CITY OF SAN DIEGO

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CITY OF SAN DIEGO

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# Appendix F Tijuana River Watershed

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# F.1 INTRODUCTION

The Tijuana River WAMP identifies the assets owned and managed by the Division, provides an understanding of critical assets required to deliver the services, records the strategies that will be used to manage the assets, and documents the future investments required to deliver the committed services in the Tijuana River WMA. The Tijuana River WAMP will serve as a road map to ensure that actions and activities that address flood risk management and water quality align across City departments. This plan will provide a vehicle to identify and prioritize potential water quality and flood risk management challenges, evaluate opportunities for integrating water quality and flood risk management into City projects and operations and maintenance activities within the Tijuana River watershed, and provide a vehicle for public participation.

## F.1.1 Tijuana River Watershed Description

The Tijuana River WMA covers approximately 467 square miles (299,228 acres) of land area within the United States portion of the Tijuana River Watershed. The Tijuana River WMA straddles the US–Mexico border with only a quarter of its 1.1 million acres lying within San Diego County. Throughout the WMA, the predominant land use is classified as vacant and undeveloped (60% on the US side, 82% on the Mexico side). On both sides of the border, the watershed becomes less populated from west to east. The major population centers in the watershed are the cities of Tijuana and Tecate in Mexico and cities of Imperial Beach and San Diego in the US. Within the Tijuana River WMA, jurisdictional control is divided amongst the County of San Diego, City of San Diego, and the City of Imperial Beach. The WMA is bounded on the north by the Otay River Watershed, which drains into San Diego Bay. It is bounded on the south by remainder of the watershed within Baja California. The Pacific Ocean is located to west and the Anza Borrego Watershed of the Colorado River Basin (Region 7) is located to the east. Elevation ranges from sea level at the Tijuana Estuary to about 6,000 feet in the Laguna Mountains (Mount Laguna and Garnet and Monument Peaks). Annual rainfall ranges from inches at the coast up to 30 inches in the Laguna Mountains. Several jurisdictions with land use authority lie within the boundaries of the Tijuana River Watershed, including the Cities of Imperial Beach and San Diego, the County of San Diego, and several Mexican municipalities including the important urban centers of Tijuana and Tecate.

The Water Quality Control Plan for the San Diego Basin (Basin Plan) prepared by the RWQCB (SDRWQCB, 1994) defines the Tijuana River WMA as consisting of eight hydrological areas (HAs), namely the Tijuana Valley (911.1), Potrero (911.2), Barrett Lake (911.3), Monument (911.4), Morena (911.5), Cottonwood (911.6), Cameron (911.7) and Campo (911.8) HAs.

Table F-1 provides data on the percentage of each jurisdiction within the WMA at the watershed level, and Figure F-1 shows the City's jurisdiction within the watershed.

**Table F-1. Tijuana River WMA Jurisdictional Breakdown**

| Jurisdiction | Acres in Watershed | Percent of Watershed |
|---|---|---|
| Imperial Beach | 2,146 | <1 |
| San Diego | 14,026 | 5 |
| County of San Diego | 3,567 | 1 |
| Mexico | 279,489 | 93 |

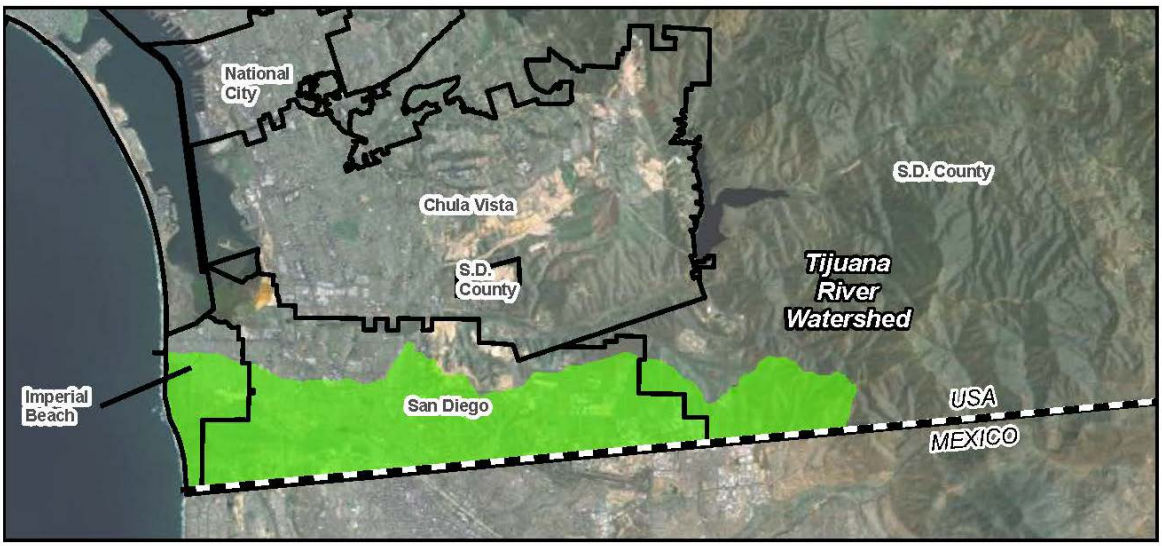


**Figure F-1. Tijuana River Watershed**

The predominant land uses in the Tijuana River WMA include Vacant/Undeveloped land (60%) followed by Open Space/Open Water (26%), Spaced Rural Residential and Residential (6% and 1% respectively), Agriculture (3%) and Transportation (2%). Hydrology in the Tijuana River WMA is characterized by a southwest-trending stream network and is comprised principally of Pine Valley Creek, Cottonwood Creek, and the Campo Creek drainages. Two reservoirs, Barrett and Morena, store water, some of which is conveyed out of the watershed via the Dulzura Conduit into the Otay River Watershed.

The Tijuana River watershed is classified as a Category I (impaired) watershed by the State Water Resources Control Board due to a wide variety of water quality problems. These problems are largely a result of non-point agricultural sources on the U.S. side of the border and a large variety of point and non-point sources on the Mexican side. The Tijuana Estuary, a National Estuarine Sanctuary that supports a variety of threatened and endangered plants and animals, is threatened by inflows from the Tijuana River containing high concentrations of coliform bacteria, sediment, trace metals (copper, lead, zinc, chromium, nickel, and cadmium), PCBs, and other urban, agricultural, and industrial pollutants.

### F.1.2 Tijuana River Watershed Coordinators

The role of the watershed coordinator is to develop watershed management plans, establish watershed specific budgets, and coordinate all activities within a watershed (e.g., NPDES compliance, flood system maintenance, capital improvement planning, special studies and regulatory negotiations (e.g., TMDLs). Two watershed coordinators have been assigned to the Tijuana River Watershed:

- David Wells
- Anne Jarque

### F.1.3 Water Quality

The Tijuana River Watershed Urban Runoff Management Plan (WURMP)[1] identifies high-priority water quality problems (HPWQPs). Table F-2 presents the HPWQPs by HA within Tijuana River WMA.

[1] Tijuana River Watershed Urban Runoff Management Program, Annual Report 2010-2011, County of San Diego, City of San Diego, and City of Imperial Beach.

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**Table F-2. Tijuana River Watershed Baseline High-priority Water Quality Problems**

| Hydrologic Area | Tijuana Valley 911.1 | Potrero 911.2 | Barrett Lake 911.3 | Monument (Pine Valley Creek) 911.4 | Morena 911.5 | Cottonwood 911.6 | Cameron 911.7 | Campo 911.8 |
|---|---|---|---|---|---|---|---|---|
| Bacteria/Pathogens | X | | | X | | | | |
| Sediment (TSS/Turbidity) | X | | | | | | | |
| Pesticides (Diazinon) | X | | | | | | | |
| Gross Pollutants | X | | | | | | | |
| Metals | X | | | | | | | |
| Organics | X | | | | | | | |
| Dissolved Minerals (Managanese) | | | X | | X | | | |
| Gross Pollutants (pH | | | X | | X | | | |
| Color | | | X | | X | | | |
| Sediment (Turbidity) | | | | X | | | | |
| Nutrient (Phosphorus) | | | | X | | | | |
| Undetermined | | X | | | | X | X | X |

Water bodies in the Tijuana River WMA and constituents that have been placed on the State Water SWRCB 2010 Section 303(d) list are presented in Table F-3. The table includes the water bodies having an adopted TMDL, for which a TMDL is in development, or for which an action other than a TMDL will be taken.

**Table F-3. Tijuana River Watershed Impaired Water Bodies**

| Water Body Name | Water Type | Watershed Calwater / USGS HUC | Location within City of San Diego Jurisdiction (Yes/No) | Pollutant | Estimated Area Assessed | First Year Listed | TMDL Requirement Status | TMDL Completion Date |
|---|---|---|---|---|---|---|---|---|
| Tijuana River | River & Stream | 91111000 / 18070305 | Yes | Eutrophic | 6 Miles | 1996 | 5A | 2019 |
| | | | | Indicator Bacteria | 6 Miles | 1992 | 5A | 2010 |
| | | | | Low Dissolved Oxygen | 6 Miles | 1996 | 5A | 2019 |
| | | | | Pesticides | 6 Miles | 1996 | 5A | 2019 |
| | | | | Phosphorus | 6 Miles | 2010 | 5A | 2021 |
| | | | | Sedimentation/Siltation | 6 Miles | 2010 | 5A | 2021 |
| | | | | Selenium | 6 Miles | 2010 | 5A | 2021 |
| | | | | Solids | 6 Miles | 1996 | 5A | 2019 |
| | | | | Surfactants (MBAs) | 6 Miles | 2010 | 5A | 2021 |
| | | | | Synthetic Organics | 6 Miles | 1996 | 5A | 2019 |
| | | | | Total Nitrogen as N | 6 Miles | 2010 | 5A | 2021 |
| | | | | Toxicity | 6 Miles | 2010 | 5A | 2021 |
| | | | | Trace elements | 6 Miles | 1998 | 5A | 2019 |
| | | | | Trash | 6 Miles | 1998 | 5A | 2019 |

**Table F-3. Tijuana River Watershed Impaired Water Bodies**

| Water Body Name | Water Type | Watershed Calwater / USGS HUC | Location within City of San Diego Jurisdiction (Yes/No) | Pollutant | Estimated Area Assessed | First Year Listed | TMDL Requirement Status | TMDL Completion Date |
|---|---|---|---|---|---|---|---|---|
| Tijuana River Estuary | Estuary | 91111000/18070305 | Yes | Eutrophic | 1319 Acres | 1996 | 5A | 2019 |
| | | | | Indicator Bacteria | 1319 Acres | 1988 | 5A | 2010 |
| | | | | Lead | 1319 Acres | 1992 | 5A | 2019 |
| | | | | Low Dissolved Oxygen | 1319 Acres | 1988 | 5A | 2019 |
| | | | | Nickel | 1319 Acres | 1992 | 5A | 2019 |
| | | | | Pesticides | 1319 Acres | 1992 | 5A | 2019 |
| | | | | Thallium | 1319 Acres | 1992 | 5A | 2019 |
| | | | | Trash | 1319 Acres | 1996 | 5A | 2019 |
| | | | | Turbidity | 1319 Acres | 2006 | 5A | 2019 |
| Pacific Ocean Shoreline, Tijuana HU, at 3/4 mile North of Tijuana River | Coastal & Bay Shoreline | 91111000/18070305 | Yes | Enterococcus | 0.03 Miles | 1996 | 5A | 2021 |
| | | | | Fecal Coliform | 0.03 Miles | 1996 | 5A | 2021 |
| | | | | Total Coliform | 0.03 Miles | 1996 | 5A | 2021 |
| Pacific Ocean Shoreline, Tijuana HU, at Monument Road | Coastal & Bay Shoreline | 91111000/18070305 | Yes | Fecal Coliform | 0.03 Miles | 1996 | 5A | 2021 |
| | | | | Total Coliform | 0.03 Miles | 1996 | 5A | 2019 |

**Table F-3. Tijuana River Watershed Impaired Water Bodies**

| Water Body Name | Water Type | Watershed Calwater / USGS HUC | Location within City of San Diego Jurisdiction (Yes/No) | Pollutant | Estimated Area Assessed | First Year Listed | TMDL Requirement Status | TMDL Completion Date |
|---|---|---|---|---|---|---|---|---|
| Pacific Ocean Shoreline, Tijuana HU, at Tijuana River mouth | Coastal & Bay Shoreline | 91111000/18070305 | Yes | Enterococcus | 0.03 Miles | 1996 | 5A | 2019 |
| | | | | Fecal Coliform | 0.03 Miles | 1996 | 5A | 2019 |
| | | | | Total Coliform | 0.03 Miles | 1996 | 5A | 2019 |
| Pacific Ocean Shoreline, Tijuana HU, at end of Seacoast Drive | Coastal & Bay Shoreline | 91111000/18070305 | Yes | Enterococcus | 0.03 Miles | 1996 | 5A | 2021 |
| | | | | Fecal Coliform | 0.03 Miles | 1996 | 5A | 2021 |
| | | | | Total Coliform | 0.03 Miles | 1996 | 5A | 2019 |
| Pacific Ocean Shoreline, Tijuana HU, at the US Border | Coastal & Bay Shoreline | 91111000/18070305 | Yes | Enterococcus | 0.03 Miles | 1996 | 5A | 2021 |
| | | | | Fecal Coliform | 0.03 Miles | 1996 | 5A | 2021 |
| | | | | Total Coliform | 0.03 Miles | 1996 | 5A | 2019 |
| Barrett Lake | Lake & Reservoir | 91130000/18070305 | Yes | Color | 125 Acres | 2006 | 5A | 2019 |
| | | | | Manganese | 125 Acres | 2006 | 5A | 2019 |
| | | | | Perchlorate | 125 Acres | 2010 | 5A | 2019 |
| | | | | Total Nitrogen as N | 125 Acres | 2010 | 5A | 2019 |
| | | | | pH | 125 Acres | 2006 | 5A | 2019 |

**Table F-3. Tijuana River Watershed Impaired Water Bodies**

| Water Body Name | Water Type | Watershed Calwater / USGS HUC | Location within City of San Diego Jurisdiction (Yes/No) | Pollutant | Estimated Area Assessed | First Year Listed | TMDL Requirement Status | TMDL Completion Date |
|---|---|---|---|---|---|---|---|---|
| Pine Valley Creek (Upper) | River& Stream | 91141000/18070305 | Yes | Turbidity | 2.9 Miles | 2006 | 5A | 2019 |
| Morena Reservoir | Lake & Reservoir | 91150000/18070305 | Yes | Ammonia as Nitrogen | 104 Acres | 2010 | 5A | 2019 |
| | | | | Color | 104 Acres | 2006 | 5A | 2019 |
| | | | | Manganese | 104 Acres | 2006 | 5A | 2019 |
| | | | | Phosphorus | 104 Acres | 2010 | 5A | 2021 |
| | | | | pH | 104 Acres | 2006 | 5A | 2019 |

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### F.1.4 Flood Risk Management

Storm water drainage systems serve multiple purposes and uses, including: conveying storm water and urban runoff downstream; protecting property from flooding during high-flow storm events; controlling stream bank erosion; protecting water quality by filtering pollutants from urban runoff; and sustaining wildlife. To that end, storm water facilities must integrate conventional flood risk management strategies for large, infrequent rain events with storm water quality control strategies and natural resource protection. Under City Policy 800-04, the City is responsible for maintaining adequate drainage facilities to remove storm water runoff in an efficient, economic, environmentally and aesthetically acceptable manner for the protection of property and life. The City's storm water system serves to convey storm water flows to protect the life and property of its citizens from flood risks. The system also serves to convey urban runoff from development such as irrigated landscape areas, driveways, and streets that flow into drainage facilities and, ultimately, to the ocean. Additionally, the City's storm water system helps protect water quality; open facilities, such as channels, can support natural resources, including wetland habitat. The long-term performance of the entire system is dependent on ongoing and proper maintenance.

To maintain the system's effectiveness, the City has developed a Master Storm Water System Maintenance Program (Master Program) that describes the specific maintenance methods and procedures of annual maintenance activities. Major channels located in Tijuana River Watershed are listed in Table F-4.

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## Table F-4. Tijuana River Watershed Channels

| Map No.[1] | Hydrologic Unit | Facility Description | Total Length (feet) | Facility Type (length in feet) | | Estimated DisturbanceWidth[2] (feet) |
|---|---|---|---|---|---|---|
| | | | | Concrete Bottom | Earthen Bottom | |
| 123 | Tijuana | Sanyo Channel | 1,255 | 1,225 | 30 | 15 |
| 124 | Tijuana | La Media & Airway | 628 | -- | 628 | 20 |
| 125 | Tijuana | Camino Maquiladora & Cactus | 1,073 | 822 | 251 | 10 |
| 126 | Tijuana | Siempra Viva & Bristow | 2,321 | 140 | 2,181 | 19 |
| 127 | Tijuana | Britannia & Bristow | 597 | -- | 597 | 20 |
| 128 | Tijuana | Virginia Channel | 503 | -- | 503 | 20 |
| 129 | Tijuana | Smythe Channel | 1,956 | 1,635 | 321 | 12 |
| 130 | Tijuana | Smythe Channel | 1,365 | -- | 1,365 | 24 |
| 136 | Tijuana | Tocayo Channel | 2,637 | 2,485 | 152 | 8 |
| 137 | Tijuana | Tocayo Channel | 1,076 | 1,043 | 33 | 8 |
| 138a | Tijuana | Tijuana River Pilot Channel | 2,476 | -- | 2,476 | 25 |
| 138b | Tijuana | Tijuana River Pilot Channel | 2,653 | -- | 2,653 | 25 |
| 138c | Tijuana | Tijuana River Pilot Channel | 719 | -- | 719 | 25 |
| 138 | Tijuana | Smugglers Gulch Channel | 1,837 | -- | 1,837 | 35 |
| 139 | Tijuana | Smugglers Gulch Channel | 1,031 | -- | 1,031 | 35 |

Notes:

[1] The Storm Water Division assigns a map number to each of the facilities within its jurisdiction. However, not all of these facilities are included in the Master Program. Thus, the map numbers in this table are not all sequential. Maps are located in Master Storm Water System Maintenance Program, City of San Diego Transportation and Storm Water Department, October 2011.

