TIJUANA RIVER VALLEY

NEEDS AND OPPORTUNITIES ASSESSMENT

MARCH 2020

THIS PAGE INTENTIONALLY LEFT BLANK

CONTENTS

Tables

Figures

APPENDICES

ACRONYMS AND ABBREVIATIONS

CDFW	California Department of Fish and Wildlife
CalRecycle	California Department of Resources Recycling and Recovery
CBP	United States Customs and Border Protection
CESPT	Comisión Estatal de Servicios Públicos de Tijuana (State Commission of Public Services of Tijuana)
CICESE	Centro de Investigación Cientifica y de Educación Superior de Ensenada (The Center for Scientific Research and Higher Education at Ensenada)
CILA	Comisión International de Limites y Aguas, Sección Mexicana (Mexican Section of the International Boundary Water Commission)
City of IB	City of Imperial Beach
City of SD	City of San Diego
County	County of San Diego
CWA	San Diego County Water Authority
IBWC	International Boundary and Water Commission
mgd	Million gallons per day
MS4	Municipal Separate Storm Sewer System
NADB	North American Development Bank
NOA	Needs and Opportunity Assessment
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and maintenance
PBCILA	CILA Pump Station
PS	Pump Station
Recovery Team	Tijuana River Valley Recovery Team
Regional Board	San Diego Regional Water Quality Control Board
SBWRP	South Bay Water Reclamation Plant
SBIWTP	South Bay International Wastewater Treatment Plant

SBOO	South Bay Ocean Outfall
SCCWRP	Southern California Coastal Water Research Project
SDSU	San Diego State University
SIO	Scripps Institute of Oceanography, University of California San Diego
SWIA	Southwest Wetlands Interpretive Association
TETRP	Tijuana Estuary Tidal Restoration Program
TMDL	Total Maximum Daily Load
TRNERR	Tijuana River National Estuarine Research Reserve
TRVRP	Tijuana River Valley Regional Park
U.S.	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USIBWC	United States International Boundary Water Commission
USGS	United States Geological Survey
UC Irvine	University of California, Irvine
WWTP	Wastewater Treatment Plant

EXECUTIVE SUMMARY

The Tijuana River Valley Needs and Opportunities Assessment

NOA REPORT EXECUTIVE SUMMARY

Introduction

The Tijuana River Valley Needs and Opportunities Assessment (NOA) Report provides a comprehensive review and assessment of current and potential management strategies that could be implemented on the United States (U.S.) side of the border to address transboundary flows of sewage, trash, and sediment into the Tijuana River Valley. The Tijuana River crosses from Mexico into the U.S. approximately five miles upstream of its outlet to the Pacific Ocean. While dry-weather flows from the Tijuana River are intended to be diverted to a treatment system in Tijuana, Mexico before reaching the U.S., the amount of flow that occurs during rain events generally exceeds the capacity of the diversion system in Tijuana. This limited diversion capacity results in frequent transboundary flows of sewage, trash, and sediment, which cause public health, environmental, and safety issues. Transboundary flows can also occur at any time of the year when the diversion system is not functioning as designed. Flows threaten the health of residents in the U.S. and Mexico, impact important estuarine habitat and waters of international significance, cause beach closures, damage agricultural resources, adversely impact the economy, compromise border security, and have the potential to affect U.S. military readiness as there

are military training installations within the impacted area.

Significant amounts of sewage, trash, and sediment have entered the Tijuana River Valley in the U.S. since at least the 1930s when a commission was first instructed by the U.S. and Mexican governments to collaborate in preparing a report on the Tijuana sewage problem. Since then, the U.S. and Mexico have enacted several treaties and policies to move towards binational solutions to address this international issue. In 1944, a treaty between the U.S. and Mexico created a joint commission with federal agencies on both sides of the border to provide binational solutions to issues that arise in the border region related to national ownership of waters, sanitation, water quality, and flood control. In the U.S., the responsible federal agency is the United States International Boundary and Water Commission (USIBWC); in Mexico, the responsible federal agency is the Comisión International de Limites y Aguas, Sección Mexicana (CILA). In the 1980s and 1990s, transboundary flows increased due to population growth in Mexico. Some improvements have been made over the years. Most notably, investments from both governments were used to build the South Bay International Wastewater Treatment Plant (SBIWTP) in the 1990s, which is currently operated by USIBWC and is capable of treating up to 25 million gallons per day (mgd) of transboundary flows that exceed the Tijuana system's treatment capacity.

Despite the efforts made to date, the Tijuana River remains the most polluted river in the San Diego region. In 2009, the San Diego Regional Water Quality Control Board (Regional Board) formed the Tijuana River Valley Recovery Team (Recovery Team) which consists of over 30 agencies and organizations with the goal of protecting the Tijuana River Valley from flooding, transboundary flows of sewage and polluted runoff, trash, and sediment. The Recovery Team, through its *Tijuana River Valley Recovery Strategy: Living with the Water* (Recovery Strategy), explored new approaches to the long-standing problem of transboundary flows and associated water quality issues. Central to the Recovery Strategy's approach was pursuit of partnerships and collaboration with Mexico rather than more traditional regulatory approaches to restoring and protecting human and environmental health. While the Recovery Strategy brought some progress and attention to border water quality issues, achievement of meaningful reductions in transboundary flows has been elusive due to the complexity of binational sources and conveyances of waste, lack of funding, diffuse leadership, and numerous jurisdictional roles.

In 2017, California Senate Bill 507 (Hueso, Gloria, Gonzalez) provided funding to conduct a "study focused on the improvement and protection of natural lands, including the main river channel, in the Tijuana River Valley," which is the genesis of this NOA Report. Senate Bill 507 also intended to update the Recovery Strategy to "include issues related to wastewater and runoff." The NOA Report focuses on analyzing potential projects to identify their potential benefits to addressing transboundary flows as well as planning-level costs for both capital investment and ongoing operations and maintenance expenses. The NOA Report retains the Recovery Strategy's guiding principle of partnering with Mexico to achieve lasting source control and environmental quality for the public in both countries, but emphasizes U.S.-based improvements that can be made to intercept and divert transboundary flows to protect downstream properties, habitats, and communities. As such, the NOA Report provides decision makers in both countries with a list of potential projects that can be implemented on the U.S. side of the border to protect human and environmental health in the Tijuana River Watershed and coastal waters. The update to the Recovery Strategy incorporates lessons learned from nearly ten years of Recovery Team efforts grounded in a detailed analysis of many ongoing and potential future projects. The NOA report was a stakeholder-driven process using the Recovery Team as the core stakeholder group for ongoing input and feedback.

Baseline Information

The Tijuana River Watershed is a large, binational watershed that straddles the border of the U.S. and Mexico. About three-quarters of the watershed lies in Mexico while the remainder is in southern San Diego County. Over time, population increases in Mexico have led to an over-burdening of Tijuana's public wastewater infrastructure which has led to increases in transboundary flows into the U.S.. There are multiple landowners on the U.S. side of the watershed, including federal, state, and local agencies along with a few private landowners. The complexity of land ownership has made it challenging overtime to cohesively address the transboundary flows into the Tijuana River Valley.

A combination of pump stations and wastewater treatment plants in Tijuana divert and treat sewage, but these systems are often incapable of handling the volume of wastewater coming from the region. The main Mexican pump station located at the border (known as PBCILA) is designed to divert flows from the Tijuana River to existing treatment plants. PBCILA is designed to pump dry weather flows of up to 23 mgd. When flows in the Tijuana River exceed this

capacity, as is often the case during rain events, protocols are in place for the facility to shut down to avoid long-term failure of the pump station. In such instances, flows do not get diverted to treatment systems, and instead flows cross the border into the Tijuana River Valley with the potential to reach the ocean. These types of untreated transboundary flows are estimated to occur, on average, 138 days per year (Arcadis 2019). Transboundary flows occur during wet weather conditions when the flows in the Tijuana River exceed PBCILA's capacity and at other times when PBCILA malfunctions.

As a starting point, the NOA reviewed existing projects and efforts in the Tijuana River Valley to inform baseline conditions. Existing projects include the Tijuana River Flood Control Project, USIBWC's SBIWTP, the City of San Diego's South Bay Water Reclamation Plant (SBWRP), the South Bay Ocean Outfall (SBOO), and a variety of other projects to divert and collect sewage, trash, and sediment in the mainstem of the Tijuana River and in nearby canyon tributaries that enter the Tijuana River Valley west of the main Tijuana River channel. Through coordination with stakeholders who manage and operate these existing projects, the NOA Report presents information on projects that are already in place to assist with transboundary flows. This baseline information was used to help define the magnitude of the existing transboundary flow issue, which informed the process to identify new proposed projects or alternatives.

Assessment Approach

The first phase of the NOA consisted of information gathering, identification of critical data gaps, and development of an approach to conduct an assessment study. This approach relied heavily on acquiring documents through coordination with multiple stakeholders in the Tijuana River Valley to ensure an accurate and complete analysis which could be relied on by a variety of stakeholders. Over 600 documents were collected and reviewed to inform baseline conditions. These documents include draft and completed studies and reports, raw data, state and federal legislation, presentations, meeting minutes, questionnaires, brochures, articles, press releases, legal documents, and transcripts, among other sources. During this review, a total of 63 projects were identified that either are currently being implemented or in the planning phase for potential future implementation throughout the Tijuana River Valley. These projects, of which, 38 are existing and 25 are proposed, were identified through engagement with 30 stakeholders from different organizations and jurisdictions.

An evaluation of existing projects determined that low-flow diversions and sedimentation basins already in place at several locations at the border provide significant benefits with respect to sewage, trash, and sediment capture, and should be continued. Existing water quality monitoring efforts have also assisted in determining water quality characteristics and pollutant levels in the watershed and are recommended to continue. Along with reviewing existing projects, the NOA Report made use of other studies being conducted concurrently by Tijuana River Valley stakeholders. Every attempt was made to coordinate efforts to limit overlapping analysis and better inform recommendations. The extensive data collection and review efforts have been crucial in identifying data gaps and opportunities across the Tijuana River Valley.

Projects

The second phase of the NOA involved developing a list of potential projects that could be implemented on the U.S. side of the border to address issues associated with transboundary flows. The NOA Report identifies projects based on the four watersheds in the Tijuana River Valley: Tijuana River, Smuggler's Gulch, Goat Canyon, and Yogurt Canyon. A project list showing location of each potential project is shown in Figure 16, Section 4. In addition, the NOA Report identifies structural projects that would require construction and non-structural projects that would include activities such as water quality testing and trash clean-up events. In total, the NOA Report identifies a total of 27 projects; 18 structural projects and nine non-structural projects, which are all intended to address the three main issues of concern considered in this study: water quality (sewage), trash, and sediment. Some of these projects overlap the 63 projects identified in the initial phase of the NOA.

Water Quality (Sewage)

For water quality, the NOA Report identifies three major approaches for moving towards better water quality. The first approach focuses on diverting additional Tijuana River flows (i.e. any flow beyond the current capacity of PBCILA) from the main channel for treatment on the U.S. side and discharge to the deep ocean through the SBOO. Treatment of additional flows can be achieved through construction of a new advanced primary treatment facility and/or expansion of existing treatment facilities. Treatment can be provided in the form of advanced primary treatment, secondary treatment, or anywhere in between. The second approach for water quality improvement focuses on diverting additional Tijuana

River flows for discharge directly to the SBOO without treatment. A lift station or a gravity-flow storm drain can be used to accomplish this diversion; however, because environmental permitting may pose a challenge for this scenario, it would likely only occur during emergency scenarios. The third approach for improving water quality focuses on in-stream basins to capture transboundary flows within the Tijuana River and/or canyon tributaries before flows reach the Tijuana River Estuary or the ocean.

The main limiting factor in determining the magnitude of flows that can be diverted and treated through implementation of water quality projects was the available capacity of the SBOO, which is currently estimated at 163 mgd. The SBOO was designed to convey a peak flow of 233 mgd; however, not all of this capacity is currently available. Currently, 70 mgd of the 233 mgd design capacity is committed for existing treatment plants (30 mgd for SBIWTP and 40 mgd for SBWRP). Therefore, only 163 mgd remains for additional flows.

Trash

The NOA Report identifies a variety of projects for trash collection and disposal, which are consistent with previous efforts. These evaluations indicate that trash racks at the mainstem of the Tijuana River and at canyon collector locations and trash traps, particularly booms, are the most appropriate structural solution throughout the watershed.

Sediment

The NOA Report identifies opportunities for addressing sedimentation concerns including the construction of in-channel or off-channel capture basins. While the two approaches are similar, the primary difference is that off-channel sediment basins would be constructed adjacent to the channel (thus, outside of the channel). Both options would involve sediment capture and removal which may be able to be hauled to a landfill or reused for alternative purposes such as beach replenishment or fill material on construction sites.

Evaluation of Potential Project Alternatives

Of the 27 projects in the NOA Report, some of projects are required to be implemented concurrently to obtain the most effective pollutant reduction benefit. Additionally, some projects may be considered in lieu of other projects. Therefore, based on the critical issues of concern within each of the watersheds analyzed, the NOA identifies 21 alternatives. Although some alternatives are

standalone projects, others were created by combining multiple projects that would ideally be implemented together. Each of the 21 alternatives were then evaluated based on the following metrics:

- Cost (construction, design, environmental permitting and monitoring, and annual operation and maintenance)
- Benefits (reduction in transboundary flows and capture of trash and sediment)
- Implementation, operation, and maintenance (i.e., technical feasibility, operating complexity and sustainability)
- Environmental impacts (i.e., impacts on riverine and ocean habitat)
- Community and societal impacts (i.e., environmental justice, ancillary community benefits, community disruption and public support)

Recommendations

The NOA Report includes recommendations for alternatives that can intercept, divert, and treat, in compliance with the Clean Water Act, as much of the transboundary flows as feasible and to discharge the treated flows through the SBOO. The current unused capacity of the SBOO is 163 mgd, which is considered the major limiting factor on the amount of transboundary flows that could be feasibly diverted and discharged to the Pacific Ocean. Therefore, the maximum amount of additional diversion and treatment conceptualized in the NOA Report is 163 mgd. Each of the alternatives proposed in the NOA Report would provide benefits to the Tijuana River Valley and address the goal of treating as much of the polluted flows as possible. However, the NOA Report recognizes the finite nature of resources. As such, alternatives are ranked by those that would provide the greatest return on investment. In general, alternatives focusing on the main channel of the Tijuana River are likely to provide the most value, followed by alternatives located at or near the main tributaries (Smuggler's Gulch, Goat Canyon, and Yogurt Canyon), and the lowest ranked alternatives are those that are general and could be implemented in other locations within the Tijuana River Valley. With implementation of the proposed alternatives that include maximum treatment of flows from the main channel of the Tijuana River, the NOA Report estimates that the number of unaddressed transboundary flow days can be reduced from 138 days per year to 12 days per year.

THIS PAGE INTENTIONALLY LEFT BLANK

INTRODUCTION

1. INTRODUCTION

This Needs and Opportunities Assessment (NOA) Report provides a comprehensive review and assessment of potential management strategies to address transboundary flows of sewage, trash, and sediment that enter the Tijuana River Valley located within the United States (U.S.). The NOA Report is intended to provide information and guide decisions on the future implementation of projects to reduce impacts on the Tijuana River Valley from the transboundary flows that originate in Mexico. The report includes an analysis of existing conditions and management practices, a needs assessment and data gap analysis, potential proposed projects, an evaluation of proposed project benefits and costs, and recommendations.

1.1 Background and Previous Efforts

The Tijuana River Watershed is a large (1,750 square mile), binational watershed that straddles the border of San Diego County, California, and northern Baja California in Mexico. Approximately three quarters of the watershed lies in Mexico and includes the cities of Tijuana and Tecate. On the U.S. side, the watershed extends into the jurisdictions of the City of San Diego, the City of Imperial Beach, and the County of San Diego. The Tijuana River flows from Mexico into the U.S. and ultimately discharges into the Pacific Ocean through the Tijuana River Estuary.

Historically, transboundary flows crossing into the U.S. from Mexico have raised water quality and human health concerns throughout the region. These flows often contain wastewater, sediment, and trash, which threaten the Tijuana River Valley's valuable ecological, recreational, and economic resources, as well as the Tijuana River National Estuarine Research Reserve (TRNERR), the Tijuana River Valley Regional Park (TRVRP), the Naval Outlying Landing Field, and the adjacent communities of Imperial Beach, Nestor, and San Ysidro.

Because flows originate in Mexico and impact resources and communities in the U.S., these transboundary flows are an international concern. As such, there have been several treaties and policies enacted between the U.S. and Mexico to move towards a binational solution to address border-related issues, including water and wastewater issues associated with transboundary flows. The first treaty that was enacted between the U.S. and Mexico for the border region was the Treaty of February 2, 1848, which established the U.S.-Mexico international boundary. A subsequent treaty was enacted on December 30, 1853 and modified the boundary to be delineated as it exists today. The Treaty of February 3, 1944 created a joint commission with federal agencies on either side of the border to provide binational solutions to issues that arise in the border region related to national ownership of waters, sanitation, water quality, and flood control. In the U.S, the responsible federal agency is the United States International Boundary and Water Commission (USIBWC); in Mexico, the responsible federal agency is the Comisión International de Limites y Aquas, Sección Mexicana (CILA). Minute Order 283, signed in 1990 by USIBWC and CILA, stipulates that "the Government of Mexico will assure that there are no discharges of treated or untreated domestic or industrial wastewaters into waters of the Tijuana River that cross the International Boundary." Compliance with Minute Order 283 depends largely on the frequency and duration of rainfall in the Tijuana River Watershed. The majority of flows during dry-weather conditions are pumped to the existing diversion system in Mexico. However, during wet weather conditions, flows cross into the U.S. when flow volumes exceed the capacity of the diversion system in Mexico that is operated by CILA.

In the 1980s and 1990s, there was a noticeable increase in transboundary flows due to population growth in Mexico. As a result, USIBWC and CILA collaborated to construct the South Bay International Wastewater Treatment Plant (SBIWTP). The SBIWTP is located in the U.S., approximately two miles west of the San Ysidro Point of Entry. The SBIWTP is able to treat approximately 25 million gallons per

day (mgd) and is primarily utilized to treat dry weather flows. Treated flows are discharged to the Pacific Ocean via the South Bay Ocean Outfall (SBOO).

Following implementation of the SBIWTP and the SBOO, water quality improved as the new infrastructure was able to capture and treat the majority of flows during dry weather events. Since 1999, when construction of the SBOO was finalized, efforts to manage transboundary flows have been focused on expanding the wastewater collection system in Mexico to keep up with rapid regional population growth. As a result, much of the critical collection lines and pumps, as well as the wastewater treatment plant (San Antonio de Los Buenos), in Mexico have not been modernized or extensively maintained. In recent years, an increase in failures of the wastewater collection system in Mexico has resulted in more frequent events of dry weather flows crossing into the U.S.. Storm flows convey sediment and trash into the Tijuana River Valley, which are deposited in channels, impacting the environment, water quality, flood protection, and public health. The Tijuana River, Tijuana River Estuary, and coastal waters of the Pacific Ocean combined are listed as having 37 impairments on the Clean Water Act 303(d) List of Impaired Waters. In addition, the beaches in Imperial Beach and at the mouth of the Tijuana River Estuary are frequently closed due to water quality impairments. The recent increase in flows entering the U.S. and documented water quality impairments further validate the need to address the transboundary flow issues in the Tijuana River.

1.2 Needs and Opportunities Assessment

1.2.1 Senate Bill 507

In February 2017, a large sewage spill occurred in Mexico that resulted in over 140 million gallons of wastewater entering the U.S. via the Tijuana River over several weeks. This spill reinvigorated local efforts in San Diego, and California, to address the transboundary flow issue. In October 2017, Senate Bill 507, sponsored by Senator Ben Hueso, was enacted by the State of California. Senate Bill 507 provided $500,000 in grant funding to the County of San Diego to complete a comprehensive needs assessment to review and assess potential solutions to transboundary flows associated with the Tijuana River Valley. With this grant funding, the County of San Diego identified a need to conduct a study to provide a comprehensive evaluation of the water quality concerns within the

Tijuana River Valley and identify potential projects that could be implemented in the U.S. to address these concerns regardless of constraints associated with funding, project ownership, or land ownership.

1.2.2 Nexus to the Recovery Team

In 2007, the San Diego Regional Water Quality Control Board (Regional Board) initiated the development of a Total Maximum Daily Load (TMDL) for sedimentation and trash for the Tijuana River Valley. A TMDL is a regulatory plan for restoring impaired waters and was initiated partly because of the ongoing impairment of the Tijuana River in the U.S. due to transboundary flows from Mexico. As part of the TMDL, in 2008, the Regional Board convened its first sediment and trash workshop with stakeholders, which led to the creation of the Tijuana River Valley Recovery Team (Recovery Team) in 2009. The Recovery Team consists of more than 30 federal, state, and local agencies along with other interested stakeholders from both sides of the international border focused on addressing sediment, trash, and associated environmental issues in the Tijuana River Valley. The Recovery Team's mission is to bring together the governmental, administrative, regulatory, and funding agencies along with the scientific community, the environmental community, and interested stakeholders to protect the Tijuana River Valley from future accumulations of trash and sediment in order to restore the Tijuana River Floodplain to a balanced wetland ecosystem.

In 2012, the Recovery Team developed a Strategic Plan (*Tijuana River Valley Recovery Strategy: Living with the Water*) that established four goals for the Tijuana River Valley and identified seven priority action areas to address these goals. In 2015, the Recovery Team developed the Five-Year Action Plan to outline specific goals for the next five years. The Regional Board recognized that implementation of the Five-Year Action Plan and Recovery Team Strategic Plan may achieve water quality improvements in the Tijuana River Valley and may constitute a nonregulatory alternative to the TMDL.

In 2019, the Regional Board announced it was initiating the development of a new TMDL for the Tijuana River Valley to address ongoing impairments related to bacteria and trash. To date, the Regional Board has completed a problem statement and held a California Environmental Quality Act scoping meeting for the new TMDL. The Recovery Team continues to meet quarterly in a stakeholder advisory role to the Regional Board on the development of the bacteria and trash

TMDL and associated permitting. The Recovery Team also provides updates on activities related to the Tijuana River Valley, coordinates and supports scientific investigations, manages and protects the Tijuana River Valley and Estuary, facilitates interagency coordination, and provides opportunities for public participation.

