FINAL

Water Quality Report

Prepared for

SEAWORLD PARKS & ENTERTAINMENT

San Diego, California
March 25, 2021

Brown AND Caldwell
450 B Street, Suite 1500
San Diego, CA 92101

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List of Abbreviations

BMP	best management practice
CCC	California Coastal Commission
CGP	Construction General Permit
City	City of San Diego
NPDES	National Pollutant Discharge Elimination System
NPDES Permit	National Pollutant Discharge Elimination System Permit No. CA0107336
NTU	nephelometric turbidity units
OWS	oil/water separator
SeaWorld	SeaWorld Parks and Entertainment aquatic amusement park
SPCC	Spill Prevention, Control, and Countermeasure Plan
SWPPP	Stormwater Pollution Prevention Plan
USEPA	United States Environmental Protection Agency
WWTP	wastewater treatment plant

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Section 1

Introduction and Background

The SeaWorld Parks and Entertainment aquatic amusement park (SeaWorld) is updating its 2002 Master Plan to provide a comprehensive update that has largely been implemented. As with the 2002 SeaWorld Master Plan, the 2020 Master Plan sets forth the long-range conceptual development program, development parameters, and project review procedures for the future renovation and development of the entire leasehold area. The 2020 Master Plan would be part of the City of San Diego's (City) Local Coastal Program for Mission Bay Park (SeaWorld San Diego et al. 2019).

The purpose of this document is to provide information regarding the applicable water quality regulations, existing conditions related to Mission Bay and SeaWorld water quality, and the potential water quality impacts from implementing SeaWorld's 2020 Master Plan.

SeaWorld's 2020 Master Plan would retain the five designated planning areas—theme park, guest parking, administration and support, SeaWorld Marina, and Perez Cove Shoreline (Appendix A); however, the 2020 Master Plan would transition from a "site-specific" development paradigm as outlined in the 2002 Master Plan to an "area-specific" development paradigm that more closely matches SeaWorld's future renovation needs. The 2020 Master Plan would define each planning area with a description of the existing uses, allowed uses, general development criteria, and project-specific development criteria for all future development within the SeaWorld leasehold. The 2020 Master Plan would not result in the expansion of the leasehold.

SeaWorld is located in Mission Bay Park within the City. SeaWorld is approximately 8 miles northwest of the downtown/civic center area. The boundaries of Mission Bay Park are Interstate 5 on the east, the Pacific Ocean on the west, Interstate 8 and the San Diego River Floodway on the south, and Grand Avenue on the north. The SeaWorld leasehold comprises approximately 172 acres of land and 17 acres of water along the south shore of Mission Bay Park, which is owned by the City.

SeaWorld discharges various water streams into Mission Bay that have the potential to impact water quality in the bay. These water streams include stormwater runoff and treated bay water used in the marine habitats. SeaWorld currently implements significant treatment and non-structural control measures (detailed in Appendix B) to minimize its impact to Mission Bay water quality. This document evaluates the potential for additional impacts resulting from implementation of the 2020 Master Plan beyond what was analyzed in the SeaWorld's 2001 *Environmental Impact Report: SeaWorld Master Plan Update* (EIR) prepared for the 2002 Master Plan (baseline).

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Section 2

Summary of Previous 2001 EIR Analysis and Findings

The 2001 EIR provided a description of the best management practices (BMPs) SeaWorld implemented to comply with its existing National Pollutant Discharge Elimination System (NPDES) Permit No. CA0107336 (NPDES Permit) and proposed measures to minimize water quality impacts from master-planned activities that would also comply with Construction General Permit (CGP) requirements, if a CGP is required. The programs and measures that were identified during the 2001 EIR are also reflective of the current programs and are detailed in Sections 2.1 and 2.2 below.

The Master Plan areas analyzed in the 2001 EIR are shown in Appendix A.

2.1 SeaWorld's BMP Programs

SeaWorld has already integrated water quality BMPs into its overall environmental management program. A Stormwater Pollution Prevention Plan (SWPPP) was created in 2006 per SeaWorld's NPDES Permit to ensure appropriate management of stormwater during facility operation. The SWPPP was recently updated to remain current with SeaWorld operations (Brown and Caldwell 2019). Two types of water quality BMPs are employed at SeaWorld—non-structural and structural controls. Non-structural controls are operational protocols implemented by personnel throughout SeaWorld as preventative measures, while structural controls involve containing or treating stormwater. The following section describes the existing BMP programs at SeaWorld (also covered under the SWPPP) initially identified in the 2001 EIR.

2.1.1 Non-Structural BMPs

Specific non-structural BMPs implemented at SeaWorld are described below.

Good Housekeeping

SeaWorld has established a housekeeping policy that requires:

- A waste management and litter control program, which includes curb-side trash pick-up, common area litter pick-up, and emptying of trash receptacles in common areas.
- Employees continually policing walkways and parking areas to pick up stray litter.
- Sweeping and/or vacuuming on a regular basis of impervious surfaces, including streets, walkways, and parking lots throughout SeaWorld. SeaWorld owns and operates two full-size street sweepers for sweeping the parking lot and streets. The street cleaning program includes dry sweeping of paved areas at least weekly to remove trash, litter, and particulate matter before it enters the storm drains. Park personnel sweep walkways daily.
- Following regularly scheduled walkway sweeping and periodic pressure washing. Wash water produced is collected and discharged into the on-site wastewater treatment plants (WWTPs).
- Keeping dumpsters covered, and in clean and neat conditions at all times. Disposing fluids of any kind in dumpsters is prohibited.
- Recycling where available and practical.

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Preventative Maintenance

A preventative maintenance program involving inspection and maintenance of all storm drain filters, two storm drain inlet filters, and secondary containment cleanout sumps is in effect at SeaWorld. This consists of:

- Drain inlet setup and maintenance activities, including catch basin cleaning to remove trash, vegetation, and sediment. The extracted/bagged materials are separated, weighed, and documented, and a sample of the extracted material is sent to a certified laboratory for analysis. All storm drain inspections and cleaning are documented and logged by the Maintenance Department.
- Drain inlet cleaning three times a year.
- Oil absorbent socks replaced, as needed (a minimum of twice a year).
- Regular inspection and cleanout of secondary containment unit sumps performed by trained personnel. Sump water is disposed of at the Backwash Recovery Basin.
- Where feasible, routing stormwater runoff through catch basin inserts (i.e., Fossil Filter or Drain Pac). These inserts remove sediments, oil and grease, and other pollutants before they enter the storm drain system.
- Quarterly maintenance activities at the on-site WWTPs that include cleaning the stormwater/wastewater conveyance system.
- Prohibiting marine habitat and pool draining activities during stormwater bypass discharge events.
- Periodic maintenance and cleaning of roofs and gutters.

Spill Prevention and Response

Spill prevention and response procedures have been established at SeaWorld as part of SeaWorld's Spill Prevention, Control, and Countermeasure (SPCC) Plan. Spill prevention activities to be performed as part of this program include:

- Supervising bulk oil or chemical deliveries and transfers.
- Confirming tank liquid levels prior to deliveries and transfers.
- Using secondary containment pallets during chemical transfers.
- Performing monthly inspections and documentation of tanks, storage areas, and appurtenances.
- Cleaning up leaks and spills of lubricating and hydraulic oils from machinery and equipment, as needed. Absorbents are used to contain leaks and are properly disposed of promptly following spill cleanup.
- Locating spill kits with oil-absorbing materials in areas of potential spillage.

Material Handling and Storage

A material use control program has been established for SeaWorld that includes guidelines for managing materials with a potential to contaminate stormwater. These guidelines include:

- Displaying information regarding the proper storage and disposal practices of potential pollutants, such as motor oils and antifreeze.
- Using materials that encourage participation in recycling and proper disposal of hazardous waste.
- Prohibiting the storage of uncovered hazardous substances and other potential pollutants in uncovered outdoor areas.

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- Proper disposal and rainfall protection techniques for spent paint cans, waste oils, etc.
- Prohibiting material transfer during storm events.
- Prohibiting the use of pesticides and herbicides that have been prohibited by the United States Environmental Protection Agency (USEPA).
- Spill prevention/response practices.
- Shipping and receiving practices.

Erosion Control and Site Stabilization

The overall erosion control and site stabilization strategy for SeaWorld includes the following objectives and BMPs:

- Long-term erosion control measures to prevent sediment from leaving the site. Vegetation and other appropriate ground cover on all slopes and other open areas is maintained to provide adequate long-term soil protection and erosion control to prevent the transport of sediment from the site during rainfall events and irrigation. Any erosion problems caused by rainfall, broken sprinkler heads, or irrigation are promptly repaired. In addition, SeaWorld's irrigation system is equipped with leak-detection capabilities that automatically shut off the system.
- Herbicide/pesticide and fertilizer management practices designed to minimize stormwater contaminants from landscaping applications. The intentional disposal of landscape debris into a storm drain or receiving water, as well as the discharge of any other types of pollutants, such as motor oil or antifreeze, into a storm drain or receiving water is prohibited. Using pesticides and fungicides that have been banned from manufacture by the USEPA is prohibited.

Public Education

SeaWorld will participate in a public education and industrial outreach program. The main goal of this program is to reduce stormwater pollution through public education and raise the level of awareness of water quality issues. To reduce illegal dumping, SeaWorld plans to continue implementing the BMP of marking the storm drains throughout SeaWorld to indicate they drain to the bay.

2.1.2 Structural BMPs

In addition to non-structural BMPs, specific structural BMPs are implemented at SeaWorld. Structural BMPs generally consist of structural devices that reduce or prevent pollutants in stormwater runoff (described below).

Overhead Coverage

Overhead coverage at SeaWorld includes structural BMPs that support material use and storage protection. These consist of:

- Structures that protect materials, chemicals, and pollutant sources from contact with stormwater.
- Separated roofed, secondarily contained, and locked storage of hazardous materials and hazardous wastes.
- Storage lockers with adequate ventilation and labeling approved for storing flammable materials.

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Retention Ponds

SeaWorld has installed a concrete retention basin near the northern property boundary. The retention basin is engineered to contain stormwater runoff from a 100-year, 24-hour event. Dissolved particulates and suspended solids from stormwater are treated through settling. Following a completed storm event, the retained water is routed to the East WWTP. Sediment is removed from the retention basin at a minimum of once a year, or as needed.

Secondary Containment Structures and Control Devices

Due to the relatively flat topography within SeaWorld, areas of industrial processes and outdoor storage containers are elevated to prevent run-on. Bulk chemical storage tanks have concrete secondary containment dikes with adequate capacity to keep run-on and runoff contained.

Inlet Controls

Where feasible, stormwater runoff is routed through catch basin inserts (i.e., Fossil Filter or Drain Pac). These inserts remove sediments, oil and grease, and other pollutants before they enter the storm drain system.

Oil/Water Separator

SeaWorld uses multiple oil/water separators (OWSs). OWSs can be used to treat a variety of contaminants, including free-floating oil, dissolved oil, and suspended solids. Four OWS are located on site:

- A 750-gallon OWS located at the Journey to Atlantis
- Two 1,000-gallon concrete OWSs located at the wash rack area
- A 500-gallon OWS located at the Oiled Wildlife Care Center

2.2 Proposed BMPs to minimize Water Quality Impacts from Master-Planned Activities

BMPs proposed for implementation during construction activities and over the operating life of the proposed new facilities are designed to minimize the potential water quality impacts to Mission Bay. Specifically, the controls are designed to address concerns related to water quality and to comply with SeaWorld's SWPPP and NPDES Permit. This section describes BMPs recommended for implementation during construction activities and long-term operation.

SeaWorld's two WWTPs provide filtration, chlorine disinfection, and dechlorination. The primary constituents that are removed include solids and bacteria. Because the two plants have significant excess capacity, runoff from approximately 96 percent of SeaWorld is directed toward one of the two WWTPs. SeaWorld is committed to directing 100 percent of runoff from newly constructed areas into the treatment system; however, the potential exists for pollutants other than sediment and bacteria to be present in runoff. Therefore, SeaWorld implements additional controls to control other pollutants in accordance with its SWPPP. These include an aggressive street-sweeping program (on pedestrian paths and in the parking lot), storm drain stenciling and public education, and installation of catch basin· inserts (Fossil Filter and Drain Pac). SeaWorld has inspected all storm drain lines using closed-circuit television and has cleaned or jetted lines that have required such maintenance. In addition, SeaWorld has installed Filter-Pak® gravity filters in most storm drains that are 12 inches or greater to filter out sediments. These filters are inspected and maintained by SeaWorld maintenance staff and replaced as needed.