[2] Disturbance width for channels wider than 20 feet (top of bank to top of bank) is assumed to be the width of the bottom of the channel plus two feet up each side slope. Disturbance width for channels less than 20 feet includes bottom and all of the side slopes.

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## F.2 ASSET INVENTORY – "WHAT DO WE OWN?"

The body of the report explains the asset hierarchy and the division of asset classes into hard, soft, and natural categories, and the subdivisions within those categories. In this appendix, we present the assets within the Tijuana River Watershed asset category (i.e., hard, soft, and natural).

### F.2.1 Hard Assets

The hard assets include the conveyance system, structures, and pump station equipment with replacement costs greater than $5,000. Table F-5 shows the list of hard asset subclasses, their quantities and, where applicable, lengths.

**Table F-5. Tijuana River Watershed Hard Assets**

| Asset Class/Subclass | Asset Count | Total Length (feet) | Total Length (miles) |
|---|---|---|---|
| Conveyance System: | | | |
| • Box Culvert | 89 | 15,289 | 2.90 |
| • Brow Ditch | 2 | 886 | 0.17 |
| • Channel | 107 | 48,752 | 9.23 |
| • Storm Drain Pipe | 1,804 | 232,398 | 44.01 |
| Structures: | | | |
| • Cleanout | 594 | | |
| • Inlet | 955 | | |
| • Energy Dissipator | 82 | | |
| • Low Flow Diversion Structure | 1 | | |
| • Headwall | 244 | | |
| • Outlet | 282 | | |
| **Total** | **4,167** | **297,325** | **56.31** |

In terms of asset count, inlets account for 44 percent of Tijuana River Watershed storm water structures assets, followed by cleanouts and outlets, with 28 percent and 13 percent, respectively. Within the conveyance system, the dominant asset type is the storm drain system, which accounts for 78 percent (44 miles) of total conveyance length. The detailed distribution of the storm water conveyance and structures is shown in Figures F-2 and F-3.

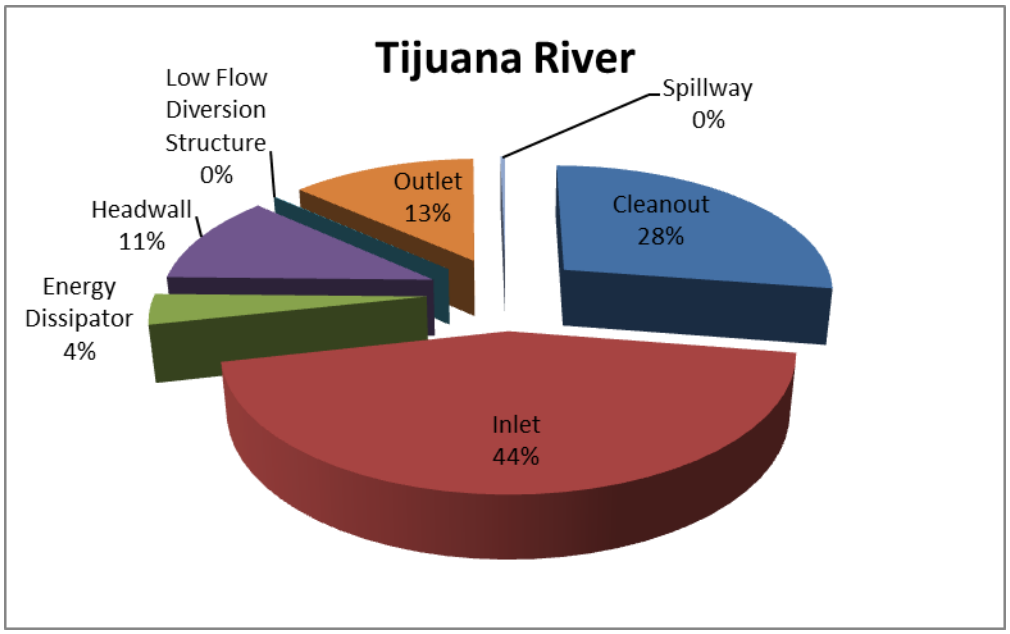


**Figure F-2. Distribution of Storm Water Structures by Asset Count - Tijuana River Watershed**

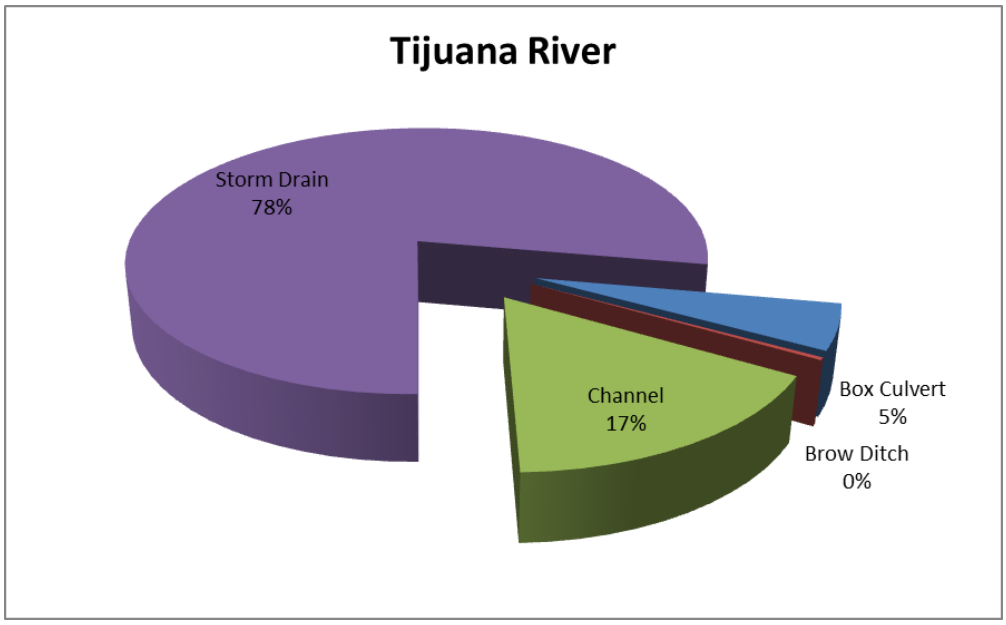


**Figure F-3. Distribution of Storm Water Conveyance by Length - Tijuana River Watershed**

In addition to those assets listed in Table F-4, there is additional equipment that is not particularly part of the Tijuana River Watershed since this equipment is used in all six watersheds. This equipment includes O&M equipment (e.g., truck, loader, mechanical sweeper, BMP monitoring equipment). For this iteration of the WAMP, these assets will be tracked at the Division level. Structural BMPs (e.g., drainage insert, downspout filter, infiltration basin) are specific to the watershed and are accounted for if implemented in the watershed. Table F-6 shows the list of assets within this category and their quantities.

**Table F-6. The Equipment**

| Asset Class/Subclass | Asset Count |
|---|---|
| Operation and Maintenance Equipment | 102 |
| Best Management Practices Monitoring Equipment | 12 |
| **Total** | **114** |

## F.2.2 Natural Assets

Natural assets include receiving waters, runoff/discharges, City-owned parcels, and MHPAs. Table F-7 lists the natural asset classes/subclasses and their quantities in the Tijuana River Watershed.

**Table F-7. Tijuana River Watershed Natural Asset Classes/Subclasses and Quantities**

| Asset Class/Subclass | Quantity in Tijuana River Watershed |
|---|---|
| Receiving Waters | Currently treated as one asset within the Tijuana River Watershed. For future updates, recommend to refine into specific receiving water assets. For the Tijuana River Watershed, there are 1,308 receiving waters/segments. |
| Runoff/Discharges | Currently treated as one asset within the Tijuana River Watershed. For future updates, manage runoffs and discharges at the hydrologic sub-area level. There are 282 mainstem outfalls in the Tijuana River Watershed, which will be associated with the hydrologic sub-areas. |
| City Parcels | There are 112 City Parcels in the Tijuana River Watershed. |
| MHPAs | There are 46 MHPAs in the Tijuana River Watershed. |

**Acronyms:**
CLRP - Comprehensive Load Reduction Plan
LOS – level of service
MHPA - multiple-habitat planning area

## F.2.3 Soft Assets

Soft assets are currently being managed, for the most part, on a City-wide basis. In the coming years, they will be managed on a watershed-specific basis, with the primary focus being on the watersheds with the greatest business risk exposure associated with these soft assets. Some of the soft assets will be managed

within TMDL catchments based on TMDL implementation plans (CLRPs). The CLRPs will specify which catchments have the greatest pollutant loads. Using the CLRP pollutant loading scores, BRE will be calculated to identify the catchments needing additional soft asset management resources to achieve LOSs. Table F-8 shows the soft asset classes and the quantities of assets in those classes in the Tijuana River Watershed.

**Table F-8. Tijuana River Watershed Soft Asset Subclasses and Quantities**

| Asset Class/Subclass | Quantity in Tijuana River Watershed |
|---|---|
| City Department Behavior | Currently treated as one asset in the Tijuana River Watershed. They will continue to be treated as one asset. |
| Public Behavior | |
| Good Will, Relationships, Credibility | |
| Policies and Procedures for Other City Departments | |
| Ordinances, Standards, Requirements | |
| Municipal Non-structural BMPs | Currently treated as one asset in the Tijuana River Watershed. As TMDL implementation plans are completed, they will be treated as one asset for each TMDL receiving water within the watershed. |
| Private Non-structural BMPs | |
| Land Development Standards | |

## F.3 ASSET MANAGEMENT COSTS: "WHAT IS WORTH?"

Asset valuations are an integral part of asset management. The valuation process provides the City with the knowledge of estimated costs to support its budgetary planning, identify high value assets, and gain understanding into the total value of the assets at all levels of the hierarchy. Using the estimated costs, future funding requirements can be created and the lowest lifecycle cost can be tracked against the assets. Asset management costs include replacement costs for hard assets and operations and maintenance costs for all assets. It is important to note that natural and soft assets cannot be "replaced" per se, however, their "value" is estimated to be the funding needed to manage the assets to meet the LOS required by the regulators and desired by the citizens. The same can essentially be said for hard assets. However, because hard assets require replacement when they reach the end of their useful lives, the funding needed includes the cost of replacing the asset. Thus, their "value" can be estimated as the sum of their replacement and operations and maintenance costs.

Each hard asset in the hard asset register was assigned an estimated replacement cost. The replacement cost is estimated based on what it might cost to replace the hard asset in today's (2013) dollars. Storm drain, brow ditch, and channel replacement costs were calculated using each segment's length, while storm water structures (e.g., inlets, outlets) were assigned a unit cost. The replacement costs for each hard asset class are shown in Table F-9. These unit costs are determined based on inputs from the Division's staff.

A summary of the Division's hard asset replacement costs for the Tijuana River Watershed is provided below in Table F-9. The conveyance system accounts for about 71 percent of the total replacement costs and structures account for 29 percent. Figure F-4 shows the distribution of Tijuana River Watershed hard asset replacement costs.

**Table F-9. Tijuana River Watershed Assets Replacement Costs and Total Replacement Costs**

| Asset Class/Subclass | Replacement Cost | Total Replacement Costs |
|---|---|---|
| Conveyance System: | | |
| • Box Culvert | $250,000/unit | $22.3 million |
| • Brow Ditch | $400/linear feet | $354,000 |
| • Channel | $400/linear feet | $19.5 million |
| • Storm Drain | $400/linear feet | $93 million |
| Structures: | | |
| • Cleanout | $20,000/unit | $11.9 million |
| • Inlet | $20,000/unit | $19.1 million |
| • Energy Dissipater | $40,000/unit | $3.3 million |
| • Headwall | $40,000/unit | $0.8 million |
| • Low Flow Diversion Structure | $400,000/unit | $400,000 |
| • Outlet | $40,000/unit | $11.3 million |
| • Spillway | $15,000/unit | $105,000 |
| **Total** | | **$190.8 million** |

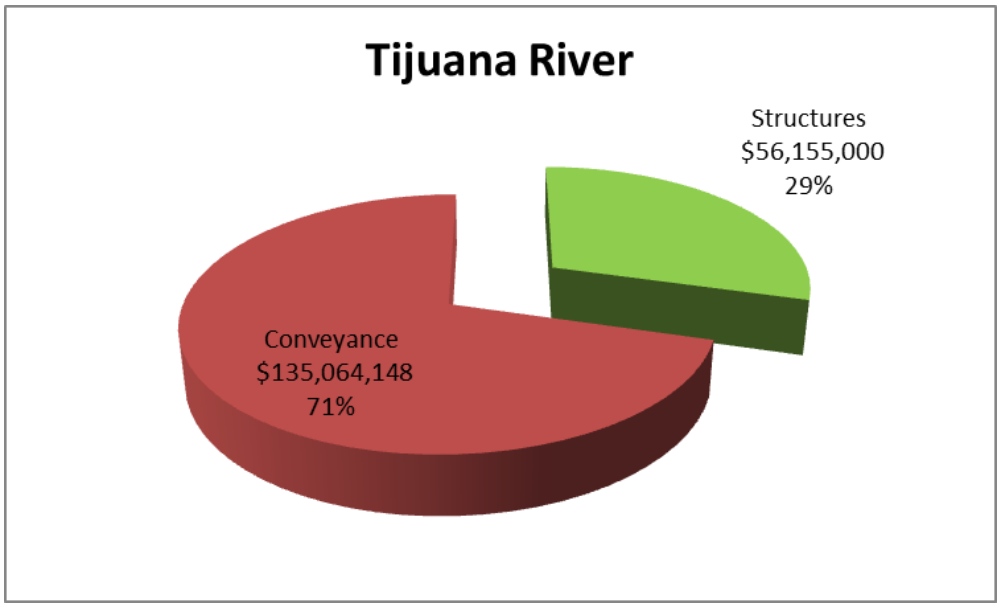


**Figure F-4. Tijuana River Watershed Hard Assets Replacement Costs**

Figure F-5 shows the distribution of conveyance system asset replacement costs. Of the total conveyance system, about 69 percent consists of storm drains, followed by box culverts, channel, and broditches.

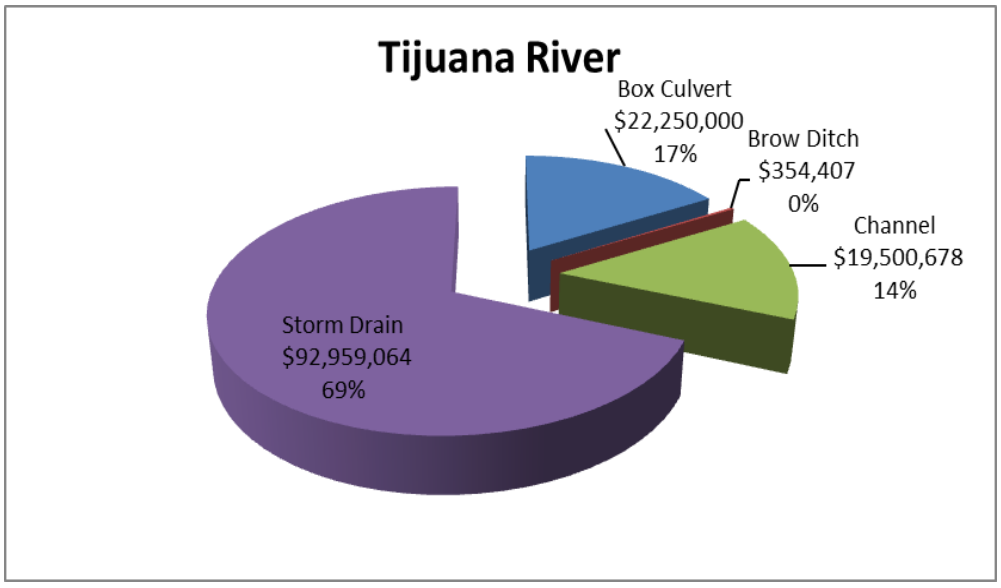


**Figure F-5. Tijuana River Watershed Conveyance System Assets Replacement Costs**

Figure F-6 shows the distribution of the asset replacement costs for storm water structures. Of the total system, most of structures consist of inlets (34 percent), followed by cleanouts (21 percent), outlets (20 percent), and headwalls (18 percent). The three remaining asset classes, energy dissipators, low flow diversion structure, and spillways represent 7 percent of the total asset replacement costs.

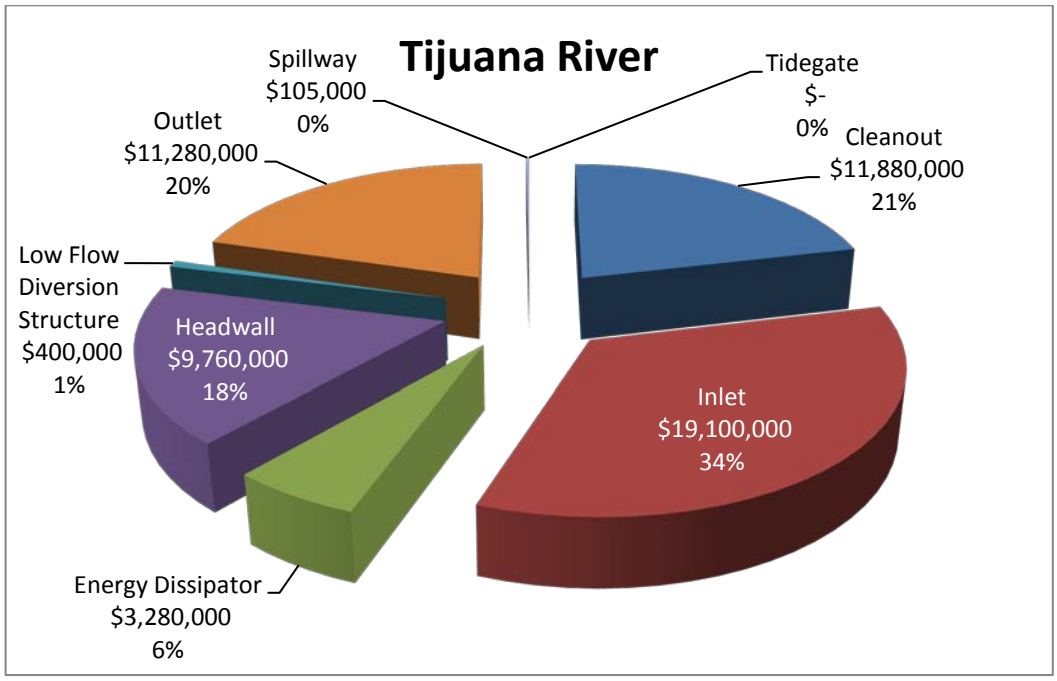


**Figure F-6. Tijuana River Watershed Storm Water Structures Asset Replacement Costs**

In addition to hard assets managed under Tijuana River watershed above, there is equipment that is managed at the Division level. Figure F-7 shows the distribution of the total replacement costs for the Division's equipment assets. Nearly 99 percent of the total system consists of O&M equipment and BMP monitoring equipment (1 percent).