Due to the efforts that have taken place by the Regional Board and the Recovery Team to address water quality issues in the Tijuana River Valley, stakeholders associated with these groups have been integrally involved in the development of this NOA Report. Stakeholders associated with both groups have provided technical support, helped identify projects, and reviewed and provided input on strategies and deliverables throughout the development of this report.

1.2.3 Approach

The ultimate purpose of the NOA Report is to identify potential projects that could be implemented on the U.S. side of the border to improve water quality in the Tijuana River. The effort was broken down into the following two stages:

1. The goal of the first stage was to complete a comprehensive needs assessment to evaluate the current issues in the Tijuana River Valley and review past, current, and planned efforts intended to address the ongoing water quality issues.
2. The goal of the second stage was to identify and evaluate potential projects that can be implemented on the U.S. side of the border to address the cross border flows of sewage, trash, and sediment. The second stage also included development of an assessment document that details the needs in the Tijuana River Valley and the opportunities or projects that can be implemented to meet those needs. The intent of the final assessment is to demonstrate the magnitude of the issue and potential solutions so that entities across the region can work together to identify funding and other resources necessary to address the long-standing water quality issues in the Tijuana River Valley.

1.2.4 Overview of Stakeholder Participation

As discussed in Section 1.2.3, the NOA was developed in two stages. The first stage involved collecting information on existing and planned projects, as well as studies and research relevant to potential projects in the Tijuana River Valley. One of the purposes of the first stage was to ensure that the NOA would build off existing information and not recreate research or efforts that had already been completed. As such, the first stage involved extensive stakeholder outreach

and meetings with organizations and individuals involved in the Tijuana River Valley (primarily the Recovery Team) to collect data and information. Within this first stage, over 50 meetings were held with approximately 30 organizations to gather information and to follow up and gather additional details as needed. See Appendix A for the Stakeholder Meeting Log, which includes detailed information about the meetings that were held associated with the NOA report.

The second stage of the NOA involved developing a list of potential projects that could be implemented on the U.S. side of the border to address issues associated with cross border flows of wastewater, trash, and sediment. During this stage, stakeholder participation occurred in two different ways. First, stakeholder meetings continued with major stakeholders identified in the first stage of the NOA. The purpose of these meetings was to gain information about potential projects and vet the draft project list with stakeholders familiar with the Tijuana River Valley. In addition, on July 25, 2019, a public meeting was held in San Ysidro for the NOA. The purpose of the public meeting was to educate the public on the NOA purpose and need and receive public input on the draft list of projects. It is estimated that 80 members of the public attended this meeting, and after the meeting, 35 individuals submitted public comments.

Additionally, several meetings were held with the Environmental Protection Agency (including both the California and Federal branches) to ensure collaboration on the ultimate list of project alternatives as well as provide updates on the NOA. Other agencies and stakeholder groups, including the Tijuana River Valley Recovery Team Steering Committee, USIBWC Citizen's Forum, California Department of Fish and Wildlife, CalRecycle, City of San Diego, USIBWC, and Regional Board, among others, were consulted and regularly updated regarding the NOA and the project alternatives selected. The projects and recommendations identified in this NOA include feedback from these major stakeholders.

BASELINE
INFORMATION

2. BASELINE INFORMATION

2.1 Existing Water Quality Issues

The Tijuana River Watershed is a large, binational watershed that straddles the border of southern California and northern Baja California in Mexico. Approximately three quarters of the watershed lies in Mexico and includes the City of Tijuana and the City of Tecate. On the U.S. side, the watershed extends into the City of San Diego, the City of Imperial Beach, and the County of San Diego. The Tijuana River flows from Mexico into the U.S. and discharges to the Pacific Ocean through the Tijuana River Estuary.

The flow of the river, at any given time, may consist of stormwater, effluent discharged from wastewater treatment plants in Mexico, sewage spills, industrial/agricultural discharges, groundwater, and other unidentified sources. The Tijuana River, Tijuana River Estuary, and coastal waters of the Pacific Ocean shoreline are listed as impaired water bodies under the Clean Water Act section 303(d) List of Water Quality Limited Waters for numerous constituents, including bacterial indicators, trash, ammonia, benthic community effects, eutrophication, low dissolved oxygen, pesticides, phosphorous, sedimentation/siltation, lead,

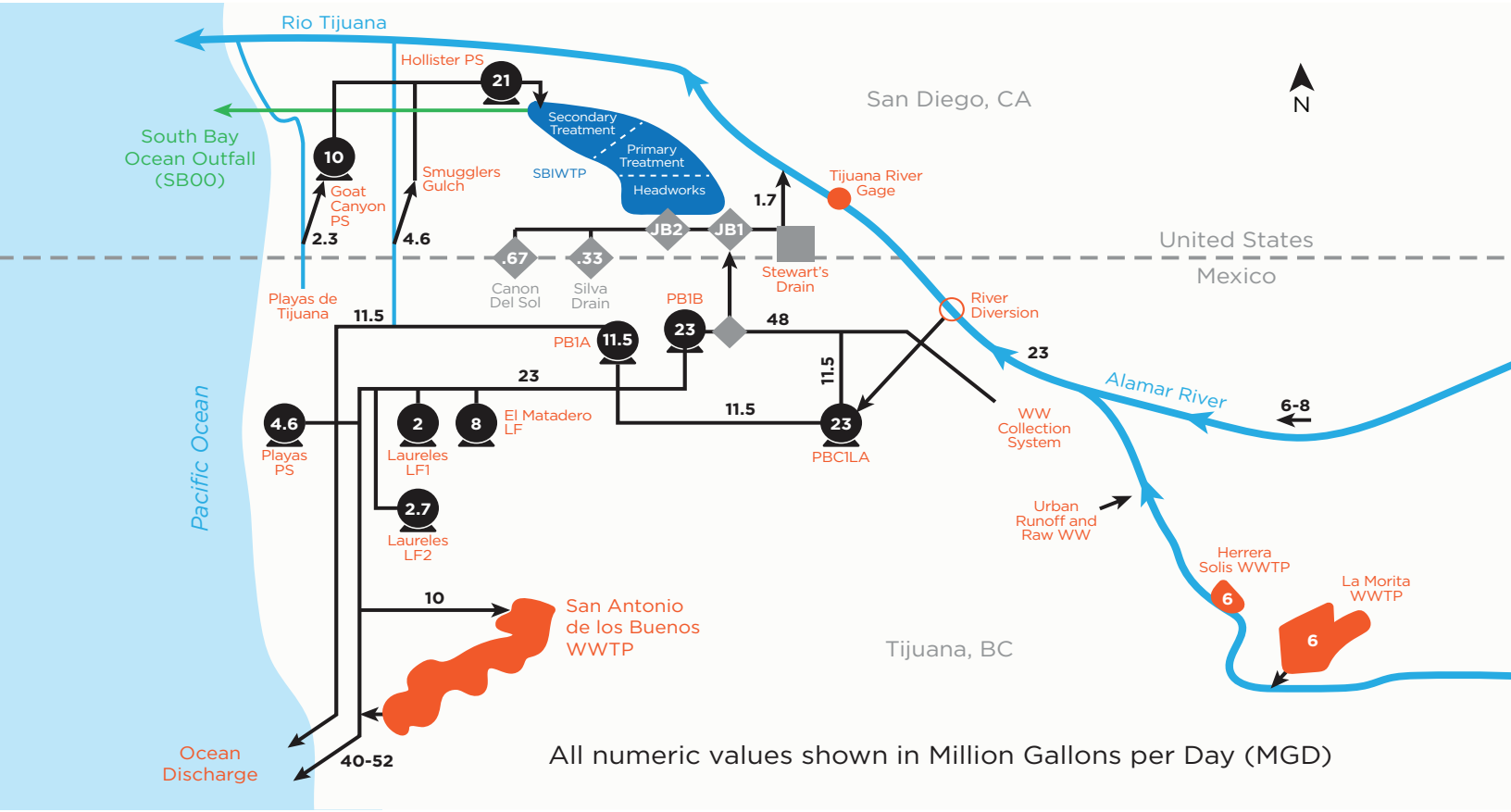
selenium, solids, surfactants, synthetic organic chemicals, total nitrogen, toxicity, trace elements, nickel, thallium, and turbidity.

As part of a 1944 Treaty between the U.S. and Mexico, flows from the Tijuana River are required to be diverted back into Mexico prior to crossing into the U.S.. The USIBWC and CILA are responsible for addressing sewage problems and the associated water quality issues in the Tijuana River Watershed. These efforts have led to the construction and operation of infrastructure on both sides of the border to capture, treat, and discharge the transboundary sewage flows from Mexico. The infrastructure operated as part of the 1944 Treaty includes the River Diversion Structure and Pump Station CILA (PBCILA). This infrastructure diverts flows from the mainstem of the Tijuana River at a point just south of the international border to either the San Antonio de los Buenos outfall (a Pacific Ocean shoreline discharge point located in Mexico approximately 5.6 miles south of the border) or to the SBIWTP for treatment.

In addition to infrastructure on the mainstem of the Tijuana River, there is also infrastructure that diverts flows from tributaries to the Tijuana River before the flows cross into the U.S.. Concrete channels and basins form canyon collector systems designed to capture transboundary flows from Mexico in tributary canyons and ravines that drain north across the border. The five canyon collector systems are the Goat Canyon Diversion Structure, Smuggler's Gulch Diversion Structure, Cañon del Sol Collector, Silva Drain Collector, and Stewart's Drain Collector. Flows from the canyon collectors are diverted to the SBIWTP and treated along with flows captured at the mainstem of the Tijuana River. These facilities are shown on Figure 1.

The PBCILA facility, operated by the Comisión Estatal de Servicios Públicos de Tijuana (CESPT) and CILA, is designed to handle dry weather river flows up to 23 mgd. Flows in excess of 23 mgd remain in the river channel and cross into the U.S. without treatment, where they eventually flow to the Pacific Ocean via the Tijuana River Estuary. However, there are times when the system malfunctions during the dry weather season, which allows flows in the main river channel and the canyon collectors to bypass the diversion and treatment infrastructure and flow to the Tijuana River Estuary and Pacific Ocean south of Imperial Beach without treatment. During storm events, flows in the Tijuana River can reach well over 1 billion gallons per day, which greatly exceeds the existing capacity of the diversion and treatment infrastructure.

Figure 1: Dry weather Flow Infrastructure on the Tijuana River



During storm events PBCILA is generally shut down, allowing flows from the Tijuana River and its tributaries to flow untreated to the Pacific Ocean. Depending on how much rainfall has occurred, it may take several months for the river channel flow to fall below the operational threshold of PBCILA. In order for PBCILA to restart and divert flows to the treatment facilities or the San Antonio de los Buenos outfall, no additional rain can be forecast during three days following a wet weather event. The diversion system components and operations for the main river channel are described in more detail in the North American Development Bank (NADB) led Tijuana River Diversion Study (Arcadis 2019). The canyon collector systems are operated and maintained by USIBWC. These facilities are operated during dry weather and during low-flow storm events until sediment and solid waste impede the pump operations. The collector pumps are reactivated once the post storm flows have receded and the collector basins are cleaned of sediment and debris.

Stormflows not only contain pollutants, but also transport large quantities of trash, sediment, and non-native plant species into the Tijuana River Valley,

depositing them in channels and among the vegetation. These conditions create vector issues, threaten riparian habitat, impact public health, and restrict the natural flow of the Tijuana River.

Transboundary flows are estimated to occur, on average, 138 days per year. This average comes from the NADB Diversion Study, which includes a statistical analysis of the transboundary flows recorded at the USIBWC flow gage located at the border for a 7-year period from 2009 to 2016 (Arcadis 2019). These flow estimates include rain events that exceed the diversion capacity as well as days when the diversion structure and/or pump station were out of service or not operating at full capacity.

Impacts on the beaches in the vicinity of the Tijuana River outlet are monitored by the County of San Diego's Department of Environmental Health as part of the Beach & Bay Water Quality Program. Any time transboundary flows occur, the Department of Environmental Health will evaluate if flows are reaching the Pacific Ocean and, if they are, provide public notification of beach closures. During storm events or other meteorological influences, changes in currents can transport wastewater discharges from the San Antonio de los Buenos outfall located south of the U.S.-Mexico border northward into U.S. waters, also triggering beach closures. Due to the complexity of flows and impacts, the NADB Diversion Study determined it is not possible to directly correlate the transboundary flow days with beach closure/ advisory days. This NOA relies on those determinations and analyses.

Water quality monitoring along the watersheds has been a valuable source of data for understanding the magnitude of impacts from transboundary flows. A summary of the ongoing monitoring programs is provided below:

- In October 2015, the U.S. and Mexico sections of the IBWC signed Minute 320, which establishes a framework for addressing the solid waste, sediment, and water quality issues in the Tijuana River watershed. Minute 320 resulted in the formation of a binational working group for each issue area, as well as an executive level binational core group. Subsequent to the substantial transboundary sewage flows that occurred in February 2017, the USIBWC water quality working group recommended a monitoring program. In December 2018, the USIBWC initiated a 1-year binational monitoring program to collect data from the Tijuana River and adjacent canyon collectors. The monitoring program does not address toxicity or trash and the monitoring frequencies of the program are limited.

- The United States Customs and Border Protection (CBP) started a 6-month monitoring effort in January 2018. CBP collected water samples for one week each month in the canyon collector areas and other select locations within the Tijuana River Valley where CBP personnel operate. Testing of biological and chemical contaminants that were collected as part of this effort is based on standards of the Agency of Toxic Substances and Disease Registry. The initial effort was focused on dry weather surface water samples taken in the mainstem of the Tijuana River near the border and the canyon collectors. In September 2018, CBP began another 6-month sampling effort expanded to include wet weather events. The expanded monitoring also included soil samples and additional sampling locations along the main channel. The purpose of this sampling effort was to gain a better understanding of what constituents are included in transboundary flows, and to develop informed solutions that best protect those who may be exposed to constituents in these areas. Analysis of the biological data concluded that transboundary flows include untreated domestic discharges, because levels of bacteria (E. coli, total coliform, and enterococcus) were found in excess of levels that are typical to a wastewater collection system. The findings also concluded that uncontrolled discharges occur from industrial and agricultural uses that originate from Mexico and the Tijuana River. The CBP analysis does not indicate a pattern of deliberate illicit industrial wastewater discharges from within Mexico, however it is most likely indicative of nonpoint discharges related to stormwater and non-stormwater runoff incidents.
- The Regional Board requires USIBWC to conduct water quality monitoring and assessment pursuant to the Monitoring and Reporting Program for the 2014 National Pollutant Discharge Elimination System (NPDES) Permit. The Monitoring and Reporting Program establishes conditions for USIBWC to conduct routine or episodic self-monitoring of the discharges regulated under Order Number R9 2014 0009 at specified locations. The Monitoring and Reporting Program requires USIBWC to report the results to the Regional Board with information necessary to evaluate discharge characteristics and compliance status. USIBWC's monitoring is conducted jointly with the City of San Diego. Since the City of San Diego's South Bay Water Reclamation Plant (SBWRP) discharges via the same ocean outfall as IBWC's SBIWTP, the City of San Diego has the same receiving water monitoring requirements in its NPDES Permit Number CA0109045 (Order Number R9 2013 0006 as amended by Order Numbers R9 2014 0071 and R9 2017 0023).

- Southern California Coastal Water Research Project (SCCWRP) conducts monitoring at the mouth of the Tijuana River (where the river meets the Pacific Ocean) as part of its Southern California Bight assessments. This effort includes assessments of benthic macroinvertebrates, sediment chemistry, and toxicity.
- The County of San Diego's Department of Environmental Health conducts bacteriological water sampling at the Pacific shoreline.
- The TRNERR collects a variety of physical, chemical, and specimen data to conduct research and assess the health of the Tijuana River Estuary.
- The California State Water Resources Control Board conducts monitoring at Hollister Bridge as part of its Stream Pollution Trend Project of the Surface Water Ambient Monitoring Program. This includes sampling of sediment and water to analyze toxicity and pesticides.
- The City of Imperial Beach conducts water quality monitoring as required by the Regional Board Order Number R9 2013 0001, as amended by Order Numbers R9 2015 0001 and R9 2015 0100, the NPDES Permit for Discharges of Urban Runoff from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds within the San Diego Region.
- Other parties, including the Regional Board, conduct episodic monitoring for ambient monitoring and specific studies.

2.2 Existing Water Quality Projects

As part of the initial task for this study, data and project information related to sediment, trash, and water quality was gathered from stakeholders interested in the Tijuana River Valley. Over 600 documents were collected, recorded, and indexed by constituent (water quality, sediment, and trash) and watershed (Tijuana River main channel, Smuggler's Gulch, Goat Canyon, and Yogurt Canyon). The evaluation identified the following facilities and maintenance operations as existing water quality projects in the Tijuana River Valley.

2.2.1 Tijuana River Flood Control

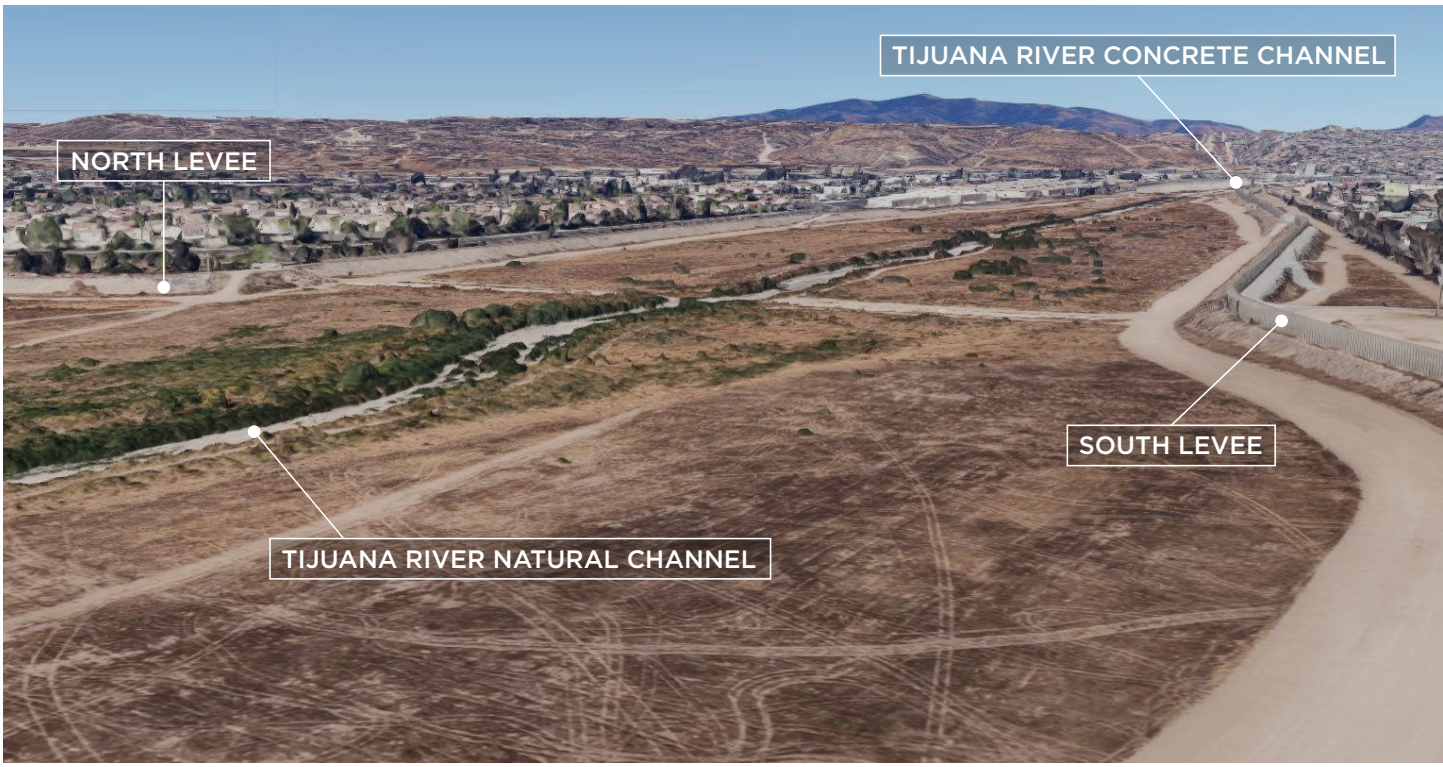
The USIBWC operates and maintains the Tijuana River Flood Control Project. The flood control project consists of a concrete lined channel for the Tijuana River in Mexico extending 2.7 miles upstream from the border, and a concrete and rock lined channel in the U.S. extending 0.9 mile downstream from the

border. The downstream portion of the channel in the U.S. has a flared section to reduce the velocity of flows before flows enter the natural (not concrete or rock-lined) channel downstream of the Flood control project. The concrete and rock-lined channel and bordering levees located within the U.S. were constructed pursuant to joint U.S.-Mexico approved design criteria and can contain a flood of approximately 88,000 mgd (135,000 cubic feet per second).

The levees in the U.S. tie into high ground on the north to protect the community of San Ysidro and on the south to protect the SBIWTP and the City of Tijuana, Mexico from flooding. The U.S. levee on the north bank of the river is two miles long and on the south bank of the river is 1.9 miles long. Figure 2 shows the Tijuana River flood control system of levees.

This levee system conveys flows in the Tijuana River from Mexico that bypass the diversion infrastructure. The condition and capacity of the levee system is currently being evaluated by the USIBWC, in conjunction with the United States Army Corps of Engineers (USACE).