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2.2.1 Controls During Construction Activities

Because the BMPs to be implemented during construction are related to the specific activities or materials being used, they are described categorically rather than by the specific exhibit, ride or show to be constructed. Additional BMPs may be required if a CGP is required, as further discussed in Section 2.2.3.

Erosion and Sediment Controls

Most construction activities will involve clearing, grading, and/or excavation that disturbs soil. Sediments from these activities can be mobilized by stormwater, irrigation runoff, or other urban runoff. Although much of this water will be filtered and discharged into SeaWorld's water treatment system, controls should still be implemented to minimize the potential for erosion. The following controls may be appropriate, depending on the specific nature of the grading and excavation activities:

- Perimeter and shoreline controls (e.g., straw bales, silt fences)
- Daily street sweeping and dry cleanup
- Covered stockpiles (e.g., with tarps or various soil stabilization methods)
- Gravel construction entrances and/or tire washes
- Revegetation

BMPs for Oil, Grease, and Lubricants

Construction may involve a variety of vehicles and heavy equipment. Because this equipment is frequently used, parked, and/or stored in a concentrated area there is a potential for leaks and spills during use and maintenance. To minimize the potential for leaks and spills, the following BMPs may be implemented:

- Conduct maintenance, fueling, and washing off site in designated areas
- Properly maintain vehicles and equipment
- Repair leaks promptly
- Place drip pans under vehicles or equipment that is parked or stored for long periods
- Equip sites with spill control kits
- Store fuels, oils, and lubricants in contained storage areas

BMPs for Organics, Pesticides, Fertilizers, and Other Materials

Construction activities use a variety of materials, including paints, stains, adhesives, solvents, and other chemicals. In addition, fertilizers and pesticides are frequently used to establish new vegetation when construction is completed. These materials should be applied, stored, and disposed in accordance with regulations and handled so as to minimize the potential for contact with runoff. Control measures for these materials include:

- Storing materials offsite or inside locked and contained storage
- Purchasing only what is needed for the job to minimize future storage or disposal issues
- Using fewer toxic alternatives when possible
- Equipping sites with spill control kits
- Avoiding over-irrigation of newly planted slopes

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BMPs for Concrete

Concrete washout water and concrete saw-cut slurry are high in pH and should not be discharged to the storm drain system or allowed to run off. Concrete washout can be managed by:

- Performing washout of concrete trucks in designated areas only, where washout will not reach stormwater.
- Not washing out concrete trucks into storm drains, open ditches, streets, streams or onto the ground.
- Washing out trucks into designated facilities.
- Not allowing excess concrete to be dumped on site, except in designated areas.

For on-site washout:

- Locate washout areas at least 50 feet from storm drains, open ditches, or water bodies on larger sites.
- Prohibit runoff from the area by constructing a temporary pit or bermed area large enough for liquid and solid waste.
- Place the washout waste into a temporary washout area where the concrete can set, be broken up, and then disposed properly.
- Implement washouts in a manner that prevents leaching. Washout containers must be water tight, and washouts on or in the ground must be lined with a suitable impervious liner, typically a plastic-type material.

2.2.2 Controls During Long-Term Operation

Over the operating life of the facilities there will be some potential to impact water quality from sources such as equipment maintenance, animal wastes, and intensive visitor use. As part of SeaWorld's SWPPP, controls are evaluated, and additional BMPs will be added as needed.

2.2.3 Permitting Considerations

In accordance with State Water Resources Control Board Order 2009-0009-DWQ (as amended by 2010-2014 DWQ and 2012-0006-DWQ), any construction or demolition activity that results in a land disturbance equal to or greater than 1 acre is subject to the CGP; therefore, if the collective land area to be disturbed by concurrent active projects described in the Master Plan Update will exceed 1 acre, SeaWorld will need to seek coverage under the CGP during construction activities. Compliance with this permit will involve preparing a construction SWPPP that outlines specific BMPs to be implemented to minimize pollutants in runoff from the construction sites.

The CGP SWPPP will be consistent with the types of activities outlined above and will provide more detail, including detailed drawings that illustrate where specific BMPs will be implemented on each site. In addition, the San Diego Regional Water Quality Control Board updated the NPDES Permit with a new Order No R9-2018-0004 adopted June 20, 2018. As a result, the NPDES Permit contains updated and more stringent discharge and monitoring requirements than the NPDES Permit described in the 2001 EIR. SeaWorld will continue to comply with all requirements of the NPDES Permit pursuant to the 2018 Order.

2.3 Mitigation, Monitoring, and Reporting

In addition to the BMPs described in Sections 2.1 and 2.2 above, the 2001 EIR provided a description of mitigation measures to reduce cumulative operational impacts associated with

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development under the proposed Master Plan Update on water quality to below a level of significance. These measures from 2001 are presented below, along with the status of their implementation since 2001.

2.3.1 Mitigation Measure 4.5-1

Mitigation Measure 4.5-1 stated that future expansion activities at SeaWorld Marina shall include the following:

1. Installation of an automatic shutoff on the fuel pump;
2. Regular inspection of the sanitary pumpout on a routine basis;
3. Prohibiting boat hull paint removal and repainting in the marina area; and
4. Prohibiting in-water hull scraping to remove marine growth and collecting and properly disposing of any marine material removed from hulls.

Provisions 1 through 3 of Mitigation Measure 4.5-1 have been fulfilled. Regarding provision 4, routine boat maintenance for tenants occurs, which is typical of all marina operations. Agreements with tenants ensure that vessels are properly maintained. More extensive repair and maintenance activities are typically performed off site or in dry dock.

2.3.2 Mitigation Measure 4.5-2

Mitigation Measure 4.5-2 stated that, within two years of the approval of the SeaWorld Master Plan Update by the Coastal Commission, SeaWorld will install catch basin inserts such as a Fossil Filter, or equivalent, to capture oil and grease in runoff at the point where it enters the storm drain system from parking lots and fueling areas.

The provisions of Mitigation Measure 4.5-2 have been fulfilled.

2.3.3 Mitigation Measure 4.5-3

Mitigation Measure 4.5-3 stated that, in order to reduce cumulative water quality impacts related to construction to below a level of significance, a Master SWPPP shall be prepared and approved by the City Engineer and Regional Water Quality Control Board. This Master SWPPP shall include general as well as specific measures which will be implemented to control water pollution related to construction. At a minimum, the Master SWPPP shall include the following provisions or their equivalent:

<u>Erosion and Sediment Controls</u>

1. Surface runoff shall be directed to the SeaWorld surface runoff treatment collection system except during times of high rainfall;
2. Perimeter and shoreline controls (e.g., straw bales, silt fences) shall be used;
3. Street sweeping and dry cleanup shall be completed daily;
4. Stockpiles shall be covered;
5. Gravel construction entrances and/or tire washes shall be used; and
6. Temporary landscaping shall be used when prolonged exposure may occur.

<u>Oil, Grease, and Lubricants</u>

1. Conduct maintenance, fueling, and washing offsite;
2. Properly maintain vehicles and equipment;
3. Repair leaks promptly;

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4. Place drip pans under vehicles or equipment that is parked or stored for long periods;
5. Have spill control kits on the site; and
6. Store fuels, oils, and lubricants in contained storage areas.

Concrete

1. Wash out concrete trucks into earthen pits and remove/dispose of the hardened material;
2. Fill concrete trucks with water and wash them offsite; and
3. Dry and dispose of concrete saw-cut slurry as solid waste.

The provisions of Mitigation Measure 4.5-3 have been fulfilled, but are superseded by the CGP SWPPP requirements outlined in Section 2.2.3.

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Section 3

Description and Analysis of the 2020 Master Plan

The City certified the EIR for the SeaWorld Master Plan in 2001 (SCH No. 1984030708). The certified 2001 EIR evaluated development of the entire SeaWorld Master Plan area, or project area, including water quality impacts. This document tiers from the previously certified 2001 EIR, as permitted by Sections 15152 and 15168 of the California Environmental Quality Act (CEQA) Guidelines. Thus, this report only evaluates the potential water quality impacts from implementation of the 2020 Master Plan beyond what was analyzed in the 2001 EIR.

The following analysis is based on the City's adopted CEQA *Significance Determination Thresholds* for water quality as identified below:

- **Issue 1:** Would the project result in an increase in pollutant discharge to receiving waters during or following construction? Would the project discharge identified pollutants to an already impaired water body?
- **Issue 2:** What short- and long-term effects would the project have on local and regional water quality? What types of pre- and post-construction BMPs would be incorporated into the project to preclude impacts to local and regional water quality?

Furthermore, this analysis is structured in terms of each designated planning area and discusses potential impacts relative to potential future construction activities and long-term operation of SeaWorld. A map of the areas is included in Appendix A.

3.1 Area 1: SeaWorld Aquatic Theme Park

Area 1 encompasses the SeaWorld park area of 97.2 acres bounded by the South Pacific Passage channel of Mission Bay to the north, the administration and support area to the west, the South Shores area of Mission Bay Park to the east, and the guest parking area to the south. This area includes 7 acres of open water used for water shows at the Waterfront Stadium.

Future allowed uses in Area 1 may include:

- Marine habitats
- Special-effects theaters
- Land-based adventure rides
- Pelagic fish exhibits (large fish)
- Water-play attractions
- Themed track or water rides
- Special-format projection attractions
- Playgrounds
- Performance venues
- Boat rides
- Historia reenactment presentations

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- Research facilities
- Animal habitat
- Rescue conservation/wildlife rehabilitation facilities
- Special-event centers and facilities
- Educational facilities
- Culinary facilities
- Gift shops
- Restrooms
- Support facilities
- Multi-media facilities
- Surface parking and access ways
- Other uses consistent with the intent and purpose of the 2020 Master Plan as determined by the City and the California Coastal Commission (CCC) during review of any project Coastal Development Permit application

These projects have not yet gone through an extensive planning and design process. While certain areas of SeaWorld have been identified for future development or redevelopment, the specific nature of the projects has not been defined.

The following subsections present an analysis of potential water quality impacts during construction and over the lifetime of SeaWorld. The types of projects are separated into impacts discussed in terms of three scenarios—exhibits, ride attractions, and shows.

3.1.1 Water Quality Impacts Associated with Future Exhibits

because exhibits tend to focus on fish, aquatic life, and other animals it is likely that future exhibits will include marine habitats and other water areas, as well as fenced or otherwise controlled areas where animals would reside. Future exhibit areas would also likely include visitor-used elements such as landscaped areas, pathways, and supporting facilities (e.g., snack stands, restrooms, etc.).

Specific projects that could be built under the exhibits scenario may include, but are not limited to:

- Marine habitats
- Pelagic fish exhibits (big fish tanks)
- Wildlife exhibits
- Research facilities

Water Quality Impacts from Construction Activities. Most Area 1 projects are redevelopment sites that will involve demolishing the existing land use and reconstructing the new exhibit. In each case, it is anticipated a significant amount of demolition will be required to construct the new exhibit. It is expected that demolition debris will be removed and disposed or recycled off site quickly. Any asphalt to be removed will be trucked off site and recycled, if possible. Construction of any exhibit will involve significant heavy equipment (earth-moving equipment, dump trucks, etc.) for grading. Marine habitats will be plumbed such that they are connected to one of the WWTPs. A variety of construction products and materials will be used in various stages of the project, including paints, lubricants, fuels, solvents, adhesives, coatings, etc.; construction materials will be stored outdoors.

Potential pollutants resulting from demolition and construction activities are expected to include:

- Sediment
- Fuel, oil, grease, and other lubricants

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- Organics (from paint, solvents, etc.)
- Concrete wastes (elevated pH)
- Nutrients (nitrogen and phosphorous from initial landscaping)

Prevention measures to address wastes associated with demolishing and constructing new exhibit facilities are described in Section 2.

Impacts from Long-Term Operation. The main sources of water quality impacts from exhibits would include marine habitat water, hose down of animal areas, landscaping, and pedestrian traffic. Bacteria and viruses may be introduced by animal contact with the water in the aquarium or by washing activities in animal areas. Landscape maintenance may introduce sediments, nutrients, and organics (pesticides and herbicides).

