SAN DIEGO WATER BOARD 2022 USEPA VISION REPORTS – SAN DIEGO BAY SITES

SEPTEMBER 2022

Introduction

This USEPA Vision Report summarizes the progress on Water Quality Restoration Plans to restore designated beneficial uses to four sites in San Diego Bay in the San Diego Region. The California Water Quality Control Board, San Diego Region (San Diego Water Board) uses a variety of approaches and alternatives to address Clean Water Act (CWA) total maximum daily load (TMDL) requirements to restore designated beneficial uses to water bodies. Impairments in surface waters not attaining water quality standards must be resolved using existing regulatory tools in accordance with the *Water Quality Control Policy for Addressing Impaired Waters: Regulatory Structure and Options* (Impaired Waters Policy).

Strategy for San Diego Bay – Sediment Cleanups (Category 5-alternatives) and Source Control

As part of the Strategy for San Diego Bay for addressing sites identified by the State Water Board's the Bay Protection Toxic Clean Program and for prioritizing human health risks identified in OEHHA fish advisories, the San Diego Water Board issued regulatory orders to responsible parties in the San Diego Bay for toxic sediment cleanup of the following sites and pollutants (Table 1).

Table 1. Pollutant Listings from Clean Water Act 303(d) List.

Site Name	Pollutants
A) San Diego Bay Shoreline, Laurel-Hawthorn Embayment, Western Region (Downtown Anchorage)	Benthic Community Effects, Sediment Toxicity (San Diego Bay: Mercury, Polycyclic Aromatic Hydrocarbons (PAHs), Polychlorinated Biphenyls (PCBs))
B) San Diego Bay Shoreline, Laurel-Hawthorn Embayment, Eastern Region (Downtown Anchorage)	Benthic Community Effects, Sediment Toxicity (San Diego Bay: Mercury, PAHs, PCBs)
C) San Diego Bay Shoreline at Harbor Island, East Basin	Copper (San Diego Bay: Mercury, PAHs, PCBs)
D) San Diego Bay Shoreline near Chollas Creek - Chollas Creek Mouth	Benthic Community Effects, Sediment Toxicity (San Diego Bay: Mercury, PAHs, PCBs)

These projects are part of the San Diego Water Board's USEPA Vision.

A. San Diego Bay Shoreline, Laurel-Hawthorn Embayment, Western Region

1. Project Information

a. **Project Name and Hydrologic Area:** Laurel-Hawthorn Embayment, Western Region (Teledyne Ryan Site). Cleanup and Abatement Order (CAO) No. R9-2015-0018, Laurel Hawthorn Embayment: Excavation/Enhanced Monitored Natural Recovery (EMNR) Remedial Action for the 30-Inch Storm Water Conveyance System (SWCS) Outfall, 2701 North Harbor Drive, San Diego, California. This site is in the Pueblo San Diego Hydrologic Unit, San Diego Mesa Hydrologic Area, Lindbergh Hydrologic Sub-Area (908.21).

b. **Impaired Water Body:** San Diego Bay Shoreline, Downtown Anchorage (Laurel Hawthorn Embayment [Western Region]) and San Diego Bay are listed on the Clean Water Act (CWA) 303(d) list of Impaired Waters for impairments due to the pollutants listed in Table 2.

Table 2. Pollutant list for Laurel-Hawthorn Embayment, Western Region (Downtown Anchorage)

Water Body Name	Watershed Name	Pollutant Listing	Site Assessment Unit ID
San Diego Bay Shoreline, Downtown Anchorage	Pueblo San Diego Hydrologic Unit	Benthic macroinvertebrate impairment	CAB908210001999021009181 6
San Diego Bay Shoreline, Downtown Anchorage	Pueblo San Diego Hydrologic Unit	Sediment toxicity impairment	CAB908210001999021009181 6
San Diego Bay	Pueblo San Diego Hydrologic Unit	Mercury	CAB910100001999021013242 2
San Diego Bay	Pueblo San Diego Hydrologic Unit	Polycyclic Aromatic Hydrocarbons (PAHs)	CAB910100001999021013242 2
San Diego Bay	Pueblo San Diego Hydrologic Unit	Polychlorinated Biphenyls (PCBs)	CAB910100001999021013242 2

c. **Water Body Type:** Bay and Harbor

d. **Beneficial Uses:** The San Diego Basin Plan and the Water Quality Control Plan for Enclosed Bays and Estuaries - Part 1 Sediment Quality, designate the following beneficial uses for San Diego Bay that apply to the Laurel Hawthorn Embayment: Commercial and Sports Fishing (COMM), Shellfish Harvesting (SHELL), Estuarine Habitat (EST), Marine Habitat (MAR), Wildlife Habitat (WILD), Rare, Threatened or Endangered Species (RARE)

2. **Status: Order No. R9-2015-0018 issued a directive to conduct pre-remediation, remediation, and post-remediation verification monitoring to ensure the background abatement concentrations of total PCBs is achieved at the site and to determine if the activated carbon has any adverse effects on the benthic community. The investigation and cleanup at the Teledyne Ryan site have been completed. The CAO abatement goal has been achieved. Additional information is included in section 7 Water Body Impairment.**

   a. **Pollutants(s):** San Diego Bay Shoreline, Downtown Anchorage (Laurel-Hawthorn Embayment) is on the CWA 303(d) list for benthic macroinvertebrate and sediment toxicity impairments. San Diego Bay is on the CWA 303(d) list for mercury, polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs).

      Bay sediment sampling conducted in June 2012 near the 30-inch stormwater conveyance system (SWCS) outfall, indicated that total PCBs were present in bay sediments in concentrations as high as 12.2 milligrams per kilogram(mg/kg) in the immediate vicinity of the outfall, but that concentrations attenuate rapidly with distance from the outfall location. For comparison, a concentration of 0.084 mg/kg has been used as background in previous sediment quality investigations in San Diego Bay.

   b. **Pollutant Sources:** Between the early 1940's and mid-1999, Ryan Aeronautical Company and its successors (Teledyne Ryan Aeronautical Company, Teledyne Industries, Inc. [now known as TDY Industries, LLC], and TDY Holdings, LLC) hereinafter collectively referred to as "the Dischargers," conducted aerospace component manufacturing operations at a facility on 44 acres of land at 2701 North Harbor Drive in San Diego. The land was leased from the City of San Diego and, subsequently, from the San Diego Unified Port District and is located between Lindbergh Field and San Diego Bay.

      The Dischargers used PCBs in manufacturing operations at the facility. PCBs are manufactured chemicals previously used in electrical transformers, lubricating oils, and plastics. The Dischargers caused PCB wastes, originating from the 2701 North Harbor Drive facility, to be deposited in the catch basins and collection sumps associated with the SWCS at the site. These wastes were subsequently discharged from the SWCS outfalls to San Diego Bay. A 30-inch SWCS historically drained a portion of the Dischargers' 2701 North Harbor Drive facility, Lindbergh Field, and the nearby Coast Guard facilities

and discharged to the portion of San Diego Bay that forms a small embayment between Laurel Street and Hawthorn Street.

3. Water Board Program Oversight

a. Water Board Program: The San Diego Water Board's Site Cleanup Program provides regulatory oversight of cleanup activities. Enforcement actions, NPDES permits, 401 Water Quality Certifications, and waste discharge requirements (WDRs) are regulatory tools that can be used for source control.

b. Authority: The San Diego Water Board's legal authority to regulate water quality, including the cleanup of sites that impair water quality, is derived from a variety of state and federal laws and regulations, state and regional plans and policies that include:

i. The Porter-Cologne Water Quality Control Act (Division 7 of the California Water Code, commencing with section 13000)

ii. The California Health and Safety Code

iii. The Federal Clean Water Act

iv. The California Code of Regulations, Titles 23 and 27.

v. The Code of Federal Regulations, Title 40

vi. State and Regional Water Board plans and policies and plans, including but not limited to:

- *Water Quality Control Plan for Enclosed Bays and Estuaries of California – Sediment Quality Provisions* (Sediment Quality Provisions)
- *Water Quality Control Plan for the San Diego Basin* (San Diego Basin Plan)
- Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality of Waters in California*,
- Resolution No. 92-49, *Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304*.
- *Water Quality Enforcement Policy*

c. Regulatory Approach: The San Diego Water Board is using its regulatory authority over water quality provided by the California Water Code and statewide enforcement policies and tools to address the water quality issues and the impairments to beneficial uses of waters on the CWA 303(d) list. This supports attaining information on the impaired waters, allows for timely actions, and use of adaptive management strategies as new information becomes available.

The existing pollutants at this site appear to be legacy pollutants from sources linked to previous industrial activities that no longer exist at the site. Targeted pollutant removal is a critical step to addressing the impairments to beneficial uses and restoring water quality as required by CWA section 303(d).

4. Action or Implementation Plan

As a part of the demolition of surface structures and subsurface utilities at the former TDY site, all connections to the 30-inch SWCS from the site were terminated in 2011. Following subsequent cleanout of the 30-inch SWCS in 2012, the extent of PCB impacts associated with the 30-inch SWCS were delineated in January 2013. TDY and the San Diego Water Board agreed that it was economically feasible to remediate the impacted area through a combination of direct removal, enhanced monitored natural recovery (EMNR) with carbon addition, and stabilization of residual sediment within the riprap surrounding the SWCS outfall (R9-2015-0018, Finding 10).