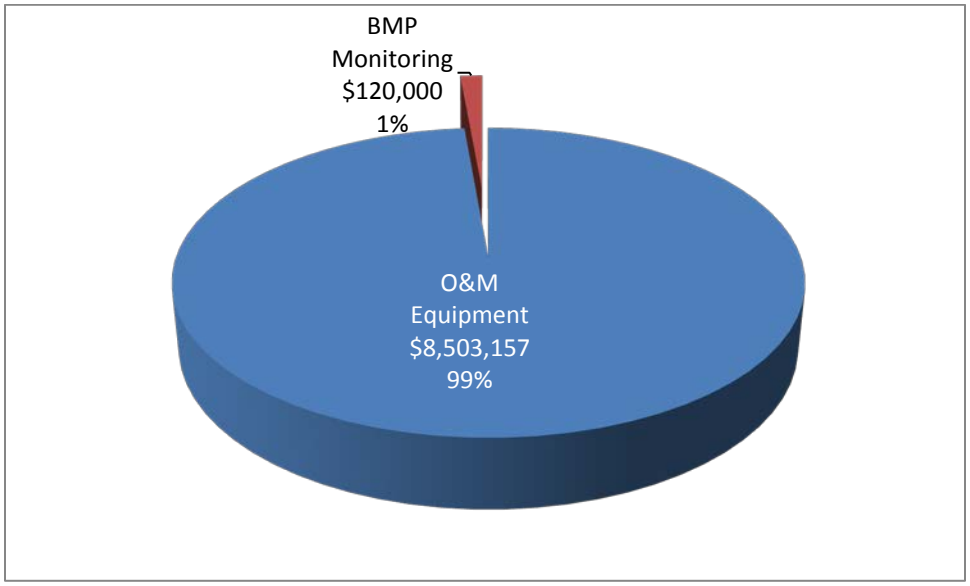


**Figure F-7. The Division's Equipment Asset Replacement Costs**

## F.4 WHAT IS ITS CONDITION?

During the asset inventory process it was realized that the asset attributes in GIS were incomplete. Good quality data attributes were only available for storm drains. For the rest of the hard asset classes, the condition was estimated based on the year of installation. When information regarding the year of installation was missing, the following order of gap closing strategy are used.

- Connecting assets (e.g., pipe and cleanout)
- Nearby assets (street section)
- Neighboring assets (the install year of majority of similar asset types in the hydrologic subarea)

Figure F-8 shows the historical asset installation profile of the Tijuana River Watershed hard assets. It shows the installation trends, which generally coincide with events in history (e.g., economic recessions, heightened government spending, development of communities). The dollar value represented in the figure is expressed in today's (2013) estimated replacement costs. It does not represent the actual capital investment that took place in any given year. The figure illustrates the replacement costs of assets installed per year, represented in 2013 dollars, dating back to the earliest asset installation.

As shown in the figure, the construction of the Division's storm water system was initiated in the early-1950s. There are few high peaks occurring 5 years between 1960 and mid-1980s. After this time, the development has stayed steady exception for the drop of development in mid-1990s.

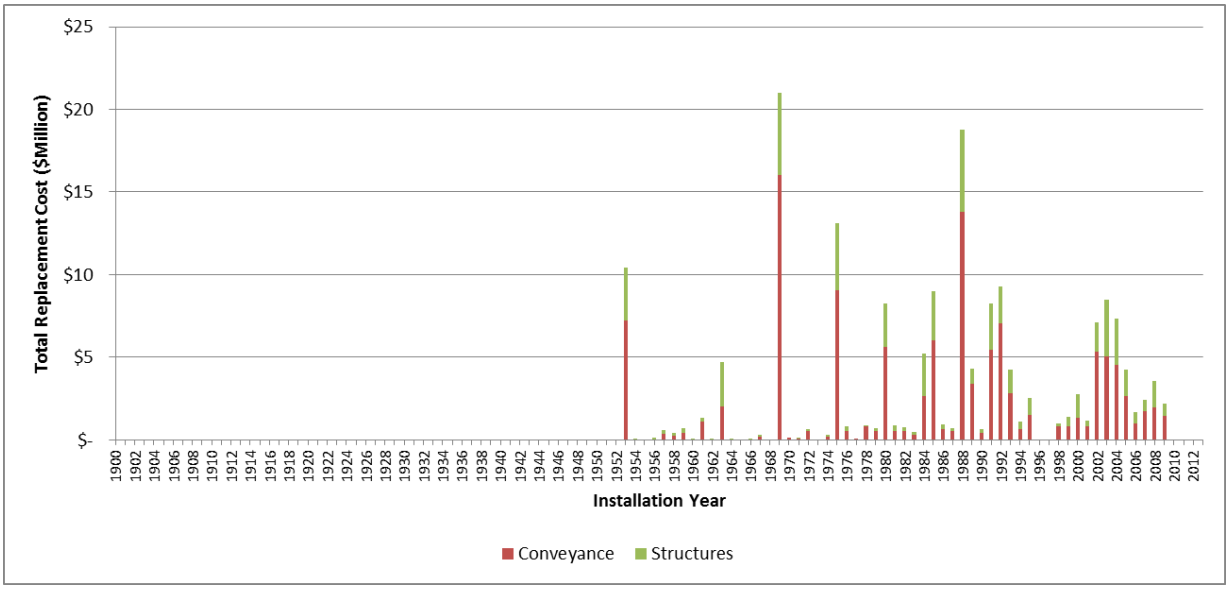


**Figure F-8. Installation Profile - Tijuana River Watershed**

To further understand the current state of the Division's hard assets, condition data was analyzed. The available condition scores were categorized into five categories: excellent, good, fair, poor, and immediate attention. Each category was represented by a numerical value of 1 to 5, respectively. These condition scores equate to the asset's probability of failure. As shown in Figure F-9, among the total of 4,167 assets listed in the Tijuana River asset inventory excluding equipment, about 85 percent are either in excellent or good condition (condition 1 and condition 2) and only 2 percent of the assets are in immediate need of attention.

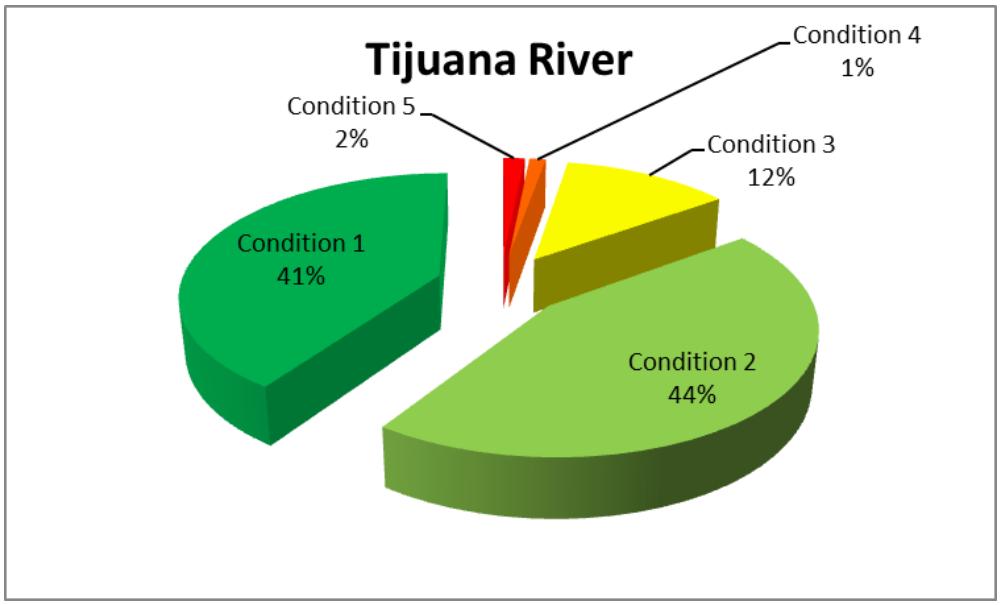


**Figure F-9. Summary of Hard Asset Conditions - Tijuana River Watershed**

As shown in (Figure F-10), both conveyance and structure mostly are in condition 3 or better with only 3 percent of the asset in condition 4 or worse.

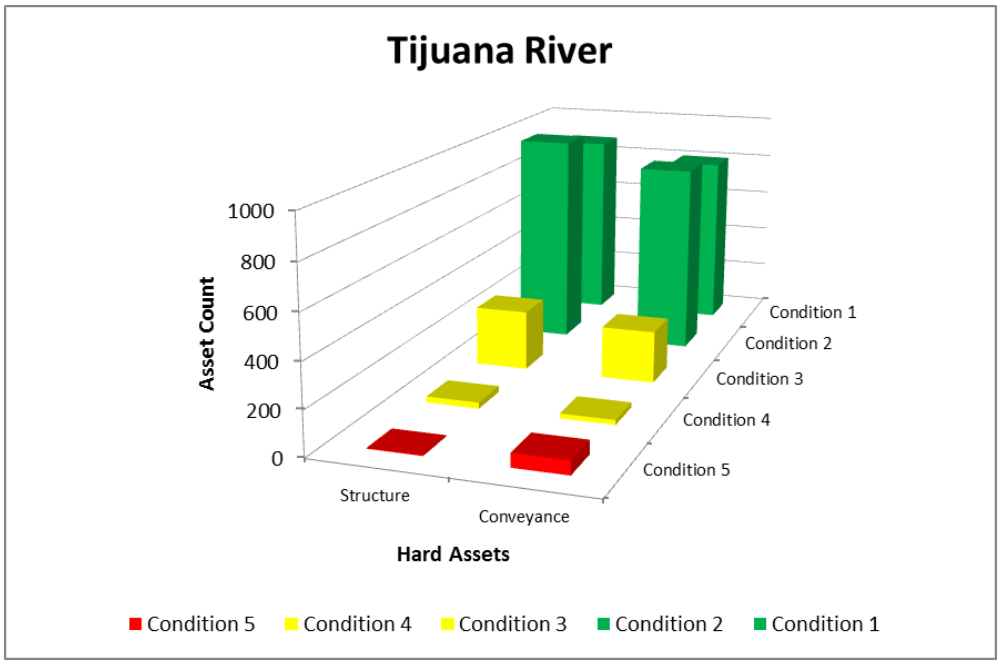


**Figure F-10. Summary of Hard Asset Conditions by Asset Class - Tijuana River Watershed**

Figure F-11 provides a summary of the conveyance system asset conditions for the Tijuana River Watershed. Within the conveyance system, storm drains account for most of the assets that are condition 4 or worse (99 percent). The majority of storm drains that are in need of replacement are metal pipes, which have a relatively short useful life of 35 years.

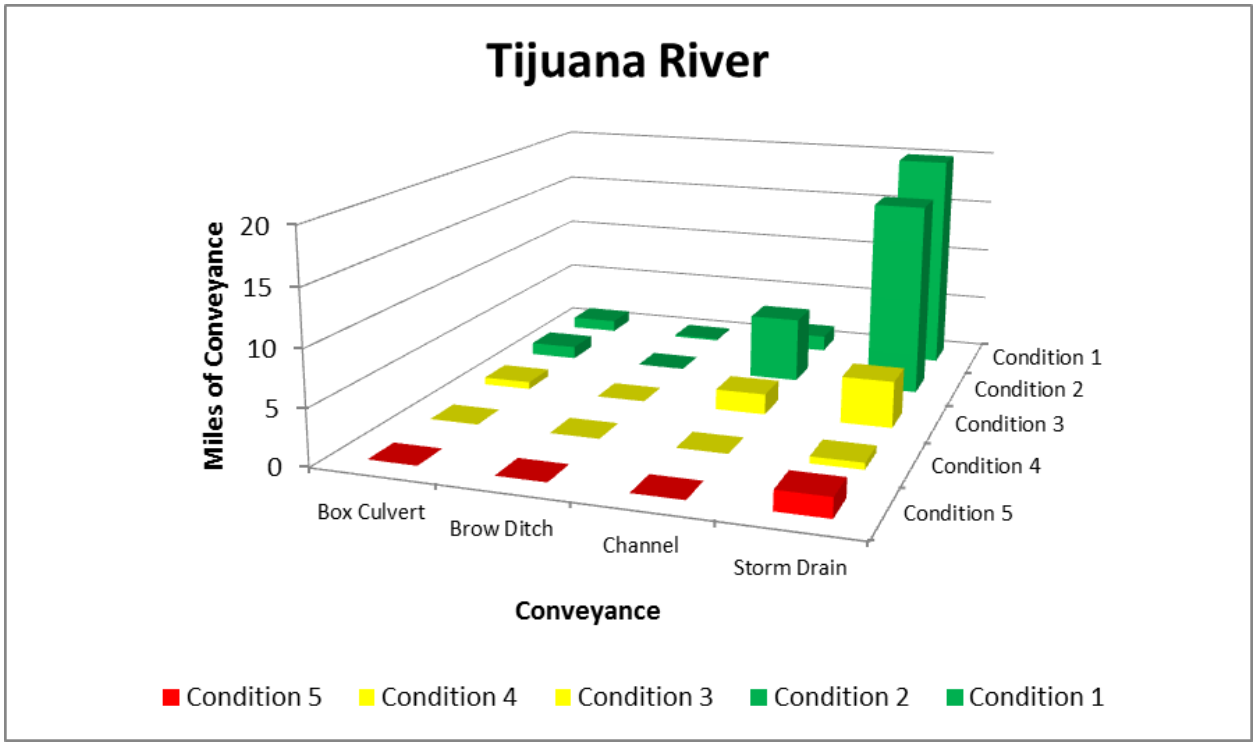


**Figure F-11. Summary of Conveyance System Conditions - Tijuana River Watershed**

Figure F-12 provides a summary of the conditions of the storm water structures for the Tijuana River Watershed. Most of the assets within this group (99 percent) are condition 3 (fair) or better, and less than 1 percent are condition 4 or 5. This condition profile reflects the fact that most of the structures are made of concrete and have a relatively long useful life of 100 years.

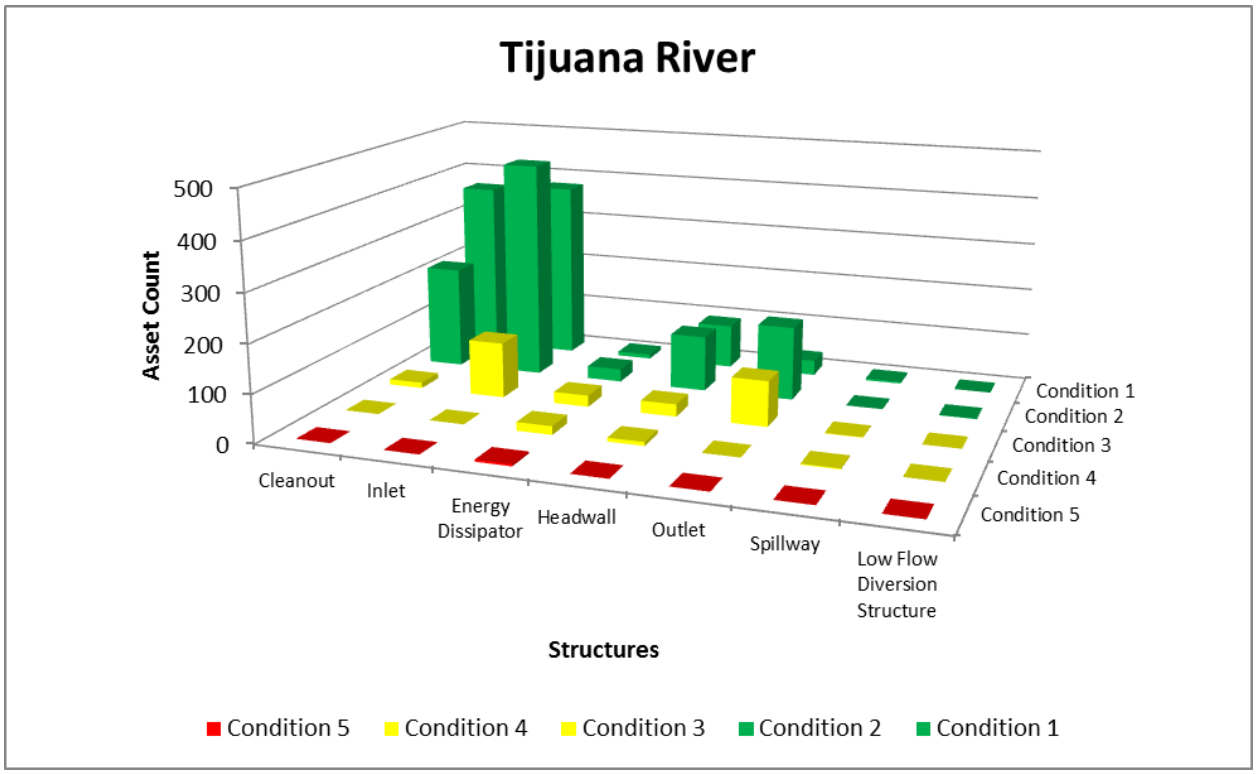


**Figure F-12. Summary of Conditions of Storm Water Structures - Tijuana River Watershed**

Figure F-13 provides a summary of the condition of the Division's equipment, which consists of BMP monitoring equipment and O&M equipment.