In summary, the types of water quality pollutants expected to be present from SeaWorld operations include:

- Oil, grease, and other lubricants
- Organics (paint, solvents, pesticides, herbicides, etc.)
- Fecal coliform, other bacteria, and viruses
- Nutrients (nitrogen and phosphorous from landscape maintenance)
- Trash
- Sediment

Preventive measures to address wastes associated with operating future exhibits are described in Section 2.

3.1.2 Water Quality Impacts Associated with Future Ride Attractions

Future rides may range from full-water-contact rides to land-based dry rides to non-water-contact boat rides. Water quality analysis for these various possibilities are described herein.

Specific projects that could be built under the ride attractions scenario may include, but are not limited to:

- Land-based adventure rides
- Water-play attractions
- Themed track or water rides
- Playgrounds
- Boat rides

Water Quality Impacts from Construction Activities. It is anticipated a significant amount of demolition will be required to construct any new ride/attraction. It is expected that demolition debris will be removed and disposed or recycled off site quickly. Any asphalt to be removed will be trucked off site and recycled, if possible. Construction will involve significant heavy equipment (earth-moving equipment, dump trucks, etc.) for grading. Cranes or other large specialized equipment may be needed to hoist lift towers or other structural elements (such as track supports) into place. Areas with extensive water-contact recreation and/or marine habitats will be plumbed such that they are connected to one of the WWTPs. Because boat-ride-related structures may be constructed adjacent to or directly in the water of Mission Bay, special considerations are needed to prevent construction materials from coming in contact with or discharging into the water. Construction materials will be stored outdoors. A variety of construction products and materials will be used in various stages of the project, including paints, lubricants, fuels, solvents, adhesives, coatings, etc.

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Potential pollutants resulting from demolition and construction activities are expected to include:

- Sediment
- Fuel, oil, grease, and other lubricants
- Organics (from paint, solvents, etc.)
- Concrete wastes (elevated pH)
- Nutrients (nitrogen and phosphorous from initial landscaping)

Preventive measures to address wastes associated with demolition and construction of new rides/ attractions are described in Section 2.

Impacts from Long-Term Operation. Depending on the nature of the ride attraction, the water quality impacts may vary. For rides that include a track, cars, or other mechanical apparatus, operation and maintenance will likely require the use of lubricants, solvents, paints, and other organics. For rides with a significant water element, water overspray may mobilize pollutants on paved surfaces and other areas. Bacteria and viruses may be introduced by human body contact with the water and from animals in the marine habitat associated with SeaWorld. Landscape maintenance may also introduce sediments, nutrients, and organics (pesticides and herbicides).

In summary, the types of water quality pollutants expected to be present from operation of SeaWorld include:

- Oil, grease, and other lubricants
- Organics (paint, solvents, pesticides, herbicides, etc.)
- Fecal coliform, other bacteria, and viruses
- Nutrients (nitrogen and phosphorous, from landscape maintenance)
- Sediment

Preventive measures to address water quality impacts associated with operating future ride attractions are described in Section 2.

3.1.3 Water Quality Impacts Associated with Future Shows

Future show attractions may include a variety of venues, from indoor, media-oriented theatre presentations and stage acting to outdoor performances featuring animals. The water quality impacts would depend on the specific nature of the show. In general, indoor activities will tend to have less potential for water quality impacts than activities in outdoor or open-air facilities. Water quality impacts are, therefore, discussed in general.

Specific projects that could be built under the ride attractions scenario may include, but are not limited to:

- Special-effects theatres
- Special-format projection attractions
- Wildlife performance venues
- Historic reenactment presentations
- Live performance venues

Water Quality Impacts from Construction Activities. A significant amount of demolition will be required to construct any new show. It is expected that demolition debris will be removed and disposed or recycled off site quickly. Any asphalt to be removed will be trucked off site and recycled, if possible. Construction of any exhibit will involve significant heavy equipment (earth-moving equipment, dump trucks, etc.) for grading, and soil will be disturbed. Areas with marine habitats or

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animals will be plumbed such that they are connected to one of the WWTPs. Because construction of structures related to boat rides associated with future shows may take place adjacent to or directly in the water of Mission Bay, special considerations need to be taken to prevent contact or discharge of construction materials into the water. Construction materials will be stored outdoors. A variety of construction products and materials will be used in various stages of the project, including paints, lubricants, fuels, solvents, adhesives, coatings, etc. Potential pollutants resulting from demolition and construction activities are expected to include:

- Sediment
- Fuel, oil, grease, and other lubricants
- Organics (from paint, solvents, etc.)
- Concrete wastes (elevated pH)
- Nutrients (nitrogen and phosphorous from initial landscaping)

Preventive measures to address wastes associated with demolition and construction of new show attractions are described in Section 2.

Impacts from Long-Term Operation. Water quality impacts may vary depending on the nature of the show. Indoor shows will have minimal water quality impacts, mainly associated with parking and landscaping, and pedestrian traffic.

Bacteria and viruses may be introduced by human body contact with the water and from animals in the marine habitat or by washing activities in animal areas (if the show includes animal participation).

In summary, the types of water quality pollutants expected to be present from operating the future shows may include:

- Oil, grease, and other lubricants
- Organics (paint, solvents, pesticides, herbicides, etc.)
- Fecal coliform, other bacteria, and viruses
- Nutrients (nitrogen and phosphorous from landscape maintenance)
- Sediment

Preventive measures to address water quality impacts associated with operating future show attractions are described in Section 2.

3.2 Area 2: Guest Parking

The guest parking area comprises 56 acres along the south side of the leasehold between SeaWorld and SeaWorld Drive. Future allowed uses in Area 2 may include surface parking, temporary events and associated structures, outdoor educational activities, and operations yards. Reconfiguration and restriping of surface parking will be allowed in response to operational needs. Two previously approved projects are the parking garage and transit station.

3.2.1 Previously Approved Parking Garage

A four-level parking garage is proposed within the existing parking lot. The parking garage will not be needed until SeaWorld attendance justifies additional parking. Half of the first level will be below grade. The CCC has not reviewed or granted approval of the parking garage and is in no way bound by the development concept contained herein.

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3.2.2 Previously Approved Transit Station

SeaWorld is committed to working with San Diego Metropolitan Transit System to accommodate a transit station within the Area 2 parking lot, if and when the opportunity arises. The CCC has not reviewed or granted approval of a transit station and is in no way bound by the development concept contained herein.

The following paragraphs present an analysis of the potential water quality impacts during construction and over the lifetime of the possible Area 2 projects.

Water Quality Impacts from Construction Activities. Existing (pre-construction) uses of this area are vehicle parking and parking access. Demolition activities associated with constructing the new garage (and transit station, if approved) will involve asphalt removal. The asphalt will be trucked off site and recycled, if possible. Construction of the facility will involve significant heavy equipment (earth-moving equipment, dump trucks, etc.) for grading, as the first level of the garage will be below grade and will require significant excavation. Soil will be disturbed. Construction materials, as well as stockpiled soil, will be stored outdoors. A variety of construction products and materials will be used in various stages of the project, including concrete, paints, lubricants, fuels, solvents, adhesives, coatings, etc.

Potential pollutants resulting from demolition and construction activities are expected to include

- Sediment
- Fuel, oil, grease, and other lubricants
- Organics (from paint, solvents, etc.)
- Concrete wastes (elevated pH)
- Nutrients (nitrogen and phosphorous from initial landscaping)

Preventive measures to address water quality impacts associated with demolition and construction of the new parking garage are described in Section 2.

Impacts from Long-Term Operation. The structure will be a four-story open concrete facility for vehicle parking. The potential water quality impacts are associated with vehicle parking and landscaping around the new facility. In addition, if the transit station is included, there may be additional pollutants associated with operating and maintaining trolley or people-mover vehicles, track, and elevators. Therefore, the types of water quality pollutants expected to be present from operating this structure include:

- Oil, grease, and other lubricants (from vehicle leaks in the parking structure and transit station facility(s) operations and maintenance)
- Nutrients (nitrogen and phosphorous from landscape maintenance)
- Sediment

Preventive measures to address water quality impacts associated with operating the parking garage and transit structures, if constructed, are described in Section 2.

3.3 Area 3: Administration and Support

The administration and support area consists of 6.8 acres of land located immediately west of SeaWorld (Area 1) between the SeaWorld Marina and the guest parking area. This area contains many of the support facilities needed to operate SeaWorld, including administrative offices, security, water treatment, storage, and other facilities. A reserved parking lot is located in the south portion of the area.

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Future allowed uses in Area 3 may include offices, water treatment, storage, maintenance, parking, and similar types of theme park support facilities.

Water Quality Impacts from Construction Activities. Most future uses of Area 3 are redevelopment sites that will involve demolishing the existing land use and reconstructing the new facility. In each case, it is anticipated a significant amount of demolition will be required to construct the new facility. It is expected that demolition debris will be removed and disposed or recycled off site quickly. Any asphalt to be removed will be trucked off site and recycled, if possible. Construction of some facilities will involve significant heavy equipment (earth-moving equipment, dump trucks, etc.) for grading. Water treatment facilities will be plumbed such that they are connected to one of the WWTPs. Construction materials will be stored outdoors. A variety of construction products and materials will be used in various stages of the project, including paints, lubricants, fuels, solvents, adhesives, coatings, etc.

Potential pollutants resulting from demolition and construction activities are expected to include:

- Sediment
- Fuel, oil, grease, and other lubricants
- Organics (from paint, solvents, etc.)
- Concrete wastes (elevated pH)
- Nutrients (nitrogen and phosphorous, from initial landscaping)

Preventive measures to address wastes associated with demolishing and constructing the new facilities are described in Section 2.

Impacts from Long-Term Operation. The main sources of water quality impacts from Area 3 facilities would include vehicle parking, landscaping around new facilities, and hazardous materials and waste storage connected to water treatment activities. Landscape maintenance may introduce sediments, nutrients, and organics (pesticides and herbicides).

In summary, the types of water quality pollutants expected to be present from operating the facility include:

- Oil, grease, and other lubricants
- Organics (paint, solvents, pesticides, herbicides, etc.)
- Nutrients (nitrogen and phosphorous from landscape maintenance)
- Trash
- Sediment

Preventive measures to address wastes associated with operating administration and support facilities are described in Section 2.

3.4 Area 4: SeaWorld Marina

The SeaWorld Marina contains a 1-acre shoreline land area and a 10-acre open water area. The water area contains the 200-slip marina operated by SeaWorld. Restroom, shower, and lounge facilities are provided for marina guests. On the east side of the marina is the water intake platform, which is one of two intake areas that provide sea water for SeaWorld's marine animals. The filter plant for the intake is located just to the south in Area 3.

Future allowed uses in Area 4 may include marina operations, boat mooring, boat storage, dry storage facilities, boat loading, restrooms, lounge facilities, bayside café, and parking.

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3.4.1 Previously Approved Marina Expansion

As provided in the 2002 Master Plan, the 2020 Master Plan proposes a future expansion of the existing marina by extending the three existing docks and adding a fourth dock to the west. The marina expansion would add 115 water berths for a total of 315 berths. This entitlement has been carried forward in the 2020 Master Plan as a future conceptual development and was only granted by the City. The CCC has not reviewed or granted approval of the marina expansion and is in no way bound by the development concept contained herein.

Water Quality Impacts from Construction Activities. The existing land uses in this area are boat launching and docking. Proposed new land uses would be the same, only expanded. Very minor demolition activities are anticipated since the docks are being extended and not replaced. Because construction activities will take place directly in the water of Mission Bay, special considerations need to be taken to prevent construction materials from coming in contact with or discharging into the water. Construction materials will be stored outdoors. A variety of construction products and materials will be used in various stages of the project, including concrete, paints, lubricants, fuels, solvents, adhesives, coatings, etc.

Potential pollutants resulting from demolition and construction activities are expected to include:

- Sediment
- Fuel, oil, grease, and other lubricants
- Organics (from paint, solvents, etc.)
- Concrete wastes (elevated pH)

Preventive measures to address water quality impacts associated with demolishing and constructing the marina expansion project are described in Section 2.

Impacts from Long-Term Operation. The project would result in an expanded marina operation similar to but larger than the existing operation. The types of water quality impacts associated with operating the expanded area would be the same as under the current operation. The number of boats would increase (from 200 to 315); therefore, the potential pollutant load from the operation would be expected to increase commensurably. Notably, since most uses of this facility occur directly in or adjacent to Mission Bay, the potential for direct discharge is higher than for other uses of SeaWorld.