Site remediation was initiated in October 2017 and was completed in November 2017. Project elements consisted of the following:

- **Targeted Sediment Removal**. Bay sediment at the base of the existing riprap below the SWCS outfall was removed to a depth of 3-feet below the current sediment surface. Dredged sediment was placed on a barge, dewatered, and transported to an offsite disposal facility. The dredged area was then backfilled with clean sand to pre-existing bathymetric surface elevations (Geosyntec 2018, section 3).
- **Shoreline Reinforcement**. The area adjacent to the SWCS was reinforced with a geotextile component anchored with a coarse gravel/cobble layer to hold the geotextile fabric in-place and protect it from UV damage. The gravel/cobble layer will reinforce the shoreline from future erosion, mitigate migration to San Diego Bay of any residual contaminated sediment in the rip rap, and minimize under scouring of the existing riprap. In addition, the SWCS outfall pipe, which had become buried over time, was extended an additional 8-feet to allow for free drainage of the SWSC outfall structure (Geosyntec 2018, section 4).
- **EMNR Layer**. An EMNR layer composed of clean sand mixed with 3 percent activated carbon was placed over the target area of approximately 1 acre. The carbon-amended sand cover was designed to achieve a post-remediation biologically available surface-area weighted average concentration (SWAC) of 0.092 mg/kg for total PCBs across the site. The carbon amendment will also provide an additional reduction in the bioavailability of residual PCBs in the underlying bay sediment. The cover will allow for natural sedimentation and bioturbation mixing of the cover material with the underlying sediment while providing a cleaner habitat for benthic invertebrates (Geosyntec 2018, section 5).

5. Funding

Funding has been provided by TDY Industries, LLC. The San Diego Unified Port District is the land trustee for the State of California and is responsible for activities in San Diego Bay and lands along San Diego Bay.

6. Involved Parties

TDY is responsible for the discharge of PCB wastes from the 30-inch SWCS to the Laurel Hawthorn Embayment (R9-2015-0018, Finding 3).

7. Monitoring and Success Measures:

Order No. R9-2015-0018 issued a directive to conduct pre-remediation, remediation, and post-remediation verification monitoring to ensure the background abatement concentrations of total PCBs is achieved at the site and to determine if the activated carbon has any adverse effects on the benthic community. Starting in December 2018, approximately one-year following installation of the EMNR layer, a sampling program was implemented to assess post-remediation sediment, porewater, and benthic community conditions. This investigation assessed the integration of the EMNR layer with Bay sediments, PCB concentrations within the sediment and porewater, and the recolonization of the benthic community in the EMNR area after remediation. The integrity of the EMNR layer was also confirmed through the collection of discrete sediment cores. The sampling program was completed in January 2019 (Geosyntec 2019, section 2).

The following information was obtained from the Final Cleanup and Completion Report (June 3, 2019), section 3.0:

The post-remediation sampling program was implemented to assess the conditions of the sediment and benthic community in the vicinity of the 30-inch SWCS outfall in the Laurel-Hawthorn embayment one year following completion of the EMNR remedy. The abatement goal for this project was to achieve a post-remediation effective SWAC of 0.092 mg/kg for PCBs in sediment across the project area. The post-remediation effective SWAC was 0.047 mg/kg, meeting the project abatement goal. Other data was also collected on an informational basis. These data included an evaluation of benthic conditions as compared to pre-remediation and adjacent to the sediment; changes in porewater concentrations; and collection of sediment cores to evaluate changes to the EMNR layer over time. Key findings were as follows:

- The post-remediation effective sediment PCB SWAC is 0.047 mg/kg. This result is well below the abatement goal 0.092 mg/kg (110% of the reference concentration of 0.084 mg/kg). The CAO abatement goal has been achieved.
- Comparison to the pre-remediation SWAC (0.604 mg/kg) indicated that sediment total PCBs have been reduced by approximately 13-fold since implementation of the remedy.

- In the mid-EMNR area, the average total PCBs in porewater for polygons 11, 13, and 12 demonstrate significant reductions (i.e., 10- to 23-fold) in freely dissolved and bioavailable pore water PCBs in comparison to those measured prior to remediation.
- Results show that the benthic community has recolonized to at least the extent they were present at the site prior to remediation. Additional improvement in the benthic community is expected over time.
- Sediment core observations confirm the continued integrity and depth of the EMNR layer and show a thin layer of sedimentation on top of the EMNR layer. The total PCB concentration in the surface sediment grab samples on the EMNR cover were very low (averaging 0.054 ug/kg), providing evidence that natural recovery is ongoing.
- In a letter dated February 14, 2020, the San Diego Water Board issued a No Further Action. The letter confirms the completion of site investigation and cleanup at the Teledyne Ryan site. No further action related to the releases at the Teledyne Ryan site is required at this time.

8. References

Geosyntec, 2019, Final Cleanup and Abatement Completion Report for the 30-Inch SWCS Outfall to the Laurel-Hawthorn Embayment East of 2710 North Harbor Drive, San Diego, California, June 3,2019

Geosyntec, 2018, Post Remediation Performance Report for the 30-Inch SWCS Outfall to the Laurel-Hawthorn Embayment East of 2710 North Harbor Drive, San Diego, California, June 19, 2018

San Diego Basin Plan, *Water Quality Control Plan for the San Diego Basin*, September 1, 2021.

San Diego Water Board, 2020, No Further Action – 30-Inch SWCS Outfall to the Laurel-Hawthorn Embayment East of 2710 North Harbor, San Diego, California, February 14, 2020

San Diego Water Board, 2015, Cleanup and Abatement Order No. R9-2015-0018, An Order Directing TDY Industries, LLC, TDY Holdings, LLC, and Teledyne Ryan Aeronautical Company to Cleanup and Abate the Effects of Waste Discharged from the Former Facility at 2701 North Harbor Drive to the Laurel Hawthorn Embayment of San Diego Bay, San Diego, California, September 3, 2015

B. San Diego Bay Shoreline, Laurel Hawthorn Embayment, Eastern Region

9. Project Information

a. Project Names and Hydrologic Area: This project is the "Cleanup of the Laurel Hawthorn Embayment (Eastern Region)." The site is known on the Clean Water Act (CWA) 303(d) List as "San Diego Bay Shoreline, Downtown Anchorage."

The entire Laurel Hawthorn Embayment is a 35-acre urban embayment with an average water depth of approximately 15-20 feet. It is located at the eastern end of the northernmost portion of San Diego Bay. Although the project name refers to the eastern region of the embayment, discharges and investigations associated with site pollutants are also located in its central and western areas. The site is downstream of the Pueblo San Diego Hydrologic Unit, San Diego Mesa Hydrologic Area, Lindbergh Hydrologic Sub-Area (908.21).

b. Impaired Water Body: San Diego Bay Shoreline, Downtown Anchorage (Laurel Hawthorn Embayment [Eastern Region]) and San Diego Bay are listed on the CWA 303(d) list of Impaired Waters for impairments due to the pollutants listed in Table 3.

Table 3. Pollutant list for Laurel-Hawthorn Embayment, Eastern Region (Downtown Anchorage)

Water Body	Pollutant	Water Body ID
San Diego Bay Shoreline, Downtown Anchorage	Benthic Community Effects	CAB908210001999021009 1816
San Diego Bay Shoreline, Downtown Anchorage	Sediment Toxicity	CAB908210001999021009 1816
San Diego Bay	Mercury	CAB910100001999021013 2422
San Diego Bay	PAHs	CAB910100001999021013 2422
San Diego Bay	PCBs	CAB910100001999021013 2422

c. Water Body Type: Bay and Harbor

d. Beneficial Uses: The *Water Quality Control Plan for the San Diego Basin* (San Diego Basin Plan) and the *Water Quality Control Plan for Enclosed Bays and Estuaries of California – Sediment Quality Provisions* (Bays and Estuaries Plan) designate the beneficial uses applicable to San Diego Bay that are impacted or have the potential to be impacted by wastes discharged to San Diego Bay and its sediments:

i. Human Health
   - Commercial and Sport Fishing (COMM)
   - Shellfish Harvesting (SHELL)

ii. Aquatic Life – Benthic Community
   - Estuarine Habitat (EST)
   - Marine Habitat (MAR)

iii. Aquatic Life – Dependent Wildlife
   - Wildlife Habitat (WILD)
   - Rare, Threatened, or Endangered Species (RARE)

10. Water Body Impairment

a. Pollutants: Downtown Anchorage (Laurel-Hawthorn Embayment) is on the CWA 303(d) List for benthic macroinvertebrate and sediment toxicity impairments. San Diego Bay is on the CWA section 303(d) List of impaired waters due to mercury, PAHs, and PCBs.

Several sediment chemistry investigations conducted between 1993 and 2015 have revealed elevated levels of metals, pesticides, PAHs, and PCBs in sediment in the Laurel Hawthorn Embayment:

i. Bay Protection and Toxic Cleanup Program sampling in 1993 and 1994 (State Water Board, 1996)

ii. Solar Turbines sediment investigation in 2000 (Arcadis, 2001)

iii. Phase I and II Total Maximum Daily Load (TMDL) investigations in 2003 and 2004 (Anderson et al., 2004; 2005)

iv. Downtown Anchorage sediment characterization in 2012 (Haley & Aldrich, 2012)

v. Relined 24-inch storm drain sediment characterization (Geosyntec, 2015a)

vi. Southernmost 24-inch storm drain sediment characterization (Geosyntec, 2015b)

vii. Laurel Hawthorn Central Embayment sediment characterization (Amec Foster Wheeler, 2015)

Sediment quality triad analyses suggest that the benthic community is negatively impacted by exposure to these pollutants. Mercury and PCBs in sediments within the Laurel Hawthorn Embayment may also be one of the sources contributing to elevated levels of mercury and PCBs found in the tissues of fish in San Diego Bay. Consumption of fish with elevated levels of these pollutants can adversely impact human and ecological health.

b. **Pollutant Sources:** Findings from the investigations cited above indicate that sources of sediment pollution in the Laurel Hawthorn Embayment may include point source discharges from storm water conveyance systems owned by Navistar/Solar Turbines, the City of San Diego, and General Dynamics:

    i. Solar Turbines owns and operates a facility near the Laurel Hawthorn Embayment. Navistar is the successor to International Harvester, the previous owner and operator of the facility. The facility is involved in the manufacture of industrial gas turbine engines and related components and equipment. Two 24-inch facility outfalls and one 54-inch Municipal Separate Storm Sewer System (MS4) outfall drain the facility. Historically, wastes and runoff from the facility have also been discharged through a third 24-inch facility outfall (Geosyntec, 2021 [section 1]).

    ii. The City of San Diego owns and maintains an 84-inch MS4 outfall that discharges runoff from a 532-acre urbanized area (nearly one square mile). An interstate highway and railway corridor run in parallel to each other through the southwest portion of the drainage area. A significant portion of the drainage area lies east of these transportation corridors and consists largely of residential and roadway areas. The areas along the transportation corridors and to the west include industrial and commercial properties leased by the Port of San Diego (Tetra Tech, 2021 [section 2.2]).

    iii. One 42-inch MS4 outfall drains portions of the San Diego International Airport, including an industrial facility previously owned and operated by General Dynamics. While in operation from 1935 to 1996, the facility was involved in the manufacture of aircraft and aerospace parts (Exponent, 2021 [section 3.1.2]).