Figure 2: Tijuana River Flood Control Project

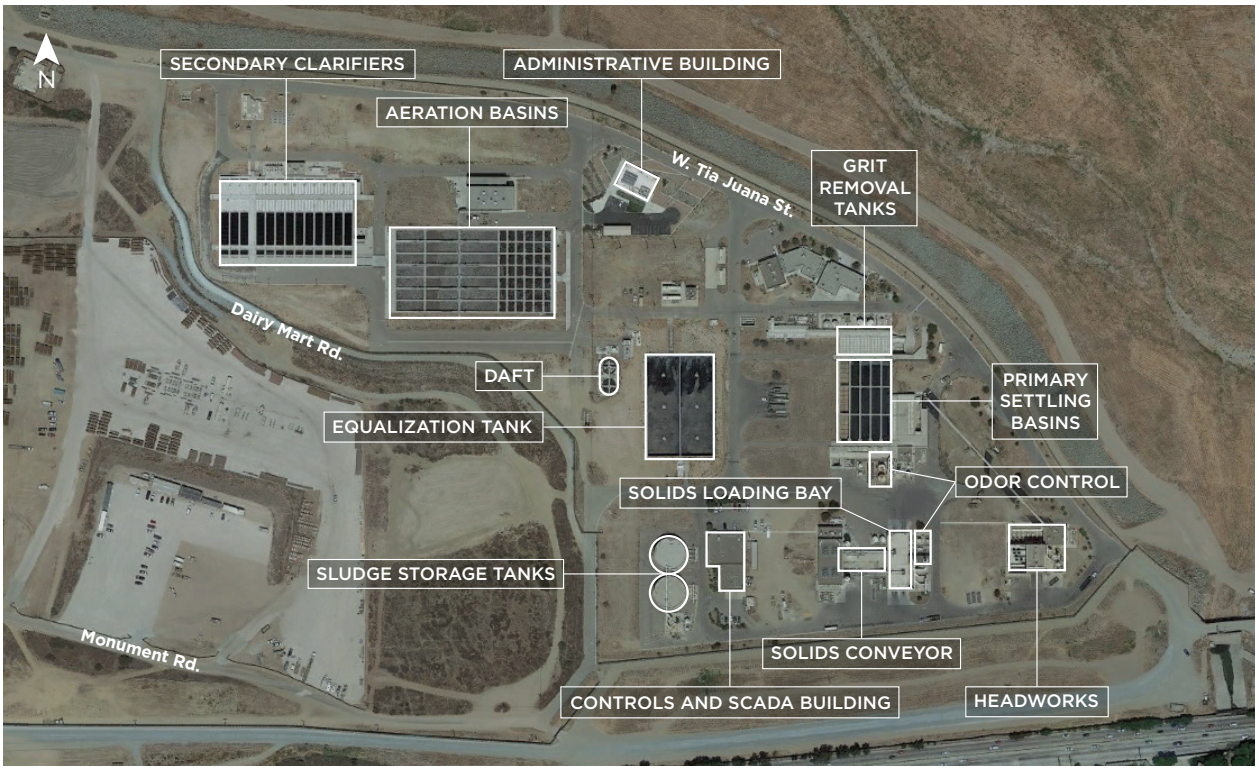


The Tijuana River Diversion Structure is designed to collect dry weather river flows up to 23 mgd.

2.2.2 South Bay International Wastewater Treatment Plant (SBIWTP)

The SBIWTP was constructed in 1997 on a 75-acre site with a 25 mgd operational capacity (30 mgd peak capacity) for secondary treatment with expansion capability of up to 100 mgd (Figure 3). The SBIWTP is located within the U.S. about two miles west of the San Ysidro Port of Entry. The plant treats dry weather flows of sewage originating in Mexico and discharges the treated flows to the Pacific Ocean through the SBOO. Dry weather transboundary flows are diverted to the SBIWTP from the five canyon collector systems (Goat Canyon, Smuggler's Gulch, Cañon del Sol, Silva Drain, and Stewart's Drain), as well as the main Tijuana River channel. Flows from the canyon collector systems and the main Tijuana River channel are diverted by separate infrastructure and combined before flowing to the SBIWTP; therefore, the SBIWTP can currently treat a peak of 30 mgd from all the existing diversion systems.

Figure 3: Layout of South Bay International Wastewater Treatment Plant



2.2.3 South Bay Water Reclamation Plant (SBWRP)

The SBWRP was constructed in 2002 by the City of San Diego and operates in accordance with NPDES Permit Number CA01090445 (Order R9 2017 0023). This facility can treat 35 mgd of wastewater to secondary and/or tertiary recycled water standards, but is currently operating at a rate of only 15 mgd. The SBWRP is located on a 22-acre site near Dairy Mart Road and Monument Road in the eastern part of the Tijuana River Valley and is adjacent to the SBIWTP. Figure 4 shows the overall layout of the SBWRP. The SBWRP treats wastewater collected from South Bay communities in the U.S. and does not receive any transboundary dry weather or stormwater flows from the Tijuana River.

Figure 4: Layout of South Bay Water Reclamation Plant

2.2.4 South Bay Ocean Outfall (SBOO)

The SBOO and the South Bay Land Outfall, located just north of the border, were completed in 1998 and are owned and operated by the City of San Diego. The SBOO is an 11-foot diameter tunnel extending 3.5 miles offshore to a depth of 93 feet below sea level. Treated flows from both the SBWRP and the SBIWTP are mixed at an effluent distribution vault before entering South Bay Land Outfall. The South Bay Land Outfall is a tunnel that extends from the effluent distribution vault to the coastline, after which it discharges into the Pacific Ocean via the SBOO.

The SBOO extends beneath the seabed 3.5 miles offshore. From there, the outfall pipe connects to a vertical riser assembly that conveys effluent to a pipeline buried just beneath the surface of the sea floor. This subsurface pipeline then splits into a Y shaped multiport diffuser system, with the two diffuser legs each extending an additional 1,980 feet to the north and south.

The SBOO is designed to handle an average flow of 174 mgd with a peak flow of 233 mgd. Currently, the SBOO has an average flow of 28.4 mgd, which is only a portion of the available capacity. The City of San Diego's SBWRP existing permit allows for a maximum permitted flow of 40 mgd (NPDES Permit Number CA0109045). In addition, USIBWC's existing permit allows for a maximum permitted flow of 30 mgd from SBIWTP (NPDES Permit Number CA0108928). Therefore, the available excess capacity of the SBOO would be 163 mgd if the SBIWTP (30 mgd) and the SBWRP (40 mgd) permitted flows are considered in the outfall capacity, or 193 mgd if only the 40 mgd of SBWRP permitted flows are considered in the outfall capacity.

Since the SBOO is not operating at full capacity, many diffuser ports remain closed in order to enhance mixing of the treated water in the ocean by increasing the exit velocity from the operating diffuser ports.

Figure 5: Location of the South Bay Ocean Outfall

2.2.5 Canyon Collectors and Diversion Structures

Canyon collectors are concrete channels and basins designed to capture transboundary dry weather flows from Mexico in canyons and ravines draining north across the border to the Tijuana River. The five canyon collector systems are located at Goat Canyon, Smuggler's Gulch, Cañon del Sol, Silva Drain, and Stewart's Drain. The NOA focused on the two western canyon collectors (Smuggler's Gulch and Goat Canyon).

Each canyon collector system includes a low-flow basin designed to capture dry weather flows, a screened drain/inlet, and infrastructure that allows flows to be sent to the SBIWTP. Captured flows are diverted to the SBIWTP for treatment and are disposed through the SBOO.

Dry or wet weather flows in the canyon collectors that exceed the maximum design capacity of the existing diversion infrastructure are not diverted to SBIWTP for treatment, and instead flow untreated north toward the Tijuana River Valley. These excess flows ultimately discharge into the Tijuana River and potentially get routed to the Tijuana River Estuary and the Pacific Ocean.

Yogurt Canyon is the westernmost canyon through which flows drain north from Mexico to the U.S.. This canyon is the only canyon that does not have existing canyon collector and diversion infrastructure. As such, flows in Yogurt Canyon flow untreated in a northern direction toward the Tijuana River Estuary.

Smuggler's Gulch Diversion Structure

Constructed in 2009 as part of the Secondary Border Fence Project, the Smuggler's Gulch diversion structure is located downstream of a double box culvert under a 145-foot high earthen berm topped with a road and border fence. The diversion structure has an average design capacity of 4.67 mgd (14.0 mgd peak). Dry weather flow from this canyon diversion structure is collected in a low area directly downstream of the culvert, conveyed to the Hollister Pump Station in a 30-inch polyvinyl chloride pipe, and pumped to the SBIWTP. Wet weather flows from the 5.9 square mile watershed (3,762 acres), which includes the Matadero Canyon in Mexico, bypasses the diversion structure and flows north under Monument Road in a natural channel to the Tijuana River. There is an existing culvert under Monument Road that conveys flows in Smuggler's Gulch from the south side of Monument Road to the north side of Monument Road. Flows entering the U.S. from Mexico at Smuggler's Gulch frequently exceed the capacity of the existing culvert under Monument Road. During these conditions, Monument Road may be unpassable, which cuts off access to the homes and properties located along Monument Road and to the west of Smuggler's Gulch.. Figure 6 shows the diversion structure at Smuggler's Gulch.

Figure 6: Smuggler's Gulch Diversion Structure

Goat Canyon Diversion Structure

The Goat Canyon diversion structure was also constructed in 2009 as part of the Secondary Border Fence Project. Downstream of a triple box culvert, the average design capacity of the Goat Canyon collector is 2.3 mgd (7.0 mgd peak). Dry weather flow from the diversion structure is conveyed in a 24-inch polyvinyl chloride pipe to the Goat Canyon pump station, which is then pumped to the SBIWTP via the Hollister pump station. Wet weather events from the 4.6 square mile watershed (2,941 acres), as well as any dry weather events that bypass the diversion structure, discharge directly to the Tijuana River Estuary. Figure 7 shows the diversion structure at Goat Canyon.

Figure 7: Goat Canyon Diversion Structure

2.2.6 Goat Canyon Sediment and Trash Capture

California State Parks is responsible for maintaining and cleaning the Goat Canyon sediment basins in order to keep excess sediment from inundating sensitive habitats including the Model Marsh and Tijuana River Estuary. The structure consists of two basins where sediment and trash are intercepted. Trash booms are in place to collect floatable debris as shown in Figure 8. The structure originates south of the border in Los Laureles Canyon in Mexico.

The sediment basins were designed to accommodate as much sediment as possible within the area that was available for construction and, on average, collect up to approximately 60,000 cubic yards of sediment, trash, and debris annually. In cases of extreme weather events, such as in 2005, the sediment basins were filled to capacity and, therefore, sediment was carried to and deposited in historic wetland habitat, destroying 18 acres of salt marsh, salt pan, and ruderal habitat.

Figure 8: Goat Canyon Sediment Basins and Trash Boom

2.2.7 Yogurt Canyon Culvert

Yogurt Canyon is the smallest of the three tributary canyons, with a watershed area less than 1 square mile (415 acres). There is an existing culvert at Yogurt Canyon that was constructed in 2009 as part of the Secondary Border Fence Project (Figure 9). The design capacity of this culvert is unknown. There is no diversion structure at Yogurt Canyon to capture and divert dry weather flows to the SBIWTP as with the other two tributaries. The storm flows crossing the border are conveyed north toward the Tijuana River Estuary by way of a natural channel. Any measurable rainfall in the Yogurt Canyon watershed is likely to produce enough runoff to flood Monument Road. Unlike Smuggler's Gulch, there is no culvert under Monument Road at the Yogurt Canyon crossing. Flooding of Monument Road in this location can restrict access to Border Field State Park and impact border security activities. In addition to sewage and sediment impacts, the flow of stormwater into the Tijuana River Estuary at Yogurt Canyon has the potential to affect salt marsh habitat by diluting the salt water with fresh water.

Figure 9: Yogurt Canyon Culvert

ASSESSMENT APPROACH

3. ASSESSMENT APPROACH

3.1 Data Collection and Gap Analysis

The initial stage of the NOA effort consisted of information gathering, identification of critical data gaps, and development of an approach for conducting an assessment study. To acquire documents relevant to the project, over 30 stakeholders in the Tijuana River Valley were identified and contacted (see Appendix A for a list of stakeholders). Through meetings, web searches, and email conversations, over 600 documents were collected and reviewed, including Microsoft Excel spreadsheets, meeting minutes, and reports. A Data Organization and Gaps Summary document (Appendix B) was prepared to document the steps taken to create, file, and record relevant information and data gaps. These documents were then filed in a database for future reference. A list of the documents is included in Appendix C: Data Collection Table.

Each document was reviewed and categorized based on issue of concern, location within the Tijuana River Valley, and whether the projects listed in the document have been implemented. A project was defined as either a site study, water sampling activity, or a capital project. The issues of concern that were targeted by the projects consisted of sewage, sediment, trash, and flooding. The age of the reports, along with the project constraints, were reviewed to determine the practicality of implementation. Within each watershed, existing and proposed projects were evaluated to determine their effectiveness based on existing monitoring reports and specific project debriefs submitted by various stakeholders. Examples of the projects that were identified include detailed hydrology and hydraulics analysis for a particular watershed (e.g., Smuggler's Gulch), and trash capture system implementation at a specific drainage outlet (e.g., Goat Canyon). A total of 63 projects were identified across the Tijuana River Valley, including some within drainage areas not included in this study. Of the projects identified, 38 projects currently exist and 25 are proposed for future implementation. The existing and proposed projects are summarized by watershed in Table 1 through Table 4. More detailed information about these projects can be found in the associated Technical Memorandums in Appendix D through Appendix G.

The evaluation of the existing projects determined that low-flow diversions provide the most benefit to a watershed and have the potential to target two issues of concern, sewage and sediment, at the same time. Low-flow diversions exist in all the watershed drainage areas except Yogurt Canyon. In addition, sedimentation basins were determined to be an effective measure to capture sediment and trash. Sedimentation basins with trash booms allow for the capture of an increased volume of trash during moderate storm events. Goat Canyon includes existing sedimentation basins and a trash boom that are maintained by California State Parks. Water quality monitoring along the watersheds has been a valuable source of data for understanding the magnitude of impacts from transboundary flows. Starting in January 2018, CBP began monitoring water quality at the canyon outlets to assist in assessing the risks to human health, developing long term solutions, and addressing the sources. Additional water quality monitoring has been conducted over the past few years at each of the watersheds. This monitoring has provided information to determine the water quality characteristics of the watershed and identify specific pollutants in the watershed.

Table 1: Projects for the Tijuana River

Tijuana River Existing Projects	Sewage	Trash	Sediment	Flood Control	Report
PBCILA Low-Flow Diversion Structure (USIBWC)	●	●	●		
Approximate Location of secondary flow meter (USIBWC)				●	
Steel Grates Weir Low-Flow Diversion (USIBWC)	●	●	●		
PBCILA., 4 new pumps (USIBWC)	●				
Sediment removal 7000 CY/Yr (USIBWC)		●	●	●	
Hydraulic Flood Plain Study 2012 (City of SD)					●
Earthen Berm on Tijuana River near border (USIBWC)	●	●	●	●	
Phase 1 Hydrology, Sediment, Floodplain Study (USACE)					●
FloodRISE (UC Irvine)				●	●
2012 Sediment Yield Estimate (City of SD)					●
Coastal Sediment Dynamics (USGS)					●
Wetland Mitigation (City of SD)		●	●		
Pilot Channel Maintenance (City of SD)				●	
Soil Sampling 1991 (County)					●
Soil Sampling 2014 (CWA)					●
Soil Sampling 1990 (County)					●
Soil Sampling 2018 (County)					●
Soil Sampling 1999/2000 (County)					●
Sediment Monitoring 2004 (SWIA)			●		
Soil Sampling 1999 (USEPA)					●
Dune Restoration 1987 (California State Parks)			●		
Tidal Restoration Program 1991 (California Coastal Conservancy)					●
WQ Sampling 2018 (CBP)	●				●
WQIP 2016 (County/City of SD)					●
Beach Replenishment (California State Parks and City of IB)			●		

Table 1: Projects for the Tijuana River (continued)

Tijuana River Proposed Projects	Sewage	Trash	Sediment	Flood Control	Report
Tijuana River Estuary Restoration (TRNERR)	●		●	●	
Smythe Channel Mitigation Site (City of SD)		●	●	●	
Tidal Restoration (TRNERR/SWIA)	●		●	●	
Pollutant Plume Modeling (SIO)	●				●
Brown Property Restoration (County)		●	●	●	●
Dry weather flow monitoring at River Mouth (USIBWC)	●			●	
Dry weather flow monitoring at Dairy Mart Rd Bridge (USIBWC)	●			●	
Dry weather flow monitoring at Saturn Bl (USIBWC)	●			●	
Dry weather flow monitoring at Hollister St Bridge (USIBWC)	●			●	
Sediment Basin at Dairy Mart Rd Bridge (USIBWC)		●	●	●	
Trash Booms (USIBWC)		●			
Nelson Quarry Reclamation (California State Parks)			●		
Phase 2 Hydrology, Sediment, Floodplain Study (USACE)					●
Tijuana River Diversion Study (NADB/USEPA/ Arcadis)	●	●	●	●	●
North and South Levee Imp 2017 (USIBWC)				●	

Table 2: Projects For Smuggler's Gulch

Smuggler's Gulch Existing Projects	Sewage	Trash	Sediment	Flood Control	Report
Low-Flow Diversion Structure (USIBWC)	●	●	●		
2010 Geotech Boring and Sediment Sampling (City of SD)			●		●
WQ Sampling 2018 (CBP)	●				●
Channel Maintenance & Mitigation Monitoring (City of SD/County)		●	●	●	●

Smuggler's Gulch Proposed Projects	Sewage	Trash	Sediment	Flood Control	Report
Dry weather flow water quality monitoring (USIBWC)	●			●	
Sediment Basin (REMOVED FROM USIBWC PLAN)		●	●	●	
Trash Booms (Alter Terra)		●			

Table 3: Projects For Goat Canyon

Goat Canyon Existing Projects	Sewage	Trash	Sediment	Flood Control	Report
Low-Flow Diversion Structure (USIBWC)	●	●	●		
Sediment Basin 40,000 CY		●	●	●	
Trash Boom (California State Parks)		●			
Cross Border Trash Tracking (Alter Terra)		●			●
FloodRISE (UCI)				●	●
Sediment Study (CICESE)					●
Tire Recycling (Cal Recycle)		●			●
WQ Sampling 2018 (CBP)	●				●

Goat Canyon Proposed Projects	Sewage	Trash	Sediment	Flood Control	Report
Dry weather low-flow monitoring - Location #1 (USIBWC)	●			●	
Dry weather flow monitoring - Location #2 (USIBWC)	●			●	
Dry weather low-flow monitoring - Location #3 (USIBWC)	●			●	

Table 4: Projects For Yogurt Canyon

Yogurt Canyon Existing Projects	Sewage	Trash	Sediment	Flood Control	Report
WQ Sampling 2018 (CBP)	●				●

Yogurt Canyon Proposed Projects	Sewage	Trash	Sediment	Flood Control	Report
Dry weather low-flow monitoring - Location #1 (USIBWC)	●			●	
Dry weather flow monitoring - Location #2 (USIBWC)	●			●	
Dry weather low-flow monitoring - Location #3 (USIBWC)	●			●	
Monument Rd Improvements (California State Parks)		●	●	●	

The data collection and review was a critical step in determining where information is limited across the Tijuana River Valley (i.e., data gaps) and where studies are needed to further project implementation or determine site specific constraints. The data gaps have been summarized to target specific issues of concern at each watershed. The issues of concern vary greatly due to the volume of runoff for each watershed, as well as the effectiveness of existing management practices on both sides of the border. Funding for the long-term maintenance of existing facilities, as well as implementing new beneficial projects, has been a challenge in efforts to improve the Tijuana River Valley. This NOA Report analyzes identified projects to determine which have been effective in mitigating issues of concern and which are being planned for implementation. Future projects require the preparation of specific planning level documents to further understand the feasibility of implementation. For projects that have some planning level documents completed, a conceptual design may need to be implemented to initiate the preparation of environmental documentation and clearance. The following summarizes the results from the data gap analysis at each of the four major watersheds and recommendations moving forward.

3.1.1 Tijuana River

The Final Phase 1 Hydrology, Sediment, and Floodplain Study (USACE 2018) models the hydrology of the Tijuana River Valley and provides a summary on the flood and sediment impacts on the river. However, Phase 1 of the study only models the Tijuana River Valley from the border to the Pacific Ocean. This limits the understanding of the watershed hydrology and sediment transport from the upstream system. Phase 2 will integrate data provided by agencies in Mexico so that the assessment reflects conditions in Mexico as well. Ultimately, the study findings may inform a sediment management plan and regulatory requirements (waivers, waste discharge requirements, etc.) for the Tijuana River Valley, which is a priority project in the Recovery Team's 5 Year Action Plan.

A better understanding of the water quality of the Tijuana River Valley from the international border crossing to the mouth of the river is needed, as well as an understanding of how far flows travel in the Tijuana River Valley under different dry weather flow conditions. Without this information, it is challenging to fully evaluate the effectiveness of both existing and proposed projects. In addition, the water quality monitoring to date has not included a thorough analysis specific to pathogens (Giardia, Cryptosporidium, viruses) or nutrient levels to help understand the risks to human health and the Tijuana River Valley habitat.

Additional gaps include the tracking of daily pumping at the PBCILA diversion structure to understand what events trigger flows to bypass the diversion structure, as well as a trash study to help determine the volume of trash that is expected to enter the U.S. from Mexico following certain rainfall events. Current communication protocols for transboundary flow events do not include a Tijuana River Valley-wide plan that coordinates responses by the various impacted agencies and stakeholders.

3.1.2 Smuggler's Gulch

Smuggler's Gulch needs a comprehensive watershed specific hydrology, hydraulics, and sediment study to inform the planning and design of proposed projects. Classification of contaminated and noncontaminated fractions of sediment is required to establish a long-term maintenance and disposal plan for sediment management. The average design capacity of the existing diversion structure is 4.67 mgd, with a peak capacity of 14.0 mgd. Understanding how the diversion facility operates, in addition to the design capacity limitations, is critical to understanding what is currently being diverted (dry and wet weather) and the potential to increase the volume of diversion into the intake structure. Similar to what is noted above for the Tijuana River, water quality monitoring to date has not included a thorough analysis of specific pathogens (Giardia, Cryptosporidium, viruses) or nutrient levels to help in understanding the risks to human health and habitat near Smuggler's Gulch. An additional data gap identified is the need for a trash study based on the population and land use characteristics of the Smuggler's Gulch watershed to help determine the classification and volume of trash that is expected to enter the U.S. from Mexico following certain rainfall events.