Potential pollutants expected from the operation of the marina include:

- Fuel, oil, and grease (leakage from boats and boat fueling)
- Bacteria (from sanitary waste discharges/spills)
- Heavy metals, particularly copper (from boat bottom antifouling paints)

Preventive measures to address water quality impacts associated with operating the expanded marina are described in Section 2.

3.5 Area 5: Perez Cove Shoreline

The Perez Cove Shoreline area consists of 11.4 acres of land between the Perez Cove shoreline on the east and Perez Cove Way on the west. The northern portion of the area contains the Hubbs-SeaWorld Research Institute and parking lot. Additional asphalt parking areas and landscaping cover the remaining area. The parking area serves marina guest and is an auxiliary lot for SeaWorld employees.

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Future allowed uses in Area 5 may include parking, a hotel, visitor -serving commercial/recreation uses, research and meeting facilities, and parkland.

3.5.1 Previously Approved Hotel

As provided in the 2002 Master Plan, the 2020 Master Plan includes a future 300-room hotel. The conceptual proposal includes a ballroom, meeting rooms, surface parking, and a parking structure. A small landing dock for hotel guests will be built in the Perez Cove Shoreline directly behind the hotel. Additional access from the shoreline to the marina docks will be provided on the north side of the site. Prior to project review, SeaWorld will provide an economic feasibility analysis assessing the need for another hotel in Mission Bay Park. The CCC has not reviewed or granted approval of the hotel and is in no way bound by the development concept contained herein.

Water Quality Impacts from Construction Activities. Existing (pre-construction) uses of this area are vehicle parking and access areas. Demolition activities associated with constructing the new building will involve asphalt removal and minor demolition. The asphalt will be trucked off site and recycled, if possible. Facility construction will involve significant heavy equipment for grading (earth-moving equipment, dump trucks, etc.). Utilities (electrical, water, sewer, storm drain) will be trenched. Construction materials will be stored outdoors. A variety of construction products and materials will be used in various stages of the project, including paints, lubricants, fuels, solvents, adhesives, coatings, etc.

Potential pollutants resulting from demolition and construction activities are expected to include:

- Sediment
- Fuel, oil, grease, and other lubricants
- Organics (from paint, solvents, etc.)
- Concrete wastes (elevated pH)
- Nutrients (nitrogen and phosphorous from initial landscaping)

Impacts from Long-Term Operation. The final area will result in a series of hotel buildings and appurtenant structures with most human activities occurring indoors. The majority of potential water quality impacts are associated with parking and landscaping around the new structures, and from use of the boat landing dock; therefore, the types of water quality pollutants expected to be present from operating this facility include:

- Fuel, oil, grease, and other lubricants (from vehicle leaks in the parking lot and leakage from boats at the landing dock)
- Nutrients (nitrogen and phosphorous from landscape maintenance)
- Sediment

Preventive measures to address water quality impacts associated with operating the hotel are described in Section 2.

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Section 4

Significance Conclusions

After reviewing the proposed master-planned activities and assuming continued compliance with existing BMPs, proposed BMPs under a possible CGP, and the NPDES permit, the SeaWorld 2020 Master Plan does not present significant impacts to water quality, and no mitigation measures are recommended.

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Section 5

Limitations

This document was prepared solely for SeaWorld in accordance with professional standards at the time the services were performed and in accordance with the contract between SeaWorld and Brown and Caldwell dated September 10, 2019. This document is governed by the specific scope of work authorized by SeaWorld; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by SeaWorld and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

This document sets forth the results of certain services performed by Brown and Caldwell with respect to the property or facilities described therein (the Property). SeaWorld recognizes and acknowledges that these services were designed and performed within various limitations, including budget and time constraints. These services were not designed or intended to determine the existence and nature of all possible environmental risks (which term shall include the presence or suspected or potential presence of any hazardous waste or hazardous substance, as defined under any applicable law or regulation, or any other actual or potential environmental problems or liabilities) affecting the Property. The nature of environmental risks is such that no amount of additional inspection and testing could determine as a matter of certainty that all environmental risks affecting the Property had been identified. Accordingly, THIS DOCUMENT DOES NOT PURPORT TO DESCRIBE ALL ENVIRONMENTAL RISKS AFFECTING THE PROPERTY, NOR WILL ANY ADDITIONAL TESTING OR INSPECTION RECOMMENDED OR OTHERWISE REFERRED TO IN THIS DOCUMENT NECESSARILY IDENTIFY ALL ENVIRONMENTAL RISKS AFFECTING THE PROPERTY.

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Section 6

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Appendix A: SeaWorld Planning Area Boundaries

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Appendix B: Mission Bay Water Quality Data and SeaWorld's Water Quality Systems

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Appendix B

Mission Bay Water Quality Data and SeaWorld's Water Quality Systems

B.1 Water Quality Constituents and Factors

Mission Bay is located along the City's coastline just north of the San Diego River mouth. Mission Bay and the lands surrounding it have been developed as an extensive public park for a variety of recreational uses. SeaWorld is located on the southwestern shores of Mission Bay on a 189-acre parcel leased from the City. Mission Bay is tidally influenced and receives fresh water inputs from three main tributaries (Rose Creek, Tecolote Creek, and Cudahy Creek), as well as numerous storm drains that discharge into it. Most of the storm drain pump stations, as well as Rose Creek and Tecolote Creek, have been fitted with low-flow interceptors to direct non-stormwater flows to the sanitary sewer. During storm events, the low-flow interceptors are bypassed, allowing storm flows to enter the bay. Urban stormwater runoff may contain a variety of pollutants, including oil and grease, heavy metals, sediment, nutrients, and bacteria. There are routine beach and bay closures and advisories issued for Mission Bay (although none are known to be attributable to SeaWorld). Most are the result of sewer spills and overflows. It is hard to source and measure storm drain flows. Low flow or dry weather flows from storm drain outlets are particularly problematic.

There is relatively limited data on the receiving water quality of Mission Bay. Most of the sampling conducted has been done at various areas around the bay, rather than directly adjacent to SeaWorld. Therefore, there is no existing historical data set for evaluating the background water quality directly offshore from SeaWorld. The following sections present a summary of data available from various agencies and SeaWorld after 2001. Data prior to that date is discussed in the 2000 Water Quality Analysis for the SeaWorld Master Plan Update (URS 2000). It is important to note that the data was collected for purposes other than evaluating overall water quality in Mission Bay and are limited to certain specific areas.

B.1.1 Mission Bay Background Data

Several shoreline areas of Mission Bay have been designated as impaired for indicator bacteria (*Enterococcus*, total coliform, and fecal coliform), and are currently on the 303(d) list of impaired waters for Total Maximum Daily Load (TMDL) development[1]. A bacteria TMDL exists for Mission Bay and was based on the 2002 303(d) listings[1]. Wasteload allocations were derived for Municipal Separate Storm Sewer System (MS4) permittees but did not assign a wasteload allocation to SeaWorld discharges. Other listed impairments also exist in Mission Bay at the mouth of Rose Creek (eutrophic, lead), the mouth of Tecolote Creek (eutrophic, lead), and in Quivira Basin (copper) [1]. Park

[1] AMEC Foster Wheeler Environment & Infrastructure, Inc., *Mission Bay Watershed Management Area Water Quality Improvement Plan*, Technical Document prepared for the City of San Diego and Caltrans, submitted to the San Diego Regional Water Quality Control Board, February 2016.

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discharges are not expected to be a reasonable source or contributor to the non-bacteria impairment listings given their lack of proximity to impairment locations.

A robust and comprehensive study by the City[2] evaluated indicator bacteria levels in Mission Bay with source identification techniques and identified potential management options. Total coliform, fecal coliform, and *Enterococcus* concentrations from locations in the vicinity of Park discharges exceeded the water quality standards less frequently than other areas of Mission Bay. The study ultimately concluded excessive irrigation runoff, storm drains, intertidal sediments, and wrack line deposits served to convey and amplify bacteria levels in Mission Bay[2]. In particular, avian bacteria inputs were shown to directly run off to the bay or were transported to the bay via storm drains from excessive irrigation during the dry season[2]. The Mission Bay watershed has 19 persistent MS4 outfalls[3], 6 of which discharge directly to Mission Bay, and 9 of which discharge to a tributary flow to Mission Bay[1]. One of these persistent MS4 outfalls is located in the vicinity of SeaWorld discharges in Perez Cove.

Of the areas listed as impaired for bacteria in Mission Bay or investigated for excessive bacteria inputs by the City (2004), none are located within the direct vicinity of SeaWorld's NPDES discharges. Water quality issues in Mission Bay have been focused on shorelines and sub-embayments where flushing and exchange with ocean water are expected to be minimal.

Sediments are a known potential contributor to bacteria levels in Mission Bay[1,2]. Bacteria may be transported to the bay with sediment in stormwater runoff or can be resuspended from shallow bottom sediments by wave action, wind, or human activity (e.g., boats or swimmers). Investigations into the role of sediment in Mission Bay bacteria levels conclude that while site-specific characteristics are important, sediment impacts to receiving waters appear to be relatively minor. In some locations where sediment can be disturbed by swimmers or maximal tidal currents, sediment and bacteria can be transported to receiving waters, usually in the intertidal areas[2].

Data obtained from the State Water Resources Control Board Beach Monitoring Data website indicate extensive monitoring of bacterial indicators (total coliform, fecal coliform, and *Enterococcus*) in Mission Bay from 1998 to present. Examining the data from 2001 to 2019, water samples have been collected at 24+locations throughout the bay and analyzed for the three indicators on a weekly basis. The samples have been collected to assess the quality of the water for recreational uses. The data indicate widespread presence of bacteria throughout the bay. The concentrations of these indicator bacteria vary widely (between less than 2 most probable number per 100 milliliter [MPN/100 mL] and several thousands). In some cases, the densities of bacteria observed in Mission Bay exceed the standards for water-contact recreation (REC-1). The single-sample REC-1 standards are 10,000 MPN/100 mL for total coliform, 400 MPN/100mL for fecal coliform, and 104 MPN/100 mL for *Enterococcus*. Exceedances of REC-1 standards have led to postings for portions of Mission Bay (i.e., providing health warnings to people using the bay).

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[2] City of San Diego, *Mission Bay Clean Beaches Initiative Bacterial Source Identification Study Final Report*, Technical Report prepared by City of San Diego Metropolitan Wastewater Department, Stormwater Pollution Prevention Program in conjunction with MEC Analytical Systems – Weston Solutions, Inc., prepared for the California State Water Resources Control Board, September 2004.

[3] A 'persistent outfall' is defined in AMEC (2016) as "the presence of flowing, pooled, or ponded water more than 72 hours after a measurable rainfall event of 0.10 inch or greater during three consecutive monitoring and/or inspection events."

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B.1.2 SeaWorld Fireworks Program Data

SeaWorld has been performing water and sediment sampling in Mission Bay since 2001 to monitor the potential impacts of the summer fireworks program to both water and sediment[4]. Initial water and sediment sampling was conducted during yearly events between 2001 and 2004 (SAIC 2001, 2002, 2003, and 2004). These monitoring events and reports presented metals concentrations for water and sediment samples and included statistical analyses of the results to evaluate the impacts of the fireworks events on Mission Bay. Results from the 2001 to 2004 monitoring events indicated:

1. No statistically significant spatial or temporal patterns in concentrations of metals, with the exception of a slight increase in barium over reference concentrations.
2. Fireworks residue was not accumulating and creating deleterious effects in water or sediments within Mission Bay.

In 2006, at the request of the California Regional Water Quality Control Board San Diego Region (Water Board), SeaWorld conducted a detailed assessment of water, sediment, and fireworks debris. Results from the 2006 sampling indicated metals concentrations in water and sediment were similar to the results from previous investigations and that semi-volatile organic compounds (SVOC) and explosives residue were generally not reported above the laboratory method detection limit (MDL) or at low concentrations. Inorganic compounds reported were also typical of a salt water environment. Perchlorate was reported at low concentrations in water and, similar to reports in the literature (Wilkens et. al. 2007), was believed to attenuate quickly subsequent to deposition.