    These outfalls discharged and/or currently discharge to the Laurel Hawthorn Embayment.

11. Water Board Program Oversight

a. Water Board Program: The San Diego Water Board's Site Cleanup Program provides regulatory oversight of cleanup activities. Enforcement actions, NPDES permits, 401 Water Quality Certifications, and waste discharge requirements (WDRs) are regulatory tools that can be used for source control.

b. Authority: The San Diego Water Board's legal authority to regulate water quality, including the cleanup of sites that impair water quality, is derived from a variety of state and federal laws and regulations, state and regional plans and policies that include:

i. The Porter-Cologne Water Quality Control Act (Division 7 of the California Water Code, commencing with section 13000)

ii. The California Health and Safety Code

iii. The Federal Clean Water Act

iv. The California Code of Regulations, Titles 23 and 27.

v. The Code of Federal Regulations, Title 40

vi. State and Regional Water Board plans and policies and plans, including but not limited to:

- *Water Quality Control Plan for Enclosed Bays and Estuaries of California – Sediment Quality Provisions* (Sediment Quality Provisions)
- *Water Quality Control Plan for the San Diego Basin* (San Diego Basin Plan)
- Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality of Waters in California*,
- Resolution No. 92-49, *Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304*.
- *Water Quality Enforcement Policy*.

c. Regulatory Approach: The San Diego Water Board uses the regulatory authority provided by the California Water Code and State Water Board enforcement policies and tools to address impairments to beneficial uses of waters on the CWA 303(d) List. This allows for timely site investigations and cleanup actions.

Based on historical site uses and site investigations, the dischargers assume that the existing pollutants at the Laurel Hawthorn Embayment (Eastern Region) are primarily legacy pollutants of historical discharges from industrial sites (Geosyntec, 2021 [section 1.4.2]; Tetra Tech, 2021 [section 3]; Exponent, 2021 [section 3]). Targeted pollutant removal is a critical step to address the impairments to beneficial uses and restore water quality as required by CWA section 303(d).

12. Investigative Orders

At this time, the San Diego Water Board has not directed the site's responsible parties (dischargers) to clean up polluted sediment at the site or reduce ongoing discharges of pollutants. Such actions require adequate assessment of site conditions. Therefore, the Board first ordered the dischargers to conduct monitoring to collect sufficient data to inform the next step(s), which may include clean-up of legacy pollution and/or reduction of ongoing discharges of pollutants, with the goal of attaining water quality objectives. On October 2, 2019, the San Diego Water Board issued three orders to direct monitoring and assessment actions in the Laurel Hawthorn Embayment (Eastern Region):

a. Investigative Order No. R9-2019-0039: An Order Directing Solar Turbines, Inc., and Navistar, Inc., to Investigate Sediment Pollutants in the Laurel Hawthorn Embayment of San Diego Bay, San Diego County, California (San Diego Water Board, 2019a)

b. Investigative Order No. R9-2019-0040: An Order Directing the City of San Diego to Investigate Sediment Pollutants in the Laurel Hawthorn Embayment of San Diego Bay, San Diego County, California (San Diego Water Board, 2019b)

c. Investigative Order No. R9-2019-0041: An Order Directing General Dynamics Corporation to Investigate Sediment Pollutants in the Laurel Hawthorn Embayment of San Diego Bay, San Diego County, California (San Diego Water Board, 2019c)

Per the investigative orders, the dischargers are required to conduct sediment assessments and submit sediment assessment reports that include: (1) descriptions of appropriate source control methods (e.g., catch basin cleanouts) or best management practices to prevent recontamination of the site if uncontrolled pollutant sources are determined to still be present, and (2) recommendations, based on the sediment assessments, for further investigation or cleanup of the site.

Once the sediment assessment reports are completed, the San Diego Water Board may, as appropriate, direct the dischargers to implement actions to clean up legacy pollution, reduce ongoing discharges of pollutants, and attain water quality standards in accordance with an appropriate schedule.

13. Funding

Navistar, Solar Turbines, the City of San Diego, and General Dynamics are responsible for providing funds to cover reasonable costs associated with the investigation, cleanup, and abatement of the site. The San Diego Water Board is not aware of additional funding sources/opportunities.

14. Involved Parties

Navistar, Solar Turbines, the City of San Diego, and General Dynamics are responsible for discharges of wastes to the Laurel Hawthorn Embayment conveyed through outfalls they own and used (or previously owned and used). The San Diego Water Board is not aware of additional parties that may need to be involved in investigation, cleanup, and abatement of Laurel Hawthorn Embayment (Eastern Region). However, additional dischargers (TDY Industries, LLC, TDY Holdings, LLC, and Teledyne Ryan Aeronautical Company) are responsible for discharges of wastes to the westernmost portion of the Laurel Hawthorn Embayment. Although this site is also within the Laurel Hawthorn Embayment, it is considered a separate site, and has already undergone cleanup.

15. Monitoring

Per the aforementioned investigative orders, the dischargers were required to submit sediment assessment work plans that include: (1) study questions related to the extent, magnitude, and ongoing presence of the pollutants, (2) a summary of previously conducted site investigations, (3) a conceptual site model, (4) a sampling and analysis plan, (5) a map, and (6) an implementation schedule for activities included in the dischargers' respective sediment assessment work plans.

a. In February 2021, the San Diego Water Board approved the dischargers' sediment assessment work plans (Geosyntec, 2021; Tetra Tech, 2021; Exponent, 2021). The overall objective of the sediment investigations is to delineate the spatial extent and magnitude of pollutants (metals, pesticides, PAHs, and PCBs) in sediments in the Laurel Hawthorn Embayment to determine if they may pose a threat to human health, the benthic community, and/or aquatic-dependent wildlife. **Navistar/Solar Turbines Discharges:** In July and August 2021, Navistar/Solar Turbines collected sediment samples, samples for benthic sediment quality objective (SQO) assessments, water column samples, fish tissue samples, and invertebrate samples within the east-central portion of the Laurel Hawthorn Embayment (Table 4).

Table 4. Navistar/Solar Turbines Sediment Investigation Tasks

Work Plan Task	Status
Sediment samples (surface and core) were collected at 24 locations. The top 3 feet of the core samples were analyzed for grain size, total organic carbon, total solids, priority metals (plus aluminum and iron), total mercury, semi-volatile organic compounds (SVOCs), and PCBs. They were also screened against the moderate threshold of the Chemical Score Index (CSI). Additional analyses were conducted in the bottom two horizons of the sediment core (3-4 feet and 4-5 feet) when the 2- to 3-foot horizon contained analytes (i.e., PCBs, mercury, lead, and PAHs) with exceedances of the CSI moderate threshold.	Completed
Benthic samples were randomly collected from three of the 24 sediment sampling locations and analyzed for benthic community, chemistry, organochlorine pesticides, and toxicity testing.	Completed
Water column grab samples were collected at three mid-depth locations at each of the randomly assigned benthic sampling stations. At each station, in-situ water quality parameters were measured across the water column (i.e., temperature, salinity). The water samples were analyzed for total suspended solids (TSS) and PCBs.	Completed
Sport fish and prey fish were retrieved from the water by trawl and hook-and-line fishing. Composite samples were assembled with their tissues. Three sport fish composite samples were analyzed for lipid content and PCBs. Three prey fish composite samples were analyzed for lipid content, PCBs, PAHs, and metals.	Completed
Three types of invertebrates (brown shrimp, blue mussels, and oysters) were retrieved from the water by trawl and by hand (dive collection at three locations). Three species-specific composite samples were assembled with their tissues and analyzed for lipid content, PCBs, and PAHs.	Completed
A sediment assessment report, which includes and assessment of the monitoring results, was submitted to the San Diego Water Board.	Completed
Documents and data were uploaded to GeoTracker and the California Environmental Data Exchange Network (CEDEN).	Completed

In May 2022, Navistar/Solar Turbines submitted its sediment assessment report to the San Diego Board, which includes assessments and recommendations based on the sediment investigation (Geosyntec, 2022). The analytical results from sediment samples indicate that historical discharges from the four Navistar/Solar Turbines storm drain outfalls are sources of PCBs in sediment in the eastern-central portion of the Laurel Hawthorn Embayment. The results from other chemical analyses did not indicate that Navistar/Solar Turbines storm drain outfalls are sources of pollution from other compounds of potential concern (COPCs). Most COPCs were not present at concentrations of concern. Some samples had elevated mercury concentrations, but the locations of these samples indicate non-storm drain sources (e.g., boat paint, atmospheric deposition, other non-point source discharges).