3.1.3 Goat Canyon

The Goat Canyon sedimentation basins and trash boom have historically been effective in trapping sediment and trash that crosses the international border. The challenge for these existing facilities is obtaining reliable and consistent funding to manage the disposal of the sediment and trash detained in the basins. Classification of contaminated and noncontaminated fractions of sediment and trash is needed to establish a budget for the long-term maintenance and disposal plan for the basins which can consider the potential for trash recycling and beneficial reuse of sediment. The average design capacity of the existing

diversion structure is 2.33 mgd, with a peak capacity of 7.0 mgd. Understanding how the diversion facility operates, in addition to the design capacity limitations, is critical to understanding what is currently being diverted (dry and wet weather) and the potential to increase the volume of diversion into the intake structure. Similar to the Tijuana River and Smuggler's Gulch, water quality monitoring to date has not included a thorough analysis of specific pathogens (Giardia, Cryptosporidium, viruses) or nutrient levels to help in understanding the risks to human health and the canyon habitat and downstream estuary.

3.1.4 Yogurt Canyon

Yogurt Canyon is the watershed with the least amount of information available. Flows into the Tijuana River Estuary from Yogurt Canyon receive no intervention, so documented sewer line breaks and spills (per the "Spills Photo Documentary 2017" [U.S. CBP 2017) and the "List of Known Transboundary Spills" [County of San Diego 2016] documents) are not captured and flow directly into the estuary. An assessment of a potential low-flow diversion is needed to understand the level of sewage that can be diverted to prevent flows from flowing directly into the Tijuana River Estuary. In addition, a comprehensive watershed specific hydrology, hydraulics, and sediment study is needed to understand the volumes of fresh water and sediment that enter the estuary. This study could also assist in designing the appropriate drainage conveyance through Monument Road to reduce flooding and improve access to Border Field State Park. The road suffers from several washouts and is consistently flooded due to runoff from Yogurt Canyon. Similar to the Tijuana River, Smuggler's Gulch, and Goat Canyon, water quality monitoring to date has not included a thorough analysis of specific pathogens (Giardia, Cryptosporidium, Viruses) or nutrient levels to help in understanding the risks to human health and the downstream estuary.

3.2 Concurrent Studies

In addition to the existing and proposed projects discussed in the previous section, there are other ongoing studies for future projects that are being addressed by others, concurrent with the NOA. A summary of these projects is provided below.

3.2.1 Tijuana River Diversion Study: Flow Analysis, Infrastructure Diagnostic and Alternative Development

- The study was directed by the NADB, in coordination with the U.S. Environmental

Protection Agency (USEPA), USIBWC, CILA, Comisión Nacional del Agua, and CESPT.

- The study was initiated in the spring of 2018 and completed in July 2019.
- The study consists of transboundary flow analysis, diversion infrastructure and operations diagnostics, and an evaluation of technical alternatives identified for potential infrastructure improvements in Mexico, the U.S., or both countries for mitigation of transboundary flows.
- The study provides a summary of the treaty minutes that apply to the transboundary flows in the Tijuana River Valley.
- The study did not result in a recommendation for a single solution. The recommendations focused on the need for analysis through preliminary engineering and a feasibility study for any of the proposed investment options.

3.2.2 Feasibility Study for Sediment Basins, Tijuana River International Border to Dairy Mart Road

- The study was directed by USIBWC as part of the Minute 320 objectives.
- The study was initiated in November 2018 and a 60% Feasibility Study was completed in June 2019.
- The study consists of river hydraulics and sediment transport modeling for the existing river conditions and proposed conceptual sediment basin alternatives.
- The final study (anticipated in early 2020) is expected to identify a preferred alternative to address sediment and trash in the main channel of the Tijuana River between the International Border and Dairy Mart Road.

3.2.3 Tijuana River Valley Stakeholder Solution

- Surfrider San Diego has partnered with Dexter Engineering to develop a conceptual solution to the sediment, trash, sewage, and chemicals that impact the Tijuana River Valley.
- The study was initiated in 2018 with project concepts presented in November 2018, February 2019, and May 2019.
- The concept includes an extension and widening of the main concrete river channel with the current flood control facility, construction of a low-flow diversion and pump system to divert flows from the channel to the SBIWTP,

installation of a debris rack to catch trash, and construction of a sediment basin upstream of Dairy Mart Road.

3.2.4 Tijuana River Valley Recovery Team Recovery Strategy

- The study was completed in collaboration with more than 30 federal, state, and local agencies (including California State Parks, USEPA, CBP, TRNERR, Regional Board, USIBWC, County of San Diego, City of San Diego, City of Imperial Beach, etc.), as well as other stakeholders on both sides of the border (including Coastal Conservancy, Surfrider, San Diego Coastkeeper, Tijuana River Valley Equestrian Association, etc.).
- The strategy plan was initiated in June 2008.
- The Recovery Strategy was completed in January 2012, and the Five-Year Action Plan was completed in March 2015.
- The objective of the Recovery Strategy is to document the existing conditions related to sediment and trash issues in the Tijuana River Valley and outline solutions that will allow beneficial uses of the Tijuana River Valley and its resources to be achieved.
- The objective of the Five-Year Action Plan is to maintain collaborative momentum and implement priority projects that advance Recovery Team goals as described in the Recovery Strategy.

3.2.5 Tijuana Estuary Tidal Restoration Project

- Initially developed in 1991 for the California Coastal Conservancy and U.S. Fish and Wildlife Service (lead agencies), the Tijuana Estuary Tidal Restoration Program (TETRP) is a large multi-phased wetland restoration program involving up to 500 acres of restoration. Its primary objective is to restore habitat values that have been lost and increase the exchange of water in a tidal cycle which will, in turn, enhance flushing, improve water quality, and control sedimentation.
- The study was followed by the Tijuana Estuary – Friendship Marsh Restoration Feasibility and Design Study prepared in March 2008 for the California Coastal Conservancy and Southwest Wetlands Interpretive Association (SWIA).
- This feasibility and design study reexamines the potential for restoration of the southern arm of Tijuana River and updates and refines the 1991 design/ plan to include a programmatic level feasibility analysis and engineering plans.

3.2.6 Brown Property Restoration

- The County of San Diego is the landowner and project lead.
- Grant funding was secured for planning, environmental analysis and permitting, and design.
- The Hydraulic and Sediment Transport Analysis for the Brown Property Fill Removal was completed in 2019.
- Four conceptual fill removal alternatives were considered. The hydraulic results indicate that the alternatives will not significantly lower the water surface elevations or provide flood inundation benefits near the project over the range of flow events studied. The reductions vary depending on the alternative, flow event, and cross section, and the maximum reduction is less than five inches.
- The County of San Diego is currently looking at revising the project scope and costs in consultation with key stakeholders.

3.2.7 Nelson Sloan Quarry Restoration

- California State Parks is the project lead in partnership with the County of San Diego and City of San Diego.
- Grant funding was secured for planning, environmental, and development of operation agreements.
- The study was initiated in 2010 (URS 2010), followed by the Nelson Sloan Management and Operations Plan and Cost Analysis in 2016 (AECOM 2016).
- The purpose of this plan is to provide stakeholders with sediment management responsibilities in the valley a description of how the quarry might be managed and operated as a location for the placement of sediment and concurrently meet the requirements of the conditional use permit and Restoration Plan.
- California State Parks is currently preparing environmental analysis and design documents.
- The project will also require preparation of a multijurisdictional agreement that details roles and responsibilities during operation of the proposed project.

3.2.8 Hydraulics and Hydrology Model, Phase 1

- This was developed by USACE in coordination with the City of San Diego.

- In September 2018, the USACE completed a Phase 1 Hydrology, Floodplain and Sediment Transport Study extending from the international border to the Pacific Ocean.
- The USACE initiated Phase 2 of the study in July 2018, which is still underway. It is anticipated that Phase 1 modeling will be extended into Mexico and include the operation of the reservoirs in Mexico.
- The overall study goals are to determine flow rates and flood risks for a range of storm events; plan for future flow management activities that may be used to mitigate flood risk in the U.S. Mexico border area; and help inform future flood, sediment and trash management activities (including watershed conservations, preservation, and restoration management strategies).

3.2.9 Border Impact Bond

- Walls, a registered 501(c)(3) nonprofit, has proposed a financing strategy (Border Impact Bond) to focus on the need for upstream source control to reduce transboundary flow of trash and sediment across the U.S. Mexico border.
- The means of investing in and providing 3rd party financial support for such a bond are being examined at present.
- The Border Impact Bond would create value for plastics and repurpose trash in parts of Tijuana with the goal of developing a blueprint that can be employed more broadly across various parts of the border. It is the goal of the NOA to include these projects to the extent they are practicable, consistent with the Recovery Team Strategic Plan, and relevant to solving the impacts from transboundary flows.

3.3 Stakeholder Coordination and Public Outreach

A public workshop was held at 6 p.m. on July 25, 2019, at Casa Familiar in San Ysidro. The workshop informed the public and other stakeholders of the reason for the assessment and presented the potential projects. The workshop began with a PowerPoint presentation that included an explanation of the assessment. Following the presentation, all in attendance were invited to review and comment on the various projects. Displays of potential projects were in various locations around the room while stakeholders were able to ask questions of the project team. Stakeholders were also able to provide comments.

PROJECTS

4. PROJECTS

4.1 Management Strategies

A number of mitigation or management strategies were developed for each of the three main issues of concern: water quality (i.e., sewage), sediment, and trash. Preliminary concepts were then developed for each strategy, which helped inform the development of projects and alternatives. The following sections further describe the strategies and concepts evaluated.

4.1.1 Water Quality

Divert and Treat

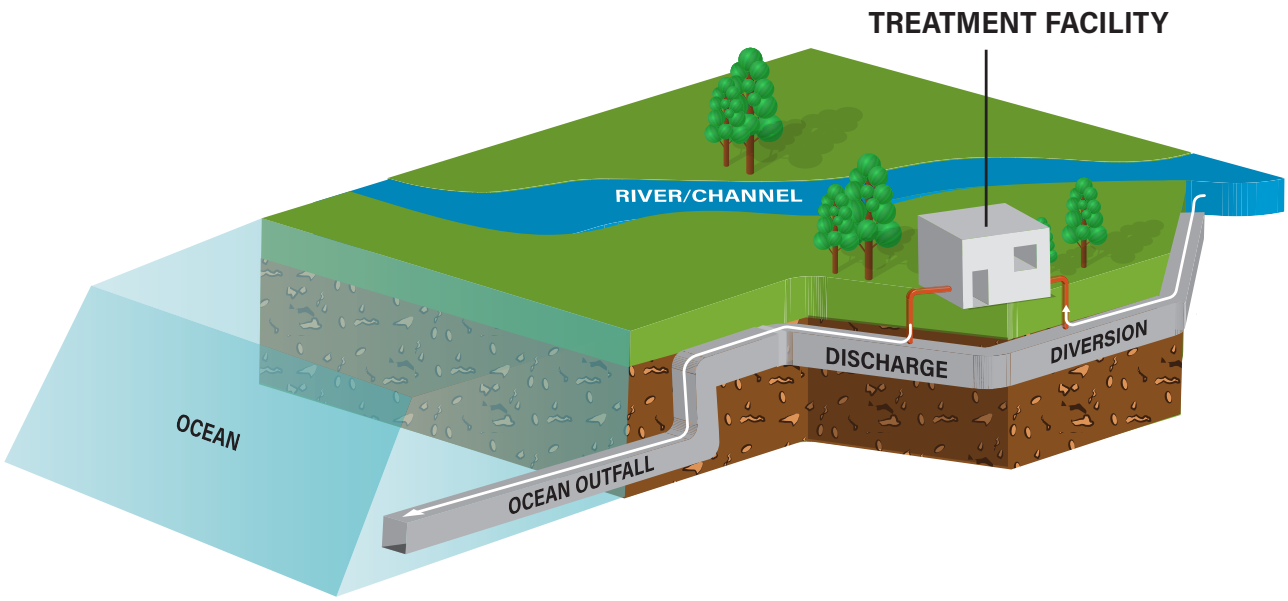
The main goal of this concept (Figure 10) is to divert additional flows (above the current 23 mgd dry weather flow diversion available through PBCILA) from the mainstem of the Tijuana River and/or from the canyon collectors for treatment and discharge. A new pump station on the U.S. side of the border would operate primarily during certain storm events. This new pump station would be required, because the existing pump station (PBCILA) is designed to shut down during storm events. The new pump station could also divert dry weather flows if those flows either exceed PBCILA's 23 mgd capacity or PBCILA is not operational. Treatment would be achieved through the construction of a new advanced primary treatment facility and/or expansion of existing treatment facilities (e.g., SBIWTP, SBWRP). Since the flows would be periodic in nature,

physical treatment processes, such as primary settling, can be provided in a parallel treatment train to handle the variations in flow.

The type of treatment options for the new stormwater treatment plant could range from advanced primary treatment to secondary treatment with discharge either to SBOO or directly to the Tijuana River. The treatment expansion projects need to address the following aspects:

- Removal of sediments and solids from the water
- Removal of degradable organics to levels that reduce the impacts of disposing flows to the ocean
- Disinfection to reduce the level of pathogens and indicator bacteria before disposal
- A sufficient level of treatment to address other water quality issues associated with Clean Water Act Section 303(d) impairments

Figure 10: Water Quality Strategy I: Divert and Treat

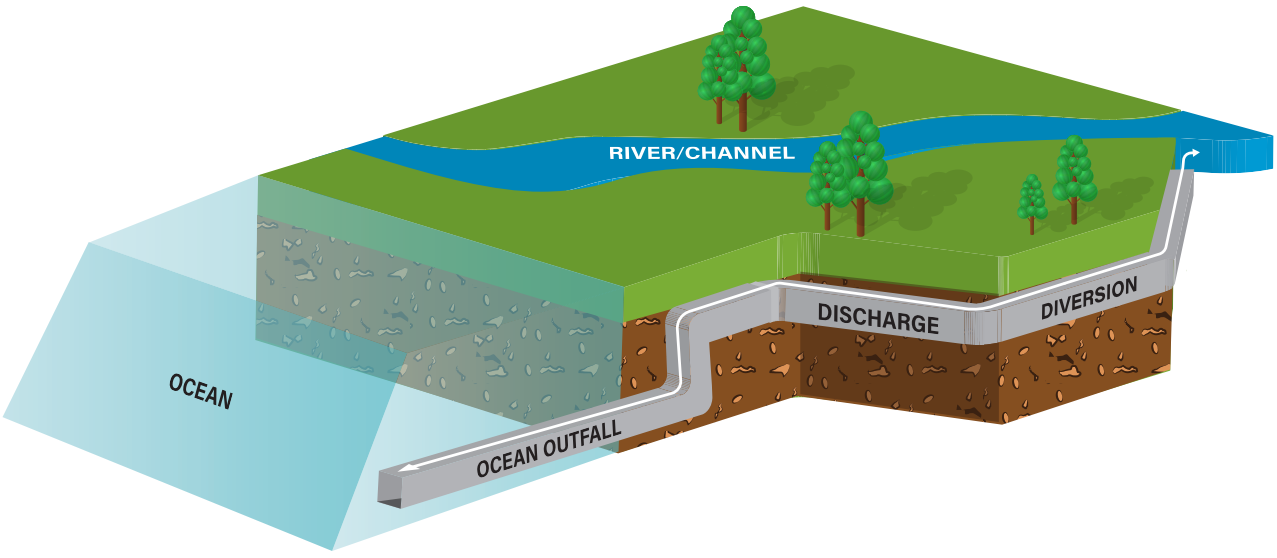


Construction of additional treatment facilities could be phased to reduce the initial capital investment. Based on concerns of possible negative impacts on the existing treatment processes, it is suggested that a new plant be built independently from the existing SBIWTP or SBWRP plants. Any new discharge will require an update to the existing NPDES permits, will need to address applicable NPDES requirements, and may require additional ocean outfall monitoring.

Divert and direct discharge

The main goal of this concept (Figure 11) is to divert additional Tijuana River flow (above the current 23 mgd dry weather flow diversion available through PBCILA) for discharge directly to the SBOO without treatment. This concept would construct a new lift station on the U.S. side of the border to divert transboundary flows to the existing SBOO without primary or secondary treatment. Trash control, sediment removal, and screening would need to be provided at the new lift station. A diversion option for consideration is a gravity flow storm drain, in lieu of a lift station. The existing SBOO currently has 163 mgd to 193 mgd of unused peak capacity (refer to Section 2.2.4 for additional details)

Figure 11: Water Quality Strategy II: Divert and Direct Discharge

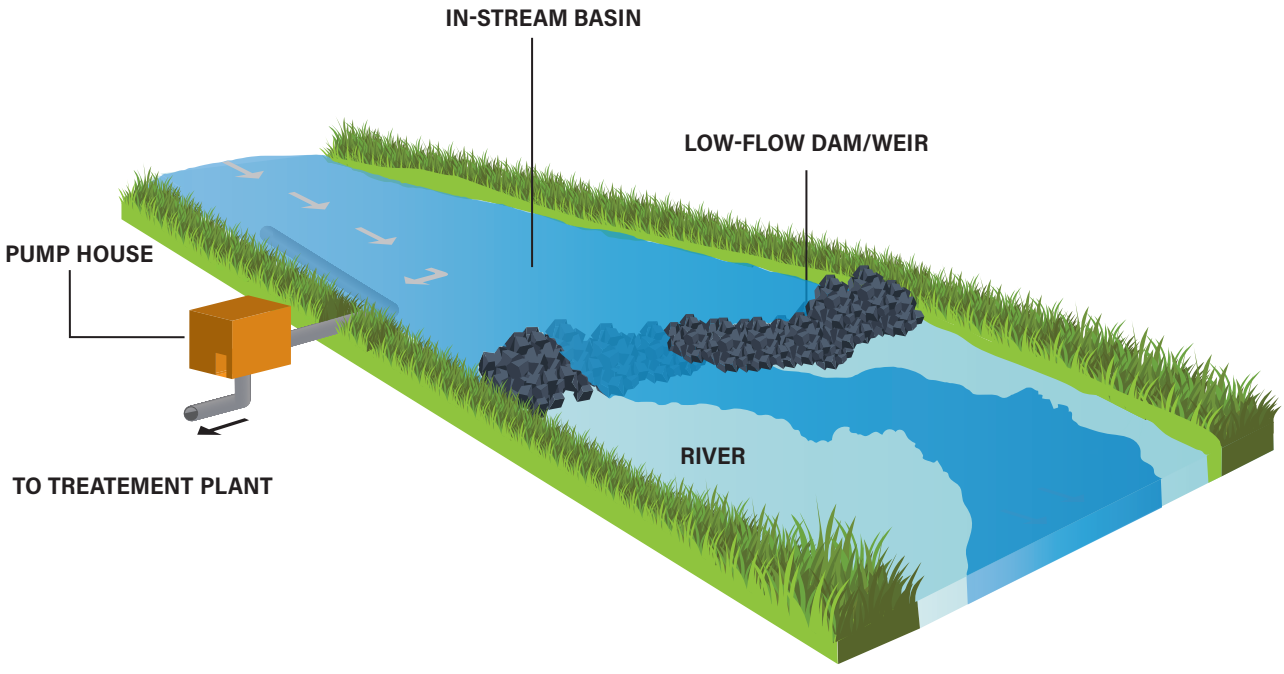


that could be used in the case of an emergency spill or potentially during minor storm events to capture additional pollutant laden runoff. However, permitting of untreated discharges to the SBOO by the Regional Board would need to be secured before implementing this management strategy as there is a high likelihood that the discharge would not meet the currently permitted discharge requirements and may have an effect on ocean water quality. This concept could also be considered for emergency and/or maintenance operations associated with one of the other management strategy concepts.

In-Stream Basin

The main goal of this concept (Figure 12) is to capture transboundary flows within the river and/or tributaries before flows go downstream and reach the Tijuana River Estuary and Pacific Ocean. This concept would construct a detention basin to capture transboundary flows at a key location(s) within the watershed. The basin would be necessary to capture flows that bypass upstream diversion structures. The basin would have an in-line weir for routing flows into a subbasin to pump the collected flow to a treatment facility (e.g., SBIWTP, SBWRP, or new stormwater treatment facility) or directly to the SBOO.