Additional sediment sampling was performed on January 4, 2007. The results showed that concentrations of marker metals in the fireworks area were generally similar to other areas of Mission Bay, and that sediment texture was a factor affecting metals concentrations. Upon completing the initial investigative activities, the Water Board developed Addendum No. 1 to Order No. R9-2005-0091 of SeaWorld's NPDES Permit No. CA0107336 (NPDES Permit), "Waste Discharge Requirements for SeaWorld of California, San Diego County." Addendum No. 1 requested sampling of water and sediment be conducted after three firework events in the Fireworks Deposition Zone (FDZ) and at two reference locations between 2008 and 2010. Overall, the findings of the 2008 through 2010 sampling events indicated there is some enrichment of metals and other chemicals in sediments. Perchlorate was also observed in surface water, but chemical concentrations in sediments and water were below applicable regulatory thresholds and toxicity of the sediment was actually higher in March prior to the fireworks program being performed. Benthic infauna analysis indicated more disturbed habitat in the reference locations when compared to the FDZ.

On June 1, 2011, the Water Board issued Order No. R9-2011-0022, General NPDES Permit for Residual Firework Pollutant Waste Discharges to Waters of the United States in the San Diego Region from the Public Display of Fireworks (the Fireworks General Permit) for public and private fireworks events over surface water bodies in the San Diego region became effective, under which SeaWorld was designated a Category 1 discharger. SeaWorld's firework events then became covered under NPDES Permit No. CAG999002. The Fireworks General Permit requires SeaWorld to conduct water and sediment sampling after the conclusion of SeaWorld's summer fireworks events (Labor Day weekend). Water samples are analyzed for SVOCs, perchlorate, total phosphorus, and total and dissolved metals. Sediment samples are analyzed for grain size, chemistry (total organic carbon, metals, polycyclic aromatic hydrocarbons, phenol, phthalate compounds, polychlorinated biphenyls, and pesticides), toxicity, and benthic infauna. The sample locations can be found on the map provided in Appendix C. Three sample sites within the FDZ are chosen at random each sampling

[4] Brown and Caldwell, *Fireworks Monitoring and Reporting Work Plan*, prepared for SeaWorld Parks and Entertainment Inc. November 30, 2011.

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cycle for the water and sediment samples. Two reference locations are sampled (Sailbay and Rose Creek) in accordance with the 2011 Fireworks Monitoring Plan. The FDZ and reference sites are also shown on the map in Appendix C.

B.1.3 SeaWorld NPDES Data

In compliance with Order No. R9-2000-25, a previous version of the NPDES Permit, SeaWorld conducted a eutrophication study in Mission Bay for 12 months from 2000 to 2001[5]. The study analyzed data from seven monitoring locations, including two locations adjacent to SeaWorld's effluent discharges, and examined inputs of nitrates and phosphate nutrients into the Mission Bay system. It also studied the levels of dissolved oxygen (DO) and phytoplankton (algae) in the bay. The study established there was no eutrophication in Mission Bay. DO levels were consistently above levels in the Water Quality Control Plan for the San Diego Basin (Basin Plan). Results for phytoplankton (algae) indicate relatively low chlorophyll-a concentrations, indicating limited algal production in Mission Bay. The mean value for all sites was 2.6 micrograms per liter (µg/L). Mean concentrations for all sampling locations were 0.13 milligrams per liter (mg/L) for ammonia, 0.21 mg/L for nitrate, 0.10 mg/L for total phosphorus, 0.05 mg/L for orthophosphorus, and 1.10 mg/L for total Kjeldahl nitrogen (TKN).

Order No. R9-2011-0032, as amended by Order No. R9-2013-0034, required SeaWorld to monitor two stormwater bypass events at a representative stormwater bypass discharge location. SeaWorld sampled four stormwater bypass events at Monitoring Location SW-01 between December 13, 2012, and March 7, 2016. SeaWorld sampled one stormwater bypass event at Monitoring Location SW-02 (February 28, 2014). The locations of SW-01 and SW-02 are shown on the map in Appendix C. The maximum results of grab samples are shown in Table B-1 below.

Table B-1. Historic Stormwater Bypass Monitoring Data

Pollutant	Unit	Monitoring Location SW-01	Monitoring Location SW-02
pH	s.u.	7.76	7.75
Total Coliform	MPN/100 mL	16,000	5,000
Fecal Coliform	MPN/100 mL	5,000	3,000
Enterococcus	CFU/100 mL	16,000	56
Ammonia	mg/L	0.18	0.25
Oil and Grease	mg/L	ND	ND
TSS	mg/L	209	38
Settleable Solids	mL/L	0.70	0.2
Turbidity	NTU	64	31.6
Residual Chlorine	µg/L	NA	NA
Copper	µg/L	76	ND
Silver	µg/L	ND	ND

[5] Law Crandall, A Division of Law Engineering and Environmental Services, Inc., *SeaWorld San Diego Eutrophication Summary Report 2000-2001*, prepared for SeaWorld Adventure Parks, Law Project No. 70311-0-0144, 2002.

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Table B-1. Historic Stormwater Bypass Monitoring Data			
Pollutant	Unit	Monitoring Location SW-01	Monitoring Location SW-02
Cyanide	µg/L	3.7	--
Zinc	µg/L	110	--

µg/L = micrograms per liter; CFU =colony-forming unit; mL = milliliter; mg/L = milligrams per liter; MPN = most probable number; NA = not applicable; ND = non-detectable; NTU = nephelometric turbidity units; s.u = pH standard unit; TSS = total suspended solids.

As a component of the updated NPDES Permit (Order R9-2018-0004, effective date August 1, 2018), SeaWorld is required to conduct a receiving water monitoring program. SeaWorld monitors bacterial indicators (total coliform bacteria, fecal coliform bacteria, and *Enterococcus*) as well as field measurements for temperature, pH, salinity, specific conductivity, and DO. Water samples are collected from nine locations. The stations can be found on the map in Appendix C and include influent and effluent point stations (W-INF, EFF-002, E-INF, EFF-001) positioned in Mission Bay to characterize the effluent plume based on an incoming or outgoing tide during a given sampling event (SW-1, SW-2, SW-3, SW-4), and a reference location assumed to be outside the influence of the effluent plume regardless of tide (REF-1). The location of the reference station is the same as the reference location monitored during the eutrophication study conducted by SeaWorld in 2000 to 2001[5]. Because the sampling is ongoing (the program began collecting samples in March 2019), no annual reports are available for review at the time of this Water Quality Report. This program is designed to measure the effects of SeaWorld's discharge on the receiving waters of Mission Bay.

As part of complying with its NPDES Permit, SeaWorld routinely samples effluent water quality from its water treatment discharge outfalls. A review of the NPDES effluent monitoring data from September 2011 through December 2017 is provided in Table B-2.

Table B-2. Historic Effluent Limitations and Monitoring Data for Discharge Point Nos. 001 and 002						
Parameter	Units	Effluent Limitations			Monitoring Data (September 2011 through December 2017)	
		6-Month Median	Average Monthly	Maximum Daily	Highest Average Monthly	Highest Maximum Daily
Discharge Point No.001						
Flow	mgd	--	--	3.24	--	2.59
Oil and Grease	mg/L	--	25	75	4.7	4.7
	lbs/day	--	676	2,026	57.5	57.5
TSS	mg/L	Narrative [1]			2.6	2.6
Settleable Solids	mg/L	--	1.0	3.0	<0.1	<0.1
Turbidity	NTU	--	75	225	1.7	1.7
pH	s.u.	--	7.0-9.0		7.0-8.04	
Ammonia	mg/L	--	--	0.55	--	0.22
	lbs/day	--	--	15	--	1.71
Chlorine Residual	mg/L	--	0.21	0.42	0.07	0.34

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Table B-2. Historic Effluent Limitations and Monitoring Data for Discharge Point Nos. 001 and 002						
Parameter	Units	Effluent Limitations			Monitoring Data (September 2011 through December 2017)	
		6-Month Median	Average Monthly	Maximum Daily	Highest Average Monthly	Highest Maximum Daily
	lbs/day	--	5.7	11.3	0.39	0.49
Copper, Total Recoverable	µg/L	24	38.13	76.5	17.6	17.6
	lbs/day	0.65	1.0	2.1	0.7	0.4
Silver, Total Recoverable	µg/L	6.5	23.16	36	4.03	4.03
	lbs/day	0.2	0.6	1.0	0.06	0.06
Enterococcus	CFU/100 mL	--	35	104	19.6	90
Fecal Coliform	MPN/100 mL	Narrative [2]			8.81	5,000
Total Coliform	MPN/100 mL	Narrative [3]			10.5	16,000
Chronic Toxicity	TU_C	Narrative [4]			--	1.0
Discharge Point No.002						
Flow	mgd	--	--	6.12	--	3.19
Oil and Grease	mg/L	--	25	75	4.3	4.3
	lbs/day	--	1,276	3,828	88.4	88.4
TSS	mg/L	Narrative [2]			11.5	16.5
Settleable Solids	mg/L	--	1.0	3.0	ND	ND
Turbidity	NTU	--	75	225	1.3	1.3
pH	s.u.	--	7.0-9.0		7.52-8.06	
Ammonia	mg/L	--	--	0.55	--	0.14
	lbs/day	--	--	28.1	--	2.88
Chlorine Residual	mg/L	--	0.21	0.42	0.06	0.14
	lbs/day	--	10.7	21.4	0.44	0.49
Copper, Total Recoverable	µg/L	24	38.13	76.5	37.5	37.5
	lbs/day	1.2	1.9	3.9	0.7	0.7
Silver, Total Recoverable	µg/L	6.5	23.16	36	2.17	2.17
	lbs/day	0.33	1.2	1.8	0.04	0.04
Enterococcus	CFU/100 mL	--	35	104	2.9	8
Fecal Coliform	MPN/100 mL	Narrative [2]			7.29	2,400
Total Coliform	MPN/100 mL	Narrative [3]			25	16,000
Chronic Toxicity	TU_C	Narrative [4]			1	1

TU_c = chronic toxicity unit

Narratives:

1. *The concentration of suspended solids in the discharge of aquaria wastewater through Outfall No. 001 shall not be increased in excess of 10 mg/L as a monthly average or 15 mg/L as a daily maximum when compared to the suspended solids concentration in the intake water.*

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2. *The fecal coliform concentration based on a minimum of not less than five samples over a calendar month shall not exceed a log mean of 200/100mL, nor shall more than 10 percent of total samples during any calendar month exceed 400/100mL.*
3. *The median total coliform concentration throughout the water column for any calendar month shall not exceed 70/100mL nor shall more than 10 percent of the samples collected during any calendar month exceed 230/100 mL for a five-tube decimal dilution test or 330/100 mL when a three-tube dilution test is used.*
4. *There shall be no chronic toxicity in the effluent discharge.*

In addition to effluent monitoring, SeaWorld also measures bacteria levels in the influent to the treatment system from Mission Bay. Brown and Caldwell analyzed effluent and influent water quality data in the SeaWorld Receiving Water Monitoring Program Work Plan[6]. Indicator bacteria samples (total coliform, fecal coliform, and *Enterococcus*) collected between December 2013 and July 2018 indicate SeaWorld effluent typically has very low levels of bacteria. During the period of this review (approximately 4.5 years), SeaWorld's discharge did not exceed any of the applicable bacteria water quality criteria. More than 70 percent of the total coliform, 80 percent of fecal coliform, and 90 percent of *Enterococcus* samples were reported to have concentrations below the laboratory MDL, indicating very low levels or no bacteria are typically discharged in SeaWorld effluent. Even in samples where bacteria are detected, the effluent levels are typically very low. In fact, *Enterococcus* bacteria were never detected above 7 CFU/100 mL.

A comparison of influent and effluent quality was conducted to evaluate the potential of SeaWorld's NPDES discharges to affect Mission Bay receiving waters. A same-day comparison of influent and effluent samples revealed influent bacteria concentrations are higher than effluent concentrations in more than 90 percent of the samples; thus, most of the time, water discharges to Mission Bay have lower bacteria levels than the water taken into SeaWorld's NPDES system from Mission Bay.

The NPDES Permit water quality requirements of the effluent are described in Table B-3.

B.2 SeaWorld's Water Quality Systems

SeaWorld is committed to maintaining a clean, attractive park while ensuring compliance with applicable environmental requirements (NPDES Permit and SWPPP). Because SeaWorld maintains numerous marine habitats, it operates two water treatment facilities on the premises. In addition, SeaWorld implements non-structural control measures (e.g., street sweeping) to remove sediments and pollutants from paved surfaces.