Navistar/Solar Turbines concluded the following after using the analytical results to assess impacts to human health, the benthic community, and aquatic-dependent wildlife:

- **Human Health Impacts.** The Laurel Hawthorn Embayment does not meet the human health sediment quality objective and is categorized as “clearly impacted” due to a high sediment linkage (predicted contribution of PCBs from sediment to sport fish) and elevated PCB concentrations in sport fish tissue concentrations.

- **Benthic Community Impacts.** The eastern portion of the Laurel Hawthorn Embayment does not meet the benthic organism sediment quality objective. Three stations in the eastern portion of the Laurel Hawthorn Embayment are categorized as “possibly impacted.” On a percent area-basis, this exceeds 15% of the total project area. There is high degree of uncertainty as to whether sediment COPCs or other stressors (e.g., ammonia, sulfides, grains size, trash/debris, anchoring or other physical impacts on the sediment surface) are the primary cause of these benthic community impacts.

- **Wildlife Impacts.** Negligible risks were found in association with consumption of target prey items (small fish, invertebrates, or both) for the three avian receptors evaluated that may forage in the eastern Laurel Hawthorn Embayment (cormorant, least tern, and scoter).

Based on the results of this monitoring and assessment, which has defined the lateral and vertical extent of COPCs, Navistar/Solar Turbines recommended the next step to the San Diego Water Board: preparation of a feasibility study to evaluate potential remedial action alternatives to reduce risks associated with historical discharges.

b. **City of San Diego Discharges:** The City of San Diego collected and analyzed sediment samples from upland drainage sites (catch basins) within the 547-acre area that drains to the 84-inch MS4 outfall, sediment samples, samples for benthic SQO assessments, and fish tissue samples within the central portion of the Laurel Hawthorn Embayment (Table 5). The in-Bay sampling and analysis approach was based, in part, on potential historical and current sources and sinks of pollutants. The City of San Diego will use the analytical results to assess impacts to human health, the benthic community, and aquatic-dependent wildlife (Tetra Tech, 2021 [section 6.5]).

The City of San Diego completed all monitoring activities described in its approved work plan in Summer 2021 but is still in the process of assessing the data and producing a report. The City of San Diego anticipates submitting the sediment assessment report to the San Diego Water Board by October 28, 2022, pending receipt of all validated data. Like the May 2022 Navistar/Solar Turbines sediment assessment report, the City of San Diego sediment assessment report will contain recommendations related to source control methods to prevent recontamination of the site and/or to further investigation or cleanup of the site.

Table 5. City of San Diego Sediment Investigation Tasks

Work Plan Task	Status
Catch basin grab samples were collected at 15 upland drainage locations and analyzed for metals, pesticides, PAHs, percent solids, total organic carbon (TOC), and grain size distribution.	Completed
Sediment samples (surface and core) were collected at 22 locations within the Laurel Hawthorn Embayment and analyzed for metals, pesticides, PAHs, PCBs, percent solids, TOC, and grain size distribution.	Completed
Benthic samples were randomly collected from at least three of the 22 sediment sampling locations and analyzed for benthic community, chemistry, organochlorine pesticides, and toxicity testing.	Completed
Sport fish were retrieved from the water and composite samples were assembled with their tissues. The samples were analyzed for lipid content, PCBs, and Dieldrin.	
A sediment assessment report, which will include assessment of the monitoring results, will be submitted to the San Diego Water Board.	In progress; due 10/28/2022
Documents and data will be uploaded to GeoTracker and CEDEN.	In progress; due 10/28/2022

c. **General Dynamics Discharges:** General Dynamics collected and analyzed sediment samples, samples for benthic SQO assessments, water column samples, and fish tissue samples within the west-central portion of the Laurel Hawthorn Embayment (Table 6). This is the area that may be impacted from historical and/or ongoing discharges from the 42-inch MS4 outfall used by General Dynamics. General Dynamics will use the analytical results to assess impacts to human health, the benthic community, and aquatic-dependent wildlife (Exponent, 2021 [section 4.2.2]).

During summer 2021, General Dynamics completed all monitoring activities described in its approved work plan but it is still in the process of assessing the data and producing a report. General Dynamics anticipates submitting the sediment assessment report to the San Diego Water Board by October 31, 2022, pending receipt of all validated data. Like the May 2022 Navistar/Solar Turbines sediment assessment report, the General Dynamics sediment assessment report will contain recommendations related to source control methods to prevent recontamination of the site and/or to further investigation or cleanup of the site.

Table 6. General Dynamics Sediment Investigation Tasks

Work Plan Task	Status
Sediment samples (surface and core) were collected at 20 locations within the Laurel Hawthorn Embayment and analyzed for metals, pesticides, PAHs, PCBs, percent solids, TOC, and grain size distribution.	Completed
Benthic samples were randomly collected from five of the 20 sediment sampling locations and analyzed for benthic community, chemistry, organochlorine pesticides, and toxicity testing.	Completed
Water column grab samples were collected at five mid-depth locations at each of the randomly assigned benthic sampling stations. At each station, in-situ water quality parameters were measured across the water column (i.e., temperature, salinity). The water samples were analyzed for total suspended solids (TSS) and PCBs.	Completed
Sport fish and prey fish were retrieved from the water and composite samples were assembled with their tissues. Three sport fish composite samples were analyzed for lipid content and PCBs. Three prey fish composite samples were analyzed for lipid content, PCBs, PAHs, and metals.	Completed
Three types of invertebrates (brown shrimp, blue mussels, and oysters) were retrieved from the water by trawl and by hand (dive collection at three locations). Three species-specific composite samples were assembled with their	Completed

tissues and analyzed for lipid content, PCBs, PAHs, and metals.	
A sediment assessment report, which will include assessment of the monitoring results, will be submitted to the San Diego Water Board.	In progress; due 10/31/2022
Documents and data will be uploaded to GeoTracker and the CEDEN.	In progress; due 10/31/2022

Based on these recommendations in the dischargers' sediment assessment reports and evaluation by the San Diego Water Board, the Board may issue cleanup orders to the dischargers. This would also prompt additional monitoring requirements to track progress on water and sediment quality improvements, guide adaptive management strategies, demonstrate and maintain progress, and provide information to the San Diego Water Board to determine the need for other corrective actions in accordance with the Impaired Waters Policy to attain water quality standards in the Laurel Hawthorn Embayment (Eastern Region).

16. References

Amec Foster Wheeler, 2015. Sediment Chemistry Assessment Report, Laurel Hawthorn Central Embayment, San Diego Bay, San Diego, California. Prepared for General Dynamics Corporation, San Diego Regional Airport Authority, and San Diego Unified Port District. April 2015.

Anderson, B.S., P. Nicely, B. Phillips, and J. Hunt, 2004. TMDL Sediment Quality Assessment Study at the B Street/Broadway Piers, Downtown Anchorage, and Switzer Creek, San Diego Bay, Phase I Final Report. March 2004.

Anderson, B.S., J. Hunt, and B. Phillips, 2005. TMDL Sediment Quality Assessment Study at the B Street/Broadway Piers, Downtown Anchorage, and Switzer Creek, San Diego, Phase II Final Report. June 2004.

Arcadis, 2001. RCRA Facility Investigation, Phase III Sediment Investigation of Polychlorinated Biphenyls, Polyaromatic Hydrocarbons, and Metals (Including Hexavalent Chromium). May 14, 2001.

Exponent, 2021. Sediment Assessment Work Plan Investigative Order R9-2019-0041: Laurel Hawthorn Embayment in the Vicinity of the 42-in Outfall. Prepared for General Dynamics Corporation. February 12, 2021.

Geosyntec, 2015a. Sediment Characterization Report for the Relined 24-Inch Storm Drain Outfall Vicinity. Prepared for Solar Turbines. October 20, 2015.

Geosyntec, 2015b. Sediment Characterization Report for the Southernmost 24-Inch Storm Drain Outfall Vicinity. Prepared for Solar Turbines. October 20, 2015.

Geosyntec, 2021. Sediment Assessment Work Plan Investigative Order No. R9-2019-0039. Prepared for Navistar/Solar Turbines. February 5, 2021.

Geosyntec, 2022. Sediment Assessment Report Investigative Order No. R9-2019-0039. Prepared for Navistar/Solar Turbines. May 23, 2022. Haley & Aldrich, 2012. Sampling and Analysis Report: Downtown Anchorage Vicinity in San Diego Bay, San Diego, California. Prepared for San Diego County Regional Airport Authority. April 2012.

San Diego Water Board, 2019a. Investigative Order No. R9-2019-0039, An Order Directing Solar Turbines, Inc., and Navistar, Inc., to Investigate Sediment Pollutants in the Laurel Hawthorn Embayment of San Diego Bay San Diego, California. October 2, 2019.

San Diego Water Board, 2019b. Investigative Order No. R9-2019-0040, An Order Directing the City of San Diego to Investigate Sediment Pollutants in the Laurel Hawthorn Embayment of San Diego Bay San Diego, California. October 2, 2019.

San Diego Water Board, 2019c. Investigative Order No. R9-2019-0041, An Order Directing General Dynamics Corporation to Investigate Sediment Pollutants in the Laurel Hawthorn Embayment of San Diego Bay San Diego, California. October 2, 2019.

State Water Board, 1996. Chemistry, Toxicity, and Benthic Community Conditions in Sediments of the San Diego Bay Region. September 1996.

Tetra Tech, 2021. Investigation of Sediment Pollutants in the Laurel Hawthorn Embayment of San Diego Bay, San Diego County, California: Work Plan. Prepared for the City of San Diego. February 3, 2021.