Figure 12: Water Quality Strategy III: In-Stream Basin

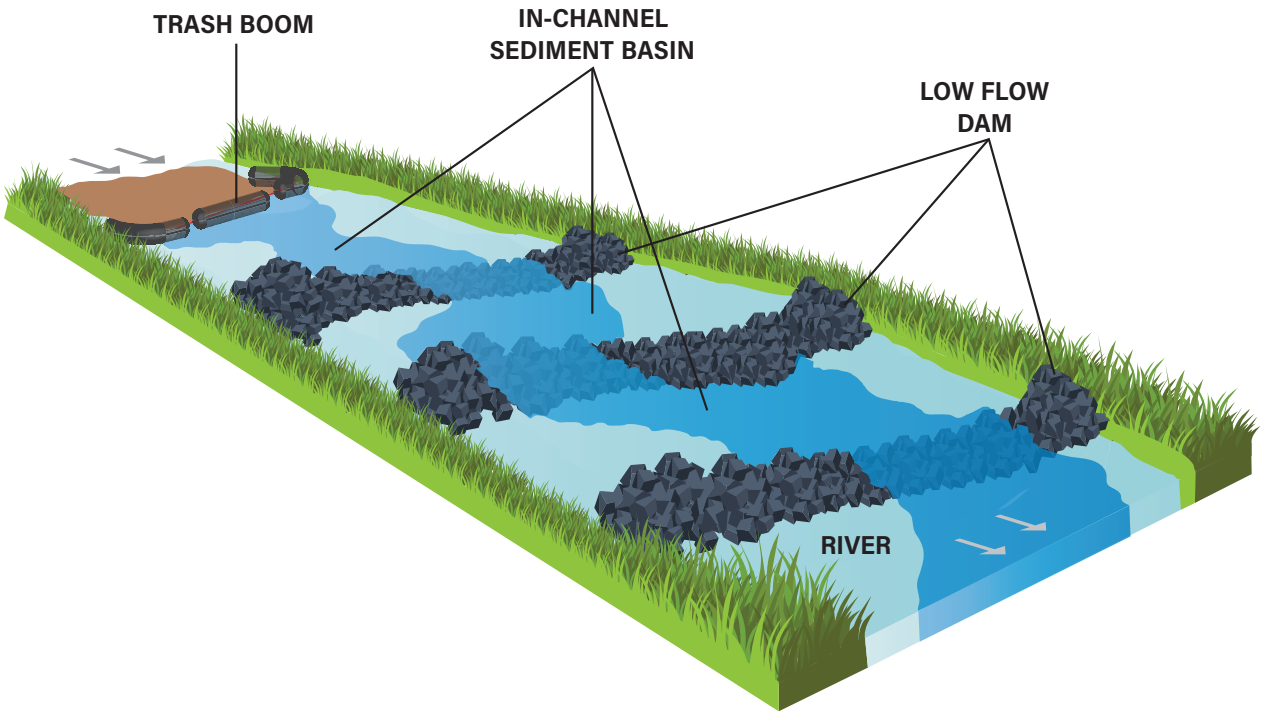


4.1.2 Sediment

In-channel capture basins

The goal of this concept (Figure 13) is to create storage areas within the existing channel (main channel and/or tributaries) that allow low flows to pond long enough for the sediment bed load (i.e., coarser sediment) to settle out. The accumulated sediment can then be removed from the basin and hauled off to a landfill or used for other purposes (e.g., beach replenishment, construction fill, etc.). Ponding areas can be created by excavating low areas within the channel, by constructing in-line weirs or check dams across the channel, or a combination of both. A single basin or series of basins can be used to capture the volume of sediment desired. An example of an in-line sediment basins can be seen in Goat Canyon just upstream of Monument Road. The collected sediment may be useful as construction fill and/or beach replenishment but would need to be tested to ensure the quality of sediment is suitable for reuse.

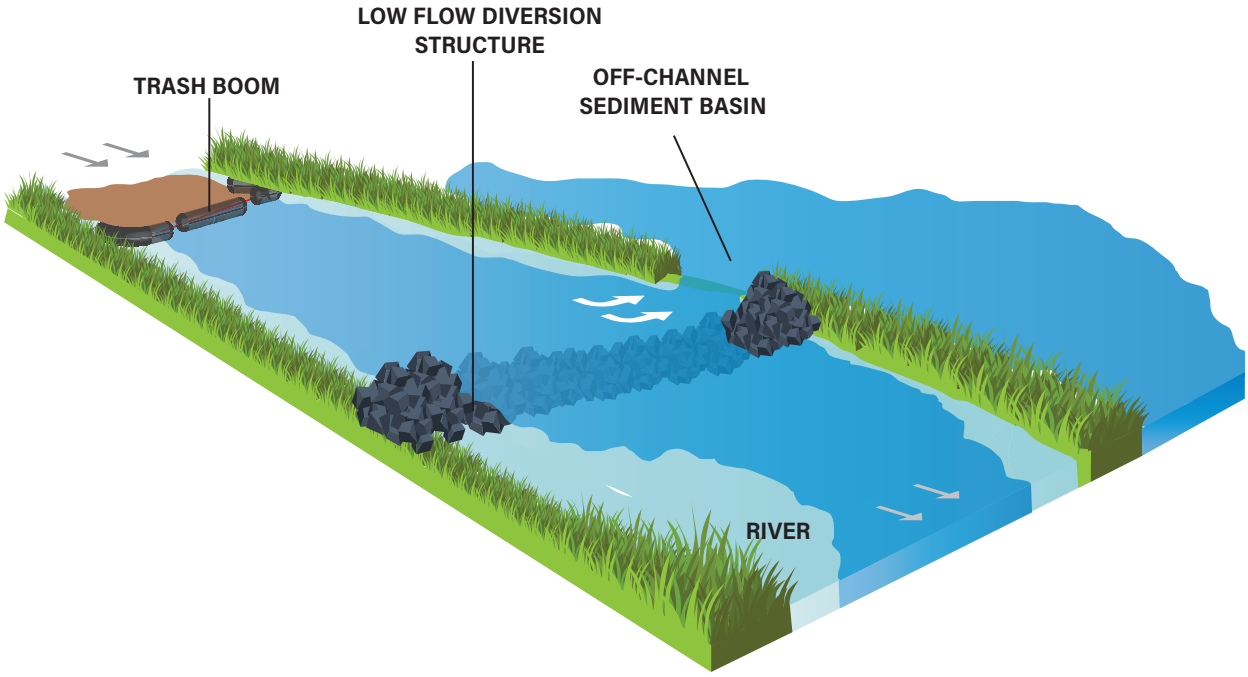
Figure 13: Sediment Capture Strategy I: In-Channel Basin



Off-channel capture basin

The goal of this concept (Figure 14) is very similar to the in-channel basin. The main difference is the off-channel sediment basin is constructed adjacent to the channel (on either side). It can be designed to work in combination with the in-channel basin storage to increase the ponding volume for sediment capture. A diversion or lateral weir structure would be needed to divert higher flows into the off-channel storage area, allowing lower flows to pond and the sediment to settle out within the channel. The off-channel basin would collect the suspended sediments (i.e., fine sand and silt), which predominantly bind contaminants, and provide for the additional sediment storage during peak storm events. The sediment basin(s) would be cleaned out as needed to maintain adequate storage volume. The collected sediment would likely need to be hauled to a landfill due to the high likelihood of contamination.

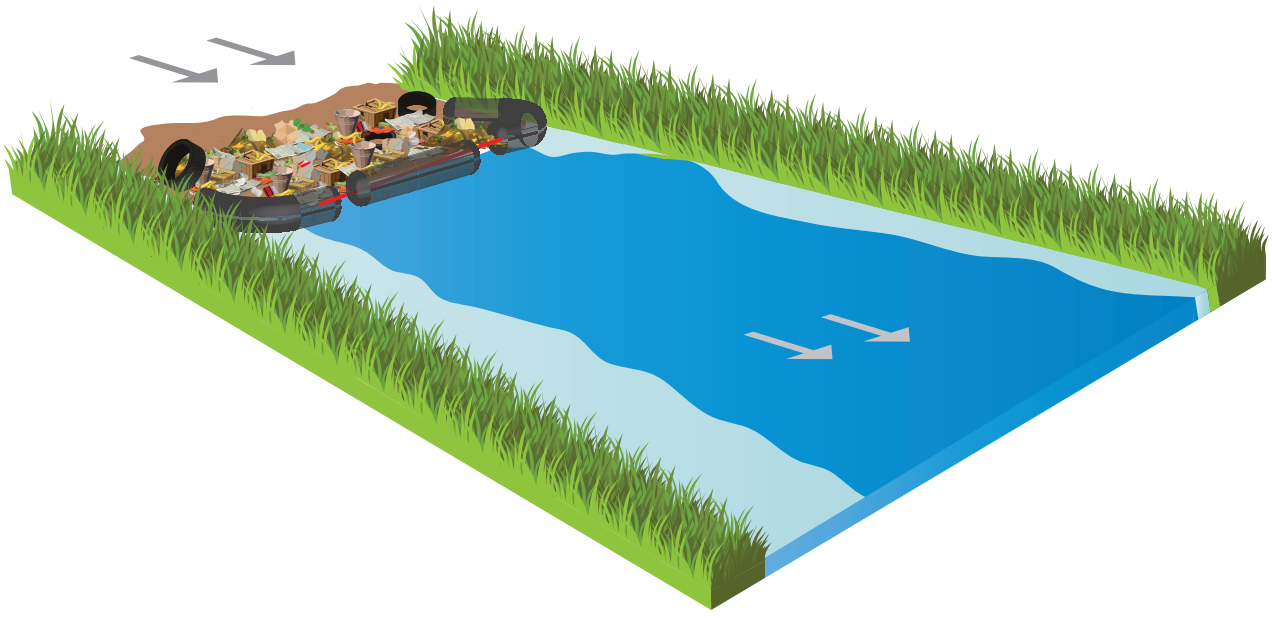
Figure 14: Sediment Capture Strategy II: Off-Channel Basin



4.1.3 Trash

The data collection and review of projects for the Tijuana River Valley area indicate the possibility of implementing a variety of trash collection and disposal opportunities. The 60% Report Feasibility Study for Sediment Basins Tijuana River International Border to Dairy Mart Road (Stantec 2019) currently in progress for the USIBWC reviewed various best management practices for trapping trash. The trash traps examined by the USIBWC included in-line screens, self-cleaning screens, and booms and baffles (Figure 15). The findings of the report indicated that in-line screens, generally installed as angled, vertical metal bars in the flow path, tend to clog and are not reliable. Self-cleaning screens, such as Continuous Deflective Separation units, are used in situations where the drainage area is less than 1,200 acres, but they require substantial pressure to operate. Trash booms and baffles were found to deflect and trap litter at low flow velocities with large drainage areas. Considering the location constraints of each of the different traps, trash/debris booms would be the most appropriate type of traps. The findings of the report appear reasonable because the booms installed as part of the Goat Canyon sediment basin project appear to be effective.

Figure 15: Trash Capture Strategy



It should be noted that no trash device is 100 percent effective at capturing trash. This is attributable, in part, to the need to limit flooding events by allowing flows to bypass the system—allowing some trash to pass and, thus, furthering the need to continue manual efforts of trash collection. As such, nonstructural efforts can also be considered, such as clean ups and recycling incentives. Ultimately, a combination of a variety of approaches will be needed.

4.1.4 Other

Although existing flooding was not one of the three main issues of concern evaluated within the NOA, there is the potential that projects proposed to address sewage, trash, and sediment may have an impact (positive or negative) on the existing flooding conditions. Flood risk reduction measures were considered as an additional benefit to any projects proposed to address the three main issues of concern.

4.2 Project Identification Process

Based on the management strategies and preliminary concepts described in the previous section, individual projects were identified to address watershed specific needs for each of the three issues of concern in each of the four main watersheds. The project focus for each of the four watersheds is described below.

4.2.1 Tijuana River

The issues of concern within the main channel of the Tijuana River include sewage, sediment, and trash. Although these pollutants get washed downstream to the ocean during peak storm events, the major concern is with the upper reach of the river between the U.S.-Mexico border and Dairy Mart Road. The USIBWC Sediment Feasibility Study (Stantec 2019) addresses the sediment and trash in the upper reach of the river, so the primary focus of the Tijuana River projects in the NOA is water quality (i.e., sewage). The costs and benefits of various diversion and treatment options have been evaluated, as described in Section 4.3.

4.2.2 Smuggler's Gulch

Although water quality is a concern for Smuggler's Gulch, the existing canyon collector generally provides adequate collection and diversion so that flows can be treated at the SBIWTP during dry weather conditions. As such, the primary focus for Smuggler's Gulch is on sediment and trash capture, including projects like those that exist at Goat Canyon. Additional collection and diversion of wet weather flows are also considered, as well as in-channel treatment options, because existing facilities can only address dry weather flows.

4.2.3 Goat Canyon

Similar to Smuggler's Gulch, the canyon collector at Goat Canyon generally provides adequate collection and diversion so that dry weather flows can be treated at the SBIWTP. Unlike Smuggler's gulch, there are also existing trash and sediment capture facilities within Goat Canyon (currently operated by California State Parks). Considering the existing infrastructure and facilities at Goat Canyon, all three of the primary issues of concern are currently being addressed to some level at Goat Canyon. The primary need at Goat Canyon is a long-term plan and reliable funding source for the ongoing management (removal and disposal) of trash and sediment captured by the existing facilities. A project to develop a Sediment and Trash Management Plan is considered to meet this ongoing management need. Additional collection and diversion of wet weather flows are also considered, as well as in-channel treatment options, because existing facilities only address dry weather flows.

4.2.4 Yogurt Canyon

Although there are currently no dry or wet weather capture or treatment facilities in Yogurt Canyon, there does not appear to be a major concern with water quality or trash issues in this area. The main concern appears to be downstream during wet weather events when Monument Road gets flooded. The high-volume wet weather events also convey sediment and fresh water into non-tidal areas of salt marsh habitat within the Tijuana River Estuary. Projects to redirect the flow and sediment into tidally influenced areas of the estuary (consistent with the TETRP) are considered as the primary need within Yogurt Canyon.

4.2.5 Other Considerations

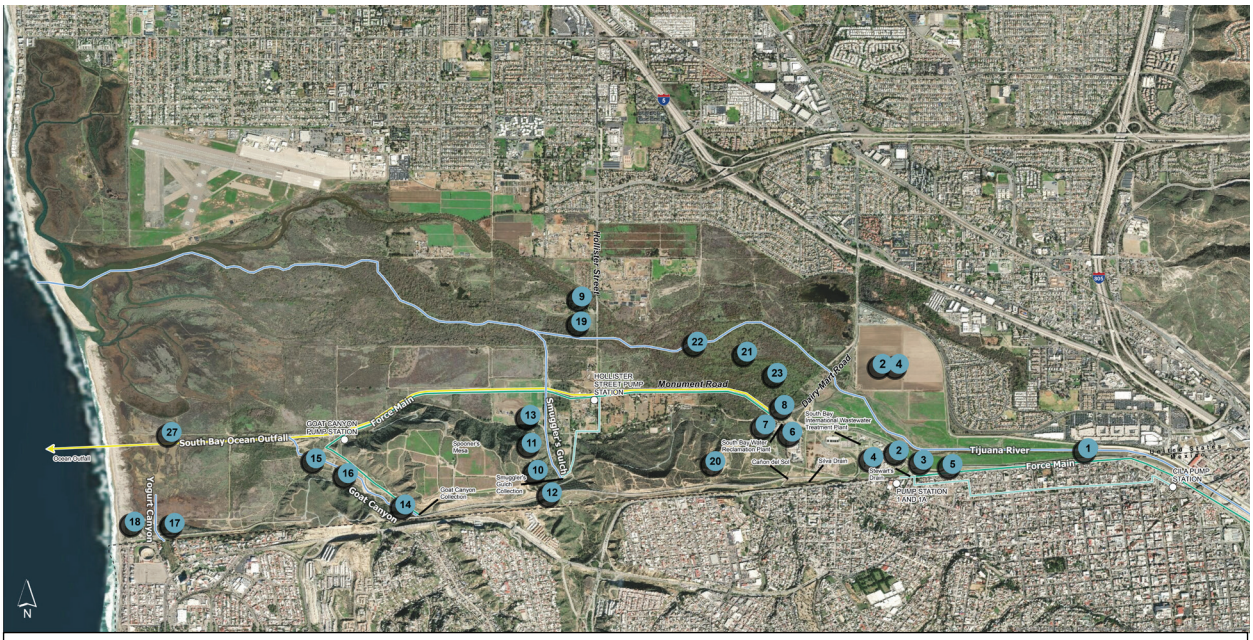
There are a number of other projects that are ongoing, can be implemented across the Tijuana River Valley, and/or are consistent with the Recovery Team Strategic Plan, which are also considered as part of the NOA. These include restoration projects (Brown Property, Nelson Sloan Quarry, TETRP, and invasive species removal), monitoring (water quality and soil sampling), and clean up and recycling programs. Additional projects that could potentially provide limited benefits or did not address one of the primary issues of concern were noted as part of the data collection and gap analysis but were not considered further in the evaluation process.

4.3 Project Evaluation

A total of 27 projects were identified using the strategies described above. Figure 16 shows each of the 27 projects on a map to illustrate the geographic location of each project in relation to the border crossing, three major tributaries, pump stations, and the SBOO. The potential costs were estimated for each project, along with the pros and cons, and summarized for comparison. The potential costs were based on a Class 5 planning level estimate. A Class 5 level is intended to provide a cost estimate with an accuracy of 50 to 20 percent below to 30 to 100 percent above the actual cost. The water quality project costs were estimated using HDR's WaterCost Model. The trash and sediment project costs were estimated based on actual data from similar projects in the area (e.g., Goat Canyon).

Table 5 through Table 7 provide a summary of the potential projects for the main Tijuana River, tributaries, and other parts of the watershed, respectively.

Figure 16: Potential Projects Location Map



POTENTIAL PROJECTS					
Project #	**Project Title**	**Sewage**	**Trash**	**Sediment**	**Flood Control**
1	Tijuana River Trash Booms*		X		
2	Tijuana River Sedimentation Basins*		X	X	X
3	New Lift Station to Divert Flows to SBIWTP**	X			
4	New Storm Water Treatment Facility at IBWC SBIWTP	X			
5	New Lift Station to Divert flows to SBWRP	X			
6	Expand Primary Treatment Capacity at City of San Diego SBWRP	X			
7	Pumped Direct Discharge to SBOO without Treatment**	X			
8	Gravity Flow Direct Discharge to SBOO without Treatment**	X			
9	Tijuana River In-Stream Water Quality Detention Basin	X			
10	Smuggler's Gulch Trash Booms		X		
11	Smuggler's Gulch Sedimentation Basin			X	X
12	Smuggler's Gulch Retrofit Low-Flow Diversion	X			
13	Smuggler's Gulch In-Stream Water Quality Detention Basin	X			
14	Goat Canyon Retrofit Low-Flow Diversion	X			
15	Goat Canyon Retrofit In-Stream Water Quality Detention Basin	X			
16	Sedimentation and Trash Management in Goat Canyon		X	X	X
17	Low-Flow Diversion at Yogurt Canyon	X			
18	Yogurt Canyon Pilot Channel			X	X
19	Brown Property Restoration (County)		X	X	X
20	Nelson Sloan Quarry Restoration (State Parks/County)			X	
21	Invasive Species Removal and Restoration (County)				X
22	Water Quality Monitoring	X			
23	Soil Sampling (County)			X	X
24	Recycling Incentives		X		
25	NGO Clean-up Programs		X		
26	Emergency Action Plan	X	X	X	X
27	Tijuana Estuary Tidal Restoration Program	X	X	X	

*Project being analyzed by IBWC **Similar project being analyzed by the NADB Diversion Study

Table 5: Potential Projects in the Main Tijuana River

#	PROJECT TITLE & DESCRIPTION	EST. PROJECT COST	PROS (+)	CONS (-)	OTHER
1	**TIJUANA RIVER TRASH BOOMS**				
	Install trash capture devices (booms) across the span of the Tijuana River just upstream of the transition from a concrete to earthen channel (within IBWC's flood control channel). The booms would catch trash as it enters the United States side of the Tijuana River, and would require frequent maintenance. This project is currently being analyzed by IBWC through a feasibility study, as well as a conceptual study by Surfrider.	• **Est. Implementation Cost:** <$2M • **Est. O&M Cost:** <$2.5M	• Can be incorporated into other projects (e.g. sediment basins, water quality diversions, etc.) • Reduces impacts to natural areas downstream of Dairy Mart Road • Simple, effective device not associated with increased flood risk	• Potential to impact border security operations • Sizing of infrastructure challenging due to the unpredictability in the type and volume of trash • Frequent ongoing maintenance required, and access can be complicated during rainy season	• Amount of trash captured will depend on the peak, velocity, and duration of storm flows
2	**TIJUANA RIVER SEDIMENTATION BASINS**				
	Construct sedimentation basins either within or adjacent to the Tijuana River, upstream of Dairy Mart Rd. The basins would capture flows and allow sediment to settle into the basins to reduce sewage and sediment inflow into the downstream portions of the Tijuana River. This project would result in the retention of polluted runoff for a period of time. The basins could also incorporate green technology to remove contaminants from the water. These facilities would require frequent maintenance. This project is currently being analyzed by IBWC through a feasibility study, as well as a conceptual study by Surfrider.	• **Est. Implementation Cost:** $12M* • **Est. O&M Cost:** TBD * * *per IBWC 60% Sediment Feasibility Study (Alternative A).*	• Potential to increase sediment capture east of Dairy Mart Road, which protects sensitive downstream habitat • Can be configured to also capture trash and sewage	• Limitations on how much sediment can be captured based on available land for basins • Requires ongoing maintenance and sediment disposal • Access for maintenance can be complicated during rainy season • Requires significant environmental analysis and permitting	• Existing river channel upstream of Dairy Mart Road currently acts as a type of natural basin trapping sediment from moving downstream
3	**NEW LIFT STATION TO DIVERT FLOWS TO SBIWTP**				
	Provide a new lift station to divert up to 163 mgd to a new South Bay International Wastewater Treatment Plant (SBIWTP) for primary treatment before discharging 3.4 miles offshore through the South Bay Ocean Outfall (SBOO).	• **Est. Implementation Cost:** a. 35 mgd = $10M b. 100 mgd = $22M c. 163 mgd = $32M	• Could provide backup to capture flows and spills not captured upstream in Mexico	• Limited capacity to divert flows during rainy season (only up to the 1-year rain event)	• NADB Diversion Study has evaluated the construction of a new diversion facility to primarily address flows that occur during dry weather

Table 5: Potential Projects in the Main Tijuana River (continued)