SeaWorld has a sanitary sewer system that collects sanitary sewage and restaurant drainage from throughout SeaWorld and discharges to the City's sanitary sewer system. Saltwater used to provide habitat for aquatic animals and SeaWorld's saltwater restroom, along with stormwater from the internal Park areas, is collected in two discrete pipeline systems. SeaWorld currently has one saltwater restroom and has plans to add more saltwater restrooms in the future. The water is drawn from Mission Bay and treated. The water is filtered and disinfected with chlorine to produce a suitable environment for the exhibit mammals tolerant to chlorine. Saltwater used in the fish exhibits is filtered and disinfected using ozone and ultraviolet light at specific exhibit locations. The water from the exhibits, marine habitats, and other exhibit pools is continually cycled through the systems and then pumped to one of SeaWorld's two water treatment facilities. Each facility is designed with a diversion weir to collect stormwater flows when system capacity is exceeded due to stormwater discharges. These weirs function as a high-flow bypass; treatment of "first flush" stormwater is provided even during large storm events. In total, there are two stormwater bypass discharge points located in the west-side collection system, and four located in the east-side collection system. Each

[6] Brown and Caldwell, SeaWorld San Diego Receiving Water Monitoring Program Work Plan, January 2019.

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of the treatment systems eventually discharges into Mission Bay along the northern boundary of SeaWorld. The treatment systems, distinguished as the East and West WWTPs, collect and treat the water with sodium hypochlorite and sodium sulfite prior to being discharged to Mission Bay. The fact that the majority of stormwater runoff from inside SeaWorld is collected and treated is itself a stormwater BMP. In this regard, SeaWorld is implementing a stormwater BMP that is more intensive than those implemented at the vast majority of industrial facilities within San Diego County.

The East and West WWTPs are chlorination/dechlorination treatment systems. Both facilities transfer saltwater from diverter basins into chlorine contact chambers where the water is disinfected by injecting sodium hypochlorite. After an extended contact period during which water is moved through a series of contact chambers, any residual chlorine remaining is neutralized by reaction to injected sodium sulfite before the water is discharged to Mission Bay. The plant is designed to operate automatically but can be operated semi-automatically or manually if the need arises. Among the automatically controlled devices are the vault pumps and their related valves (flow and chemical), and the chlorine and sodium sulfite metering pumps. Automatic system control and monitoring is accomplished by means of an interactive computer system, chlorine residual analyzers, and controllers for both chlorine and sodium sulfite. The computer is interfaced through a multiplexer with sensing and control devices. The computer gathers data from the system, displays these data, and allows setting of control parameters and control of certain system devices. The chlorine residual analyzers sample wastewater from the treatment system at three points in each system, measuring the chlorine residual in mg/L. These residual readings are signaled to controllers to meter chlorine and sodium sulfite use as well as to recorders and the computer. The desired residual chlorine measurement is 0.0 mg/L. The disinfected, dechlorinated water is then discharged to Mission Bay.

Discharges from the East and West WWTPs are covered under SeaWorld's NPDES Permit. The NPDES Permit requires monitoring of the discharge to Mission Bay at two points—the East and West WWTP outfalls to Mission Bay. The NPDES Permit covers the discharge of continuous flows from the marine habitats, intermittent flows from pool draining, facility irrigation and wash down waters, and stormwater discharges. Maximum permissible discharges under the NPDES Permit are 3.24 and 6.12 mgd from the East and West WWTP outfalls, respectively. At this time, SeaWorld has significant excess capacity in the systems, except during periods of high rainfall. The average total combined flow from the WWTPs during dry weather is less than 6 mgd. SeaWorld is required to monitor the water quality of the effluent from its outfalls. The effluent limits are provided in Table 1-3. The most recent Basin Plan was updated in 2016, and its requirements are covered by the recently revised NPDES Permit (Order No. R9-2018-0004).

The standards for total and fecal coliform are narrative and based on rolling 30-day average values. The standards are stringent and are designed to protect shellfish harvesting. For fecal coliform, the standard states that the concentration shall not exceed the geometric mean of 200 MPN/100 mL based on at least five samples in any 30-day period, and that no more than 10 percent of the samples in any given 30-day period shall exceed 400 MPN/100 mL. For total coliform, the standard requires that the median concentration shall not exceed 70 MPN/100 mL in any 30-day period, and that no more than 10 percent of the samples in any given 30-day period shall exceed 230 MPN/100 mL (five-tube test) or 330 MPN/100 mL (three-tube test).

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Table B-3. NPDES Permit Discharge Limitations (as revised by Order No. R9-2018-0004)				
Constituent	**Unit**	**Average Monthly**	**Maximum Daily**	**Instantaneous Maximum**
Chronic Toxicity	Pass/Fail and % effect	-	-	Pass and less than 50% effect
pH	pH units	-	-	7.0-9.0
TSS	mg/L	Narrative [1]		
Settleable Solids	mg/L	1.0	-	3.0
Turbidity	NTU	75	-	225
Oil & Grease	mg/L	25	-	75
Ammonia	mg/L	-	-	0.55
Total Chlorine Residual	mg/L	0.21	-	0.42
Copper, Total Recoverable	µg/L	38.1	76.5	-
Silver	µg/L	20.99	36	-
Chronic Toxicity (Test of Significant Toxicity)	Pass/Fail and % effect	-	-	Pass and less than 50% effect
Enterococcus	MPN/100 mL	35	-	104
Fecal Coliform	MPN/100 mL	Narrative[2]		
Total Coliform	MPN/100 mL	Narrative [2]		

Narratives:

1. *The concentration of suspended solids shall not be increased in excess of 10 mg/L as a monthly average or 15 mg/L as a daily maximum when compared to the suspended solids concentration in the intake.*
2. *The fecal coliform concentration for the effluent for the calendar month based on a minimum of five samples shall not exceed a geometric mean of 200/100mL, and 400/100 mL in more than 10 percent of samples collected.*

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Appendix C: SeaWorld Water and Sediment Monitoring Locations

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Appendix A: SeaWorld Planning Area Boundaries

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478,181

479,705

AREA 5

Future Marina Expansion Site

AREA 4

Ingraham St

Future Hotel Site

AREA 3

AREA 1

AREA 2

W Mission Bay Dr

Sea World Dr

Future Parking Garage Site

3,625,095

3,625,095

Legend

- 2002 - Master Plan
- 2020 - Master Plan
- Previously Approved Projects

478,181

479,705

Brown AND Caldwell

Date:	Dec 3, 2019
Project No:	154018
Client:	SeaWorld Master Plan
Figure ID:	SWMP3191203

Basemap: ESRI, USGS, SeaWorld (2019), Linscott Law & Greenspan Engineers (2000)

0 240 480 960

Feet

Appendix A
SeaWorld Master Plan Areas
SeaWorld Master Plan

Path: \\bcsanfp01\projects\Projects\Sea World\154018 - SeaWorld Master Plan Update 2019\GIS\MXDs\SeaWorldMP_MasterPlans_11x17.mxd
Last saved by: PWatts.20191203.1532

Coordinate System: NAD 1983 UTM Zone 11N
Datum: North American 1983

Appendix B: Mission Bay Water Quality Data and SeaWorld's Water Quality Systems

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Appendix B

Mission Bay Water Quality Data and SeaWorld's Water Quality Systems

B.1 Water Quality Constituents and Factors

Mission Bay is located along the City's coastline just north of the San Diego River mouth. Mission Bay and the lands surrounding it have been developed as an extensive public park for a variety of recreational uses. SeaWorld is located on the southwestern shores of Mission Bay on a 189-acre parcel leased from the City. Mission Bay is tidally influenced and receives fresh water inputs from three main tributaries (Rose Creek, Tecolote Creek, and Cudahy Creek), as well as numerous storm drains that discharge into it. Most of the storm drain pump stations, as well as Rose Creek and Tecolote Creek, have been fitted with low-flow interceptors to direct non-stormwater flows to the sanitary sewer. During storm events, the low-flow interceptors are bypassed, allowing storm flows to enter the bay. Urban stormwater runoff may contain a variety of pollutants, including oil and grease, heavy metals, sediment, nutrients, and bacteria. There are routine beach and bay closures and advisories issued for Mission Bay (although none are known to be attributable to SeaWorld). Most are the result of sewer spills and overflows. It is hard to source and measure storm drain flows. Low flow or dry weather flows from storm drain outlets are particularly problematic.

There is relatively limited data on the receiving water quality of Mission Bay. Most of the sampling conducted has been done at various areas around the bay, rather than directly adjacent to SeaWorld. Therefore, there is no existing historical data set for evaluating the background water quality directly offshore from SeaWorld. The following sections present a summary of data available from various agencies and SeaWorld after 2001. Data prior to that date is discussed in the 2000 Water Quality Analysis for the SeaWorld Master Plan Update (URS 2000). It is important to note that the data was collected for purposes other than evaluating overall water quality in Mission Bay and are limited to certain specific areas.

B.1.1 Mission Bay Background Data

Several shoreline areas of Mission Bay have been designated as impaired for indicator bacteria (*Enterococcus*, total coliform, and fecal coliform), and are currently on the 303(d) list of impaired waters for Total Maximum Daily Load (TMDL) development[1]. A bacteria TMDL exists for Mission Bay and was based on the 2002 303(d) listings[1]. Wasteload allocations were derived for Municipal Separate Storm Sewer System (MS4) permittees but did not assign a wasteload allocation to SeaWorld discharges. Other listed impairments also exist in Mission Bay at the mouth of Rose Creek (eutrophic, lead), the mouth of Tecolote Creek (eutrophic, lead), and in Quivira Basin (copper) [1]. Park

[1] AMEC Foster Wheeler Environment & Infrastructure, Inc., *Mission Bay Watershed Management Area Water Quality Improvement Plan*, Technical Document prepared for the City of San Diego and Caltrans, submitted to the San Diego Regional Water Quality Control Board, February 2016.

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discharges are not expected to be a reasonable source or contributor to the non-bacteria impairment listings given their lack of proximity to impairment locations.

A robust and comprehensive study by the City[2] evaluated indicator bacteria levels in Mission Bay with source identification techniques and identified potential management options. Total coliform, fecal coliform, and *Enterococcus* concentrations from locations in the vicinity of Park discharges exceeded the water quality standards less frequently than other areas of Mission Bay. The study ultimately concluded excessive irrigation runoff, storm drains, intertidal sediments, and wrack line deposits served to convey and amplify bacteria levels in Mission Bay[2]. In particular, avian bacteria inputs were shown to directly run off to the bay or were transported to the bay via storm drains from excessive irrigation during the dry season[2]. The Mission Bay watershed has 19 persistent MS4 outfalls[3], 6 of which discharge directly to Mission Bay, and 9 of which discharge to a tributary flow to Mission Bay[1]. One of these persistent MS4 outfalls is located in the vicinity of SeaWorld discharges in Perez Cove.

Of the areas listed as impaired for bacteria in Mission Bay or investigated for excessive bacteria inputs by the City (2004), none are located within the direct vicinity of SeaWorld's NPDES discharges. Water quality issues in Mission Bay have been focused on shorelines and sub-embayments where flushing and exchange with ocean water are expected to be minimal.

Sediments are a known potential contributor to bacteria levels in Mission Bay[1,2]. Bacteria may be transported to the bay with sediment in stormwater runoff or can be resuspended from shallow bottom sediments by wave action, wind, or human activity (e.g., boats or swimmers). Investigations into the role of sediment in Mission Bay bacteria levels conclude that while site-specific characteristics are important, sediment impacts to receiving waters appear to be relatively minor. In some locations where sediment can be disturbed by swimmers or maximal tidal currents, sediment and bacteria can be transported to receiving waters, usually in the intertidal areas[2].

Data obtained from the State Water Resources Control Board Beach Monitoring Data website indicate extensive monitoring of bacterial indicators (total coliform, fecal coliform, and *Enterococcus*) in Mission Bay from 1998 to present. Examining the data from 2001 to 2019, water samples have been collected at 24+locations throughout the bay and analyzed for the three indicators on a weekly basis. The samples have been collected to assess the quality of the water for recreational uses. The data indicate widespread presence of bacteria throughout the bay. The concentrations of these indicator bacteria vary widely (between less than 2 most probable number per 100 milliliter [MPN/100 mL] and several thousands). In some cases, the densities of bacteria observed in Mission Bay exceed the standards for water-contact recreation (REC-1). The single-sample REC-1 standards are 10,000 MPN/100 mL for total coliform, 400 MPN/100mL for fecal coliform, and 104 MPN/100 mL for *Enterococcus*. Exceedances of REC-1 standards have led to postings for portions of Mission Bay (i.e., providing health warnings to people using the bay).