C. San Diego Bay Shoreline at Harbor Island, East Basin

1. Project Information

a. Project Name and Hydrologic Area: San Diego Bay Shoreline at Harbor Island (East Basin). The East Basin is a part of the larger San Diego Bay. The shoreline sites contributing discharges into the East Basin are within the Pueblo San Diego Hydrologic Unit, San Diego Mesa Hydrologic Area, Lindbergh Hydrologic Sub-Area (908.21) (San Diego Basin Plan).

The East Basin is a relatively shallow (-15 to -10 feet mean lower low water [MLLW]), artificial embayment encompassing approximately 44.9 acres of water in the north-central area of San Diego Bay that is enclosed on three sides. It is bound to the north by a constructed, riprap shoreline that is south of Harbor Drive. In the northwest corner the upland parcel known as the former Tow Basin Facility is located at 3380 North Harbor Drive. The East Basin is bound to west and south by the Harbor Island peninsula. The western shoreline contains the parcel known as the former Lockheed Marine Terminal and Railway Facility located at 1160 Harbor Island Drive. This facility also has a pier and railway that extends into the East Basin. The southern boundary is occupied by the Sunroad Resort Marina with a 550-slip floating pier. The East Basin is open to San Diego Bay along its eastern edge (Anchor QEA LLC January 2020, section 2).

b. Impaired Water Body: San Diego Bay Shoreline at Harbor Island (East Basin) and San Diego Bay are listed on the CWA 303(d) list of Impaired Waters for impairments due to the pollutants listed in Table 7.

Table 7. Pollutant list for East Basin and San Diego Bay

Water Body Name	Watershed Name	Pollutant Listing	Site Assessment Unit ID
San Diego Bay Shoreline, at Harbor Island (East Basin)	Pueblo San Diego Hydrologic Unit	Copper	CAB908210002002123011292 6
San Diego Bay	Pueblo San Diego Hydrologic Unit*	Polycyclic Aromatic Hydrocarbons (PAHs)	CAB910100001999021013242 2
San Diego Bay	Pueblo San Diego Hydrologic Unit*	Polychlorinated biphenyls (PCBs)	CAB910100001999021013242 2
San Diego Bay	Pueblo San Diego Hydrologic Unit*	Mercury	CAB910100001999021013242 2

c. **Water Body Type:** Bay & Harbor

d. **Beneficial Uses:** The following designated beneficial uses that are impacted or have the potential to be impacted by wastes discharged from the site into San Diego Bay and Bay sediments include: Preservation of Biological Habitats of Special Significance (BIOL), Commercial and Sport Fishing (COMM), Estuarine Habitat (EST), Marine Habitat (MAR), Rare, Threatened or Endangered Species (RARE), Shellfish Harvesting (SHELL), Spawning, Reproduction, and/or Early Development (SPWN), Wildlife Habitat (WILD).

2. Water Body Impairment and Pollutant Sources

Pollutant Sources: The land area around the East Basin has historically been the site of a variety of industrial facilities since 1954. The former industrial sites tested hull designs of boats, submersible vehicles, and seaplanes, and operated deep submergence vehicles. For decades hazardous materials were used and/or stored at the former facilities and were discharged to drains and outfalls into the East Basin.

The various waste constituents originating at facilities located at 3380 North Harbor Drive and 1160 Harbor Island Drive have been discharged directly or transported to the East Basin of Harbor Island, where they cause or threaten to cause a condition of pollution and an increased health risk to human consumers of fish. The wastes include metals, mercury, oils, halogenated solvents, oxygenated solvents, and organic solids with halogens. PCBs were found in the

paint used on the buildings and in an onsite transformer (Tetra Tech 2012, section 2.3).

Neither of the facilities are currently used for industrial activities. The facilities at the former Tow Basin have been demolished and cleanup of the land side was performed under the direction of the California Department of Toxic Substances Control (DTSC) in the early 2000s (Anchor QEA LLC 2020, section 2). Demolition of structures at the former Lockheed Marine Terminal and Railway Facility are planned to occur prior to implementing remedial actions in the East Basin (Anchor QEA LLC 2020, section 1).

Multiple investigations have previously been completed to characterize the landside soils and groundwater at the former facilities, and the sediments in the East Basin (Tetra Tech 2012, Executive Summary). The results of the investigations and cleanup activities of the landside soils and groundwater indicate no significant amounts of metals, mercury, or PCBs remain at the former facilities. Therefore the sources of pollutants are considered controlled (Anchor QEA LLC 2020, section 2).

The marine sediment investigations in the East Basin indicate the sediments are impacted by legacy pollutants from the former industrial sites at levels impacting human health, aquatic-dependent wildlife, and benthic communities. The remedial actions that still need to be taken are to address mercury and PCBs in marine sediments in the East Basin (Anchor QEA LLC 2020, section 1).

3. **Water Board Program Oversight**

   a. **Water Board Program:** The San Diego Water Board's Site Cleanup Program provides regulatory oversight of cleanup activities. Enforcement actions, NPDES permits, 401 Water Quality Certifications, and waste discharge requirements (WDRs) are regulatory tools that can be used for source control.

   b. **Authority:** The San Diego Water Board's legal authority to regulate water quality, including the cleanup of sites that impair water quality, is derived from a variety of state and federal laws and regulations, state and regional plans and policies that include:

      i. The Porter-Cologne Water Quality Control Act (Division 7 of the California Water Code, commencing with section 13000)
      ii. The California Health and Safety Code
      iii. The Federal Clean Water Act
      iv. The California Code of Regulations, Titles 23 and 27.
      v. The Code of Federal Regulations, Title 40
      vi. State and Regional Water Board plans and policies and plans, including but not limited to:

- *Water Quality Control Plan for Enclosed Bays and Estuaries of California – Sediment Quality Provisions* (Sediment Quality Provisions)
- *Water Quality Control Plan for the San Diego Basin* (San Diego Basin Plan)
- Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality of Waters in California*,
- Resolution No. 92-49, *Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304*.
- *Water Quality Enforcement Policy*.

c. **Regulatory Approach:** The San Diego Water Board is using regulatory authority over water quality provided by the CWC sections 13267 and 13304, as well as statewide enforcement policies and tools to address the water quality issues and the impairments to beneficial uses of waters on the CWA 303(d) list. This approach supports obtaining information on the impaired waters, identifying restoration plans, and allowing for timely actions, and using adaptive management strategies as new information becomes available.

The pollutants at this site are legacy pollutants from sources linked to previous industrial activities that occurred over decades and are no longer actively used at the sites (Anchor QEA LLC 2020, section 1). Targeted pollutant removal is a critical step to addressing the impairments to beneficial uses of marine sediments and restoring water quality as required by CWA section 303(d).

4. Action or Implementation Plan

Actions: In 2017 the San Diego Water Board issued a Cleanup and Abatement Order (CAO) R9-2017-0021, to Lockheed Martin Corporation that required a Feasibility Study, Remedial Action Plan, Cleanup and Abatement Verification Report, Post-Remedial Monitoring, and Quarterly Progress Reports. The San Diego Water Board concurred with the types of remedial actions proposed in the 2020 Revised Feasibility Study that include removal of sediments in areas with elevated COCs, placing a clean sand cover over the entire remedial area, and constructing erosion protection at outfalls (Anchor QEA LLC 2020, section 5.3.4).

However, the details on the final cleanup levels, remedial actions and monitoring were not resolved with discussions between the San Diego Water Board and Lockheed Martin Corporation. In 2021 the San Diego Water Board rescinded CAO R9-2017-0021 with the intention of issuing a new CAO (SDWB Recission Letter 2021).

A new CAO, R9-2022-0007, was adopted on August 10, 2022. The CAO requires a series of deliverables with due dates based on the adoption date of the CAO and provides prescriptive requirements for the documents. Table 8 shows the complete list of required deliverables. They include a background analysis report, feasibility studies, remedial action plans, cleanup level work plans and assessment, a remedial action completion report, post-remedial monitoring plans and reports, and quarterly progress reports. The deliverables must be timely submitted, and the feasibility studies, remedial action and monitoring plans, and post-remedial monitoring plans must also be approved by the San Diego Water Board.

CAO R9-2022-0007 clarifies that the Sediment Quality Provisions must be implemented and the final cleanup goals must first consider to be set at background sediment concentrations. Once background concentrations are identified, if it has been determined and the San Diego Water Board finds that it is not feasible to cleanup to background sediment concentrations, then alternative sediment cleanup levels that comply with State Water Board Resolution No. 92-49 and the Sediment Quality Provisions may be proposed for approval by the San Diego Water Board. CAO submittal requirements are listed in Table 8 with further discussion in section 7 on the broad approach.