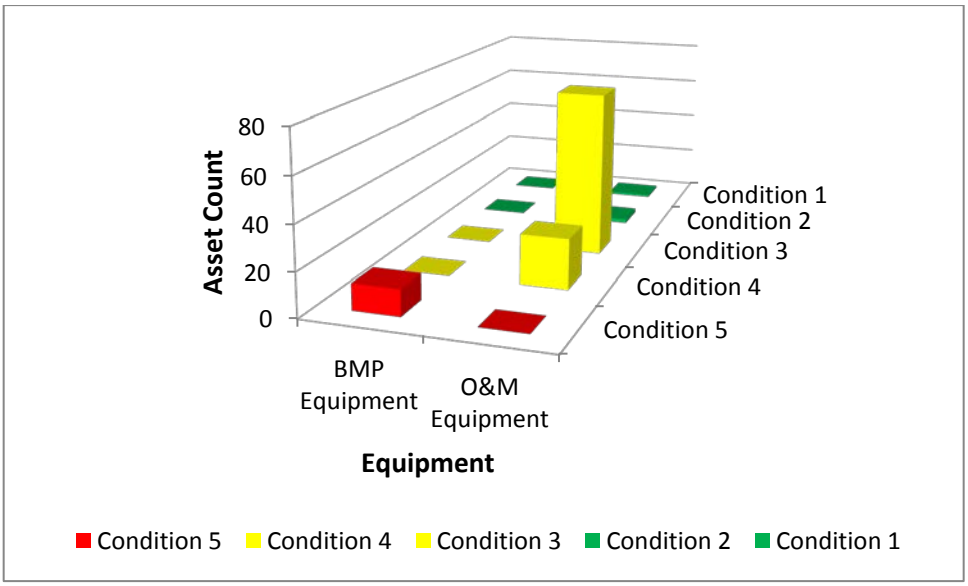


**Figure F-13. Summary of Conditions of Equipment Assets – Tijuana River Watershed**

Unlike the installation profile, the consumption profile provides the Division with the overall knowledge of what portions of the system is nearing the end of its useful life. Consumption profile figures were developed based on each hard asset's age, condition, and expected useful life. For example, a new hard asset will be 0 percent consumed, whereas a hard asset that has reached the end of its useful life will be 100 percent consumed. Similarly, hard assets with short expected useful lives will be consumed more quickly than hard assets with long useful lives.

The Tijuana Watershed's total system consumption profile is presented in Figure F-14. The figure shows that the majority of the Division's hard assets are 25 to 45 percent consumed. Less than 2 percent of the hard assets have reached or exceeded their useful life.

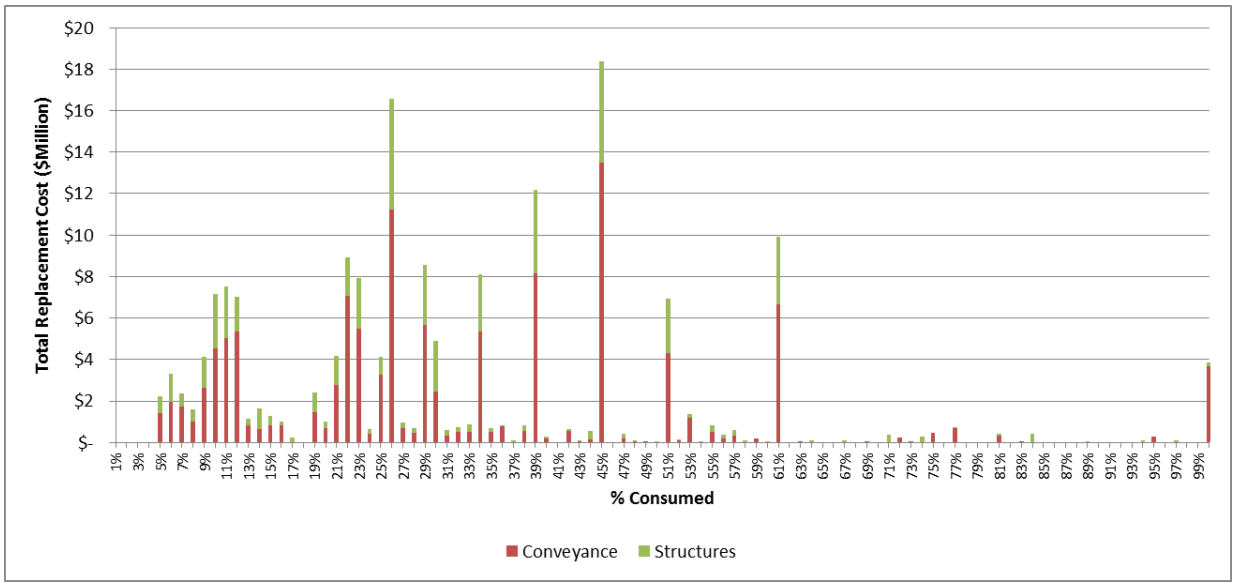


**Figure F-14. Consumption Profile – Tijuana River Watershed**

## F.5 WHAT NEEDS TO BE DONE

The main body of the WAMP describes the LOSs that were developed for each asset class. This appendix presents the assets within the Tijuana River Watershed, whether they are achieving the desired LOSs, and the necessary actions to achieve their LOSs. Table F-10 lists each asset class in the watershed, whether it is achieving its LOS, and the necessary actions to achieve its LOS.

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**Table F-10. Actions needed for Assets to Achieve LOSs**

| Asset Class | Asset Type | LOS | Achieves LOS | Description of LOS Failure | Time to Failure LOS | Actions Needed[2] |
|---|---|---|---|---|---|---|
| Public Structural or LID BMPs | Hard | 01. Public structural BMPs achieve pollutant load reductions that modeling predicts, in conjunction with other BMPs in watershed, will achieve waste load allocations for current and future TMDLs. | Yes | N/A | Per TMDL schedules | Implement CLRP BMPs |
| Public Structural or LID BMPs | Hard | 02. Maintenance activities in conjunction with other BMPs in the watershed achieve pollutant load reductions (or waste load allocations for current and future TMDLs) that modeling predicts. | Yes | N/A | Per TMDL schedules | Implement CLRP BMPs |
| Private Structural or LID BMPs | Hard | 03. Private structural BMPs achieve pollutant load reductions that modeling predicts, in conjunction with other BMPs in watershed, will achieve waste load allocations for current and future TMDLs. | Yes | N/A | Per TMDL schedules | Upgrade new and redevelopment program per actions in LOS 10 and per CLRP recommendations. |
| Runoff / Discharges | Natural | 04. Monitoring activities are able to prioritize pollutant sources and measure effects of BMPs on runoff / discharge water quality. | Yes | N/A | N/A | In partnership with regulatory agencies, assess multiple (air, water, waste) environmental pollutant sources, transport, and their impacts to receiving water quality within 5 years.<br><br>Develop an initial process to identify priority pollutant sources and to understand their fate and transport within the next 3 years, and re-evaluate annually (this objective also applies to Goals A and E). |
| Equipment – (monitoring equipment ≥ $5K) | Hard | 05, 06, 48. Sufficient equipment is available 90% of the time to conduct monitoring activities. | Yes | N/A | End of useful life | Replace equipment on timely manner |
| Equipment – (maintenance equipment ≥ $5K) | Hard | 06, 31, 39, 42. Sufficient equipment is available 90% of the time to conduct maintenance activities. | Yes | N/A | End of useful life | Replace equipment on timely manner |
| Public Non-structural BMPs | Soft | 07. Public non-structural BMPs in conjunction with other BMPs in the watershed achieve pollutant load reductions (or waste load allocations for current and future TMDLs) that modeling predicts. . | Yes | N/A | Per TMDL schedules | Implement CLRP BMPs |
| Private Non-structural BMPs | Soft | 08, 52. Private non-structural BMPs achieve pollutant load reductions that modeling predicts, in conjunction with other BMPs in watershed, will achieve waste load allocations for current and future TMDLs and permit. | No | Data is not being analyzed to determine if this is being achieved. Industrial inspection data is collected, but not analyzed to determine if non-structural BMPs are implemented effectively based on 303(d) listings. Public behavior data is collected and organized per zip code, but is not analyzed to determine if non-structural BMPs are implemented effectively based on 303(d) listings. | 0 years | Implement CLRP BMPs. Adjust data analysis procedures and, where necessary, collect supplemental data to focus on TMDL catchments. |

[2] Referenced Goals and Objectives are from the 2011 Strategic Business Plan.

**Table F-10. Actions needed for Assets to Achieve LOSs**

| Asset Class | Asset Type | LOS | Achieves LOS | Description of LOS Failure | Time to Failure LOS | Actions Needed[2] |
|---|---|---|---|---|---|---|
| Public Behavior | Soft | 09, 51, 56. Survey instruments show that public behavior is measurably reducing pollutant behaviors to make measurable progress toward meeting waste load allocations for current and future TMDLs and the ordinances, standards, and requirements implemented by the City that citizens must follow do not result in reduction in City approval ratings below 66%. | Yes | N/A | TMDL deadlines minus 7 years | Develop watershed specific education materials. Conduct sub-watershed events. Review data on a watershed basis. Do more event surveys. |
| City Department Behavior | Soft | 10. Intra- and inter-departmental coordination and collaboration on water quality and flood risk management activities. Refer to LOSs 1, 2, 7, 29, 30, 32, 33, 34, 35, 36, 37, 38, 40, 41, 43, 45, 50, and 53. | No | DSD not installing BMPs per requirements<br>ECP not installing BMPs per requirements<br>Public Utilities Water discharging water to storm drain without approvals<br>O&M reactionary to issues and not coordinating with others for many jobs<br>Other departments do not want to own O&M of any features that improve water quality, even if integrated into current infrastructure. | 0 years | WAMP<br>Modify new and re-development program to make Storm water division reviewer of water quality plans and have construction inspection role<br>Modify asset ownership for public works water quality features for storm water to have ownership of those assets<br><br>Updating and developing standard plans and specifications<br><br>Updating enforcement of operating departments' behaviors to increase penalties. |
| City Department Behavior | Soft | 11. The policies and procedures that other City departments follow show that their actions are resulting in measureable reductions in pollutant loads that make measurable progress toward meeting waste load allocations for current and future TMDLs. | Yes | N/A | N/A | Per LOS 07. |
| Ordinances, Standards, Requirements | Soft | 12a, 55a. The ordinances, standards, and requirements that the City requires for activities within the City show that they are resulting in measureable reductions in pollutant loads that make measurable progress toward meeting waste load allocations for current and future TMDLs and permit requirements. | No | Specific enough to target 303(d)-listed waters differently. | 0 years | RPer LOS 07. |
| Land Development Regulations | Soft | 12b, 55b. The ordinances, standards, and requirements that the City requires for activities within the City show that they are resulting in measureable reductions in pollutant loads that make measurable progress toward meeting waste load allocations for current and future TMDLs and permit requirements. | No | Not specific enough for 303(d)-listed waters. Not calibrated to TMDL and 303(d) requirements. Not resulting in effective BMPs as written. | 0 years | Per LOS 07. |

**Table F-10. Actions needed for Assets to Achieve LOSs**

| Asset Class | Asset Type | LOS | Achieves LOS | Description of LOS Failure | Time to Failure LOS | Actions Needed[2] |
|---|---|---|---|---|---|---|
| Runoff / Discharges | Natural | 13a. The quality and/or quantity of urban runoff and discharges are measurably reducing pollutant loads to receiving waters and/or reducing pollutant generation within receiving waters (i.e., dry weather runoff discharges). | Yes | If in a watershed with TMDL, then answer is "Failure to capture urban runoff for treatment, storage and/or infiltration." Otherwise, "None" | Per TMDL schedules | Measurably reduce City storm water discharges that impact the chemical, physical, and biological integrity of receiving waters for prior and probable beneficial uses within regulatory time frames (this objective also applies to Goal C and E).<br><br>Measurably reduce storm water pollutant discharges from the storm drain system within regulatory time frames (this objective also applies to Goals A and C).<br><br>Develop plans to meet the objectives of regulatory drivers (TMDLs and ASBS) within regulatory time frames (this objective also applies to Goal A).<br><br>Develop an initial process (coordinated with Objectives A.3, B.7, C.1, D.1- D.5) to establish non-structural BMPs to address priority pollutant sources within the next 3 years, and re-evaluate annually (this objective also applies to Goals A, B, C and D). Implement the BMPs annually.<br><br>Annually, implement (coordinated with Objectives C.3 and D.5) non-structural BMPs, operation and maintenance procedures, and outreach activities that can be deployed to efficiently reduce the discharge of pollutants to the maximum extent practicable (this objective also applies to Goals A, C, and D). |

**Table F-10. Actions needed for Assets to Achieve LOSs**

| Asset Class | Asset Type | LOS | Achieves LOS | Description of LOS Failure | Time to Failure LOS | Actions Needed[2] |
|---|---|---|---|---|---|---|
| Runoff / Discharges | Natural | 13b. The quality and/or quantity of storm water runoff and discharges are measurably reducing pollutant loads to receiving waters and/or reducing pollutant generation within receiving waters (i.e., wet weather runoff discharges). | Yes | If in a watershed with TMDL, then answer is "Failure to capture storm water runoff for treatment, storage and/or infiltration." Otherwise, "None" | Per TMDL schedules | Measurably reduce City storm water discharges that impact the chemical, physical, and biological integrity of receiving waters for prior and probable beneficial uses within regulatory time frames (this objective also applies to Goal C and E).<br><br>Measurably reduce storm water pollutant discharges from the storm drain system within regulatory time frames (this objective also applies to Goals A and C).<br><br>Develop plans to meet the objectives of regulatory drivers (TMDLs and ASBS) within regulatory time frames (this objective also applies to Goal A).<br><br>Develop an initial process (coordinated with Objectives A.3, B.7, C.1, D.1- D.5) to establish non-structural BMPs to address priority pollutant sources within the next 3 years, and re-evaluate annually (this objective also applies to Goals A, B, C and D). Implement the BMPs annually.<br><br>Annually, implement (coordinated with Objectives C.3 and D.5) non-structural BMPs, operation and maintenance procedures, and outreach activities that can be deployed to efficiently reduce the discharge of pollutants to the maximum extent practicable (this objective also applies to Goals A, C, and D). |

**Table F-10. Actions needed for Assets to Achieve LOSs**

| Asset Class | Asset Type | LOS | Achieves LOS | Description of LOS Failure | Time to Failure LOS | Actions Needed[2] |
|---|---|---|---|---|---|---|
| Receiving Water | Natural | 14. Monitoring and scientific studies are conducted to provide sufficient scientific bases for appropriate modifications to beneficial uses and water quality objectives. | Yes | N/A | N/A | In partnership with regulatory agencies, assess multiple (air, water, waste) environmental pollutant sources, transport, and their impacts to receiving water quality within 5 years.<br><br>Proactively coordinate with regulatory agencies to properly regulate non-storm water pollutant sources in the appropriate regulatory arena within 5 years.<br><br>Influence the development of legislation, regulations, and policies based on best available science that are also enforceable and attainable.<br><br>Develop an initial process to identify priority pollutant sources and to understand their fate and transport within the next 3 years, and re-evaluate annually (this objective also applies to Goals A and E).<br><br>Conduct Use Attainability Analyses/Site Specific Objectives to refine designated beneficial uses that do not exist and are not feasible to attain prior to the adoption of TMDLs. |
| Equipment – (monitoring equipment ≥ $5K) | Hard | 15. Sufficient equipment is available 90% of the time to conduct monitoring activities. | Yes | N/A | End of useful life | Replace equipment on timely manner |
| Policies and Procedures for other City Departments | Soft | 17. Respond to all reports of illicit discharges and 90% of reports of flooding causing damage or unsafe conditions (including those identified by City staff) within 2 business days. Close reports of illicit discharges by correcting or determining the discharge is not occurring within 30 calendar days or document rationale for why report could not be closed. | No | No excess capacity when staffs re out. Admin do not get the complaints through to staff in a timely manner. | 0 years | City-wide add 1 Code compliance supervisor, 4 code compliance officers, 1 /2 program manager, 1 vehicle, 3 utility workers; 1 equipment operator; and an IT upgrade for better data flows.. |

**Table F-10. Actions needed for Assets to Achieve LOSs**

| Asset Class | Asset Type | LOS | Achieves LOS | Description of LOS Failure | Time to Failure LOS | Actions Needed[2] |
|---|---|---|---|---|---|---|
| MHPAs | Natural | 18. Where costs meet the formula, water is diverted from MHPAs into water storage systems for beneficial use within time frames identified in each Watershed Asset Management Plan. | Yes | If in a watershed with TMDL, then answer is "Failure to capture storm water runoff for treatment, storage and/or infiltration." Otherwise, "None" | Per TMDL schedules | Note: Costs to plan, design, and construct infrastructure to treat, store, and infiltrate storm water runoff are captured under LOSs 13a and 13b. As infrastructure is built, those assets will be transferred to the Hard Asset type.<br><br>Develop recommendations (coordinated with Objectives C.1) for utilizing natural portions of the storm drain system and other areas of opportunity to protect and improve water quality and reduce flooding potential within 3 years and update annually (this objective also applies to Goals D and E).<br><br>Assess existing infrastructure improvements in priority areas within 3 years and update annually (coordinated with Objectives A.3 and C.1).<br><br>Plan integrated projects that alleviate flood risk, considers hydromodification impacts, and protect water quality in priority areas within 2 years following assessment (D.3) and update annually (this objective also applies to Goals A, C and E). |