#	PROJECT TITLE & DESCRIPTION	EST. PROJECT COST	PROS (+)	CONS (-)	OTHER
3	**NEW LIFT STATION TO DIVERT FLOWS TO SBIWTP (CONT'D)**				
	The maximum flow of 163 mgd to the new SBIWTP is due to the limited available capacity of 233 mgd in the SBOO (per City of San Diego) 40 mgd permitted flow for SBWRP to discharge into the SBOO and 30 mgd flow discharged to the SBOO from the existing SBIWTP. A similar project is currently being considered (Alternative 4B - 35 mgd diversion) in the Tijuana River Diversion Study sponsored by NADB (NADB Diversion Study). The SB 507 NOA is considering diversions up to 163 mgd, along with additional treatment (see Project 4). **<u>The following diversion options are considered in the SB 507 study:</u>** **a.** 35 mgd **b.** 100 mgd **c.** 163 mgd	• **Est. O&M Cost:** a. 35 mgd = $400K b. 100 mgd = $900K c. 163 mgd = $1.5M	• Can be sized to divert a minimum flow of 30 mgd and a maximum flow of 163 mgd • Potential to divert additional flow volume for treatment or disposal if additional storage is provided (e.g., new basin at the sod farm) • Potential to reduce impacts to downstream river, estuary, and beaches • Average Number of Transboundary Flow Days per Year (baseline of 138 days/year per NADB Diversion Study) **a.** 35 mgd = 56 **b.** 100 mgd = 20 **c.** 163 mgd = 12	• Requires construction of new infrastructure • Requires ongoing maintenance to be effective • Adding storage capacity at the sod farm may create impacts to surrounding areas and border security • Requires significant environmental analysis and permitting	• This project would need to be built in conjunction with Project 4 and/or Project 7 since the diverted flows would need to be sent either to the treatment facility or to the South Bay ocean outfall • The max flow is driven by the available peak capacity in the South Bay ocean outfall of 233 mgd and the permitted discharge of 40 mgd granted to SBWRP. (233-40 = 193 mgd) • The max flow is further reduced by 30 mgd (163 mgd max) to allow for existing SBIWTP capacity.
4	**NEW STORM WATER TREATMENT FACILITY AT IBWC SBIWWTP**				
	Provide a new treatment facility at IBWC's SBIWTP to handle up to 163 mgd of stormwater flow and provide primary level of treatment. This would allow for some limited wet weather diversion volumes to be routed for treatment. The maximum flow of 163 mgd at the new SBIWTP is due to the limited available capacity of 233 mgd in the SBOO (per City of San Diego), 40 mgd permitted flow for SBWRP to discharge into the SBOO and 30 mgd flow discharged to the SBOO from the existing SBIWTP. SBOO will discharge treated flows 3.4 miles offshore.	• **Est. Implementation Cost** a. 35 mgd = $64M b. 100 mgd = $141M c. 163 mgd = $194M d. 163 mgd plus storage= $372M e.35 mgd = $35M (per NADB)	• Provides new treatment facility for additional captured flows (Options a-d) • New treatment facility can be sized to handle up to 163 mgd (Options a-d) • Could provide advanced primary treatment of flows from small rain events • Utilizes existing available space at IBWC SBIWTP • Minimizes environmental impacts as the site is located within the current treatment facility boundary	• Requires construction of new treatment plant (Options a-d) • Significant annual maintenance is required • Complex operation and will need additional staff at SBIWTP to operate the facility • Requires significant environmental analysis and permitting • Addition of off-channel storage basin (Option d) would require significant maintenance to address potential impacts to adjacent neighborhoods and border security	• Building a new treatment facility in extra space on federally owned land adjacent to the existing SBIWTP (Options a-d) • A separate treatment plant is preferred that does not combine stormwater flows with existing influent to the treatment plant to maintain integrity of the existing treatment process • Can use existing SBIWTP capacity (30 mgd) for additional dry and/or wet treatment capacity (primary treatment only)

Table 5: Potential Projects in the Main Tijuana River (continued)

#	PROJECT TITLE & DESCRIPTION	EST. PROJECT COST	PROS (+)	CONS (-)	OTHER
4	**NEW STORM WATER TREATMENT FACILITY AT IBWC SBIWWTP (CONT'D)**				
	The SB 507 study also includes one of the NADB Diversion Study alternatives. The Diversion Study Alternative 4B proposes to use the existing SBIWTP Primary Treatment facility to treat up to 35 mgd prior to discharging to the SBOO. This option (Option e) differs from the SB 507 Option a in that it proposed to expand treatment at the existing Primary facility in lieu of adding a new facility at SBIWTP. **<u>The following treatment options are considered in the SB 507 study:</u>** **a.** 35 mgd **b.** 100 mgd **c.** 163 mgd **d.** 163 mgd (with 82 mg storage basin north of the river) **e.** 35 mgd (existing Primary Treatment facility per NADB)	• **Est. O&M Cost:** a. 35 mgd = $1.5M b. 100 mgd = $2M c. 163 mgd = $3M d. 163 mgd plus storage = $3.3M e.35 mgd = $6.6M (per NADB)	• Option e would not require additional footprint for treatment • Average Number of Transboundary Flow Days per Year (baseline of 138 days/year per NADB Diversion Study) **a.** 35 mgd = 56 **b.** 100 mgd = 20 **c.** 163 mgd = 12 **d.** 163 mgd plus storage = 12 **e.** 35 mgd = 56 (NADB study indicates 58)	• Option e would result in mixing of dry and wet weather flows in the Primary Treatment facility which could impact the biological processes in the Secondary Treatment.	• Option e proposed in the NADB Diversion Study needs to address biological impact of mixing of flows in Primary Treatment.
5	**NEW LIFT STATION TO DIVERT FLOWS TO SBWRP**				
	Provide a new lift station to divert up to 50 mgd of stormwater flow to the existing City of San Diego South Bay Water Reclamation Plant (SBWRP) for primary treatment before discharging to the SBOO (see Project 6). **<u>The following diversion options are considered in the SB 507 study:</u>** **a.** 20 mgd **b.** 50 mgd	• **Est. Implementation Cost:** a. 20 mgd = $8M b. 50 mgd = $13M • **Est. O&M Cost:** a.20 mgd = $300K b. 50 mgd = $500K	• Could provide backup to capture flows and spills not captured upstream in Mexico • Potential to reduce impacts to downstream river, estuary, and beaches • Lift station can be sized to deliver a minimum of 20 mgd and a maximum of 50 mgd • Average Number of Transboundary Flow Days per Year (baseline of 138 days/year per NADB Diversion Study) **a.** 20 mgd = 75 **b.** 50 mgd = 41	• Limited capacity to divert flows during rainy season (only up to 1-year rain event) • Requires construction of new infrastructure • Requires ongoing maintenance to be effective • Requires significant environmental analysis and permitting	• Similar to Project 3; however, will treat less volume • This project would need to be built in conjunction with Project 6 and/or Project 7 since the diverted flows would need to be sent somewhere • Maximum diversion limited to 50 mgd based on available space at SBWRP

Table 5: Potential Projects in the Main Tijuana River (continued)

#	PROJECT TITLE & DESCRIPTION	EST. PROJECT COST	PROS (+)	CONS (-)	OTHER
6	**EXPAND PRIMARY TREATMENT CAPACITY AT CITY OF SAN DIEGO SBWRP**				
	Provide additional primary treatment for up to 50 mgd of wet weather flow at SBWRP. This includes using excess 20 mgd capacity within the existing primary treatment process and building new facilities to add an additional 30 mgd capacity, bringing the total additional capacity to 50 mgd. Treated flow will discharge 3.4 miles offshore through SBOO. **<u>The following treatment options are considered in the SB 507 study:</u>** **a.** 20 mgd **b.** 50 mgd	• **Est. Implementation Cost:** a.20 mgd = $34M b.50 mgd = $66M • **Est. O&M Cost:** a.20 mgd = $700K b.50 mgd = $1M	• Provides new advance primary treatment capacity for additional flow diversions to work with existing treatment infrastructure • Existing Headworks and primary treatment have 20 mgd available capacity that can be used towards treating dry and/or wet weather flows (primary treatment only) • Add new screens and primary sedimentation tanks for up to a 30 mgd capacity to increase total capacity to 50 mgd • Could provide treatment of diverted dry weather flows • Utilizes existing available space at City of San Diego SBWRP • Average Number of Transboundary Flow Days per Year (baseline of 138 days/year per NADB Diversion Study) **a.** 20 mgd = 75 **b.** 50 mgd = 41	• Some risk of disrupting existing treatment process due to combined flows due to system error or emergency bypass of primary treatment • Requires significant new infrastructure • Complex construction as existing plant will need to stay in operation during the construction period • Requires ongoing maintenance to be effective • Requires significant environmental analysis and permitting • Potential to limit future expansion of facility for City of San Diego's Pure Water recycling program or additional wastewater treatment	• Expansion of existing infrastructure due to limited space, not building a new facility (as proposed in Project 4) • Current SWBRP treatment capacity is 35 mgd, but operated at only 15 mdg due to limited need for recycled water.
7	**PUMPED DIRECT DISCHARGE TO SBOO W/O TREATMENT**				
	Provide a new lift station to divert up to 193 mgd to the existing SBOO with physical sediment and trash screening only (without primary or secondary treatment). The existing SBOO currently has 233 mgd of unused capacity (per City of San Diego) that	• **Est. Implementation Cost:** 193 mgd = $18M	• Provides backup diversion of dry weather flows • Provides diversion of wet weather flows up to 193 mgd	• Limited capacity to divert flows during rainy season (only up to 1-year rain event) • Requires construction of new infrastructure • Construction can be challenging, trenchless technologies may be required due to environmental concerns	• Similar to Projects 3 and 5, but without the associated wastewater treatment process

Table 5: Potential Projects in the Main Tijuana River (continued)

#	PROJECT TITLE & DESCRIPTION	EST. PROJECT COST	PROS (+)	CONS (-)	OTHER
7	**PUMPED DIRECT DISCHARGE TO SBOO W/O TREATMENT (CONT'D)**				
	could be used in the case of an emergency spill or potentially during minor storm events to capture additional pollutant-laden runoff. SBOO will discharge diverted flows 3.4 miles offshore. This project is currently being considered (for up to 35 mgd) in the NADB Diversion Study (Alternative 4A). The SB 507 NOA is considering diversions up to 193 mgd.	• **Est. O&M Cost:** 193 mgd = $1.6M	• Moderate to low maintenance requirements • Average Number of Transboundary Flow Days per Year (baseline of 138 days/year per NADB Diversion Study) • 193 mgd = 9	• Potential impacts to the City of San Diego's Ocean Outfall permit compliance because flows entering the outfall would not receive treatment • Potential impact to marine environment at SBOO discharge location	• The max flow is driven by the available peak capacity in the SBOO of 233 mgd and the permitted discharge of 40 mgd granted to SBWRP. (233-40 = 193 mgd) • Could be considered for backup/emergency use only component to another project.
8	**GRAVITY FLOW DIRECT DISCHARGE TO SBOO W/O TREATMENT**				
	Provide a new storm drain inlet to divert up to 193 mgd to the existing SBOO with physical sediment and trash screening only (without primary or secondary treatment). The existing SBOO currently has 233 mgd unused capacity (per City of San Diego) that could be used in the case of an emergency spill or potentially during minor storm events to capture additional pollutant laden runoff. SBOO will discharge diverted flows 3.4 miles offshore. This project is currently being considered (for up to 35 mgd) in the NADB Diversion Study (Alternative 4E). The SB 507 NOA is considering diversions up to 193 mgd.	• **Est. Implementation Cost:** 193 mgd = $83M • **Est. O&M Cost:** 193 mgd = $125K	• Provides backup diversion of dry weather flows • Provides diversion of wet weather flows up to 193 mgd • No maintenance requirements for this project • Average Number of Transboundary Flow Days per Year (baseline of 138 days/year per NADB Diversion Study) • 193 mgd = 9	• Limited capacity to divert flows during rainy season (only up to 1-year rain event) • Construction can be very challenging and expensive since large diameter gravity pipe(s) will need to be installed much deeper than the pumped discharge option (Project 7) • Construction contingencies are much higher due to unknown subsurface conditions and potential conflicts (e.g. utilities) • Potential impacts to the City of San Diego's Ocean Outfall NPDES permit compliance because flows entering the outfall would not receive treatment • Potential impact to marine environment at SBOO discharge location	•Similar to Projects 3, 5 and 7, but without the need for a pump or the associated wastewater treatment process •The max flow is driven by the available peak capacity in the South Bay ocean outfall of 233 mgd and the permitted discharge of 40 mgd granted to SBWRP. (233-40 = 193 mgd) •Could be considered for backup/emergency use only component to another project.

Table 5: Potential Projects in the Main Tijuana River (continued)

#	PROJECT TITLE & DESCRIPTION	EST. PROJECT COST	PROS (+)	CONS (-)	OTHER
9	**TIJUANA RIVER IN-STREAM WATER QUALITY DETENTION BASIN**				
	Construct a basin to capture 20 million gallons of flows just downstream of Hollister Avenue. The basin would capture flows that are bypassed from the upstream proposed sedimentation basins. The basin would include an in-line weir and new pump for routing flows into a sub basin to pump flows into a force main into either SBIWTP, SBWRP or directly into SBOO. The 20 MG flows will be diverted over a one day period via the new pump station. This project is currently being assessed by the SB 507 NOA. This project may require increasing capacities to either of the treatment plants (see Projects 4 and 6).	• **Est. Implementation Cost:** 20 MG = $71M • **Est. O&M Cost:** 20 MG = $200K	• Provides additional storage volume for dry weather flows that are not captured upstream • Could divert to existing or larger proposed treatment facilities discussed in Projects 4 and 6 • Can be used to increase capacity of Hollister pump station • Average Number of Transboundary Flow Days per Year (baseline of 138 days/year per NADB Diversion Study) **a.** 20 mgd = 75	• Requires construction of new infrastructure • Requires ongoing maintenance to be effective • Requires significant environmental analysis and permitting • A portion of the river would be used to capture pollution	• This option may not be viable because of the incremental benefits vs the cost of implementing the project • Project concept considers this project as being in the vicinity of the Hollister Street Bridge

Table 6: Potential Projects in the Canyon Drainages

#	PROJECT TITLE & DESCRIPTION	EST. PROJECT COST	PROS (+)	CONS (-)	OTHER
10	**SMUGGLER'S GULCH TRASH BOOMS**				
	Management of trash devices (booms) across Smuggler's Gulch, downstream of existing collector structure. The booms catch trash as it enters the United States side via Smuggler's Gulch. Alter Terra installed the trash booms in coordination with the County (see Project 19 for Trash Management component).	• **Est. O&M Cost:** $100k/year	• Would provide similar benefits as the existing Goat Canyon trash booms • Can be incorporated into other projects • Reduces impacts to natural areas downstream of Monument Road	• Sizing of infrastructure challenging due to the unpredictability in type and volume of trash • Too much flow can wash out the trash capture infrastructure • Active maintenance is critical to maximizing trash capture	• Pilot project in progress
11	**SMUGGLER'S GULCH SEDIMENTATION BASINS**				
	Construct a sedimentation basin(s) within Smuggler's Gulch. The basins would capture flows and allow sediment to settle into the basins to reduce sediment inflow into Smuggler's Gulch. This project would reduce the need for ongoing dredging of the channel downstream of Monument, as well. **a.** Construct an in-line basin south of Monument Road, increase capacity of the road culvert, and elevate the road to 5-yr flood level. **b.** Add an off-line basin to Alternative 1 to capture fine sediments and reduce overbank flooding north of the road. **c.** Modification of Alternative 1 with two sequential in-line basins. This project is currently being assessed by the SB 507 NOA.	• **Est. Implementation Cost:** **a.** $2.0 M; **b.** $3M; **c.** $2.6M • **Est. O&M Cost:** $1M/year	• Would reduce excess sediment reaching the Tijuana River Valley • Provides benefits to natural hydrology • Could be designed to capture trash and sewage • Potential to increase the capture of sediment upstream of Monument Road • Reduces the need for dredging downstream of Monument Road • Simple, effective facility not associated with increased flood risk	• Requires ongoing maintenance to be effective • Potential to become a vector or smell nuisance if not properly maintained • Maintenance access can be complicated during rainy season • Requires significant environmental analysis and permitting	• Would provide similar benefits as the existing Goat Canyon sediment basins • Currently the City of San Diego and County of San Diego have ongoing sediment removal programs to prevent flooding • Current programs have limitations due to resources, permitting, and weather conditions • Replacement of existing Monument Road culvert would reduce localized flooding

Table 6: Potential Projects in the Canyon Drainages (continued)

#	PROJECT TITLE & DESCRIPTION	EST. PROJECT COST	PROS (+)	CONS (-)	OTHER
12	**SMUGGLER'S GULCH RETROFIT LOW-FLOW DIVERSION**				
	Increase the low-flow diversion and conveyance capacity at Smuggler's Gulch including re-constructing the outlet ponding basin to prevent dry-weather flows from flowing downstream. This project is currently being assessed by the SB 507 NOA. This project may require increasing capacities to either of the treatment plants (see Projects 4 and 6).	• **Est. Implementation Cost:** $9M • **Est. O&M Cost:** $500k/year	• Increases capacity of existing facility for treatment • Increases capture of sewage spills in dry weather	• May require additional treatment capacity or direct discharge to the South Bay Ocean Outfall	• Could be constructed to maximize capacity of existing infrastructure or, if needed, build new infrastructure • Current facility is maintained by IBWC • Similar to Project 14
13	**SMUGGLER'S GULCH IN-STREAM WATER QUALITY DETENTION BASIN**				
	Construct a basin to capture flows just downstream of Monument Road. The basin would capture flows bypassed from the proposed sedimentation basin upstream. The basin would include an in-line weir and a new pump to route flows via a force main into either SBIWTP, SBWRP or directly into SBOO. This project is currently being assessed by the SB 507 NOA. This project may require increasing capacities to either of the treatment plants (see Projects 4 and 6).	• **Est. Implementation Cost:** $40M • **Est. O&M Cost:** $1.5M/year	• Provides additional infrastructure to capture flows that bypass facility at border • Could provide opportunity for natural or biological treatment options • Could send flows to existing or proposed treatment facilities	• Requires construction of new infrastructure • Requires ongoing maintenance to be effective • Requires significant environmental analysis and permitting	• Project concept considers this project as being in the vicinity of the Monument Road bridge • Similar to Project 9 in the main river channel and Project 15 in Goat Canyon
14	**GOAT CANYON RETROFIT LOW-FLOW DIVERSION**				
	Increase the low-flow diversion and conveyance capacity at Goat Canyon including re-constructing the outlet ponding basin to prevent dry-weather flows from flowing downstream. This project is currently being assessed by the SB 507 NOA. This project may require increasing capacities to either of the treatment plants (see Projects 4 and 6).	• **Est. Implementation Cost:** $11M • **Est. O&M Cost:** $500k/year	• Increases capacity of existing facility for treatment • Increases capture of sewage spills in dry weather	• May require additional treatment capacity or direct discharge to the South Bay Ocean Outfall	• Could be constructed to maximize capacity of existing infrastructure or, if needed, build new infrastructure • Current facility is maintained by IBWC • Similar to Project 12

Table 6: Potential Projects in the Canyon Drainages (continued)

#	PROJECT TITLE & DESCRIPTION	EST. PROJECT COST	PROS (+)	CONS (-)	OTHER
15	**GOAT CANYON RETROFIT IN-STREAMWATER QUALITY DETENTION BASIN**				
	Retrofit an existing sedimentation basin to capture sewage flows. The basin would be deepened to create ponding towards the downstream end of the series of basins. A new pump and force main would route these flows to a treatment plant or directly into SBOO. This project is currently being assessed by the SB 507 NOA. This project may require increasing capacities to either of the treatment plants (see Project 4 and 6).	• **Est. Implementation Cost:** $40M • **Est. O&M Cost:** $1.5M/year	• Potential to provide additional storage volume for dry weather flows that are not captured upstream • Could provide opportunity for natural or biological treatment options • Could divert to existing or larger proposed treatment facilities	• Requires construction of new infrastructure • Requires ongoing maintenance to be effective • Requires significant environmental analysis and permitting	• Similar to Project 9 in the main river channel and Project 13 in Smuggler's Gulch • Location of this project would be at the sedimentation basins currently managed by California State Parks
16	**SEDIMENTATION AND TRASH MANAGEMENT IN GOAT CANYON**				
	California State Parks operates two existing sedimentation basins and trash booms in Goat Canyon. Funding for long-term operation and maintenance of these facilities is necessary to keep trash and sediment from flowing into the Tijuana River and Estuary. This project is currently being assessed by the SB 507 NOA.	• **Est. O&M Cost:** <$5M/year	• Identify ways to optimize the management of captured trash and sediment • Could reduce annual maintenance costs • Potential for reuse as sand supply for beach replenishment	• Identifying efficient options for sediment disposal or segregation for reuse is challenging	• Location of this project is at the sedimentation basins currently managed by California State Parks • Current program has limitations due to resources, permitting, and weather conditions
17	**YOGURT CANYON LOW-FLOW DIVERSION**				
	There is no infrastructure to divert and treat flows at Yogurt Canyon. Feasibility Studies are required to assess the feasibility of installing low-flow diversions to divert flows back to existing treatment facilities. (Similar to Smuggler's Gulch and Goat Canyon, as well as other tributaries) This project is currently being assessed by the SB 507 NOA.	• **Est. Implementation Cost:** $10M • **Est. O&M Cost:** $500k/year	• Provide dry weather flow capture infrastructure similar to current systems at Smuggler's Gulch and Goat Canyon	• Potential for limited impact to reducing pollution • Requires construction of new infrastructure • Requires ongoing maintenance to be effective • May require additional treatment capacity or direct discharge to the South Bay Ocean Outfall	• Drainage area is relatively small compared to Smuggler's Gulch and Goat Canyon • Yogurt Canyon currently flows directly to Tijuana River Estuary

Table 6: Potential Projects in the Canyon Drainages (continued)

#	PROJECT TITLE & DESCRIPTION	EST. PROJECT COST	PROS (+)	CONS (-)	OTHER
18	**YOGURT CANYON PILOT CHANNEL**				
A pilot channel is considered to convey Yogurt Canyon flows and sediment. The pilot channel would cross Monument Road under a pre-fabricated creek crossing structure. The pilot channel would be integrated north of the road with restored salt marsh habitat. This project is currently being considered by SB507 NOA	• **Est. Implementation Cost:** $5M • **Est. O&M Cost:** $5k/year	• Would reduce sediment and freshwater impacts to estuary. • Provides conveyance of sediment and flood flows into restored salt marsh habitat with tidal influence. • Would reduce flooding impacts to Monument Road. • Consistent with Tijuana Estuary Tidal Restoration Program Feasibility Study.	• Requires further studies to determine cost and benefits. • Requires significant environmental analysis and permitting.	• Little information exists for Yogurt Canyon so there is very little known about sediment.