Table 8. Summary of CAO Required Submittals and Due Dates

Directive	Document	Due Date (calendar days)
B	Background Analysis Report	Within 60 days of CAO adoption
C.1	Interim Feasibility Study	Within 60 days of CAO adoption
C.1	Final Feasibility Study	Within 45 days of Board approval of Interim Feasibility Study, or within 30 days of Board approval of Alternative Sediment Cleanup Levels Assessment
C.2	Alternative Sediment Cleanup Levels Work Plan	Within 60 days of Board approval of Interim Feasibility Study
C.2	Alternative Sediment Cleanup Level Assessment	Within 60 days of Board approval of Alternative Sediment Cleanup Levels Work Plan
D.1	Draft Remedial Action Plan	Within 60 days of Board approval of the Final Feasibility Study
D.1	Final Remedial Action Plan	Within 45 days of Board comments on the Draft Remedial Action Plan
D.2	Remedial Action Plan Implementation	Within 60 days of Board approval of Final Remedial Action Plan as long as active remedial work can be completed outside of the least tern nesting season (typically April

Directive	Document	Due Date (calendar days)
		1 through September 30). If, upon permit approval, work cannot be completed due to the least tern nesting season, corrective actions must be completed (1) within one month following the end of the current nesting season, or (2) within the number of days that remained for such completion upon onset of the nesting season, whichever is greater
E	Cleanup and Abatement Completion Report	Within 90 days of completion of last remedial event or activity
F.1	Draft Post-Remedial Monitoring Plan	Within 60 days of Board approval of the Final Feasibility Study
F.1	Final Post-Remedial Monitoring Plan	Within 90 days of Board comments on the Draft Post-Remedial Monitoring Plan
F.3	Post-Remedial Monitoring Plan Implementation	1 year, 2 years, 5 years, and possibly 10 years after submittal of the Cleanup and Abatement Completion Report
F.4	Post-Remedial Monitoring Reports	1 year, 2 years, 5 years, and possibly 10 years after submittal of the Cleanup and Abatement Completion Report
F.5	Exceedance Investigation and Characterization Study	Within 45 days of the discovery of the exceedance in year 5, if applicable
F.5	Exceedance Investigation and Characterization Report	Within 90 days of Board approval of the Exceedance Investigation and Characterization Report, if applicable
G	Quarterly Progress Reports	March 15, June 15, September 15, and December 15 of each year following completion of remediation

5. Funding

Available Funding: Former operators of the sites have provided funding for investigation and cleanup and include the General Dynamics Corporation and the Lockheed Martin Corporation. The San Diego Unified Port District is the land trustee for the State of California and is responsible for activities in San Diego Bay and on lands adjacent to San Diego Bay.

6. Involved Parties

General Parties: Former operators of the two facilities are the General Dynamics Corporation, Lockheed Martin Corporation, and Rohr Marine, Inc. The San Diego Unified Port District is the trustee for the State of California and is responsible for managing San Diego Bay and the surrounding waterfront lands.

In a settlement agreement Lockheed Martin Corporation agrees to be solely responsible for current and future costs for implementation and completion of remedial actions (Port Lockheed Lawsuit 2017, page 7). The San Diego Water Board has discretion in naming responsible parties, and respects the agreement made by the general parties.

7. Monitoring

Monitoring Plan and Success Measures: Table 8 represents a sequential series of actions and reporting that build on the work performed. The submission of reports and approval of plans mark the major milestones to satisfy the conditions of CAO R9-2022-0007. To demonstrate that cleanup levels have been successfully achieved, CAO R9-2022-0007 requires post-remedial monitoring done in accordance with the Sediment Quality Provisions as required in the CAO, and with a San Diego Water Board approved monitoring plan. Section F.1.b. of the CAO describes the necessary elements for post-remedial monitoring that include assessments of aquatic life, human health, wildlife and resident finfish, bulk sediment chemistry and the intertidal zone. Monitoring that will be done after the completion of remedial actions will be done for a minimum of 5 years, and performed in Years 1, 2, 5, and if necessary, Year 10.

8. References

Anchor QEA 2020, *Revised Feasibility Study, Cleanup and Abatement Order No. R9-2017-0021* for Former Tow Basin Facility and Former Lockheed Marine Terminal and Railway, January 17, 2020.

San Diego Basin Plan, *Water Quality Control Plan for the San Diego Basin*, September 1, 2021.

San Diego Water Board, 2022. *Cleanup And Abatement Order No. R9-2022-0007 An Order Directing Lockheed Martin Corporation To Clean Up Or Abate The Effects Of Waste Discharged From The Former Tow Basin And Former Marine Terminal And Railway Facilities At 3380 North Harbor Drive And 1160 Harbor Island Drive To The East Basin Of Harbor Island In San Diego Bay, San Diego, California, August 10, 2022.*

San Diego Water Board, 2021. *Rescission of CAO No. R9-2017-0021*, May 14, 2021.

Tetra Tech, 2012. *Site Assessment Report Lockheed Marine Terminal and Railway, San Diego, California,* June 28, 2012.

Port Lockheed Lawsuit, 2017. *United State District Court, Southern Dist. – Order Granting Motion to Confirm Settlement and Bar and Dismiss Claims*, June 20, 2017.

D. San Diego Bay Shoreline near Chollas Creek - Chollas Creek Mouth

1. Project Information

a. Project Name and Hydrologic Area: Chollas Creek Mouth Investigation. Chollas Creek mouth is part of San Diego Bay and is located in the Pueblo San Diego Hydrologic Unit, San Diego Mesa Hydrologic Area, Chollas Hydrologic Sub-Area 909.22 (San Diego Basin Plan).

The Chollas Creek Mouth Investigation of sediment quality was undertaken in 2015 to evaluate the impairment related to contaminated sediment and its sources, and to provide sediment chemistry assessment reports upon which management actions were later identified. The San Diego Water Board issued Investigative Order No. R9-2015-0058, *An Order Directing The California Department of Transportation, The City of La Mesa, The City of Lemon Grove, The City of San Diego, The National Steel and Shipbuilding Company, The San Diego Unified Port District, and The U.S. Navy* (collectively Dischargers) *to Submit Technical Reports Pertaining to An Investigation of Sediment Quality in The Mouth of Chollas Creek, San Diego Bay, San Diego County, California* (Order). The Order required the Dischargers to conduct a two-phase sediment investigation in the mouth of Chollas Creek. Phase I includes an assessment of the extent and degree of sediment contamination in the Chollas Creek mouth and in the tidally influenced area (TIA) of Chollas Creek. Phase II study identifies potential contaminant sources and pathways, including analyzing sediment collected from storm drains and catch basins (Amec, Foster, Wheeler, Phase I, 2017 & Phase II, 2018).

Chollas Creek mouth is located on the eastern shoreline in central San Diego Bay and extends east from the weir located downstream of the Belt Street Bridge, on the north beside the National Steel and Shipbuilding Company (NASSCO) pier, and to the south beside the Naval Base San Diego Pier 1 extending to the end of the piers. The total area of the Chollas Creek Mouth is approximately 25 acres with the impaired area estimated at 15 acres in the Clean Water Act (CWA) 303(d) list of Impaired Waters.

b. Impaired Water Body and Hydrologic Area: San Diego Bay Shoreline, near Chollas Creek and San Diego Bay are listed on the CWA 303(d) list of Impaired Waters for impairments due to the pollutants are listed in Table 9.

Table 9. Pollutant list for Chollas Creek Mouth and San Diego Bay

Water Body Name	Watershed Name	Pollutant Listing	Site Assessment Unit ID
San Diego Bay Shoreline, near Chollas Creek	Pueblo San Diego Hydrologic Unit	Benthic Community Effects	CAB908220001999021010283 1
San Diego Bay Shoreline, near Chollas Creek	Pueblo San Diego Hydrologic Unit	Benthic Community Effects	CAB908220001999021010283 1
San Diego Bay	Pueblo San Diego Hydrologic Unit*	Polycyclic Aromatic Hydrocarbons (PAHs)	CAB910100001999021013242 2
San Diego Bay	Pueblo San Diego Hydrologic Unit*	Polychlorinated biphenyls (PCBs)	CAB910100001999021013242 2
San Diego Bay	Pueblo San Diego Hydrologic Unit*	Mercury	CAB910100001999021013242 2

c. **Water Body Type:** Bay and Harbor

d. **Beneficial Uses:** Table 2-3 of the San Diego Basin Plan designates the following beneficial uses for San Diego Bay or Bay sediments:
Preservation of Biological Habitats of Special Significance (BIOL)*,
Commercial and Sport Fishing (COMM)*,
Estuarine Habitat (EST)*,
Industrial Service Supply (IND),
Marine Habitat (MAR)*,
Migration of Aquatic Organisms (MIGR),
Navigation (NAV),
Rare, Threatened or Endangered Species (RARE)*,
Water Contact Recreation (REC1), Non-Contact Water Recreation (REC2),
Shellfish Harvesting (SHELL)*,
Spawning, Reproduction, and/or Early Development (SPWN)*, and
Wildlife Habitat (WILD)*.
Those with an asterisk have the potential to be impacted by PAHs, PCBs, and/ or pesticides discharged into San Diego Bay.*

2. Water Body Impairment

a. Pollutant(s): The Clean Water Act section 303(d) list identified San Diego Bay Shoreline near the mouth of Chollas Creek for benthic community degradation and toxicity in the sediment in 2002. The Investigative Order study area is in the same subwatershed as the Chollas Creek Metals TMDL which was adopted on June 13, 2007, for copper, lead, and zinc. Subsequent study of the Chollas Creek Mouth reported high organics concentrations in sediments (SCCWRP & SPAWAR, 2005).

The Investigative Order Phase II Study identified elevated concentrations of metals (including copper, lead, and zinc), PAHs, and chlorinated pesticides in the City of San Diego (the City) storm drains that discharged to the Chollas Creek Mouth and the TIA (see Table 1, 2018 Tech Memo). These are the pollutants identified for additional source control.

Monitoring results showed that PCBs at all locations were below concentrations the PCB background concentration of 84 ug/kg used in the nearby Shipyard Sediment Site Cleanup and Abatement Order (CAO). One exception was at a conveyance (SA02) in an unpaved parking lot between the Santa Fe Railway and MTS Trolley lines where concentrations were still below the ERM of 180 ug/kg (see Table 1, 2018 Tech Memo). Therefore, special source control measures are not required for PCBs.

The City of San Diego investigated pollutant concentrations in storm water catch basins and cleanout structures as reported in the pilot study by Tetra Tech, 2012. Results indicated that metals and various organic pollutants (e.g., chlordane, PCBs, and DDT) accumulated and had the potential to transport through the MS4 system during storm events.