**Table F-10. Actions needed for Assets to Achieve LOSs**

| Asset Class | Asset Type | LOS | Achieves LOS | Description of LOS Failure | Time to Failure LOS | Actions Needed[2] |
|---|---|---|---|---|---|---|
| City Property | Natural | 19. Where costs meet the formula, City parcels are used to capture and store storm water for beneficial use within time frames identified in each Watershed Asset Management Plan. | Yes | If in a watershed with TMDL, then answer is "Failure to capture storm water runoff for treatment, storage and/or infiltration." Otherwise, "None" | Per TMDL schedules | Note: Costs to plan, design, and construct infrastructure to treat, store, and infiltrate storm water runoff are captured under LOSs 13a and 13b. As infrastructure is built, those assets will be transferred to the Hard Asset type.<br><br>Develop recommendations (coordinated with Objectives C.1) for utilizing natural portions of the storm drain system and other areas of opportunity to protect and improve water quality and reduce flooding potential within 3 years and update annually (this objective also applies to Goals D and E).<br><br>Assess existing infrastructure improvements in priority areas within 3 years and update annually (coordinated with Objectives A.3 and C.1).<br><br>Plan integrated projects that alleviate flood risk, considers hydromodification impacts, and protect water quality in priority areas within 2 years following assessment (D.3) and update annually (this objective also applies to Goals A, C and E). |
| Channels | Hard | 20. Where costs meet the formula, water is diverted from channels into water storage systems for beneficial use within time frames identified in each Watershed Asset Management Plan | No | The program has not been initiated. | Per TMDL schedules | Conduct an assessment to identify opportunities to capture local runoff to augment water supply.<br>Plan and design feasible projects that can capture local runoff to augment water supply.<br>Implement projects that capture local runoff to augment water supply (amount to be determined by an assessment).<br>Establish development policies and standards that treat storm water as a resource and embrace/encourage/require storm water capture to reduce runoff.<br>Coordinate and align the Storm Water Division's education and outreach programs with other City Division's water resource programs to gain public support to reduce impacts from storm water discharges and to conserve water. |
| Pipes | Hard | 21. Where costs meet the formula, water is diverted from storm drain pipes into water storage systems for beneficial use within time frames identified in each Watershed Asset Management Plan | No | | | |
| Dams / Hydraulic Structures | Hard | 22. Dams and hydraulic structures are installed or upgraded where costs meet the formula, to capture, divert, and/or store storm water for beneficial use within time frames identified in each Watershed Asset Management Plan. | No | | | |
| Detention / Retention Basins | Hard | 23. Detention and/or retention basins are installed or upgraded where costs meet the formula, to capture, divert, and/or store storm water for beneficial use within time frames identified in each Watershed Asset Management Plan. | No | | | |
| Equipment – (monitoring equipment ≥ $5K) | Hard | 48. Sufficient equipment is available 90% of the time to conduct monitoring activities. | Yes | N/A | End of useful life | Replace equipment on timely manner |

**Table F-10. Actions needed for Assets to Achieve LOSs**

| Asset Class | Asset Type | LOS | Achieves LOS | Description of LOS Failure | Time to Failure LOS | Actions Needed[2] |
|---|---|---|---|---|---|---|
| City Department Behavior | Soft | 24. The Water Branch takes the lead and sponsors storm water harvesting projects with costs shared based on benefits shared between water supply and NPDES compliance. The Storm Water Division is responsible for infrastructure associated with NPDES compliance (i.e., storm water capture, containment or infiltration). | No | PUD Water has publicly proclaimed that storm water harvesting is more costly than other water supplies PUD Water has told Storm water that they will not do initial planning, but will take projects Storm water identifies if feasible. | 0 years | Complete a planning level study in all watersheds with 15% design concepts and costs. Include regulatory changes needed for projects to be feasible and/or cost effective. Develop the cost sharing model to fund water quality and water supply benefits from appropriate agencies. |
| City Department Behavior | Soft | 25. Other City departments cooperate by allowing the use of their parcels to capture, infiltrate, and / or store storm water for beneficial use. | Yes | N/A | Failure is likely to occur per TMDL schedules. Best opportunities for storm water capture with public projects are on City parcels due to there being no need for land or easement acquisition. Other departments are resistant to use of their parcels for water capture. There have been a few pilot tests on City parcels, but nothing of a significant scale. | Develop programmatic policies and procedures with other departments for how other City parcels can be made use of for water capture, storage, infiltration, and/or treatment - what requirements need to be met by the project for allowing other uses of the properties, etc. |
| Good Will, Relationships, Credibility | Soft | 26. Survey instruments show 66% or greater public acceptance of storm water harvesting for non-potable use. | No | Not doing anything regarding this issue yet. | 0 years | Conduct research. Conduct outreach. Resurvey |
| Good Will, Relationships, Credibility | Soft | 27, 32, 33, 34, 35. Projects are not stopped by stakeholders or regulators through effective coordination and communication. | No | Clear example is the maintenance program PEIR, which was litigated, and for which appeals are made to permitting agencies by stakeholders that can hold up permitting. | 0 years | Under way: Develop project checklist with standard operating procedures (SOPs) to pull in right staff early in project, determine key public and stakeholder issues with potential project, develop project features that mitigate those issues, include stakeholders where necessary in planning. Enforce the SOPs. |

**Table F-10. Actions needed for Assets to Achieve LOSs**

| Asset Class | Asset Type | LOS | Achieves LOS | Description of LOS Failure | Time to Failure LOS | Actions Needed[2] |
|---|---|---|---|---|---|---|
| Regulatory Policy | Soft | 28. State and local health and other agencies allow the use of harvested storm water for use without extraordinary treatment or plumbing requirements that make the project more costly than other forms of water quality management. | No | California currently has no formal policy or legislation with respect to the harvesting of local storm water. As such, the Department of Public Health and local County Health Agencies have been reluctant to permit storm water harvesting. County health agencies have generally adopted a required release rule of 72 hours for rain barrels to prevent mosquito breeding. Unfortunately, this limits the beneficial use of the harvested water dramatically. Stakeholders have been referring to harvested storm water as "reused" or "grey" water, which suggests that it may be regulated as a wastewater, which will also limits is beneficial use. Some formal definition of locally harvested storm water is needed in order to establish regulatory requirements that fit its actual condition and the uses to which it can be put. | 0 years | Research the issues and how this has been handled elsewhere.<br>Develop a position paper based on best available science for how harvested storm water should be regulated to ensure safety while allowing broad uses.<br>Develop state-wide support for the position - update the position as necessary.<br>Draft legislation.<br>Use lobbyists effectively to promote the legislation, and move it through the legislature.<br>Work with state agencies on promulgation of regulation associated with the new legislation.<br>Work with city and County council to adopt local ordinances that allow use of harvested storm water in accordance with the new legislation. |
| Channels | Hard | 29. Where under capacity, channels are improved within time frames identified in the Watershed Asset Management Plans. | No | Currently there is no program implemented to address under capacity channel. | 0 year | Providing adequate maintenance to optimize flow.<br><br>Initiate capacity analysis study to identify the under capacity channel.<br><br>Initiate planning and design to improve under capacity channel. |
| Channels | Hard | 30. Channels are inspected annually. Channels that have less than 80% - 90% of their design capacity are maintained to maximize conveyance capacity and reduce flood risks. | No | A channel inspection program has been established. Some cleaning activities are conducted as needed. | 0 year | Increase O&M budget to cover monitoring and maintenance activity for high risk channel. |
| Equipment – (maintenance equipment ≥ $5K) | Hard | 31. Sufficient equipment is available 90% of the time to conduct maintenance activities. | Yes | N/A | End of useful life | Replace equipment on timely manner |
| City Department Behavior | Soft | 36. When storm water conveyance systems are managed by other City departments or property owners, these departments will conduct the maintenance needed to meet flood risk management requirements. | No | No inspections, maintenance, or repair of subsurface features occur. Failure have not occurred as of yet, but can occur without warning. | 0 year | Define the criticality of all the drainage systems on City parcels to determine which ones need an inspection program. Develop inspection requirements for asset owners based on their criticality. Enforce inspection requirements. |
| Pipes and Structures | Hard | 37. Where under capacity, pipes/structures are improved within time frames identified in each Watershed Asset Management Plan | No | Under capacity pipes/structures are not yet identified to the asset level. Even when capacity failure happened, there is no clear conclusion of the exact problem (in some cases failure was triggered by problem upstream) | 0 year | Allocate budget to identify under capacity pipes/structures. |
| Pipes and Structures | Hard | 38. Pipes/structures are maintained annually or according to schedules in the Watershed Asset Management Plans to maximize design capacity and reduce flood risks | No | Currently there are no routine pipe/structures monitoring or maintenance program. Some cleaning activities are conducted as needed (reactive approach). | 0 years | Allocate budget for routine maintenance for high risk assets |

**Table F-10. Actions needed for Assets to Achieve LOSs**

| Asset Class | Asset Type | LOS | Achieves LOS | Description of LOS Failure | Time to Failure LOS | Actions Needed[2] |
|---|---|---|---|---|---|---|
| Equipment – (maintenance equipment ≥ $5K) | Hard | 39. Sufficient equipment is available 90% of the time to conduct maintenance activities. | Yes | N/A | End of useful life | Replace equipment on timely manner |
| Pump Stations | Hard | 40. Where under capacity, pump stations are improved within time frames identified in each Watershed Asset Management Plan. | No | Some pump stations are currently under capacity | 0 years | Upgrade pump stations to meet capacity requirement |
| Pump Stations | Hard | 41. Pump stations are maintained annually or according to schedules identified in the Watershed Asset Management Plans to function as designed. | No | Currently there are no routine pump stations monitoring or maintenance program. Some maintenance activities are conducted as needed (reactive approach). | 0 years | Allocate budget for routine monitoring/maintenance for high risk assets |
| Equipment – (maintenance equipment ≥ $5K) | Hard | 42. Sufficient equipment is available 90% of the time to conduct maintenance activities. | Yes | N/A | End of useful life | Replace equipment on timely manner |
| Storm Drain System | Hard | 43. The storm drain system is mapped and updated per permit requirements | Yes | The storm drains system has been mapped but continuous update is required to maintain the accuracy of the information. | N/A | Continue to maintain and improve data quality in the asset inventory |
| Storm Drain System | Hard | 44. Pipes/structures are maintained annually to meet flood risk management and water quality requirements | No | Currently there are no routine pipe/structures monitoring or maintenance program. Some cleaning activity is conducted as needed (reactive approach). | Per TMDL schedule | Allocate budget for routine monitoring/maintenance for high risk assets |
| Public Structural or LID BMPs | Hard | 45. Public structural and LID BMPs for CIP projects are installed per permit requirements. | No | Structural BMPs have not consistently installed in new development projects. | Vary depending on the completion date of the development | Identify structural BMP not meeting permit requirements and initiate actions to meet the requirements.<br><br>Ensure post development structural BMPs are installed accordingly for next development projects. |
| Private Structural or LID BMPs | Hard | 46. Private structural and LID BMPs are installed and maintained per permit requirements. | Yes | The Division have routine inspection and monitoring program on private structural BMPs. | N/A | Continue to maintain the inspection and monitoring program. |
| Runoff / Discharges | Natural | 47. Monitoring is completed per permit requirements. | Yes | N/A | N/A | In partnership with regulatory agencies, assess multiple (air, water, waste) environmental pollutant sources, transport, and their impacts to receiving water quality within 5 years.<br><br>Develop an initial process to identify priority pollutant sources and to understand their fate and transport within the next 3 years, and re-evaluate annually (this objective also applies to Goals A and E). |
| City Department Behavior | Soft | 49, 54. Other City departments comply with their responsibilities per permit requirements congruent with policies and procedures. | No | DSD not installing BMPs per requirements<br>ECP not installing BMPs per requirements<br>Public Utilities Water discharging water to storm drain without approvals<br>Other departments do not want to own O&M of any features that improve water quality, even if integrated into current infrastructure. | 0 years | Conduct audits/walkthroughs<br>Follow up with training<br>Fines and enforcement for noncompliant |

**Table F-10. Actions needed for Assets to Achieve LOSs**

| Asset Class | Asset Type | LOS | Achieves LOS | Description of LOS Failure | Time to Failure LOS | Actions Needed[2] |
|---|---|---|---|---|---|---|
| Non-Storm water Division City Property Drainage Systems | Hard | 50. Public non-structural BMPs are implemented per permit requirements. | Yes | N/A | Per TMDL schedules | |
| Policies and Procedures for other City Departments | Soft | 53. Storm drain systems on City property are maintained per permit requirements. | No | There are a small percent of missed inspections each year. The permit does not allow any missed inspections. | 0 years | Increase number of engagements. Offer services of inspection contractor. |

**Acronyms:**

CIP – capital improvement program
Division – City of San Diego Storm Water Division
ECP – City of San Diego Engineering and Capital Projects Department
LID – low impact development
N/A – not applicable
O&M – operations and maintenance
PUD – City of San Diego Public Utilities Department
TMDL – total maximum daily load
CLRP - Comprehensive Load Reduction Plan
DSD – City of San Diego Development Services Department
FTE - full-time equivalent
LOS – level of service
NPDES – National Pollution Discharge Elimination System
PEIR – Preliminary Environmental Impact Report
SOP – standard operating procedure

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## F.6 WHEN DO WE NEED IT?

The following paragraphs describe how the determination was made regarding when assets should be replaced.

### F.6.1 Soft and Natural BRE

The main body of the report describes the meaning of BRE. The BRE was assessed to determine the ability of each asset to achieve its LOS and its potential mortality. Table F-11 lists the BRE scores for the Tijuana River Watershed soft and natural assets. The definitions of acronyms are listed below the table.

Based on the timing of failure estimate, a schedule of actions was developed. This schedule of actions is reflected in the cash flow projections, which are presented in Section F.7. The specific actions and projects slated for Fiscal Year 2015 are presented in Section F.10. The BRE scores are used to identify actions and projects to undertake when insufficient funds are available to complete all of the scheduled actions. The assets/LOSs with higher BRE scores should be funded before assets/LOSs with lower BRE scores. For assets with similar BRE scores, funding of those with higher probabilities of failure may provide more cost-effective risk reduction because probability of failure is more controllable than consequence of failure.

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**Table F-11. Soft and Natural Asset BRE Scores - Tijuana River Watershed**

| Asset Class | LOS | Achieves LOS | Time to Failure LOS | Social | | Environmental | | Economic | | Weighted Average CoF | PoF | BRE | BRE Category |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Public Perception CoF | Health & Safety CoF | Regulatory CoF | Environmental Quality CoF | Short-term Financial CoF | Long-term Financial CoF | | | | |
| Public Structural or LID BMPs | 01. Public structural BMPs achieve pollutant load reductions that modeling predicts, and, in conjunction with other BMPs in the watershed, will achieve waste load allocations for current and future TMDLs. | Hard assets CoF is calculated differently. Please refer to Section 6 for detail methodology and Appendix A.6.1 for results. | | | | | | | | | | | |
| Public Structural or LID BMPs | 02. Maintenance activities in conjunction with other BMPs in the watershed achieve pollutant load reductions (or waste load allocations for current and future TMDLs) that modeling predicts. | Hard assets CoF is calculated differently. Please refer to Section 6 for detail methodology and Appendix A.6.1 for results. | | | | | | | | | | | |
| Private Structural or LID BMPs | 03. Private structural BMPs achieve pollutant load reductions that modeling predicts, and, in conjunction with other BMPs in watershed, will achieve waste load allocations for current and future TMDLs. | Hard assets CoF is calculated differently. Please refer to Section 6 for detail methodology and Appendix A.6.1 for results. | | | | | | | | | | | |
| Runoff / Discharges | 04. Monitoring activities allow pollutant sources to be prioritized and effects of BMPs to be measured regarding runoff / discharge water quality. | Yes | N/A | 1 for all subwatersheds | 1 for all subwatersheds | 4 for all subwatersheds | Area-weighted CPI Dr/Wet composite score from Penasquitos Watershed for all subwatersheds (3.14) | 2 for all subwatersheds | 4 all subwatersheds | 7.542 for all subwatersheds | Area-weighted CPI Dr/Wet composite score from Penasquitos Watershed for all subwatersheds (3.14) | 23.7 for the all subwatersheds | Low |
| Equipment – (Monitoring Equipment ≥ $5K) | 05, 06, 48. Sufficient equipment is available 90% of the time to conduct monitoring activities. | Hard assets CoF is calculated differently. Please refer to Section 6 for detail methodology and Appendix A.6.1 for results. | | | | | | | | | | | |
| Equipment – (Maintenance Equipment ≥ $5K) | 06, 31, 39, 42. Sufficient equipment is available 90% of the time to conduct maintenance activities. | Hard assets CoF is calculated differently. Please refer to Section 6 for detail methodology and Appendix A.6.1 for results. | | | | | | | | | | | |

**Table F-11. Soft and Natural Asset BRE Scores - Tijuana River Watershed**

| Asset Class | LOS | Achieves LOS | Time to Failure LOS | Social | | Environmental | | Economic | | Weighted Average CoF | PoF | BRE | BRE Category |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Public Perception CoF | Health & Safety CoF | Regulatory CoF | Environmental Quality CoF | Short-term Financial CoF | Long-term Financial CoF | | | | |
| Public Non-structural BMPs | 07. Public non-structural BMPs in conjunction with other BMPs in the watershed achieve pollutant load reductions (or waste load allocations for current and future TMDLs) that modeling predicts. | No | Per TMDL schedules | 3 | 1 | 3 | 3 | 2 | 3 | 6.8 | 5 | 34 | Medium |
| Private Non-structural BMPs | 08, 52. Private non-structural BMPs achieve pollutant load reductions that modeling predicts, and, in conjunction with other BMPs in the watershed, will achieve waste load allocations for current and future TMDLs and permits. | No | Per TMDL schedules | 2 | 1 | 1 | 1 | 1 | 1 | 3.2 | 5 | 16 | Low |
| Public Behavior | 09, 51, 56. Survey instruments show that public behavior is measurably reducing pollutant behaviors to make measurable progress toward meeting waste load allocations for current and future TMDLs, and the ordinances, standards, and requirements implemented by the City that citizens must follow do not result in reduction in City approval ratings below 66%. | Yes | TMDL deadlines minus 7 years | 1.5 | 1 | 3 | 3 | 4 | 5 | 8.5 | 5 | 42.5 | Medium |
| City Department Behavior | 10. Intra- and inter-departmental coordination and collaboration on water quality and flood risk management activities. Refer to LOSs 1, 2, 7, 29, 30, 32, 33, 34, 35, 36, 37, 38, 40, 41, 43, 45, 50, and 53. | No | Failed | 1 | 1 | 2 | 2 | 4 | 4 | 7 | 5 | 35 | Medium |