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[2] City of San Diego, *Mission Bay Clean Beaches Initiative Bacterial Source Identification Study Final Report*, Technical Report prepared by City of San Diego Metropolitan Wastewater Department, Stormwater Pollution Prevention Program in conjunction with MEC Analytical Systems – Weston Solutions, Inc., prepared for the California State Water Resources Control Board, September 2004.

[3] A 'persistent outfall' is defined in AMEC (2016) as "the presence of flowing, pooled, or ponded water more than 72 hours after a measurable rainfall event of 0.10 inch or greater during three consecutive monitoring and/or inspection events."

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B.1.2 SeaWorld Fireworks Program Data

SeaWorld has been performing water and sediment sampling in Mission Bay since 2001 to monitor the potential impacts of the summer fireworks program to both water and sediment[4]. Initial water and sediment sampling was conducted during yearly events between 2001 and 2004 (SAIC 2001, 2002, 2003, and 2004). These monitoring events and reports presented metals concentrations for water and sediment samples and included statistical analyses of the results to evaluate the impacts of the fireworks events on Mission Bay. Results from the 2001 to 2004 monitoring events indicated:

1. No statistically significant spatial or temporal patterns in concentrations of metals, with the exception of a slight increase in barium over reference concentrations.
2. Fireworks residue was not accumulating and creating deleterious effects in water or sediments within Mission Bay.

In 2006, at the request of the California Regional Water Quality Control Board San Diego Region (Water Board), SeaWorld conducted a detailed assessment of water, sediment, and fireworks debris. Results from the 2006 sampling indicated metals concentrations in water and sediment were similar to the results from previous investigations and that semi-volatile organic compounds (SVOC) and explosives residue were generally not reported above the laboratory method detection limit (MDL) or at low concentrations. Inorganic compounds reported were also typical of a salt water environment. Perchlorate was reported at low concentrations in water and, similar to reports in the literature (Wilkens et. al. 2007), was believed to attenuate quickly subsequent to deposition.

Additional sediment sampling was performed on January 4, 2007. The results showed that concentrations of marker metals in the fireworks area were generally similar to other areas of Mission Bay, and that sediment texture was a factor affecting metals concentrations. Upon completing the initial investigative activities, the Water Board developed Addendum No. 1 to Order No. R9-2005-0091 of SeaWorld's NPDES Permit No. CA0107336 (NPDES Permit), "Waste Discharge Requirements for SeaWorld of California, San Diego County." Addendum No. 1 requested sampling of water and sediment be conducted after three firework events in the Fireworks Deposition Zone (FDZ) and at two reference locations between 2008 and 2010. Overall, the findings of the 2008 through 2010 sampling events indicated there is some enrichment of metals and other chemicals in sediments. Perchlorate was also observed in surface water, but chemical concentrations in sediments and water were below applicable regulatory thresholds and toxicity of the sediment was actually higher in March prior to the fireworks program being performed. Benthic infauna analysis indicated more disturbed habitat in the reference locations when compared to the FDZ.

On June 1, 2011, the Water Board issued Order No. R9-2011-0022, General NPDES Permit for Residual Firework Pollutant Waste Discharges to Waters of the United States in the San Diego Region from the Public Display of Fireworks (the Fireworks General Permit) for public and private fireworks events over surface water bodies in the San Diego region became effective, under which SeaWorld was designated a Category 1 discharger. SeaWorld's firework events then became covered under NPDES Permit No. CAG999002. The Fireworks General Permit requires SeaWorld to conduct water and sediment sampling after the conclusion of SeaWorld's summer fireworks events (Labor Day weekend). Water samples are analyzed for SVOCs, perchlorate, total phosphorus, and total and dissolved metals. Sediment samples are analyzed for grain size, chemistry (total organic carbon, metals, polycyclic aromatic hydrocarbons, phenol, phthalate compounds, polychlorinated biphenyls, and pesticides), toxicity, and benthic infauna. The sample locations can be found on the map provided in Appendix C. Three sample sites within the FDZ are chosen at random each sampling

[4] Brown and Caldwell, *Fireworks Monitoring and Reporting Work Plan*, prepared for SeaWorld Parks and Entertainment Inc. November 30, 2011.

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cycle for the water and sediment samples. Two reference locations are sampled (Sailbay and Rose Creek) in accordance with the 2011 Fireworks Monitoring Plan. The FDZ and reference sites are also shown on the map in Appendix C.

B.1.3 SeaWorld NPDES Data

In compliance with Order No. R9-2000-25, a previous version of the NPDES Permit, SeaWorld conducted a eutrophication study in Mission Bay for 12 months from 2000 to 2001[5]. The study analyzed data from seven monitoring locations, including two locations adjacent to SeaWorld's effluent discharges, and examined inputs of nitrates and phosphate nutrients into the Mission Bay system. It also studied the levels of dissolved oxygen (DO) and phytoplankton (algae) in the bay. The study established there was no eutrophication in Mission Bay. DO levels were consistently above levels in the Water Quality Control Plan for the San Diego Basin (Basin Plan). Results for phytoplankton (algae) indicate relatively low chlorophyll-a concentrations, indicating limited algal production in Mission Bay. The mean value for all sites was 2.6 micrograms per liter (µg/L). Mean concentrations for all sampling locations were 0.13 milligrams per liter (mg/L) for ammonia, 0.21 mg/L for nitrate, 0.10 mg/L for total phosphorus, 0.05 mg/L for orthophosphorus, and 1.10 mg/L for total Kjeldahl nitrogen (TKN).

Order No. R9-2011-0032, as amended by Order No. R9-2013-0034, required SeaWorld to monitor two stormwater bypass events at a representative stormwater bypass discharge location. SeaWorld sampled four stormwater bypass events at Monitoring Location SW-01 between December 13, 2012, and March 7, 2016. SeaWorld sampled one stormwater bypass event at Monitoring Location SW-02 (February 28, 2014). The locations of SW-01 and SW-02 are shown on the map in Appendix C. The maximum results of grab samples are shown in Table B-1 below.

Table B-1. Historic Stormwater Bypass Monitoring Data

Pollutant	Unit	Monitoring Location SW-01	Monitoring Location SW-02
pH	s.u.	7.76	7.75
Total Coliform	MPN/100 mL	16,000	5,000
Fecal Coliform	MPN/100 mL	5,000	3,000
Enterococcus	CFU/100 mL	16,000	56
Ammonia	mg/L	0.18	0.25
Oil and Grease	mg/L	ND	ND
TSS	mg/L	209	38
Settleable Solids	mL/L	0.70	0.2
Turbidity	NTU	64	31.6
Residual Chlorine	µg/L	NA	NA
Copper	µg/L	76	ND
Silver	µg/L	ND	ND

[5] Law Crandall, A Division of Law Engineering and Environmental Services, Inc., *SeaWorld San Diego Eutrophication Summary Report 2000-2001*, prepared for SeaWorld Adventure Parks, Law Project No. 70311-0-0144, 2002.

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Table B-1. Historic Stormwater Bypass Monitoring Data			
Pollutant	Unit	Monitoring Location SW-01	Monitoring Location SW-02
Cyanide	µg/L	3.7	--
Zinc	µg/L	110	--

µg/L = micrograms per liter; CFU =colony-forming unit; mL = milliliter; mg/L = milligrams per liter; MPN = most probable number; NA = not applicable; ND = non-detectable; NTU = nephelometric turbidity units; s.u = pH standard unit; TSS = total suspended solids.

As a component of the updated NPDES Permit (Order R9-2018-0004, effective date August 1, 2018), SeaWorld is required to conduct a receiving water monitoring program. SeaWorld monitors bacterial indicators (total coliform bacteria, fecal coliform bacteria, and *Enterococcus*) as well as field measurements for temperature, pH, salinity, specific conductivity, and DO. Water samples are collected from nine locations. The stations can be found on the map in Appendix C and include influent and effluent point stations (W-INF, EFF-002, E-INF, EFF-001) positioned in Mission Bay to characterize the effluent plume based on an incoming or outgoing tide during a given sampling event (SW-1, SW-2, SW-3, SW-4), and a reference location assumed to be outside the influence of the effluent plume regardless of tide (REF-1). The location of the reference station is the same as the reference location monitored during the eutrophication study conducted by SeaWorld in 2000 to 2001[5]. Because the sampling is ongoing (the program began collecting samples in March 2019), no annual reports are available for review at the time of this Water Quality Report. This program is designed to measure the effects of SeaWorld's discharge on the receiving waters of Mission Bay.

As part of complying with its NPDES Permit, SeaWorld routinely samples effluent water quality from its water treatment discharge outfalls. A review of the NPDES effluent monitoring data from September 2011 through December 2017 is provided in Table B-2.

Table B-2. Historic Effluent Limitations and Monitoring Data for Discharge Point Nos. 001 and 002						
Parameter	Units	Effluent Limitations			Monitoring Data (September 2011 through December 2017)	
		6-Month Median	Average Monthly	Maximum Daily	Highest Average Monthly	Highest Maximum Daily
Discharge Point No.001						
Flow	mgd	--	--	3.24	--	2.59
Oil and Grease	mg/L	--	25	75	4.7	4.7
	lbs/day	--	676	2,026	57.5	57.5
TSS	mg/L	Narrative [1]			2.6	2.6
Settleable Solids	mg/L	--	1.0	3.0	<0.1	<0.1
Turbidity	NTU	--	75	225	1.7	1.7
pH	s.u.	--	7.0-9.0		7.0-8.04	
Ammonia	mg/L	--	--	0.55	--	0.22
	lbs/day	--	--	15	--	1.71
Chlorine Residual	mg/L	--	0.21	0.42	0.07	0.34

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Table B-2. Historic Effluent Limitations and Monitoring Data for Discharge Point Nos. 001 and 002						
Parameter	Units	Effluent Limitations			Monitoring Data (September 2011 through December 2017)	
		6-Month Median	Average Monthly	Maximum Daily	Highest Average Monthly	Highest Maximum Daily
	lbs/day	--	5.7	11.3	0.39	0.49
Copper, Total Recoverable	µg/L	24	38.13	76.5	17.6	17.6
	lbs/day	0.65	1.0	2.1	0.7	0.4
Silver, Total Recoverable	µg/L	6.5	23.16	36	4.03	4.03
	lbs/day	0.2	0.6	1.0	0.06	0.06
Enterococcus	CFU/100 mL	--	35	104	19.6	90
Fecal Coliform	MPN/100 mL	Narrative [2]			8.81	5,000
Total Coliform	MPN/100 mL	Narrative [3]			10.5	16,000
Chronic Toxicity	TU_C	Narrative [4]			--	1.0
Discharge Point No.002						
Flow	mgd	--	--	6.12	--	3.19
Oil and Grease	mg/L	--	25	75	4.3	4.3
	lbs/day	--	1,276	3,828	88.4	88.4
TSS	mg/L	Narrative [2]			11.5	16.5
Settleable Solids	mg/L	--	1.0	3.0	ND	ND
Turbidity	NTU	--	75	225	1.3	1.3
pH	s.u.	--	7.0-9.0		7.52-8.06	
Ammonia	mg/L	--	--	0.55	--	0.14
	lbs/day	--	--	28.1	--	2.88
Chlorine Residual	mg/L	--	0.21	0.42	0.06	0.14
	lbs/day	--	10.7	21.4	0.44	0.49
Copper, Total Recoverable	µg/L	24	38.13	76.5	37.5	37.5
	lbs/day	1.2	1.9	3.9	0.7	0.7
Silver, Total Recoverable	µg/L	6.5	23.16	36	2.17	2.17
	lbs/day	0.33	1.2	1.8	0.04	0.04
Enterococcus	CFU/100 mL	--	35	104	2.9	8
Fecal Coliform	MPN/100 mL	Narrative [2]			7.29	2,400
Total Coliform	MPN/100 mL	Narrative [3]			25	16,000
Chronic Toxicity	TU_C	Narrative [4]			1	1

TU_c = chronic toxicity unit

Narratives:

1. *The concentration of suspended solids in the discharge of aquaria wastewater through Outfall No. 001 shall not be increased in excess of 10 mg/L as a monthly average or 15 mg/L as a daily maximum when compared to the suspended solids concentration in the intake water.*

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2. *The fecal coliform concentration based on a minimum of not less than five samples over a calendar month shall not exceed a log mean of 200/100mL, nor shall more than 10 percent of total samples during any calendar month exceed 400/100mL.*
3. *The median total coliform concentration throughout the water column for any calendar month shall not exceed 70/100mL nor shall more than 10 percent of the samples collected during any calendar month exceed 230/100 mL for a five-tube decimal dilution test or 330/100 mL when a three-tube dilution test is used.*
4. *There shall be no chronic toxicity in the effluent discharge.*

In addition to effluent monitoring, SeaWorld also measures bacteria levels in the influent to the treatment system from Mission Bay. Brown and Caldwell analyzed effluent and influent water quality data in the SeaWorld Receiving Water Monitoring Program Work Plan[6]. Indicator bacteria samples (total coliform, fecal coliform, and *Enterococcus*) collected between December 2013 and July 2018 indicate SeaWorld effluent typically has very low levels of bacteria. During the period of this review (approximately 4.5 years), SeaWorld's discharge did not exceed any of the applicable bacteria water quality criteria. More than 70 percent of the total coliform, 80 percent of fecal coliform, and 90 percent of *Enterococcus* samples were reported to have concentrations below the laboratory MDL, indicating very low levels or no bacteria are typically discharged in SeaWorld effluent. Even in samples where bacteria are detected, the effluent levels are typically very low. In fact, *Enterococcus* bacteria were never detected above 7 CFU/100 mL.