A Toxicity Identification Evaluation (TIE) of the Chollas Creek mouth sediments from 2001 and 2004 found that non-polar organic compounds were likely responsible for sediment toxicity seen at that time (Greenstein et al., 2011). A Regional Harbor Monitoring Program/2018 Bight sediment quality triad monitoring effort reports no toxicity at two locations and low toxicity at one location near or in the Chollas Creek mouth.

b. Pollutant Sources:
Throughout the Chollas Creek watershed the municipal separate storm sewer system (MS4) receives metals that are then discharged into Chollas Creek from industrial facilities, construction sites, underground utility vaults, and groundwater discharges from de-watering sites, as well as runoff from freeways, roads, and commercial/ industrial facilities. PAHs are discharged from roadways, parking surfaces, and creosote telephone/utility poles throughout the cities and may enter the storm water conveyance system.

Legacy chlorinated pesticides are found in impacted soils and may enter the storm water conveyance system when there is runoff. Sediments accumulating within storm drains and creeks during dry periods are a source of pollutants to the Chollas Creek Mouth during wet weather events (San Diego Water Board, 2013b, Section 5.2).

San Diego Bay sources may include adjacent industrial discharges from NASSCO and Naval Base San Diego sediment resuspension, leaching from creosote pier pilings, and direct atmospheric deposition. Migrating boat and ship traffic may also cause pollutants in sediment to resuspend and migrate.

3. **Water Board Program Oversight**

   a. **Water Board Program:** The San Diego Water Board's Site Cleanup Program provides regulatory oversight of cleanup activities. Enforcement actions, NPDES permits, 401 Water Quality Certifications, and waste discharge requirements (WDRs) are regulatory tools that can be used for source control.

   b. **Authority:** The San Diego Water Board's legal authority to regulate water quality, including the cleanup of sites that impair water quality, is derived from a variety of state and federal laws and regulations, state and regional plans and policies that include:

      vii. The Porter-Cologne Water Quality Control Act (Division 7 of the California Water Code, commencing with section 13000)

      viii. The California Health and Safety Code

      ix. The Federal Clean Water Act

      x. The California Code of Regulations, Titles 23 and 27.

      xi. The Code of Federal Regulations, Title 40

      xii. State and Regional Water Board plans and policies and plans, including but not limited to:

         - *Water Quality Control Plan for Enclosed Bays and Estuaries of California – Sediment Quality Provisions* (Sediment Quality Provisions)
         - *Water Quality Control Plan for the San Diego Basin* (San Diego Basin Plan)
         - Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality of Waters in California*,
         - Resolution No. 92-49, *Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304*.

- *Water Quality Enforcement Policy*

c. **Regulatory Approach:** The San Diego Water Board is using regulatory authority over water quality provided by the CWC sections 13267 and 13304, as well as statewide enforcement policies and tools to address the water quality issues and the impairments to beneficial uses of waters on the CWA 303(d) list and section 402 of the Clean Water Act to eliminate pollutant discharges from the MS4. This approach supports obtaining information on impaired waters, identifying restoration plans, allowing for timely actions, and using adaptive management strategies as new information becomes available.

4. Implementation Plan

This Chollas Creek mouth project is a multi-program initiative with the goal of attaining and ongoing support of its beneficial uses. This project began as a sediment cleanup investigation, but its focus shifted to identifying and reducing storm water sources of metals, PAHs, and pesticides. The project included an Investigative Order that required monitoring of the creek mouth and the sources.

The Phase I and Phase II monitoring results showed that a creek mouth cleanup was not necessary but ongoing maintenance cleanout of the catch basins within the Chollas Creek storm water conveyance system is required to ensure that contaminants are not continually loaded to the creek mouth and bay possibly leading to impairment.

This project is implemented primarily through the San Diego Regional MS4 Permit and the Permit's multi-party Water Quality Implementation Plan (WQIP) for the San Diego Bay Watershed Management Area (WMA). Secondarily, nearby NPDES permits, and WDRs for storm water require ongoing maintenance of conveyances. In addition, storm water permits, other NPDES permits, 401 Water Quality Certifications, and site cleanup program orders require monitoring and assessment to ensure discharges are not increasing pollutant loads to a level that will impact beneficial uses.

The Investigative Order study results indicate that chemical concentrations in creek mouth sediment have decreased since the 2005 sampling event, thus a Chollas Creek Mouth cleanup is likely not necessary. However, concentrations within storm drain conveyances and catch basins in the TIA suggest a potential ongoing source of chemicals of concern. The pollutants found in the TIA storm drains that require removal include copper, lead, zinc, PAHs, and chlorinated pesticides. PCB reported in sediment are not considered to be in concentrations high enough to be toxic (Amec, Foster, Wheeler, Phase I Report, Conclusion Section 8.0 & Phase II Report, Graphs in Section 4.0, Conclusion Section 9.0).

In response to the Investigative Order results, the Water Board is using its authority to regulate discharges from MS4s and private conveyances in order to increase removal of sediment from catch basins in areas of concern to prevent contaminated sediment from discharging to the Mouth of Chollas Creek. Staff assessed the City of San Diego's and other discharger's Jurisdictional Runoff Management Plan (JRMP) for the San Diego Bay WMA WQIP and their 2020-21 WQIP annual report for catch basins (see Table 11).

The City of San Diego committed to increased catch basin cleaning and street sweeping to reduce pollutant loads to meet the Chollas Creek Metals TMDL in their JRMP. The City also committed to clean catch basins during the wet season to meet the Chollas Creek Metals TMDL and to support the extension of the Bacteria TMDLs final wet weather compliance data extension to April 4, 2031. The increased catch basin cleaning of up to four times per year during the wet season was due to be in effect by FY2020 and street sweeping would be conducted at all routes twice per month in targeted areas.

Other dischargers have their commitments for storm water conveyance inspection and cleaning, and other measures, described in Section 7 and Table 12 of this report.

5. Funding

The San Diego Phase I MS4 Permit Copermittees funded the two-phased IO investigation. Implementation will be funded by those MS4 Copermittees who own catch basins in the Chollas Creek watershed that were proposed for an enhanced cleaning schedule in the San Diego Watershed WMA WQIP.

6. Involved Parties

The City of San Diego, U.S. Naval Base San Diego, Metropolitan Transit System (MTS), and BNSF Railway are responsible for maintaining storm water conveyances in the TIA.

Other storm water dischargers may include the Port of San Diego, Caltrans, Industrial General Storm Water Permit dischargers or dischargers to storm water conveyances owned by another entity may include NASSCO and other industrial dischargers.

For dischargers with the largest potential percent waste load allocation for three contaminants of concern to the Chollas Creek mouth are the Cities of San Diego, La Mesa, and Lemon Grove (San Diego Water Board, 2013b, Table 8.3, page 95). All discharges from these cities and other entities, such as Caltrans, will eventually flow through the City of San Diego storm water conveyance system within the TIA where some of the contaminants will settle in the catch basins. Pollutants from discharges within the TIA watershed, which includes the City of San Diego and others, will settle in the catch basins as well. The catch basins require clean out to prevent resuspension and transport of contaminants.

7. Inspection and Maintenance Actions for Implementation

Sediments in the Chollas Creek mouth did not exceed threshold levels requiring cleanup. The action required is maintenance to prevent pollution from the MS4 system contaminating the Chollas Creek Mouth. The San Diego Water Board will review ongoing monitoring and reporting of catch basin clean out and maintenance. (See Tables 11 and 12 for discharger requirements.)

Table 10. Phase I MS4 Permit Conveyance Maintenance and Inspection.

Permit	Plan Description	Location in Plan
Regionwide Phase I MS4 Permit - City of San Diego MS4	Annual WQIP FY2020-21	Appendix 3: JRMP Annual Report Section 5, Table 5-2 CSD-JRMP-23 CSD-JRMP-24 CSD-JRMP-27
Regionwide Phase I MS4 Permit - City of La Mesa	Annual WQIP FY2020-21	Appendix 3: JRMP Annual Report Section 9, Table 9-1 LM-13 LM-15
Regionwide Phase I MS4 Permit - City of Lemon Grove	Annual WQIP FY2020-21	Appendix 3: JRMP Annual Report Section 10, Table 10-3 LG-10 LG-11 LG-22 thru LG-25
Port of San Diego	Annual WQIP FY2020-21	Appendix 3: JRMP Annual Report Section 12, Table 12-11 PO-08

		PO-10 PO-11
San Diego County Regional Airport Authority	Annual WQIP FY2020-21	Appendix 3: JRMP Section 2: Table 2-2 Annual Report AA-5 thru AA-8

Table 11. Phase II MS4 Permit Conveyance Maintenance and Inspection.

Permit	Plan Description	Location in Plan
Phase II MS4 Permit - Industrial General Storm Water	SWPPPs are required for each industrial discharger.	Phase II MS4 Permit Fact Sheet. pgs. 29-32, 38-39, 42-45.
Phase II Industrial General Permit - BNSF Railway	BNSF Railway SWPPP, 2018.	(not available online)
Phase II MS4 Permit - Caltrans Statewide	Caltrans Maintenance Staff Guide, 2018b.	Stormwater Section. pgs. 69 -75.
Phase II MS4 Permit - U.S. Naval Base San Diego	Storm Water Mgmt. Plan, July 2021	BMP 009 BMP 026 BMP 110 (not available online)
Phase II MS4 Permit - San Diego Metropolitan Transit System	MTS MS4 Implementation Plan, 2017.	Sections F.5.f.6. F.5.f.7. (not available online)

a. **Regionwide Phase I MS4 Permit:** Three cities and the Port of San Diego are responsible for implementing requirements in the Phase I MS4 Permit within the Chollas Creek watershed. A brief description for each was taken from the 2021 Annual WQIP, Appendix 3 (see Table 11).

