 16, 2017.
- Notice of Availability was published on September 1, 2017 in the San Diego Union Tribune.
- A summary bilingual fact sheet will be mailed out to residents and businesses in the areas surrounding the project sites.
- Public meeting: To be scheduled within the public comment period.