Table 7: Other Potential Projects in the Watershed

#	PROJECT TITLE & DESCRIPTION	EST. PROJECT COST	PROS (+)	CONS (-)	OTHER
19	**BROWN PROPERTY RESTORATION**				
	Remove or adjust fill materials within a specific property to reestablish previous hydrologic flow conditions in this portion of the Tijuana River. This project is identified as a Tier 1 Project in the Tijuana River Valley Recovery Strategy and is currently undergoing design and environmental review by the County.	• **Est. Implementation Cost:** <$3.5M • **Est. O&M Cost:** $100-$250k/year	• Reduce impacts to main river channel from historic waste materials used to fill in the property that have caused narrowing of the river • Planning phase is funded and in progress • Potential for water quality, habitat, and/or hydrology benefits	• Potential for a low return on investment	• The County of San Diego is currently analyzing different options for restoration and conducting a cost benefits analysis
20	**NELSON SLOAN QUARRY RESTORATION**				
	Beneficially reuse sediment from existing Goat Canyon sedimentation basins to restore a former mine site. The project considers alternatives that take into account material import sources, material stockpiling, material sorting, material export, fill plan, restoration plan, project boundaries, operations and management structure, and estimated costs. This project is identified as a Tier 1 Project in the Tijuana River Valley Recovery Strategy and is currently undergoing design and environmental review by the California State Parks in coordination with the County.	• **Est. Implementation Cost:** $1M • **Est. O&M Cost:** $3M/year	• Provides limited storage capacity for existing sediment removal efforts • Planning phase is funded and is in progress	• Would not provide a long-term solution for sediment disposal needs • Implementation phase is not funded	• The County of San Diego owns the property and is coordinating with the California State Parks to conduct the design and environmental for this project.

Table 7: Other Potential Projects in the Watershed (continued)

#	PROJECT TITLE & DESCRIPTION	EST. PROJECT COST	PROS (+)	CONS (-)	OTHER
21	**INVASIVE SPECIES REMOVAL & RESTORATION**				
	Invasive plant species have increased in abundance in the Tijuana River Valley facing infestation from an invasive beetle (shot-hole borer). There are plans to remove these invasive species and restore native habitat and help restore the natural hydrology in the river valley. The County has identified multiple sites for restoration.	• **Est. Implementation Cost:** $5-10M • **Est. O&M Cost:** $100-$250k/year	• Provides restoration of habitat to support sensitive species • Could provide restoration of the natural hydrology • Could help in the transport of sediment through the river system • Could reduce flooding from smaller storm events	• Could mobilize existing trash and contaminated sediments • Requires ongoing maintenance to be effective • Requires significant environmental analysis and permitting	• The County of San Diego has ongoing restoration activities throughout the valley and is always seeking funding for additional activities
22	**WATER QUALITY MONITORING**				
	Water quality data and model output across the Tijuana River system is needed to assess water quality conditions and changes over time, which will help determine where additional infrastructure is needed to address water quality issues. Program could include numerical model simulations and sampling of water quality at multiple locations along the main river, from the border to the beach, as well as the tributaries.	• **Est. O&M Cost:** <$1M/year • **Est. Expanded Cost:** <$5M/year	• Could provide real-time model predictions and observations of flow at multiple points throughout the Tijuana River Valley • Would help in determining impacts to beaches when transboundary flows occur • Would help in understanding the transport of pollutants through the valley	• Requires installation of new equipment • Requires ongoing maintenance to be effective	• The County of San Diego currently does in-person visual observations to confirm if dry weather transboundary flows are reaching the Tijuana River Estuary and beach
23	**SOIL SAMPLING**				
	Data about soil and sediment quality in the Tijuana River downstream of Dairy Mart Rd, as well as in the tributaries, would be needed to determine the potential water quality impacts in the lower river reaches should the soil be disturbed during flood events or river enhancement.	• **Est. Implementation Cost:** <$100K • **Est. O&M Cost:** <$1M/year	• Provides information on quantity and quality of sediment deposited • Could provide information on options for sediment re-use and disposal projects	• Adequate removal options for existing sediment deposits have not been identified • Requires a regional approach to be effective	• Limited data is available on the quantity and quality of soil depositions in the Tijuana River Valley

Table 7: Other Potential Projects in the Watershed (continued)

#	PROJECT TITLE & DESCRIPTION	EST. PROJECT COST	PROS (+)	CONS (-)	OTHER
24	**RECYCLING INCENTIVES**				
	Provide incentives for additional recycling of plastics and tires to prevent trash discharge on the Mexico side of the border. An example would be the 4Walls initiative (Border Impact Bond) in cooperation with NAD Bank. 4Walls is promoting investment bond funding with the backing of NAD Bank. Additional funding could potentially come from O&M cost savings on the US side of the border. Although the BIB model assumes a return on investment, an initial investment is required.	• The six-year plan requires an initial investment of $3M.	• Incentivize recycling programs on the Mexico side of the border • Provides source control • Would ultimately reduce trash crossing the border	• Limited to plastics and tires • Unproven approach	• 4Walls International is developing and promoting a Border Impact Bond in cooperation with NAD Bank
25	**NGO CLEAN-UP PROGRAMS**				
	Continue to promote NGO participation in river/beach clean-up events. Continue to promote NGO participation in river/beach clean-up events. Consider partnering with organizations like WILDCOAST and Trash Free Waters to help promote inter-organizational collaboration.	• Costs likely to be minimal since efforts are primarily volunteer based. • Costs likely to be minimal since efforts are primarily volunteer based.	• Continue support of existing clean-up events within the Tijuana River Valley • Engages local community in helping with the removal of the trash • Prevents impact to the natural resources	• Ongoing trash clean-up requires resources • Requires volunteer participation to be effective • Restricted to areas that can be accessed and safe • Some areas are not able to be cleaned up directly along the border due to health hazards and security issues	• Agencies host large clean-up events and continued to conduct ongoing trash cleanup as part of regular maintenance

Table 7: Other Potential Projects in the Watershed (continued)

#	PROJECT TITLE & DESCRIPTION	EST. PROJECT COST	PROS (+)	CONS (-)	OTHER
26	**DEVELOPMENT OF EMERGENCY ACTION PLANS**				
	Despite existing and anticipated infrastructure, there are times when the volume of flows is too high and sewage spills occur. In these instances, emergency action plans are needed to identify protocols to address water quality, flooding, sediment, and trash.	• **Est. Soft Cost:** $250-500k • **Est. O&M Cost:** <$1M/year	• Establish improved, agreed upon, emergency action protocols between all agencies • Would improve communication and actions during and following an emergency event • Would expand emergency communication to include flooding, sedimentation, and trash	• Requires multi-agency coordination, cooperation, and commitment • Requires agreed upon protocols between all agencies	• Currently IBWC is responsible for communicating to stakeholders when transboundary flows occur in the main stem.
27	**TIJUANA ESTUARY TIDAL RESTORATION PROGRAM**				

	The Tijuana Estuary Tidal Restoration Program (TETRP) is a large multi-phased wetland restoration program involving up to 300 acres of restoration in the Tijuana River Estuary's southern arm. Its primary objective is to restore valuable habitat processes that have been lost and to increase the exchange of water in a tidal cycle. This will enhance flushing, improve water quality and control sedimentation to ensure the estuary is a sustained natural habitat.	• **Est Implementation Cost:**
		  - **Total Project Cost (250-300 Acres):** $100 - $200M
		  - **First Phase Cost (~85 Acres):** $25 - $50M
		• **Est. O&M Cost:** TBD
			• Provides Increased Function of Ecological Wetland Processes
			• Restores approximately 250-300 acres of wetland habitats
			• Increases ability of wetland habitat to improve coastal water quality via natural ecological processes
			• Project incorporates sea level rise projections into design
			• Increases ability of wetland to process sediment naturally via tidal flushing
			• Adaptive management should be relatively low cost
				• Extreme hydrologic events could impact restoration project
				• Expensive. Requires ongoing funding.
				• Requires Significant Environmental Analysis and Permitting (Underway)
				• Does not reduce cross border pollution, but rather reduces the impact of that pollution
					• Phase 1 final design and environmental review funded and in-progress

THIS PAGE INTENTIONALLY LEFT BLANK

PROPOSED
ALTERNATIVES

5. PROPOSED ALTERNATIVES

The 27 projects described in Section 4 were combined to form 21 alternatives based on the critical issues of concern identified within the mainstem of the Tijuana River and the major tributaries (Smuggler's Gulch, Goat Canyon, and Yogurt Canyon) and to assist decision making for implementation of projects. Certain projects are required to be implemented concurrently in order to achieve the desired pollutant reduction. As an example, with water quality being a critical issue within the main Tijuana River channel, a new lift station to divert flows from the river (Project 3) should be implemented with a new stormwater treatment facility at the SBIWTP (Project 4) to ensure there is capacity available to treat the additional flows. Additionally, some projects have different pollutant reduction options (such as Projects 3 and 4), which are separated out into different alternatives. Standalone projects (i.e., those that do not require being grouped with another project for implementation) were also included as an alternative in the list. Alternatives could be combined into an overall watershed plan or be implemented on an individual basis. The alternatives could also be phased as funding, permitting, or other constraints are evaluated.

The costs for each alternative were calculated by adding the individual project costs for the projects that comprise each alternative and adding in the estimated environmental and permitting costs to estimate a total cost to implement the alternative. In cases where alternatives consist of single projects, the alternative cost is the same as the project cost, but with costs added for environmental analysis and permitting. For each alternative, $4 million was added to the implementation costs to cover environmental review and permitting. In addition, environmental monitoring costs were estimated at $1 million per year for 10 years, for a total of $10 million. Costs are presented for each alternative in terms of capital costs as well as operations and maintenance (O&M) costs.

The alternatives were evaluated to estimate potential benefits, and information about potential benefits was used to assist in comparing the alternatives. Water quality benefits for alternatives that would be located in the mainstem of the Tijuana River are based on the transboundary flow analysis conducted by the NADB Diversion Study. As explained in Section 2.1 of the NOA Report, the NADB Diversion Study established a baseline condition that with existing infrastructure and operations in place, on average there are 138 days per year during which transboundary flows occur. This baseline condition was used in the analysis for the NOA to evaluate the potential transboundary flow days that could be reduced by implementing various alternatives in the mainstem of the Tijuana River. To quantify benefits for proposed sediment and trash alternatives in the mainstem of the Tijuana River and the major tributaries, each alternative was evaluated for its potential to remove trash and sediment. Potential trash and sediment removal were calculated in terms of tons that could be removed during a 5-year storm event.

The "Divert and Treat" strategies for the mainstem of the Tijuana River are represented by Alternatives A-G (see Appendix H Project Alternative Evaluation Matrix), which include different combinations of Projects 3-6. It should be noted that Alternatives A-E are mutually exclusive; that is, only one of the Alternatives would be selected. However, it is possible that, through a phased approach, Alternative A or E could be designed and implemented in such a way that allows for future expansion of the diversion and treatment scenarios described in Alternatives B, C, and D.

As described in Section 2.1 of the NOA Report, current treatment and diversion infrastructure has a maximum capacity to treat 23 mgd of flows from both the mainstem of the Tijuana River and the tributaries. The analysis conducted for

the NOA Report evaluated various ways to expand the treatment and diversion infrastructure so that additional flows could be treated. This analysis determined that the major limiting factor for additional treatment is the unused peak capacity of the SBOO, which is designed to convey a peak flow of 233 mgd. Given that there is already permitting in place for 70 mgd of flows to be sent to the SBOO (30 mgd from SBIWTP and 40 mgd from SBWRP), there is a remaining 163 to 193 mgd of unused peak capacity within the SBOO. Available excess capacity of the SBOO would be 163 mgd if the SBIWTP (30 mgd) and the SBWRP (40 mgd) permitted flows are considered in the outfall capacity, or 193 mgd if only the 40 mgd of SBWRP permitted flows are considered in the outfall capacity. The 163-193 mgd represents an ultimate expansion capacity for diversion from the mainstem of the Tijuana River and the tributaries since all these flows would be conveyed by the SBOO at the same time. There are two alternatives (Alternative C and Alternative D) that conceptualize diverting the maximum amount of excess flows from the Tijuana River. Because these alternatives would take up the remaining capacity in the SBOO, they could not be implemented with other alternatives focused on diversion, including Alternatives O-S, because there would be no remaining excess capacity in the SBOO.

The following section describes the alternatives, which are organized by location, and summarizes the benefits and cost estimates. Additional information that describes how the projects were determined are included in technical memoranda that are included as Appendix D-Appendix G. Appendix D includes details about projects related to water quality, Appendix E includes details about projects related to sediment, Appendix F includes details about projects related to trash, and Appendix G includes details about projects related to flooding.

5.1.1 Tijuana River Main Channel

Alternative A – Projects 3a and 4a

Alternative A combines projects 3a and 4a to divert up to 35 mgd of flow from the Tijuana River for primary treatment and discharge to the deep ocean through the SBOO. Specifically, a new intake and diversion lift station would be constructed to intercept transboundary flows on the U.S. side of the border (in the main channel upstream of the existing treatment plant) and convey intercepted flows to a new treatment plant to be constructed on the existing footprint of federally owned property adjacent to the existing SBIWTP. Alternative A is similar to Alternative 4b considered in the NADB-led Tijuana River

Diversion Study in terms of the flow capacity that could be treated (35 mgd). However, whereas NADB's Alternative 4b proposed conveyance of flows to the existing headworks, grit chamber, and primary clarification basins at SBIWTP, Alternative A in this study would convey flows to a newly constructed treatment plant that would not mix dry and wet weather flows in the primary treatment basins, thereby avoiding potential impacts to the biological treatment processes involved in SBIWTP's existing secondary treatment system. Implementation of Alternative A would provide diversion capacity to capture and treat small wet-weather flows and would also serve as a back-up (or a redundant system) to the existing diversion infrastructure in Mexico. It is assumed that the lift station and treatment plant under Alternative A would be operated during diversion system failures at PBCILA, operational/mechanical failures at PBCILA, PB1A or PB1B, or when wet-weather flows under 35 mgd exceed PBCILA's capacity. Flows beyond 35 mgd would not be diverted for treatment and would continue to flow downstream to the Tijuana River Estuary and the ocean. Using the NADB's Transboundary Flow Analysis methodology, the implementation of Alternative A would reduce the average number of unaddressed transboundary flow days from 138 to 56 days per year, representing a reduction of 61%. The preliminary cost estimate to implement Alternative A is $78 million for design, construction, and environmental review and permitting; $1.9 million per year for operation and maintenance; and $1 million per year for environmental monitoring. These cost estimates differ from NADB's estimate of $45 million in capital costs and $8.9 million in O&M costs to implement Alternative 4b because the Alternative A includes not only the diversion lift station like the NADB Alternative 4b, but includes the construction of a new 35 mgd primary treatment plant. In addition, the NADB's O&M estimate includes any chemical use for primary treatment of lift station influent and O&M costs of the existing diversion system in Mexico while O&M cost estimates for Alternative A only represent new costs that would be added to the existing O&M costs. Note that during the re-evaluation of the NADB Transboundary Flow Analysis methodology for the NOA effort, it was determined that 35 mgd diversion would reduce the average number of unaddressed transboundary flow days from 138 to 56 days per year rather than the 58 days noted in the NADB Diversion Study.

Alternative B – Projects 3b and 4b

Alternative B (Projects 3b and 4b) is similar to Alternative A except that the new lift station and treatment facility would be sized to intercept, divert, and

treat up to 100 mgd of Tijuana River flows. This greater treatment capacity would be able to handle additional wet-weather flows (between a 1 to 2-year storm event) as well as flows that occur during dry weather periods and are not diverted by PBCILA either due to capacity or operational constraints. The 100 mgd treatment scenario in Alternative B was selected for analysis because it is within the existing 163 mgd available capacity of the SBOO to convey flows to the deep ocean, and is an intermediate point between the 35 mgd scenario analyzed in Alternative A and the 163 mgd treatment scenarios analyzed in Alternatives C and D. It is estimated that implementation of Alternative B would reduce the average number of transboundary flow days from 138 to 20 days per year, which represents a reduction of 84%. The preliminary cost estimate to implement Alternative B is $167 million for design, construction and environmental review and permitting; $2.9 million per year for O&M; and $1 million per year for environmental monitoring.

Alternative C – Projects 3c and 4c

Alternative C (Projects 3c and 4c) is identical to Alternatives A and B except that the new lift station and treatment facility would be sized to intercept, divert, and treat up to 163 mgd of Tijuana River flows. This represents the maximum available capacity in the existing SBOO and would be able to handle additional wet-weather flows (slightly larger storm events than could be handled by Alternative B but still within the 1 to 2-year storm event) as well as flows that occur during dry weather periods and are not diverted by PBCILA either due to capacity or operational constraints. It is estimated that implementation of Alternative C would reduce the average number of transboundary flow days from 138 to 12 days per year, which represents a reduction of 91%. The preliminary cost estimate to implement Alternative C is $230 million for design, construction, and environmental review and permitting; $4.5 million per year for O&M; and $1 million per year for environmental monitoring.

Alternative D – Projects 3c and 4d

Alternative D (Projects 3c and 4d) is identical to Alternative C except that it includes the addition of a 82 million gallon storage basin along with the new lift station and treatment facility that would be sized to intercept, divert, and treat up to 163 mgd of Tijuana River flows. This configuration represents the maximum available capacity in the existing SBOO and would be able to handle additional wet-weather flows (equivalent to Alternative C) as well as flows that occur during dry weather periods and are not diverted by PBCILA either due to capacity

or operational constraints. The addition of the storage basin would provide maximum flexibility in managing the flows and diversion operations during wet weather events which would allow for more volume to be treated below a peak flow event of 163 mgd. Although it is estimated that implementation of Alternative D would reduce the average number of transboundary flow days from 138 to 12 days per year, which represents a reduction of 91%, it is likely that this Alternative would result in capturing more volume for treatment compared to Alternative C. The preliminary cost estimate to implement Alternative D is $408 million for design, construction, and environmental review and permitting; $4.8 million per year for O&M; and $1 million per year for environmental monitoring. Costs for Alternative D are higher than Alternative C largely due to the significant costs associated with soil excavation and disposal costs associated with construction of the storage basin.

Alternative E – Projects 3a and 4e

Alternative E (Projects 3a and 4e) is consistent with Alternative 4b from the NADB Diversion Study. This Alternative diverts up to 35 mgd of flow from the Tijuana River and discharges to the existing SBIWTP treatment facility rather than a new facility. Specifically, a new intake and diversion lift station would be constructed to intercept transboundary flows on the U.S. side of the border and convey intercepted flows to the existing primary headworks, grit chamber, and primary clarification basins. There is the potential to separate flows by routing dry weather flows to the secondary treatment facilities for full treatment and then routing wet weather flows to the existing primary basins for advanced primary treatment prior to discharge to the SBOO. Implementation of Alternative E would provide diversion capacity to capture and treat very small wet-weather flows and would also serve as a back-up (or redundant system) to the existing diversion infrastructure in Mexico. It is assumed that the lift station and treatment plant under Alternative E would be operated during diversion system failures at PBCILA, operational/mechanical failures at PBCILA, PB1A or PB1B, or when wet-weather flows under 35 mgd exceed PBCILA's capacity. Flows beyond 35 mgd would not be diverted for treatment and would continue to flow downstream to the Tijuana River Estuary and the ocean. The implementation of Alternative E would reduce the average number of unaddressed transboundary flow days from 138 to 56 days per year, representing a reduction of 61%. The preliminary cost estimate to implement Alternative E is $52 million for design, construction, and environmental review and permitting; $7 million per year for O&M; and $1

million per year for environmental monitoring. These cost estimates differ from NADB's estimate of $45 million in capital costs and $8.9 million in O&M costs to implement Alternative 4b because the Alternative E includes costs associated with environmental review and permitting which were not include in the NADB Alternative 4b. In addition, the NADB's O&M estimates includes any chemical use for primary treatment of lift station influent and O&M costs of the existing diversion system in Mexico while Alternative E O&M cost estimates represent only the additional costs that would be added to existing O&M costs.

Alternative F – Projects 5a and 6a

Alternative F (Projects 5a and 6a) would involve construction of a new lift station and modification of the City of San Diego's existing SBRWP. Currently, the SBWRP does not treat any flows from the Tijuana River, because it treats effluent captured through the City of San Diego's wastewater system. Under Alternative F, the existing SBWRP would be modified to intercept, divert, and treat an additional 20 mgd of flow diverted from the Tijuana River. Flows would be diverted for primary treatment only and discharged to the SBOO. Specifically, a new intake and diversion lift station would be constructed to intercept transboundary flows on the U.S. side of the border (in the main channel upstream of the existing treatment plant) and convey intercepted flows to the existing treatment plant. The existing SBWRP design capacity is 35 mgd but is currently operated at an average of 15 mgd. Alternative F proposes to utilize the existing excess 20 mgd capacity to treat the diverted flows. The implementation of Alternative F would reduce the average number of unaddressed transboundary flow days from 138 to 75 days per year, representing a reduction of 46%. The preliminary cost estimate to implement Alternative F is $47 million for design, construction, and environmental review and permitting; $1 million per year for O&M; and $1 million per year for environmental monitoring.

Alternative G – Projects 5b and 6b

Alternative G (Projects 5b and 6b) is similar to Alternative F in that it would involve the construction of a new lift station and expansion and modification of the existing SBWRP to intercept, divert, and treat up to 50 mgd of Tijuana River flows. The main difference with Alternative G would be the construction of new treatment facilities to provide the additional 30 mgd capacity. The existing SBWRP has limited space to accommodate a new primary treatment facility; therefore, a combination of utilizing the existing 20 mgd excess capacity with the 30 mgd addition to the existing treatment facilities can provide for treatment

up 50 mgd. This Alternative is similar to Alternative A except that construction of new advanced primary treatment facilities would occur at the City of San Diego's SBRWP rather than at the USIBWC's SBIWTP. The implementation of Alternative G would reduce the average number of transboundary flow days from 138 to 41 days per year, which represents a reduction of 70%. The preliminary cost estimate to implement Alternative G is $83 million for design, construction, and environmental review and permitting; $1.5 million per year for operation and maintenance; and $1 million per year for environmental monitoring.