- **The City of San Diego** reported that they are continuing to implement their JRMP strategies which include catch basin cleaning and street sweeping. Each maintenance location, dates and frequencies are reported in the Annual San Diego Bay Watershed WQIP Report.

  The San Diego Water Board reviews supplemental information provided by the City for catch basin cleaning and street sweeping and sends the City an annual letter of their performance. A San Diego Water Board letter dated May 17, 2022 (section 3(b)) to the City addresses concerns regarding implementation of enhanced JRMP strategies for the Chollas Creek watershed. The City is required to address those comments in its next WQIP annual report due January 31, 2023 (Regional MS4 permit).

- **The City of La Mesa** reports in the WQIP that it annually cleans 455 catch basins in the Chollas Creek watershed. La Mesa street sweeps high traffic and arterial areas once a week, other arterial areas every other week, and residential areas once a month. Parking lots and median are included in street sweeping programs.

- **The City of Lemon Grove** reports in the WQIP that it cleans catch basins annually as needed. The City street sweeps downtown commercial areas once a week; main arterials and business areas once every two weeks; and residential areas once every four weeks.

- **The Port of San Diego** captures flow but does not discharge from outfalls. Catch basins are cleaned annually. Some basins are prioritized for cleaning twice a year basined on a debris assessment (not based on sediment accumulation). Weekly street sweeping is required for high priority areas (Hydrologic Subareas 909.9 and 910.1) and other areas as needed.

- **The San Diego County Regional Airport Authority** inspects its MS4 structures (catch basins, storm drain inlets, detention basins) quarterly and cleaning is performed on an as-needed basis. Storm drain cleaning was conducted in October through December 2020. The Airport Authority street sweeps 21 acres of total airside pavement per week. Runway rubber removal was conducted on an average of every eight weeks in 2020, compared to four to six weeks in 2019. Street sweeping will be increased to address apparent sources of higher concentrations of copper and zinc.

- **The County of San Diego** is no longer responsible for any MS4 facilities within the Chollas Creek watershed. The County transferred the previously owned area (a cemetery) to other agencies in the 2017-18 reporting year.

b. Industrial General Permit

The **Industrial General Storm Water Permit (IGP)** requires dischargers to eliminate unauthorized non-stormwater discharges, develop a SWPPP, develop BMPs to specified levels, implement, and maintain BMPs, and submit reports to the SMARTS database.

The WQIP reporting, review, and response process for all Copermittees are the same as described for the City of San Diego. They must submit their portion of the San Diego Bay WMA WQIP annual report by January 31 each year. San Diego Water Board staff review the WQIP watershed report and provide a response to the Copermittees. Annual reports for other storm water permits and WDRs are reviewed by San Diego Water Board staff for compliance with follow up correspondence sent to the reporting entity.

- The **BNSF Railway** is regulated under the IGP and its SWPPP outlines requirements to clean catch basins as Level 1 status for copper and Level 2 status for zinc. They are required to have catch basins with specific filters and filter replacements, catch basins that have sediment/ debris retrofits, street sweeping, and annually replace catch basin filter media (BNSF Railway, 1998).

c. Phase II MS4 Permits and WDRs

- The **Caltrans** Draft Statewide Phase II MS4 Permit requires inspection and maintenance of storm water BMPs. Ten Chollas Creek routes require street sweeping every two weeks. For storm drain cleaning, Caltrans developed a decision document for maintenance and repair according to Caltrans SB1 (Senate Bill 1) efforts. Caltrans cleans and video tapes pipes slated for repairs. They also schedule regular maintenance upon customer service request and other crew supervisor requests, such as pre-storm season cleaning (Carl Savage, Caltrans, pers comm.). Previous to SB1, Caltrans scheduled storm drain inlet cleaning annually or when 12 inches or more of material accumulated (Maintenance Staff Guide (ca.gov), Section C22.1, C22,2).

- The Phase II MS4 Permit for the **San Diego Metropolitan Transit System (MTS)** requires that MTS implements procedures to assess and prioritize maintenance of storm drain infrastructure. MTS assigns priority to accumulation of sediment, trash and debris to high priority catch basins, which would include the Chollas Creek watershed. High priority storm drain systems are inspected and cleaned at a minimum, annually. Areas MTS

determines are hot spots from its inspections are designated to be cleaned quarterly. MTS submits annual reports to the San Diego Water Board using the SMARTS electronic system (San Diego Metropolitan Transit System, 2017).

- A Waste Discharge Requirement (WDR) developed for **U.S. Naval Base San Diego (NBSD)** addresses storm water discharges as described in the NBSD Storm Water Management Plan. Training for proper waste disposal or recycling will be performed for all new employees and semi-annually for all personnel.

  Storm water conveyances are regularly inspected monthly and maintained as needed. Criteria rankings for high, medium, and low may determine whether that frequency is adjusted. Storm Water Pollution Prevention Personnel will be provided a copy of a site plan showing the location of all storm water conveyance systems which need to be inspected.

  Catch basins are cleaned at least quarterly with one cleaning just before the rainy season. Personnel will be trained in the proper testing, removal, and disposal of sediment or a qualified contractor will be used (NAVFAC, 2021).

In summary, the Chollas Creek Mouth Investigation results showed that recent sediment sampling in the Chollas Creek mouth did not exceed threshold levels requiring cleanup. To ensure ongoing support of beneficial uses, a multi-program initiative for the storm water system is under development. This initiative requires routine inspection and maintenance of the storm water system to prevent pollutants from entering the Chollas Creek mouth.

8. References

Amec, Foster, Wheeler, 2017. *An Investigation of Sediment Quality at the Mouth and Tidally Influenced Area of Chollas Creek in San Diego Bay. Phase I Report. Investigative Order No. R9-2015-0058*. https://documents.geotracker.waterboards.ca.gov/regulators/deliverable_documents/7644209921/FINAL%20Chollas%20Creek%20IO%20Phase%201%20Report_27Feb17-Print%20version.pdf

Amec, Foster, Wheeler, 2018. *An Investigation of Sediment Quality at the Mouth and Tidally Influenced Area of Chollas Creek in San Diego Bay. Phase II Report. Investigative Order No. R9-2015-0058*. https://documents.geotracker.waterboards.ca.gov/regulators/deliverable_documents/5319469630/Final_Chollas%20Creek%20IO%20Phase%202%20Report-with%20Appendices.pdf

BNSF, 1998. *BNSF Railway Stormwater Pollution Prevention Plan. San Diego, CA*.

Caltrans, 2018a. *Decision Document: Culverts or Drainage System Repair. Sacramento, CA.*

Caltrans, 2018b. *Caltrans Stormwater Quality Handbook Maintenance Staff Guide. CTSW-RT-18-314.20.1. Sacramento, CA*.

Greenstein, D., S. Bay, and D. Young, 2011. *Sediment Toxicity Identification Evaluation for the Mouths of Chollas and Paleta Creek, San Diego, CA. Tech Report No. 669.* Southern California Coastal Water Research Project, Costa Mesa, CA.

NAVFAC, 2021. Storm Water Management Plan for Naval Base San Diego, San Diego, CA. For Order No. R9-2013-0064 as Amended by R9-2017-0009. NPDES: CA0109169.

San Diego Basin Plan, *Water Quality Control Plan for the San Diego Basin*, September 1, 2021.

San Diego Metropolitan Transit System, 2017. *San Diego Metropolitan Transit System (MTS) Phase II Implementation Plan Table*.

San Diego Water Board, 2013a. National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Were Systems (MS4s) Draining the Watersheds within the San Diego Region. Order No. R9-2013-0001, as Amended by Order Nos. R9-2015-0001 and R9-2015-0100, NPDES No. CAS0109266.

San Diego Water Board, 2013b. *Total Maximum Daily Load for Toxic Pollutants in Sediment at San Diego Bay Shorelines – Mouths of Paleta, Chollas, and Switzer Creeks* (DRAFT document, not released). June 2013.

San Diego Water Board, 2015. *Investigative Order No. R9-2015-0058. An Order Directing The California Department of Transportation, The City of La Mesa, The City of Lemon Grove, The City of San Diego, The National Steel and Shipbuilding Company, The San Diego Unified Port District, and The U.S. Navy to Submit Technical Reports Pertaining to An Investigation of Sediment Quality in The Mouth of Chollas Creek, San Diego Bay, San Diego County, California.*

San Diego Water Board, 2022a. San Diego Bay Watershed Management Area Water Quality Improvement Plan (WQIP) FY 2021 Annual Report and Appendices. January 2022.
San Diego Bay WQIP 2020-2021 Annual Report – Project Clean Water

San Diego Water Board, 2022b. *San Diego Bay Watershed Management Area Water Quality Improvement Plan 2020-21 WQIP Annual Report Review Letter*. May 17, 2022.

SCCWRP and SPAWAR, 2005. *Sediment Assessment Study for the Mouths of Chollas and Paleta Creek, San Diego, Phase I Report. Prepared by Southern California Coastal Water Research Project, Westminster, CA and Space and Naval Warfare Systems Center, San Diego, CA for the San Diego Regional Water Quality Control Board and Commander Navy Region Southwest, San Diego, CA.*

State Water Resources Control Board, 2014. General Permit for Storm Water Discharges Associated with Industrial Activities. Order No. 2014-0057-DWQ. NPDES No. CAS000001.

State Water Resources Control Board, 2015. National Pollutant Discharge Elimination System (NPDES) General Permit Fact Sheet for Storm Water Discharges Associated with Industrial Activities. NPDES No. CAS000001.

State Water Resources Control Board, September 1996. *Chemistry, Toxicity and Benthic Community Conditions in Sediments of the San Diego Bay Region*.

Tetra Tech, 2012. *Catch Basin Inlet Cleaning Pilot Study: Final Report. Submitted to The City of San Diego*. June 2012.