**Table F-11. Soft and Natural Asset BRE Scores - Tijuana River Watershed**

| Asset Class | LOS | Achieves LOS | Time to Failure LOS | Social | | Environmental | | Economic | | Weighted Average CoF | PoF | BRE | BRE Category |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Public Perception CoF | Health & Safety CoF | Regulatory CoF | Environmental Quality CoF | Short-term Financial CoF | Long-term Financial CoF | | | | |
| City Department Behavior | 11. The policies and procedures that other City departments follow show that their actions are resulting in measureable reductions in pollutant loads that make measurable progress toward meeting waste load allocations for current and future TMDLs. | Yes | Never | 1 | 1 | 4 | 2 | 2.5 | 3 | 7.1 | 5 | 35.5 | Medium |
| Ordinances, Standards, Requirements | 12a, 55a. The ordinances, standards, and requirements that the City requires for activities within the City show that they are resulting in measureable reductions in pollutant loads that make measurable progress toward meeting waste load allocations for current and future TMDLs and permit requirements. | No | Failed | 1 | 1 | 2 | 1.2 | 2 | 4 | 5.56 | 5 | 27.8 | Medium |
| Land Development Regulations | 12b, 55b. The ordinances, standards, and requirements that the City requires for activities within the City show that they are resulting in measureable reductions in pollutant loads that make measurable progress toward meeting waste load allocations for current and future TMDLs and permit requirements. | No | Failed | 1 | 1 | 3 | 2 | 2 | 3 | 6.1 | 5 | 30.5 | Medium |
| Runoff / Discharges | 13a. The quality and/or quantity of urban runoff and discharges are measurably reducing pollutant loads to receiving waters and/or reducing pollutant generation within receiving waters (i.e., dry weather runoff discharges). | Yes | N/A | 1 | 1 | 3 | 1 | 2 | 4 | 6.2 | 1 | 6.2 | Low |

**Table F-11. Soft and Natural Asset BRE Scores - Tijuana River Watershed**

| Asset Class | LOS | Achieves LOS | Time to Failure LOS | Social | | Environmental | | Economic | | Weighted Average CoF | PoF | BRE | BRE Category |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Public Perception CoF | Health & Safety CoF | Regulatory CoF | Environmental Quality CoF | Short-term Financial CoF | Long-term Financial CoF | | | | |
| Runoff / Discharges | 13b. The quality and/or quantity of storm water runoff and discharges are measurably reducing pollutant loads to receiving waters and/or reducing pollutant generation within receiving waters (i.e., wet weather runoff discharges). | Yes | N/A | 1 | 1 | 3 | 1 | 2 | 4 | 6.2 | 1 | 6.2 | Low |
| Receiving Water | 14. Monitoring and scientific studies are conducted to provide sufficient scientific bases for appropriate modifications to beneficial uses and water quality objectives. | Yes | N/A | 1 for all subwatersheds | 1 for all subwatersheds | 4 for all subwatersheds | Area-weighted CPI Dr/Wet composite score from Penasquitos Watershed for all subwatersheds (3.14) | 2 for all subwatersheds | 4 all subwatersheds | 7.542 for all subwatersheds | Area-weighted CPI Dr/Wet composite score from Penasquitos Watershed for all subwatersheds (3.14) | 23.7 for the all subwatersheds | Low |
| Equipment – (Monitoring Equipment ≥ $5K) | 15. Sufficient equipment is available 90% of the time to conduct monitoring activities. | Hard assets CoF is calculated differently. Please refer to Section 6 for detail methodology and Appendix A.6.1 for results. | | | | | | | | | | | |
| Policies and Procedures for other City Departments | 17. Respond to reports of illicit discharges and flooding (including those identified by City staff) within 24 to 48 hours. | No | Failed | 3.5 | 4 | 3 | 3 | 1 | 2 | 8.3 | 5 | 41.5 | Medium |
| MHPAs | 18. Where costs meet the formula, water is diverted from MHPAs into water storage systems for beneficial use within time frames identified in each WAMP. | Yes | Per TMDL schedules | 1 for all subwatersheds | 1 for all subwatersheds | 4 for all subwatersheds | Area-weighted CPI Dr/Wet composite score from Penasquitos Watershed for all subwatersheds (3.14) | 2 for all subwatersheds | 4 all subwatersheds | 7.542 for all subwatersheds | Area-weighted CPI Dr/Wet composite score from Penasquitos Watershed for all subwatersheds (3.14) | 23.7 for the all subwatersheds | Low |
| City Property | 19. Where costs meet the formula, City parcels are used to capture and store storm water for beneficial use within time frames identified in each WAMP. | Yes | Per TMDL schedules | 1 for all subwatersheds | 1 for all subwatersheds | 4 for all subwatersheds | Area-weighted CPI Dr/Wet composite score from Penasquitos Watershed for all subwatersheds (3.14) | 2 for all subwatersheds | 4 all subwatersheds | 7.542 for all subwatersheds | Area-weighted CPI Dr/Wet composite score from Penasquitos Watershed for all subwatersheds (3.14) | 23.7 for the all subwatersheds | Low |

**Table F-11. Soft and Natural Asset BRE Scores - Tijuana River Watershed**

| Asset Class | LOS | Achieves LOS | Time to Failure LOS | Social | | Environmental | | Economic | | Weighted Average CoF | PoF | BRE | BRE Category |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Public Perception CoF | Health & Safety CoF | Regulatory CoF | Environmental Quality CoF | Short-term Financial CoF | Long-term Financial CoF | | | | |
| Channels | 20. Where costs meet the formula, water is diverted from channels into water storage systems for beneficial use within time frames identified in each WAMP. | Hard assets CoF is calculated differently. Please refer to Section 6 for detail methodology and Appendix A.6.1 for results. | | | | | | | | | | | |
| Pipes | 21. Where costs meet the formula, water is diverted from storm drain pipes into water storage systems for beneficial use within time frames identified in each WAMP. | Hard assets CoF is calculated differently. Please refer to Section 6 for detail methodology and Appendix A.6.1 for results. | | | | | | | | | | | |
| Dams / Hydraulic Structures | 22. Dams and hydraulic structures are installed or upgraded where costs meet the formula, to capture, divert, and/or store storm water for beneficial use within time frames identified in each WAMP. | Hard assets CoF is calculated differently. Please refer to Section 6 for detail methodology and Appendix A.6.1 for results. | | | | | | | | | | | |
| Detention/Retention Basins | 23. Detention and/or retention basins are installed or upgraded where costs meet the formula, to capture, divert, and/or store storm water for beneficial use within time frames identified in each WAMP. | Hard assets CoF is calculated differently. Please refer to Section 6 for detail methodology and Appendix A.6.1 for results. | | | | | | | | | | | |
| City Department Behavior | 24. The Water Branch takes the lead and sponsors storm water harvesting projects with costs shared based on benefits shared between water supply and NPDES compliance. The Division is responsible for infrastructure associated with NPDES compliance (i.e., storm water capture, containment or infiltration). | No | Failed | 1 | 1 | 1 | 3 | 2 | 3 | 5 | 5 | 25 | Low |

**Table F-11. Soft and Natural Asset BRE Scores - Tijuana River Watershed**

| Asset Class | LOS | Achieves LOS | Time to Failure LOS | Social | | Environmental | | Economic | | Weighted Average CoF | PoF | BRE | BRE Category |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Public Perception CoF | Health & Safety CoF | Regulatory CoF | Environmental Quality CoF | Short-term Financial CoF | Long-term Financial CoF | | | | |
| City Department Behavior | 25. Other City departments cooperate by allowing the use of their parcels to capture, infiltrate, and / or store storm water for beneficial use. | Yes | Per TMDL schedules | 1 | 1 | 4 | 3 | 3 | 4 | 8.1 | 4 | 32.4 | Medium |
| Good Will, Relationships, Credibility | 26. Survey instruments show 66% or greater public acceptance of storm water harvesting for non-potable use. | No | Failed | 1 | 1 | 1 | 3 | 1 | 4.5 | 5 | 5 | 25 | Low |
| Good Will, Relationships, Credibility | 27, 32, 33, 34, 35. Projects are not blocked by stakeholders or regulators through effective coordination and communication. | No | Failed | 5 | 5 | 5 | 5 | 5 | 5 | 15 | 4 | 60 | High |
| Regulatory Policy | 28. State and local health departments and other agencies allow the use of harvested storm water for use without extraordinary treatment or plumbing requirements that make the project more costly than other forms of water quality management. | No | Failed | 1.5 | 1 | 1 | 2.5 | 3 | 5 | 6.35 | 5 | 31.75 | Medium |
| Channels | 29. Where under capacity, channels are improved within timeframes identified in the WAMP. | Hard assets CoF is calculated differently. Please refer to Section 6 for detail methodology and Appendix A.6.1 for results. | | | | | | | | | | | |
| Channels | 30. Channels are inspected annually. Channels using less than 80% - 90% of their design capacity are maintained to maximize conveyance capacity and reduce flood risks. | Hard assets CoF is calculated differently. Please refer to Section 6 for detail methodology and Appendix A.6.1 for results. | | | | | | | | | | | |
| Equipment – (Maintenance Equipment ≥ $5K) | 31. Sufficient equipment is available 90% of the time to conduct maintenance activities. | Hard assets CoF is calculated differently. Please refer to Section 6 for detail methodology and Appendix A.6.1 for results. | | | | | | | | | | | |

**Table F-11. Soft and Natural Asset BRE Scores - Tijuana River Watershed**

| Asset Class | LOS | Achieves LOS | Time to Failure LOS | Social | | Environmental | | Economic | | Weighted Average CoF | PoF | BRE | BRE Category |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Public Perception CoF | Health & Safety CoF | Regulatory CoF | Environmental Quality CoF | Short-term Financial CoF | Long-term Financial CoF | | | | |
| City Department Behavior | 36. When storm water conveyance systems are managed by other City departments or property owners, these departments will conduct the maintenance needed to meet flood risk management requirements. | No | Failed | 1 | 1.5 | 1 | 1.5 | 1 | 1 | 3.55 | 5 | 17.75 | Low |
| Pipes and Structures | 37. Where under capacity, pipes/structures are improved within time frames identified in each WAMP. | Hard assets CoF is calculated differently. Please refer to Section 6 for detail methodology and Appendix A.6.1 for results. | | | | | | | | | | | |
| Pipes and Structures | 38. Pipes/structures are maintained annually or according to schedules in the WAMPs to maximize design capacity and reduce flood risks. | Hard assets CoF is calculated differently. Please refer to Section 6 for detail methodology and Appendix A.6.1 for results. | | | | | | | | | | | |
| Equipment – (Maintenance Equipment ≥ $5K) | 39. Sufficient equipment is available 90% of the time to conduct maintenance activities. | Hard assets CoF is calculated differently. Please refer to Section 6 for detail methodology and Appendix A.6.1 for results. | | | | | | | | | | | |
| Pump Stations | 40. Where under capacity, pump stations are improved within time frames identified in each WAMP. | Hard assets CoF is calculated differently. Please refer to Section 6 for detail methodology and Appendix A.6.1 for results. | | | | | | | | | | | |
| Pump Stations | 41. Pump stations are maintained annually or according to schedules identified in the WAMPs to function as designed. | Hard assets CoF is calculated differently. Please refer to Section 6 for detail methodology and Appendix A.6.1 for results. | | | | | | | | | | | |
| Equipment – (Maintenance Equipment ≥ $5K) | 42. Sufficient equipment is available 90% of the time to conduct maintenance activities. | Hard assets CoF is calculated differently. Please refer to Section 6 for detail methodology and Appendix A.6.1 for results. | | | | | | | | | | | |
| Storm Drain System | 43. The storm drain system is mapped and updated per permit requirements. | Hard assets CoF is calculated differently. Please refer to Section 6 for detail methodology and Appendix A.6.1 for results. | | | | | | | | | | | |
| Storm Drain System | 44. Pipes/structures are maintained annually to meet flood risk management and water quality requirements | Hard assets CoF is calculated differently. Please refer to Section 6 for detail methodology and Appendix A.6.1 for results. | | | | | | | | | | | |

**Table F-11. Soft and Natural Asset BRE Scores - Tijuana River Watershed**

| Asset Class | LOS | Achieves LOS | Time to Failure LOS | Social | | Environmental | | Economic | | Weighted Average CoF | PoF | BRE | BRE Category |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Public Perception CoF | Health & Safety CoF | Regulatory CoF | Environmental Quality CoF | Short-term Financial CoF | Long-term Financial CoF | | | | |
| Public Structural or LID BMPs | 45. Public structural and LID BMPs for CIP projects are installed per permit requirements. | Hard assets CoF is calculated differently. Please refer to Section 6 for detail methodology and Appendix A.6.1 for results. | | | | | | | | | | | |
| Private Structural or LID BMPs | 46. Private structural and LID BMPs are installed and maintained per permit requirements. | | | | | | | | | 8.85 | | 0 | |
| Runoff / Discharges | 47. Monitoring is completed per permit requirements. | Yes | N/A | 1 for all subwatersheds | 1 for all subwatersheds | 4 for all subwatersheds | Area-weighted CPI Dr/Wet composite score from Penasquitos Watershed for all subwatersheds (3.14) | 2 for all subwatersheds | 4 all subwatersheds | 7.542 for all subwatersheds | Area-weighted CPI Dr/Wet composite score from Penasquitos Watershed for all subwatersheds (3.14) | 23.7 for the all subwatersheds | Low |
| Equipment – (Monitoring Equipment ≥ $5K) | 48. Sufficient equipment is available 90% of the time to conduct monitoring activities. | | | | | | | | | 3.35 | | 0 | |
| City Department Behavior | 49, 54. Other City departments comply with their responsibilities per permit requirements congruent with policies and procedures. | No | Failed | 1 | 1 | 5 | 1.5 | 3.5 | 5 | 9.05 | 5 | 45.25 | |
| Non-Storm Water Division City Property Drainage Systems | 50. Public non-structural BMPs are implemented per permit requirements. | Yes | Per TMDL schedules | | | | | | | 4.5 | | 0 | |

**Acronyms:**

BMP – best management practice
BRE - business risk exposure
CoF - consequence of failure
CPI – catchment prioritization index
Division – City of San Diego Storm Water Division
LID – low impact development
LOS – level of service
MHPA – multiple-habitat planning area
N/A – not applicable
NPDES – National Pollution Discharge Elimination System
PoF - probability of failure
TMDL – total maximum daily load
WAMP – watershed asset management plan

## F.6.2 Hard Asset BRE

The hard assets BRE scores were calculated for each individual hard asset listed in the Tijuana River Watershed asset inventory. BRE scores are shown in three major categories: high, medium, and low. Figure F-15 shows a BRE map with the three distinct risk categories. The High Risk category (red) contains BRE scores of 36 and greater, the Medium Risk category (yellow) contains BRE scores of 15 through 36, and the Low Risk category (green) contains BRE scores less than 15.

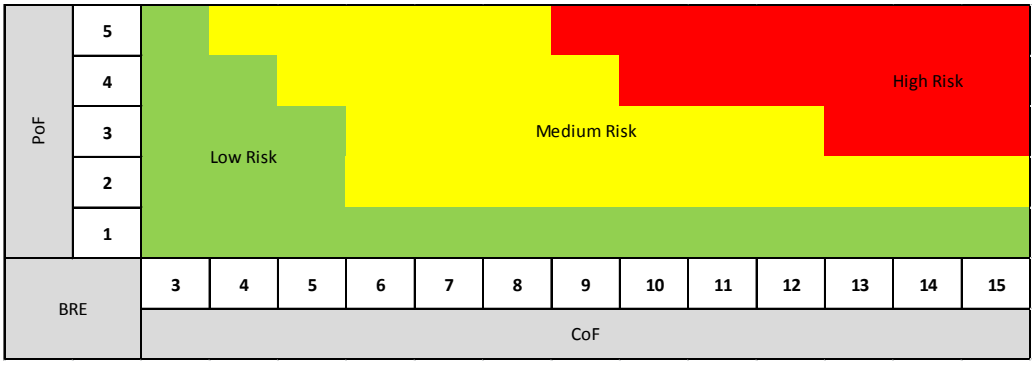


**Figure F-15. Hard Asset Risk Category Map**

Figure F-16 shows the summary of hard asset BRE scores by hard asset classes. Of the 6,167 total assets, 91 percent fall into the low risk category, followed by less than 9 percent in the medium or high risk category.

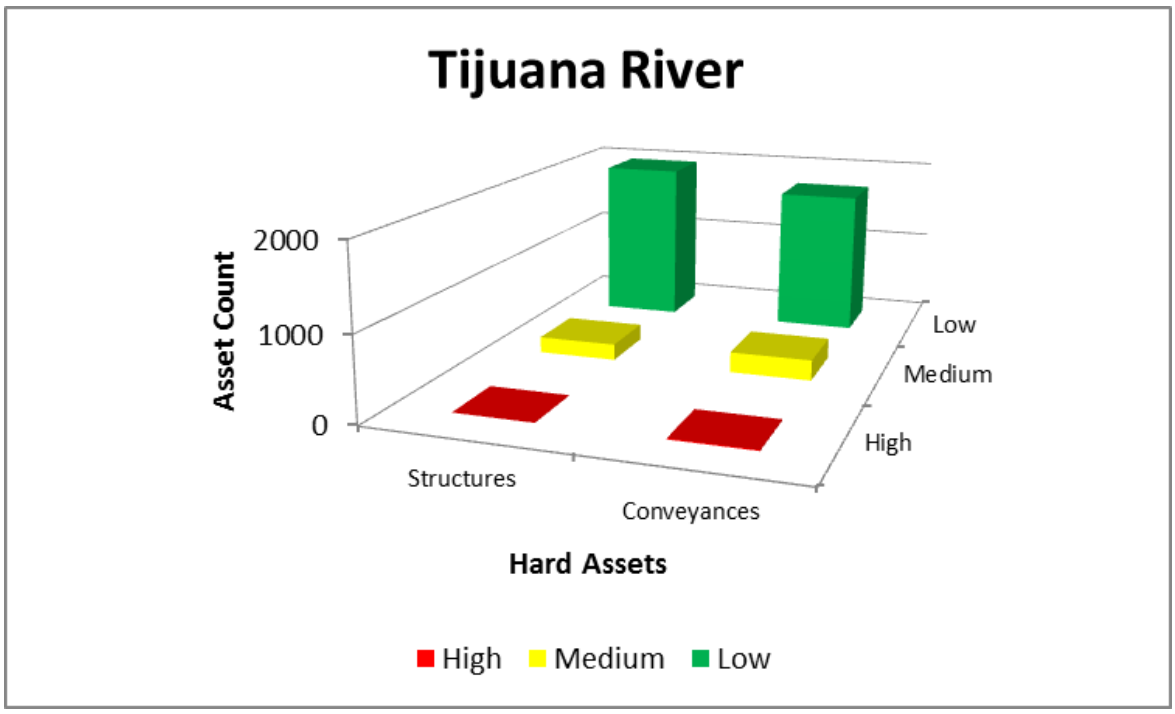


**Figure F-16. Hard Asset BRE Scores by Asset Classes - Tijuana River Watershed**

Figure F-17 shows the BRE score summary for the storm water conveyance system in Tijuana River Watershed. There are total of 3 mile of box culvert, less than a mile of brow ditch, 10 miles of channel, and 44 miles of storm drain. Out of all the conveyance systems, only storm drain assets that are in high risk.