Alternative H – Project 7

Alternative H (Project 7) would involve construction of a new lift station to divert up to 193 mgd to the existing SBOO without primary or secondary treatment. The 193 mgd was calculated by removing the existed permitted capacity of SBWRP (40 mgd) from the maximum design capacity of the SBOO (233 mgd). Under this scenario, the current 30 mgd capacity from SBIWTP and an additional 163 mgd would be directly diverted to the SBOO. Trash control, sediment removal, and screening would be provided at the new lift station. Under this Alternative, the unused SBOO peak capacity of 193 mgd could be used to capture flows caused by minor storm events or diversion system failures at PBCILA, operational/mechanical failures at PBCILA, PB1A or PB1B, or when wet-weather flows under 35 mgd exceed PBCILA's capacity. Based on agency and stakeholder feedback during completion of this NOA, NPDES permitting by the Regional Board (with USEPA approval) for Alternative H would be challenging due to the potential impacts on the ocean environment. Permit changes associated with operation of the SBOO would need to be secured before implementing this project since the existing permits required flows to be treated before they are sent to the ocean outfall. It is noted that this Alternative could be used for emergency purposes only. The implementation of Alternative H would reduce the average number of transboundary flow days from 138 to 9 days per year, which represents a reduction of 93%. For reasons described above, the increased effectiveness of this option in terms of diversion capacity would be offset by potentially greater impacts on the ocean environment. The preliminary cost estimate to implement Alternative H is $22 million for design, construction, and environmental review and permitting; $1.6 million per year for O&M; and $1 million per year for environmental monitoring.

Alternative I – Project 8

Alternative I (Project 8) is identical to Alternative H except that the diversion would be by gravity through a new storm drain rather than by lift station. Alternative I would require flows to be captured at higher upstream elevations so that the topography would allow gravity flow without the need for pumping. This would require excavating of a deep trench and constructing a longer, large-diameter gravity pipe to reach the SBOO compared to Alternative H. The implementation of Alternative I would also reduce the average number of transboundary flow days from 138 to 9 days per year, which represents a reduction of 93%. The preliminary cost estimate to implement Alternative I is $87 million for design, construction, and environmental review and permitting; $125,000 per year for O&M; and $1 million per year for environmental monitoring.

Alternative J – Project 9

Alternative J (Project 9) would involve construction of an in-stream basin to capture flows downstream of the Tijuana River Flood Control Project before the flows reach the estuary and ocean. Alternative J would construct a detention basin within the Tijuana River to capture transboundary flows just downstream of Hollister Avenue. The basin would be able to capture flows that are bypassed from the upstream PBCILA diversion structure. The detention basin would have an in-line weir for routing flows into a sub basin so flows can be pumped into a force main and conveyed to either the SBIWTP or the SBWRP. This Alternative would therefore require an increase in the treatment capacity at one or both of wastewater treatment plants to accommodate the additional flows. The implementation of Alternative J would reduce the average number of transboundary flow days from 138 to 75 days per year, which represents a reduction of 46%. The preliminary cost estimate to implement Alternative J is $75 million for design, construction, and environmental review and permitting; $200,000 per year for O&M; and $1 million per year for environmental monitoring.

Alternative K – Projects 1 and 2

Alternative K (Projects 1 and 2) includes a combination of trash booms and sedimentation basins within the main Tijuana River channel. This Alternative reflects Alternative A in USIBWC's 60% Feasibility Report for Sediment Basins Tijuana River International Border to Dairy Mart Road. This Alternative would involve excavating the existing earthen channel, downstream of the concrete and extending to Dairy Mart Road, to the original 1977 as-built condition to function

as a sedimentation basin. The USIBWC study indicated that the channel, which already functions as an in-line sedimentation basin, is as efficient as the more complicated and costly basin configurations that were also evaluated as part of the USIBWC's study. Alternative K would also include installing trash booms across the span of the Tijuana River just upstream of the transition from concrete to earthen channel (within USIBWC's flood control channel). The proposed project has been determined to have over 63% sediment trap efficiencies during the 2-, 5- and 10-year floods. It is expected that implementation of this Alternative would remove about 20,500 tons of trash and sediment during a 5-year storm event. The preliminary cost estimate to implement Alternative K is $18 million for design, construction, and environmental review and permitting; and $1 million per year for environmental monitoring The O&M costs for USIBWC's study have not been determined at the time of publication of the NOA Report and therefore are not represented in this report.

5.1.2 Tributaries

Alternative L – Projects 10 and 11a

Alternative L (Projects 10 and 11a) includes a combination of maintenance of existing trash booms and construction of a sedimentation basin within Smuggler's Gulch. Specially, this Alternative would involve constructing an in-line basin south of Monument Road, increasing the capacity of the road culvert, and elevating Monument Road to a 5-year flood level. An in-line weir would be constructed to form a basin (similar to a check dam) which would capture flows and allow sediment to settle, thus reducing sediment inflow into Smuggler's Gulch. In 2019, trash booms were installed across Smuggler's Gulch. The existing booms would be located downstream of the new in-line weir to catch trash as it enters the U.S. via Smuggler's Gulch and would require frequent maintenance. This project would also reduce the need for ongoing dredging of Smuggler's Gulch downstream (north) of Monument Road. The County of San Diego and City of San Diego currently dredge this channel annually and when feasible given weather and other conditions. Implementation of Alternative L could result in the removal of 15,600 tons of trash and sediment for a 5-year storm event. For maximum sediment and trash removal, the sedimentation basins would need to be dredged following a storm event to allow for capture of sediment in subsequent storm events. The preliminary cost estimate to implement Alternative L is $6.2 million for design, construction, and environmental review and permitting; $1.1 million per year for annual O&M; and $1 million per year for

environmental monitoring. It should be noted that Project 11c, which modified Project 11a with the inclusion of a second in-line weir, was not included in the alternatives. It was determined that sediment removal associated with Project 11c would not provide any additional benefits, yet it would increase both capital and O&M costs.

Alternative M – Projects 10 and 11b

Alternative M (Projects 10 and 11b) is similar to Alternative L in that it includes a combination of trash booms and sedimentation basins within the Smuggler's Gulch canyon drainage. However, Alternative M builds on Alternative L by adding a side weir upstream of the in-line weir to direct flows to an off-line basin to capture fine sediments and reduce overbank flooding north of Monument Road. This Alternative would include construction of a pre-engineered, pre-cast arch bridge over Monument Road to allow for the conveyance of a 2-year storm event. The existing trash booms would require frequent maintenance. Implementation of Alternative M could result in the removal of 16,100 tons of trash and sediment over a 5-year storm event. For maximum sediment and trash removal the sedimentation basins would need to be dredged following a storm event to allow for capture of sediment in the successive storm event. The preliminary cost estimate to implement Alternative M is $7 million for design, construction, environmental review and permitting: and $1.1 million per year for annual O&M; and $1 million per year for environmental monitoring.

Alternative N – Project 16

Alternative N (Project 16) involves enhanced sediment and trash management in the existing Goat Canyon sedimentation basins. In 2005, two sedimentation basins were constructed just north of the U.S.-Mexico border at the mouth of Goat Canyon to address significant amounts of sediment and trash originating from Mexico that flowed into the Tijuana River Estuary. The two basins combined are approximately 19 acres in size and can hold approximately 50,000 to 80,000 cubic yards of material. California State Parks currently operates these two sedimentation basins and two trash booms but lacks reliable and consistent funding to maintain the basins and dispose of the dredged materials (trash and sediment). Funding for long-term O&M of these facilities is necessary to keep trash and sediment from flowing into the Tijuana River and Tijuana River Estuary and to maximize the efficiency of the basins. The preliminary cost estimated for ongoing O&M of these sedimentation basins and trash booms is $5 million per year. The actual cost will vary based on the amount of sediment and trash

captured, however, the estimates included in this analysis are based on the maximum capacity of the sediment and trash management devices.

Alternative O – Project 12

Alternative O (Project 12) would involve a retrofit of the existing Smuggler's Gulch low-flow diversion system to increase the diversion capacity. The existing system is designed to capture and divert an average of 4.67 mgd (peak capacity of 14.0 mgd) of transboundary flows, which are sent to the SBIWTP for treatment. Excess flows at the existing low-flow diversion system are currently routed to the Smuggler's Gulch channel without treatment. Alternative O would expand the diversion capacity up to as much as 30 mgd to capture a greater volume of flows by reconstructing the outlet ponding basin to prevent dry weather flows from flowing downstream. The existing pump station would be retrofitted with larger-capacity pumps and associated equipment to be able to divert additional flows. It should be noted that there is very little information on how often transboundary flows bypass the existing diversion system, either as a result of exceeding the diversion system capacity or due to maintenance and operational issues. Therefore, this analysis is unable to estimate the average number of days per year in which transboundary flows at Smuggler's Gulch impact the Tijuana River Valley. The increase in diversion capacity at the existing system would add flow to existing treatment facilities, so this project would require an increase of treatment capacity at either the SBIWTP or the SBWRP. The preliminary cost for implementation of Alternative O is $13 million for design, construction, and environmental review and permitting; and $500,000 a year for O&M; and $1 million per year for environmental monitoring.

Alternative P – Project 13

Alternative P (Project 13) involves constructing a new in-stream water quality basin at Smuggler's Gulch to capture wet-weather flows bypassed from the proposed upstream sedimentation basin discussed in Alternatives L and M. The in-stream basin would be located downstream of Monument Road and would be fitted with a large-capacity pump station to route flows via a force main for treatment at the SBIWTP or the SBWRP or discharged directly into the SBOO. If flows are routed for treatment, then the capacity of the treatment plants would also need to be increased accordingly to handle the additional flow. If flows are directly disposed to the SBOO, permitting and impacts on ocean water quality would need to be addressed as discussed for Alternative H. Alternative P could result in the diversion of up to an additional 163 mgd of flows. The preliminary

cost for implementation of this Alternative is $44 million for design, construction, and environmental review and permitting; $1.5 million a year for O&M; and $1 million per year for environmental monitoring.

Alternative Q – Project 14

Alternative Q (Project 14) would involve a retrofit of the existing Goat Canyon low-flow diversion system and is similar to Alternative O. The existing system is designed to capture and divert an average of 2.33 mgd (peak capacity of 7.0 mgd) of transboundary flows to the SBIWTP for treatment. This Alternative would expand the diversion capacity up to as much as 30 mgd to capture a greater volume of flows at Goat Canyon by reconstructing the outlet ponding basin to prevent dry weather flows from flowing downstream. The existing pump station would be retrofitted with larger-capacity pumps and associated equipment to be able to divert the additional volume. Similar to Alternative O, there is very little information on how often transboundary flows bypass the existing diversion system. Therefore, this analysis is unable to estimate the average number of days per year in which transboundary flows at Goat Canyon impact the Tijuana River Valley. The increase in diversion capacity at the existing system would add flow to existing treatment facilities, so this project would also require an increase of treatment capacity at either SBIWTP or SBWRP. The preliminary cost for implementation of this Alternative is $15 million for design, construction, and environmental review and permitting; $500,000 a year for O&M; and $1 million per year for environmental monitoring.

Alternative R – Project 15

Alternative R (Project 15) would involve a retrofit of the existing Goat Canyon in-stream water quality detention basin to capture additional transboundary flows at Goat Canyon and is similar to Alternative P. The lower end of the existing sedimentation basin would be expanded to allow for ponding toward the end of the series of basins to create more capacity. A new pump station and force main would be constructed to route these flows for treatment at the SBIWTP or the SBWRP or discharged directly into the SBOO. If flows are routed for treatment, then the capacity of the treatment plants would need to be increased accordingly to handle the additional flow. If flows are directly disposed to the SBOO, permitting and impacts on ocean water quality would need to be addressed as discussed for Alternative H. Implementing this Alternative could allow for diversion of up to an additional 163 mgd of flows. The preliminary cost for implementation of this Alternative is $44 million for design, construction,

and environmental review and permitting; $1.5 million a year for O&M; and $1 million per year for environmental monitoring.

Alternative S – Project 17

Alternative S (Project 17) would involve the construction a new collector and diversion structure to create a low-flow diversion to capture transboundary flows as they enter the U.S. at Yogurt Canyon. Currently no collector or diversion structures are located in Yogurt Canyon, therefore this Alternative would create an entirely new system by constructing an outlet ponding basin, pump station, and force main. Implementing this Alternative would result in additional flows going into SBIWTP or SBWRP for treatment, which would require an increase in capacity at the treatment plants to handle the increased flows. A new system for collecting and diverting dry weather flows at Yogurt Canyon could divert up to an additional 30 mgd of flows. Yogurt Canyon is a relatively small watershed at only 415 acres compared to other watersheds in Tijuana River Valley. Therefore, it is recommended that further studies of this Alternative be conducted to determine if there will be significant benefit to the Tijuana River Valley and Tijuana River Estuary as a result of creating this diversion. Currently, little is known about the volume of dry-weather transboundary flows or storm runoff that crosses the border at Yogurt Canyon, which may pose only a relatively small and minimal impact to the environment. It is estimated that a feasibility study would cost between $250,000 and $500,000 and the preliminary cost for implementation of this Alternative would be $14 million for design, construction, and environmental review and permitting; $500,000 a year for O&M, and $1 million per year for environmental monitoring.

Alternative T – Project 18

Alternative T (Project 18) involves the construction of a 25-foot-wide pilot channel to convey wet-weather flows and sediment discharging from Yogurt Canyon towards the Tijuana River Estuary. The channel, which would be designed to handle flows for a 5-year storm event, would cross Monument Road under a prefabricated creek crossing structure and be directed towards the tidally influenced saltmarsh in the southern portion of the Tijuana River Estuary. This Alternative would support the current saltmarsh restoration efforts and is consistent with the Tijuana Estuary Tidal Restoration Program Feasibility Study. The preliminary cost for implementation of this Alternative is $9 million for design, construction, and environmental review and permitting; $5,000 a year for O&M; and $1 million per year for environmental monitoring.

5.1.3 Other Alternatives Supporting the Tijuana River Valley

Alternative U – Project 27

Alternative U (Project 27) involves implementation of the Tijuana Estuary Tidal Restoration Program (TETRP). This program is a large multi-phased wetland restoration program aimed at restoring up to 300 acres of wetland habitat in the Tijuana River Estuary. The primary objective of Alternative U is to restore valuable habitat processes that have been lost and to increase the exchange of water in a tidal cycle. Currently, the final design and environmental review of Phase 1 of this Alternative is funded and in-progress. Phase 1 is the restoration of approximately 85 acres in the southern portion of the Tijuana River Estuary. While this Alternative does not directly reduce transboundary flows, implementation would reduce potential impacts caused by transboundary flows by providing increased function of ecological processes. The preliminary cost for full implementation of this Alternative is estimated to be approximately $200 million. Current estimates for the Phase 1 construction and environmental permitting are between $25 million and $50 million. Costs for O&M of the project are currently unknown but are anticipated be needed on an annual basis to ensure that restored ecological processes are maintained over time.

5.2 Evaluation Approach

After determining the alternatives, each alternative was quantitatively evaluated based on the estimated cost (capital and O&M) and the potential water quality benefit. Estimated costs for each alternative are described in the previous section. Potential water quality benefits were quantified based on the estimated reduction in transboundary flow days that would be achieved after implementing the alternative.

After completing this quantitative analysis, each of the 21 alternatives was then evaluated based on the following qualitative metrics:

COST

Construction, design, permits, monitoring, operation, and maintenance

BENEFITS

Reducing transboundary flows, capture of trash and sediment

IMPLEMENT

Technical feasibility, operating complexity and sustainability

IMPACTS

Impacts to the environment of riverine and ocean habitat

COMMUNITY

And societal impacts to justice, ancillary benefits, disruption, and public support

To assist in the evaluation of the alternatives, a system of colored dots was used to rate the qualitative metrics for implementation, operation and maintenance, environmental, and community and societal impacts. A green dot signifies a positive impact, yellow a moderate impact, and red a negative impact. The list of alternatives, their associated projects, potential costs, potential water quality benefits, and the evaluation metrics are summarized in Appendix H.

RECOMMENDATIONS

6. RECOMMENDATIONS

Overall, rivers and tributary canyons that carry water across the border from Mexico into the Tijuana River Valley are the major sources of untreated sewage, trash, and sediment in the area. The presence of pollution is creating unsafe conditions for federal, state, and local government agency staff, residents, and visitors on public lands. Due to the magnitude of the issues caused by transboundary flows, the solution to these issues will need to be a binational effort with involvement from all major stakeholders. As described in Section 1 of this report, maximizing the collection, treatment, and discharge of dry and wet weather flows, including trash and sediment, was the primary objective in evaluating projects for this study.

This study evaluated and recommends alternatives to intercept, divert, and treat, in compliance with the Clean Water Act, as much of the polluted flows as feasible and to discharge the intercepted flows through the SBOO. The current unused peak capacity of the SBOO is 163 mgd (up to 193 mgd if no concurrent discharge from SBIWTP), which is considered the major limiting factor on the

amount of transboundary flows that could be feasibly diverted and discharged to the Pacific Ocean. The SBOO capacity is the major limiting factor, because implementing additional discharge infrastructure (an additional outfall or an expanded outfall) would be cost prohibitive and would not be able to achieve significant enough benefits to justify the cost. Each of the alternatives proposed in Section 5 would provide benefits to the Tijuana River Valley and address the goal of treating as much of the polluted flows as possible. However, the NOA Report recognizes the finite nature of resources. As such, alternatives are ranked by those that would provide the biggest return on investment. In general, alternatives focusing on the main channel of the Tijuana River are likely to provide the most value, followed by alternatives located at or near the main tributaries (Smuggler's Gulch, Goat Canyon, and Yogurt Canyon), and the lowest ranked alternatives are those that are general and could be implemented in other locations within the Tijuana River Valley.

6.1 Alternatives in the Main Channel of the Tijuana River

The NOA Report recommends prioritizing alternatives that provide solutions in the main channel of the Tijuana River. Alternatives A, B, C, D, E, F, G, H, I, J, and K have been identified as providing the most return on investment because they maximize treatment opportunities within the main stem of the Tijuana River where flows are greatest. Some alternatives are mutually exclusive so not all alternatives are recommended for implementation together. Mutually exclusive alternatives in the main channel of the Tijuana River include Alternatives A, B, C, D, and E. Many of these alternatives could, however, be implemented in phases to provide near-term benefits while securing resources for longer-term solutions. For example, an entity could implement Alternative A in the near-term while keeping Alternative C in mind during design to allow for future expansion of infrastructure. In general, alternatives addressing trash and sediment capture can be combined to compound the benefits of these capture devices and provide as much benefit as possible.

While all projects in the main stem of the Tijuana River are recommended and could be valuable to the region, stakeholder input suggested significant regulatory challenges may be faced in implementing the alternatives focused on direct discharge (Alternative H & Alternative I) and the alternative including the 82 mgd storage basin (Alternative D). While these alternatives may be valuable to the Tijuana River Valley, additional feasibility analysis and extensive stakeholder coordination are recommended as next steps towards

implementation of these alternatives.

6.2 Alternatives in the Tributaries

Next, the NOA Report recommends Alternatives L or M, N, O, P, Q, R, S, and T, which focus on projects within the three main tributaries to the Tijuana River (Smuggler's Gulch, Goat Canyon, and Yogurt Canyon). These alternatives would serve as the next set of priorities for addressing concerns in the Tijuana River Valley.

Within the tributaries, some alternatives are mutually exclusive so not all alternatives proposed are recommended for implementation together. The NOA Report recommends implementing either Alternative L or Alternative M for Smuggler's Gulch since both are different options to address sediment management. Similar to the alternatives proposed in the main channel of the Tijuana River, alternatives proposed in the tributaries that address trash and sediment capture can be combined to compound the benefits of these capture devices and provide as much benefit as possible.

6.3 Other Alternatives Supporting the Tijuana River Valley

Alternative U, implementation of the Tijuana Estuary Tidal Restoration Program, is also recommended. However, Alternative U is not a priority because implementation of the alternative would not directly reduce transboundary flows, which have been identified as a priority to address in the Tijuana River Valley. While it is not a main priority, Alternative U is still included as a recommended alternative, because it would provide increased function of ecological wetland processes that could provide indirect water quality benefits.

6.4 Next Steps

A set of projects and proposed alternatives have been identified through this study. Summary descriptions (i.e. cut sheets) were created for a select group of project alternatives to assist agencies in the first step towards design (Appendix I). Not all alternatives have cut sheets as they were intended to supplement the NOA Report and offer guidance for major elements that an agency may want to consider as the projects move forward. Next steps are expected to include initiating environmental analysis and preliminary design of the capital projects deemed necessary and feasible to achieve established objectives for the Tijuana River Valley. Environmental analysis could include a programmatic-level document that analyzes several projects or related projects and also considers

cumulative effects that could be caused by implementing more than one of the identified projects. Programmatic environmental documents are appropriate when activities are connected to a larger goal, as is the case for the projects identified in this report. A benefit of a programmatic environmental review is to allow a comprehensive examination of the projects that could be constructed in multiple phases over time. These projects may also be constructed in phases to meet funding or regulatory constraints. Regardless of the approach taken, resolving this international issue will require significant collaboration amongst stakeholders. Stakeholders at the local, state, and federal levels will need to take ownership and initiative to end the public health, environmental, and safety issues caused by transboundary pollution in the Tijuana River Valley.

7. REFERENCES

AECOM. 2016. Nelson Sloan Management and Operations Plan and Cost Analysis.

Arcadis. 2019. Tijuana River Diversion Study. Prepared for North American Development Bank.

County of San Diego. 2016. Item 8 Supporting Document Number 5 – List of Known Transboundary Spills.

Stantec. 2019. 60% Report Feasibility Study for Sediment Basins Tijuana River International Border to Dairy Mart Road.

Tijuana River Valley Recovery Team. 2012. Recovery Strategy Living with the Water.

United States Army Corps of Engineers (USACE). 2018. Phase I Hydrology, Floodplain and Sediment Transport Report Final for Tijuana River. Prepared for the City of San Diego.

United States (U.S.) Customs and Border Patrol (CBP). 2017. Sewage/Effluent Water Spills Imperial Beach/San Diego Border Region FY 2017.

URS. 2010. Land Use Options for the Nelson Sloan Property.

THIS PAGE INTENTIONALLY LEFT BLANK