A comparison of influent and effluent quality was conducted to evaluate the potential of SeaWorld's NPDES discharges to affect Mission Bay receiving waters. A same-day comparison of influent and effluent samples revealed influent bacteria concentrations are higher than effluent concentrations in more than 90 percent of the samples; thus, most of the time, water discharges to Mission Bay have lower bacteria levels than the water taken into SeaWorld's NPDES system from Mission Bay.

The NPDES Permit water quality requirements of the effluent are described in Table B-3.

B.2 SeaWorld's Water Quality Systems

SeaWorld is committed to maintaining a clean, attractive park while ensuring compliance with applicable environmental requirements (NPDES Permit and SWPPP). Because SeaWorld maintains numerous marine habitats, it operates two water treatment facilities on the premises. In addition, SeaWorld implements non-structural control measures (e.g., street sweeping) to remove sediments and pollutants from paved surfaces.

SeaWorld has a sanitary sewer system that collects sanitary sewage and restaurant drainage from throughout SeaWorld and discharges to the City's sanitary sewer system. Saltwater used to provide habitat for aquatic animals and SeaWorld's saltwater restroom, along with stormwater from the internal Park areas, is collected in two discrete pipeline systems. SeaWorld currently has one saltwater restroom and has plans to add more saltwater restrooms in the future. The water is drawn from Mission Bay and treated. The water is filtered and disinfected with chlorine to produce a suitable environment for the exhibit mammals tolerant to chlorine. Saltwater used in the fish exhibits is filtered and disinfected using ozone and ultraviolet light at specific exhibit locations. The water from the exhibits, marine habitats, and other exhibit pools is continually cycled through the systems and then pumped to one of SeaWorld's two water treatment facilities. Each facility is designed with a diversion weir to collect stormwater flows when system capacity is exceeded due to stormwater discharges. These weirs function as a high-flow bypass; treatment of "first flush" stormwater is provided even during large storm events. In total, there are two stormwater bypass discharge points located in the west-side collection system, and four located in the east-side collection system. Each

[6] Brown and Caldwell, SeaWorld San Diego Receiving Water Monitoring Program Work Plan, January 2019.

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of the treatment systems eventually discharges into Mission Bay along the northern boundary of SeaWorld. The treatment systems, distinguished as the East and West WWTPs, collect and treat the water with sodium hypochlorite and sodium sulfite prior to being discharged to Mission Bay. The fact that the majority of stormwater runoff from inside SeaWorld is collected and treated is itself a stormwater BMP. In this regard, SeaWorld is implementing a stormwater BMP that is more intensive than those implemented at the vast majority of industrial facilities within San Diego County.

The East and West WWTPs are chlorination/dechlorination treatment systems. Both facilities transfer saltwater from diverter basins into chlorine contact chambers where the water is disinfected by injecting sodium hypochlorite. After an extended contact period during which water is moved through a series of contact chambers, any residual chlorine remaining is neutralized by reaction to injected sodium sulfite before the water is discharged to Mission Bay. The plant is designed to operate automatically but can be operated semi-automatically or manually if the need arises. Among the automatically controlled devices are the vault pumps and their related valves (flow and chemical), and the chlorine and sodium sulfite metering pumps. Automatic system control and monitoring is accomplished by means of an interactive computer system, chlorine residual analyzers, and controllers for both chlorine and sodium sulfite. The computer is interfaced through a multiplexer with sensing and control devices. The computer gathers data from the system, displays these data, and allows setting of control parameters and control of certain system devices. The chlorine residual analyzers sample wastewater from the treatment system at three points in each system, measuring the chlorine residual in mg/L. These residual readings are signaled to controllers to meter chlorine and sodium sulfite use as well as to recorders and the computer. The desired residual chlorine measurement is 0.0 mg/L. The disinfected, dechlorinated water is then discharged to Mission Bay.

Discharges from the East and West WWTPs are covered under SeaWorld's NPDES Permit. The NPDES Permit requires monitoring of the discharge to Mission Bay at two points—the East and West WWTP outfalls to Mission Bay. The NPDES Permit covers the discharge of continuous flows from the marine habitats, intermittent flows from pool draining, facility irrigation and wash down waters, and stormwater discharges. Maximum permissible discharges under the NPDES Permit are 3.24 and 6.12 mgd from the East and West WWTP outfalls, respectively. At this time, SeaWorld has significant excess capacity in the systems, except during periods of high rainfall. The average total combined flow from the WWTPs during dry weather is less than 6 mgd. SeaWorld is required to monitor the water quality of the effluent from its outfalls. The effluent limits are provided in Table 1-3. The most recent Basin Plan was updated in 2016, and its requirements are covered by the recently revised NPDES Permit (Order No. R9-2018-0004).

The standards for total and fecal coliform are narrative and based on rolling 30-day average values. The standards are stringent and are designed to protect shellfish harvesting. For fecal coliform, the standard states that the concentration shall not exceed the geometric mean of 200 MPN/100 mL based on at least five samples in any 30-day period, and that no more than 10 percent of the samples in any given 30-day period shall exceed 400 MPN/100 mL. For total coliform, the standard requires that the median concentration shall not exceed 70 MPN/100 mL in any 30-day period, and that no more than 10 percent of the samples in any given 30-day period shall exceed 230 MPN/100 mL (five-tube test) or 330 MPN/100 mL (three-tube test).

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Table B-3. NPDES Permit Discharge Limitations (as revised by Order No. R9-2018-0004)				
Constituent	**Unit**	**Average Monthly**	**Maximum Daily**	**Instantaneous Maximum**
Chronic Toxicity	Pass/Fail and % effect	-	-	Pass and less than 50% effect
pH	pH units	-	-	7.0-9.0
TSS	mg/L	Narrative [1]		
Settleable Solids	mg/L	1.0	-	3.0
Turbidity	NTU	75	-	225
Oil & Grease	mg/L	25	-	75
Ammonia	mg/L	-	-	0.55
Total Chlorine Residual	mg/L	0.21	-	0.42
Copper, Total Recoverable	µg/L	38.1	76.5	-
Silver	µg/L	20.99	36	-
Chronic Toxicity (Test of Significant Toxicity)	Pass/Fail and % effect	-	-	Pass and less than 50% effect
Enterococcus	MPN/100 mL	35	-	104
Fecal Coliform	MPN/100 mL	Narrative[2]		
Total Coliform	MPN/100 mL	Narrative [2]		

Narratives:

1. *The concentration of suspended solids shall not be increased in excess of 10 mg/L as a monthly average or 15 mg/L as a daily maximum when compared to the suspended solids concentration in the intake.*
2. *The fecal coliform concentration for the effluent for the calendar month based on a minimum of five samples shall not exceed a geometric mean of 200/100mL, and 400/100 mL in more than 10 percent of samples collected.*

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Appendix C: SeaWorld Water and Sediment Monitoring Locations

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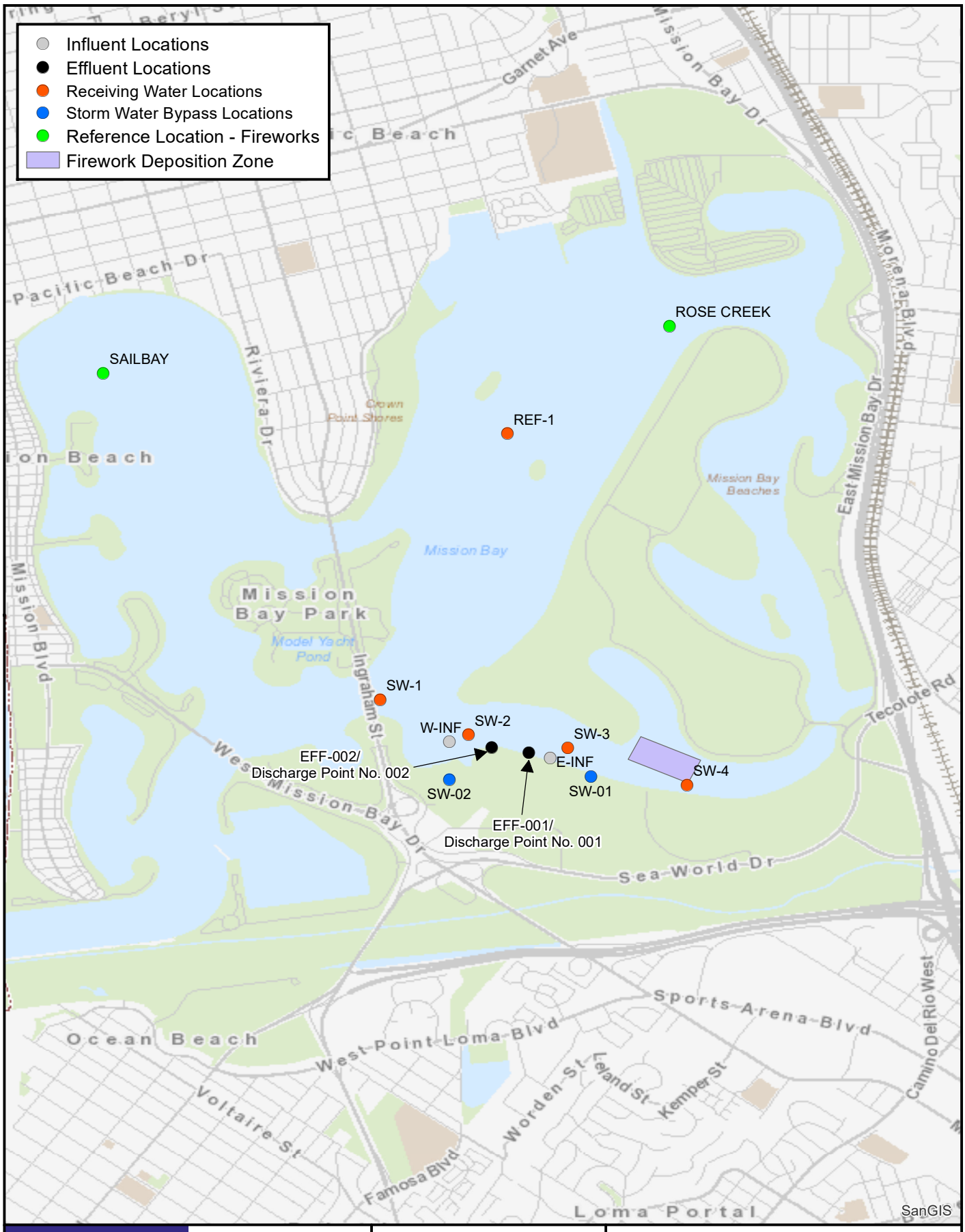

Brown AND Caldwell

Date: 9/20/2019
Project No: 154018
Client: SeaWorld

Basemap:
0 500 1,000 2,000 Feet
1 inch = 2,500 feet

Appendix C
SeaWorld Water and Sediment Monitoring Locations
Mission Bay, San Diego, California

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