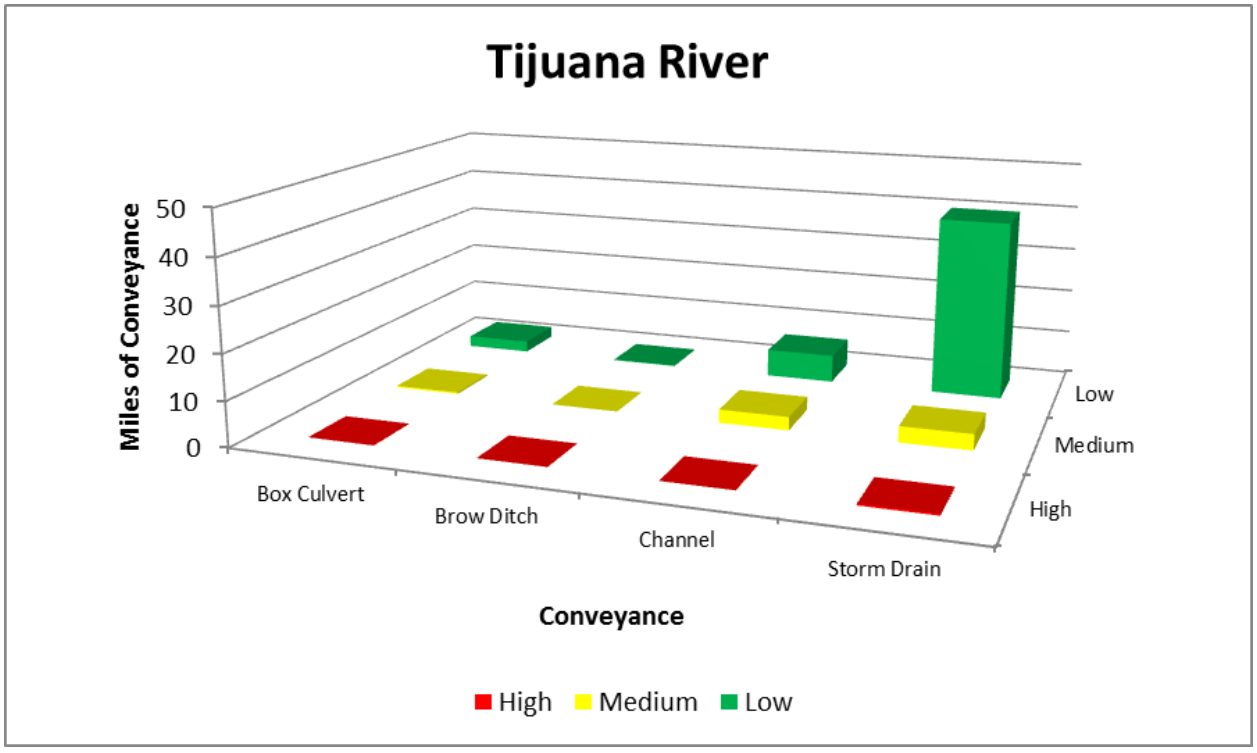


**Figure F-17. BRE Summary of Conveyance System BRE Scores - Tijuana River Watershed**

Figure F-18 shows the conveyance system CoF score map for the Tijuana River Watershed. The Tijuana River Watershed conveyance system is approximately 56 miles and about 65 percent (37 miles) of the storm water conveyances have low CoF, 28 percent (16 miles) have medium CoF, and about 7 percent (3 mile) have high CoF.

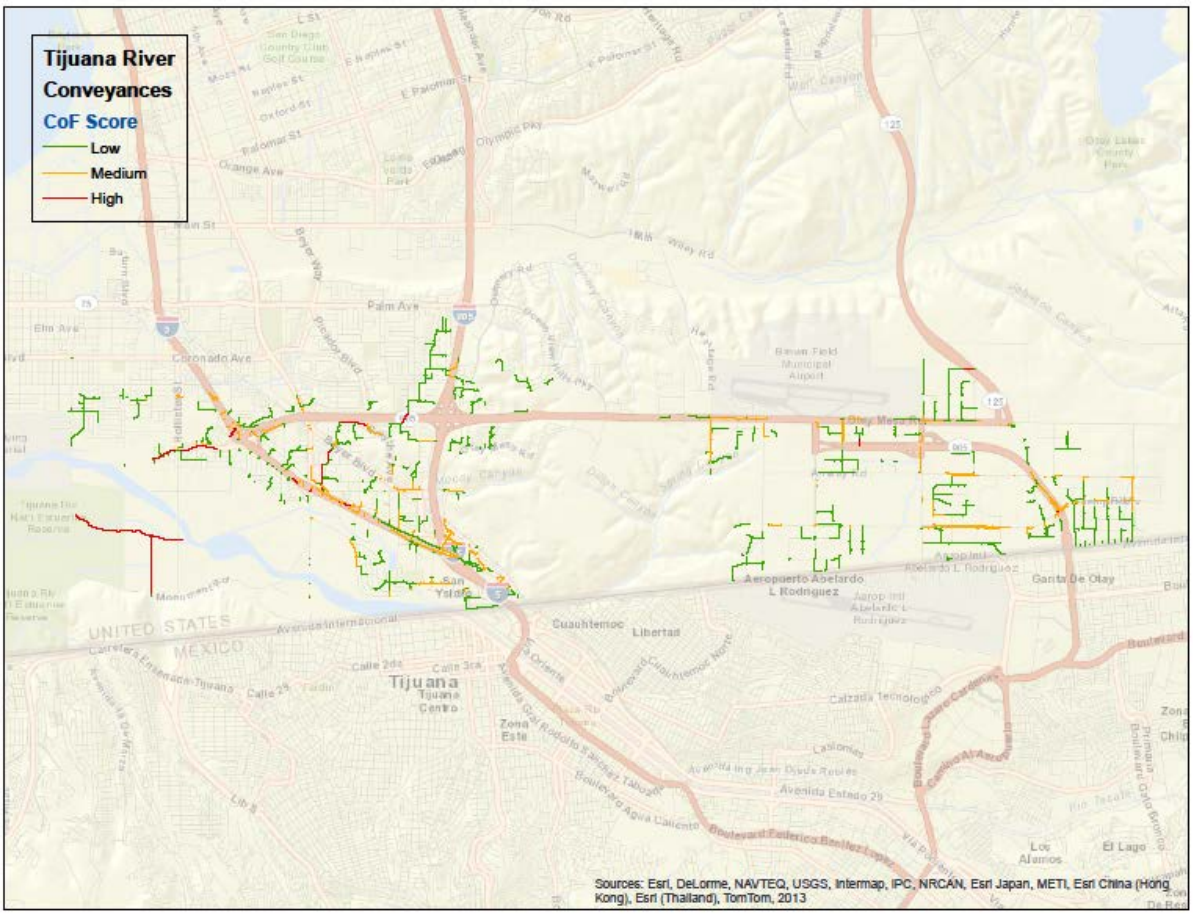


**Figure F-18. Conveyance System CoF Score Map - Tijuana River Watershed**

Figure F-19 shows the conveyance system PoF score map for the Tijuana River Watershed. Approximately 95 percent (54 miles) of the conveyances have low PoF and 3 percent (2 miles) have high PoF.

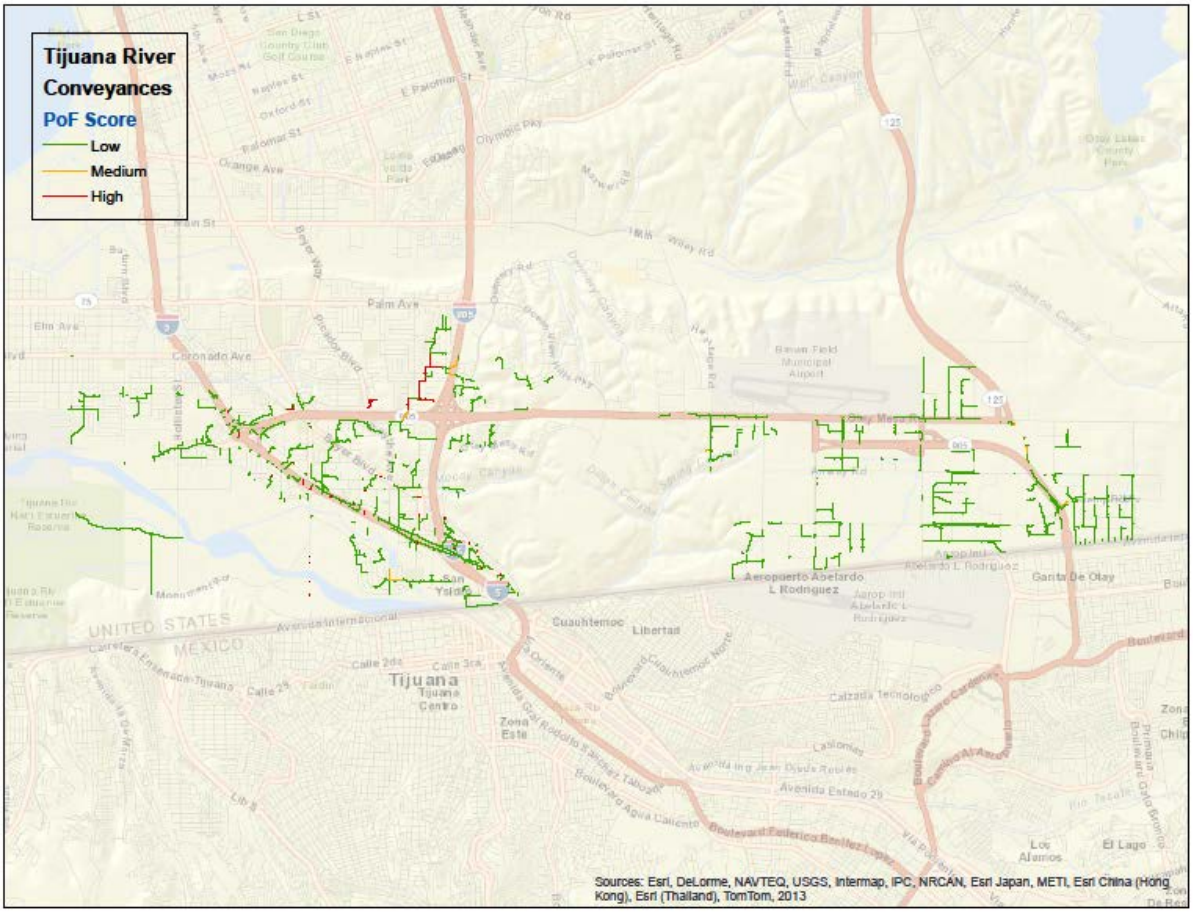


**Figure F-19. Conveyance System PoF Score Map - Tijuana River Watershed**

Figure F-20 shows the conveyance system BRE score map for the Tijuana River Watershed. 87 percent (49 miles) of the conveyance systems have low risk, 12 percent (7 miles) have medium risk, and less than 1 percent (less than a mile) have high risk.

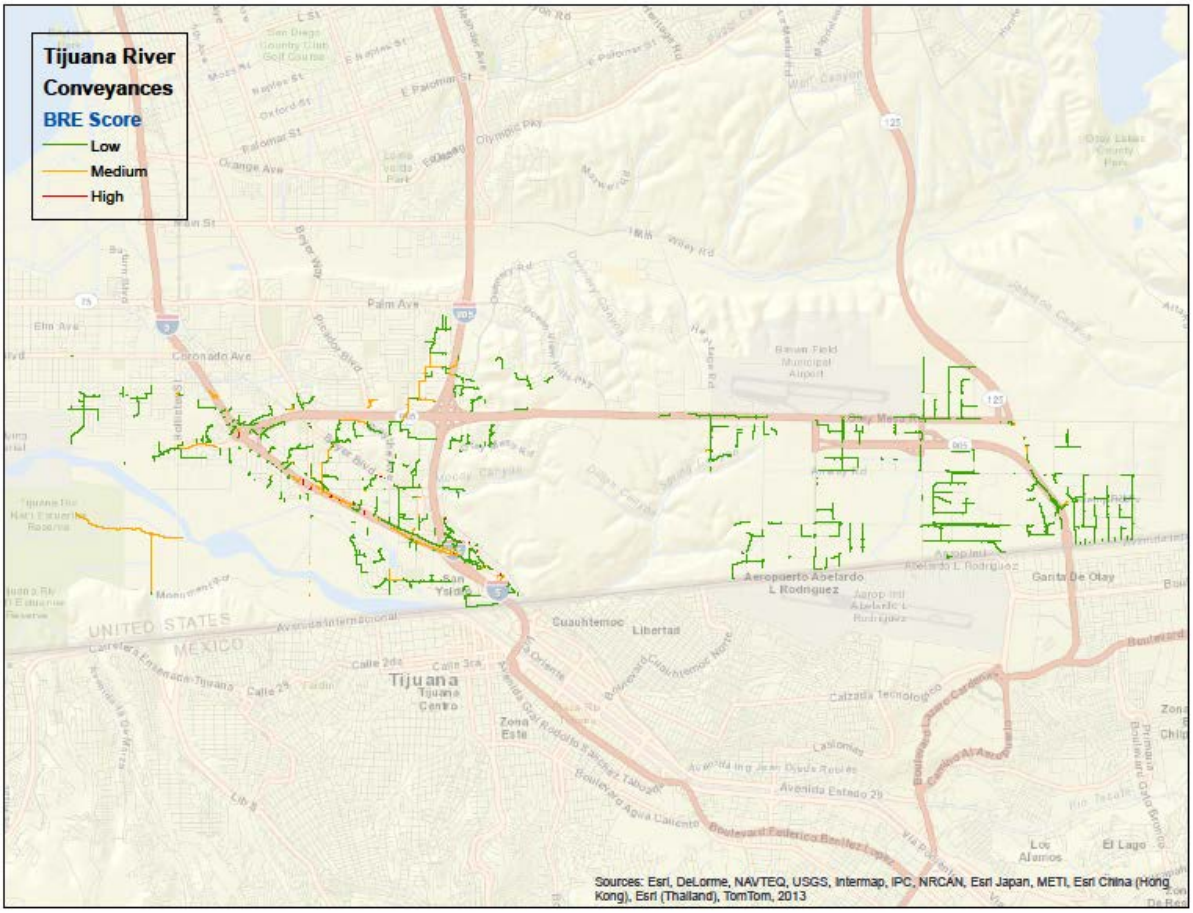


**Figure F-20. Conveyance System BRE Score Map - Tijuana River Watershed**

Figure F-21 shows the BRE summary for storm water structures in Tijuana River Watershed. 91 percent (1,969 out of 2,165) of the storm water structures have low risk and there are only two assets (less than 0.1 percent) that have high risk.

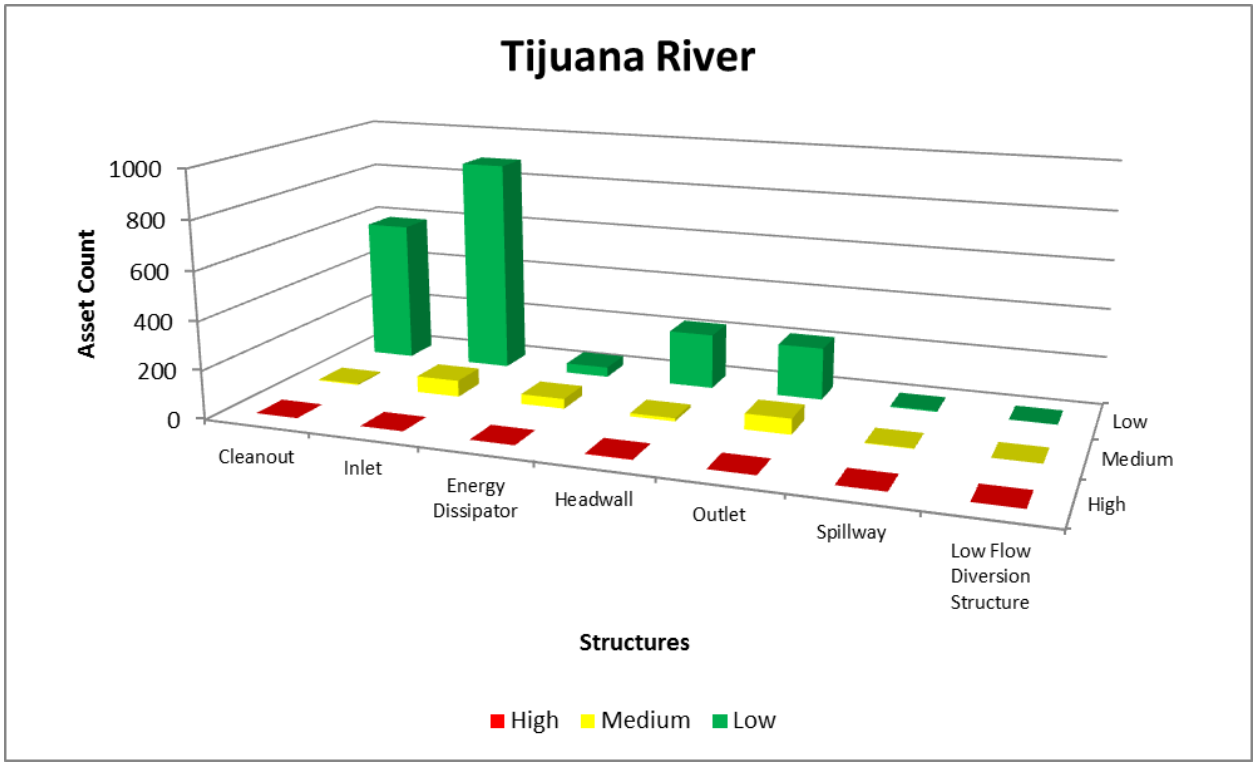


**Figure F-21. Storm Water Structure BRE Scores- Tijuana River Watershed**

Figure F-22 shows the structures CoF score map for the Tijuana River Watershed. Approximately 20 percent (423) of the structures have low CoF, 68 percent (1,477) have medium CoF, and l 1 percent (265) have high CoF.

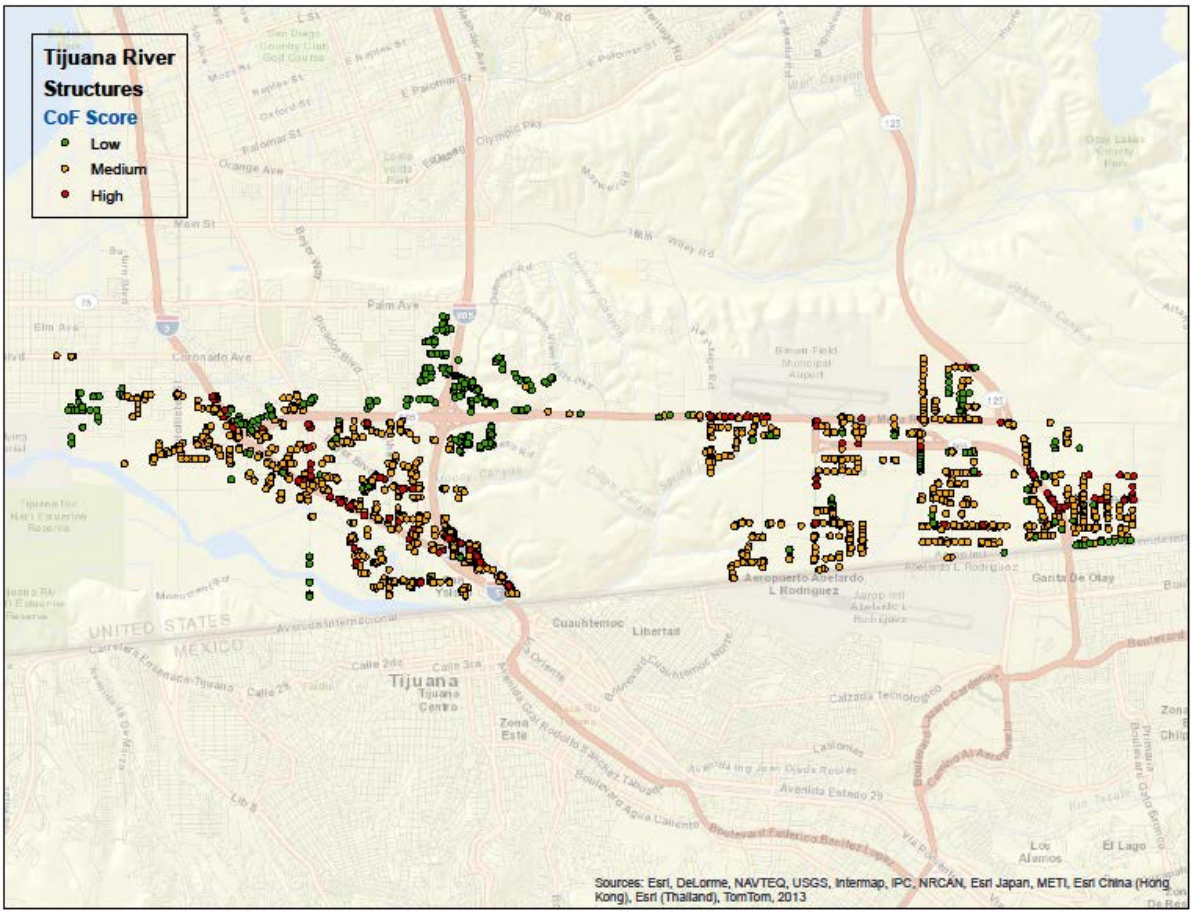


**Figure F-22. Storm Water Structure CoF Score Map - Tijuana River Watershed**

Figure F-23 shows the structures PoF score map for the Tijuana River Watershed. Approximately 97 percent (2,105) have low PoF, and less than 1 percent (11) have high PoF.

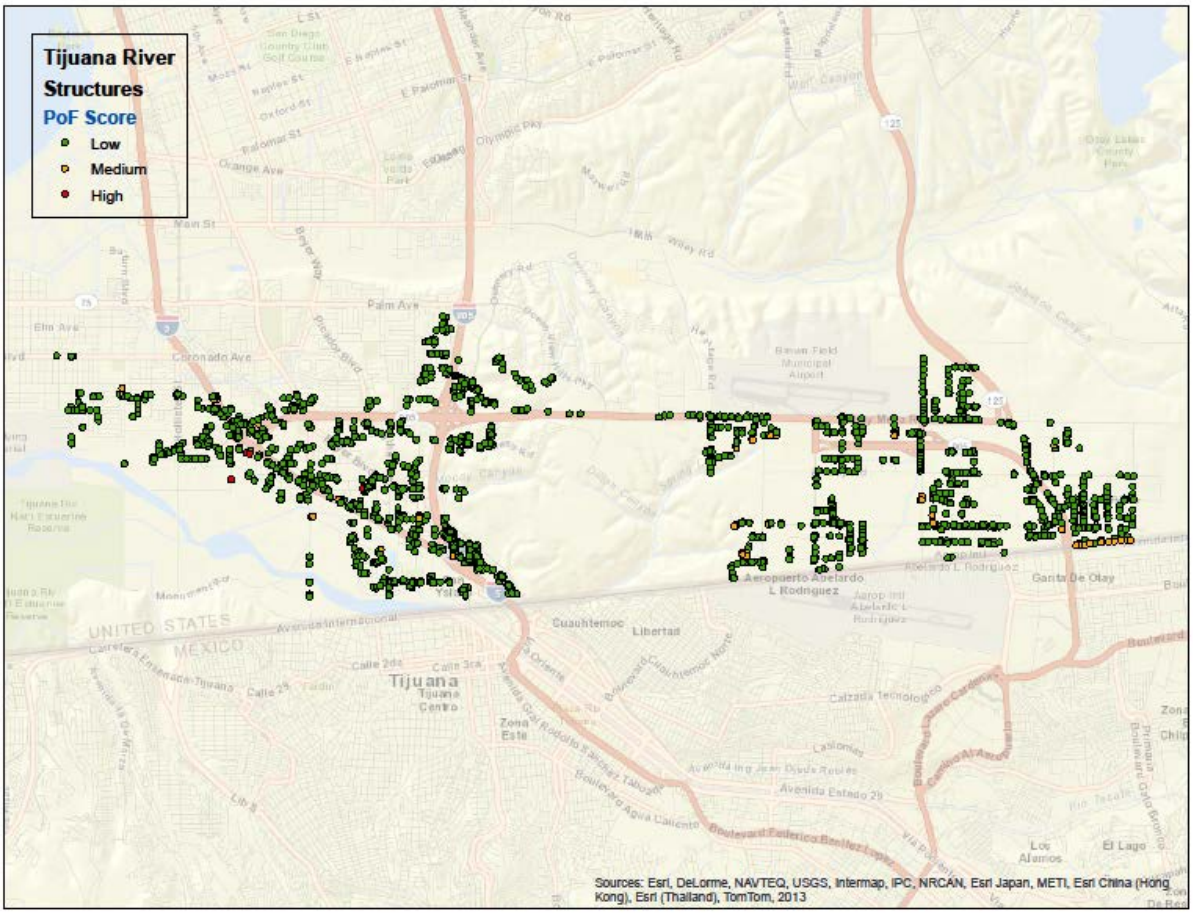


**Figure F-23. Storm Water Structure PoF Score Map - Tijuana River Watershed**

Figure F-24 shows the structures BRE score map for the Tijuana River Watershed. Approximately 91 percent (1,969) have low risk, 9 percent (194) have median risk, and less than 0.1 percent have high risk (2).

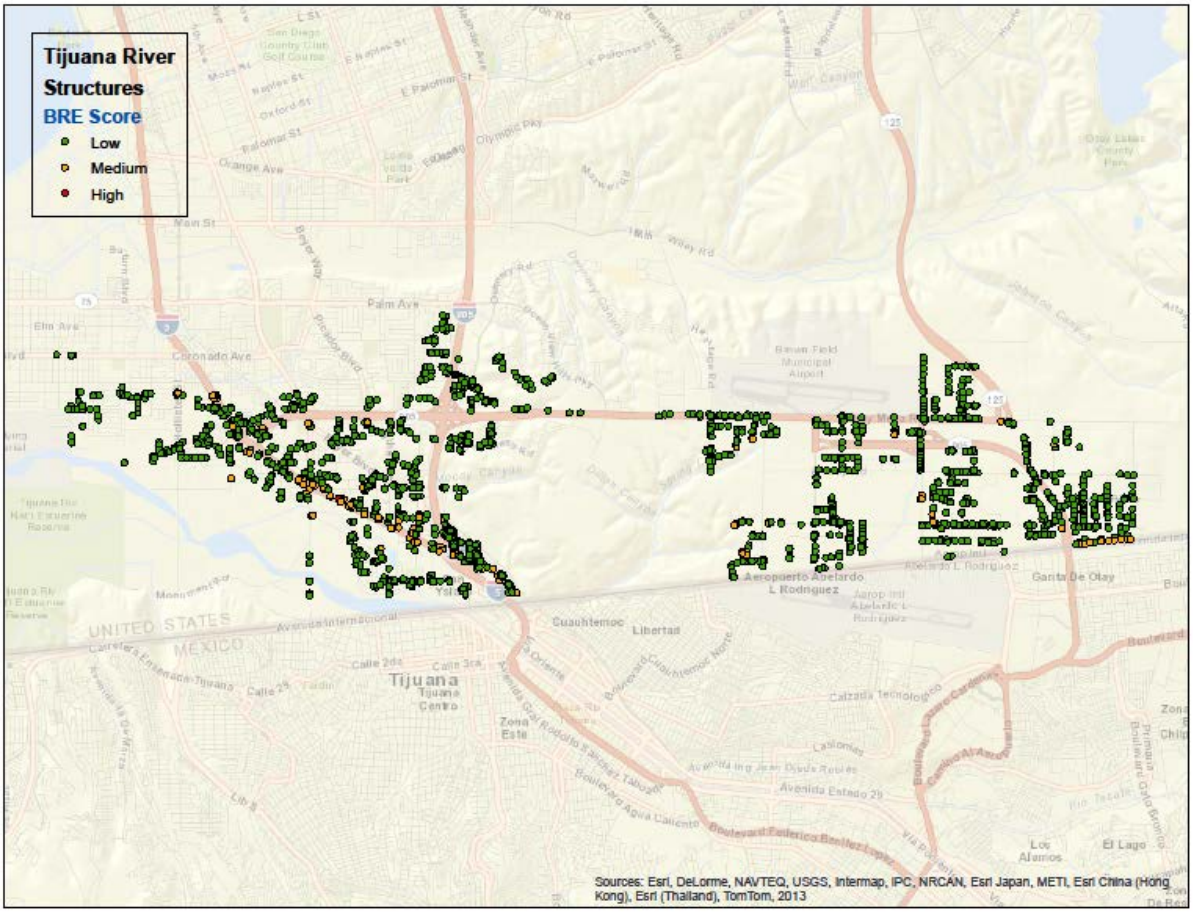


**Figure F-24. Storm Water Structure BRE Score Map - Tijuana River Watershed**

Figure F-25 shows the BRE score summary for equipment, which consists of BMP monitoring equipment and O&M equipment. In general, most of the equipment is classified as medium or low risk, except for the BMP monitoring equipment that have exceeded their anticipated useful life.

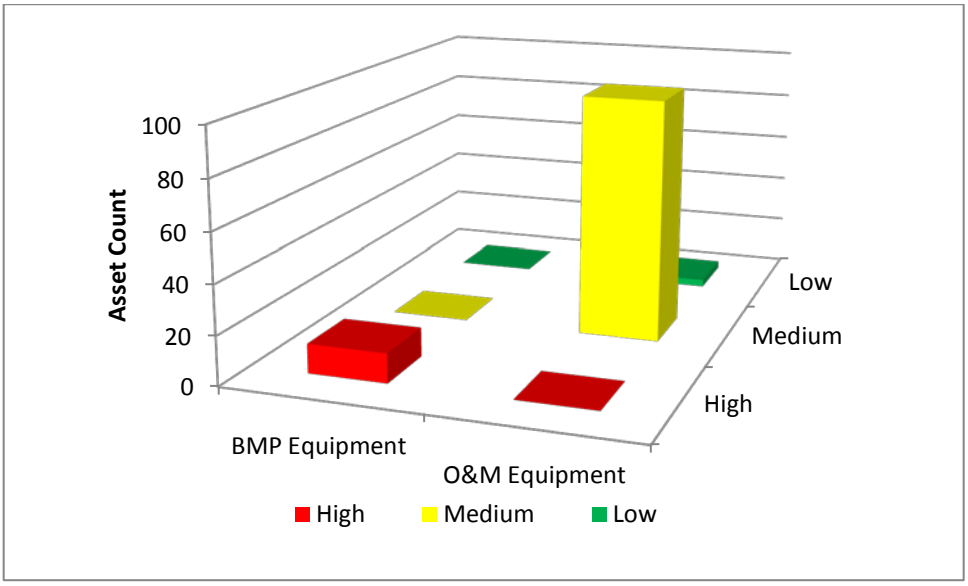


**Figure F-25. Summary of Equipment Assets – San Diego City Wide**

## F.7 HOW MUCH WILL IT COST?

Costs were estimated for all actions (e.g., hard asset replacements and refurbishment, hard asset development to meet capacity and LOS requirements, and soft and natural asset actions to meet LOS requirements) required for the next 100 years. The costs were developed using the methods outlined in Section 7 of the main body of the WAMP.

It is important to note the factors outlined below.

- Natural asset capital costs are primarily for the construction of structural BMPs for TMDL compliance, which conform to LOSs 02, 02, 07, 13a and 13b. Specific BMPs have not been identified. Costs for meeting these LOSs are expected to be partial costs and do not include all necessary BMPs and actions. Once structural treatment control BMPs are identified and developed as concept plans, they are transferred to and accounted for as hard assets.
- For numerous hard assets (e.g., structures, channels) data attributes (e.g., size, type) required to support detailed asset replacement costs were not available. As such, unit pricing methodology was used. Unit pricing methodology treats all similar type assets as one. For example, inlet size data was unavailable, therefore, all inlets were assigned a replacement cost of $20,000, regardless of size, type, and location. Costing methodology was presented in Section 3.
- For soft asset, costs to meet LOSs are based on staff projections of additional FTEs needed and other costs to be incurred.
- Costs do not include changes in the program driven by new unanticipated permit conditions in future adopted permits.
- All costs are presented in 2013 dollars. Future costs were not escalated or discounted.
- Capacity upgrades were not based on hydrologic and hydraulic (H&H) modeling, but on qualitative assessment with staff as to where and how frequently flooding occurs that is not due to debris clogging the system.

Figure F-26, F-27, and F-28 represent the projected results of 5 year, 10 year, and 30 year outlook, respectively. The average annual funding requirement based on a 100 year outlook so that this capture major capital costs for hard asset replacement or structural BMP construction that may be outside a 5 to 30 year planning horizon. The projected annual amount includes:

- replacing and rehabilitating hard assets as they reach the end of their useful lives,
- upgrading hard assets to meet capacity requirement / reduce flood risk,
- constructing hard assets to comply with TMDLs,
- upgrading water quality programs to meet NPDES requirements and TMDLs,
- identifying opportunities for storm water capture, and
- continuing to develop best available science and data for stakeholders and regulators to assist with compliance activities.

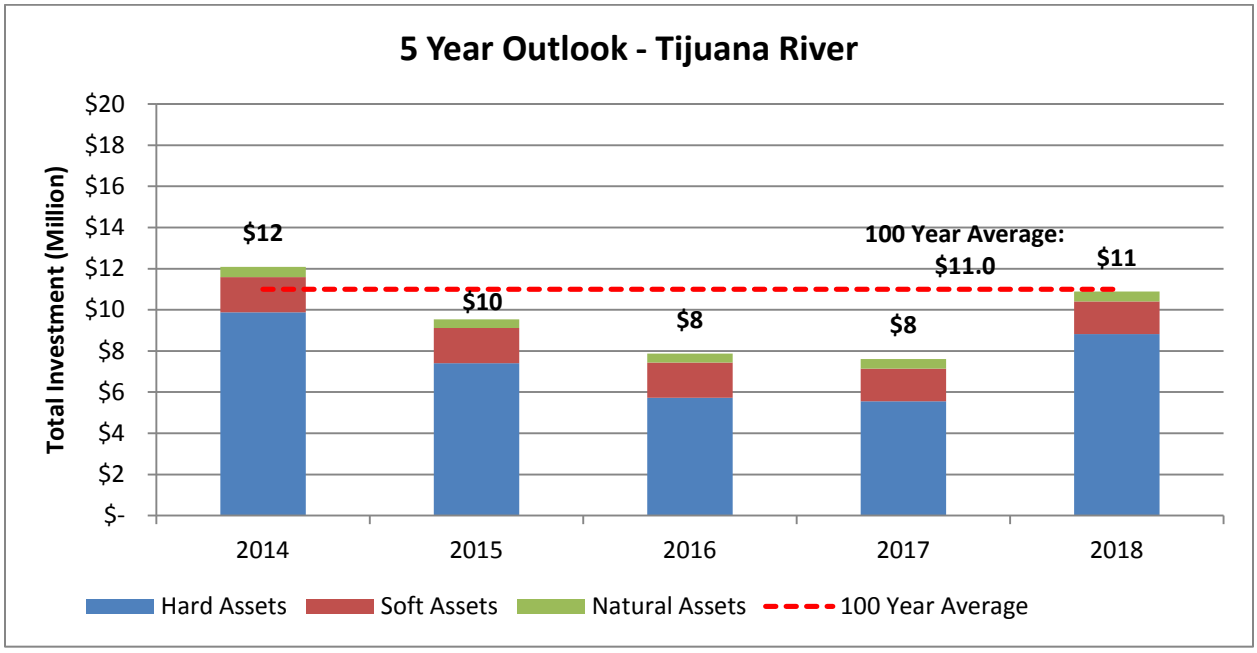


**Figure F-26. Watershed 5 Year Outlook by Asset Type – Tijuana River Watershed**

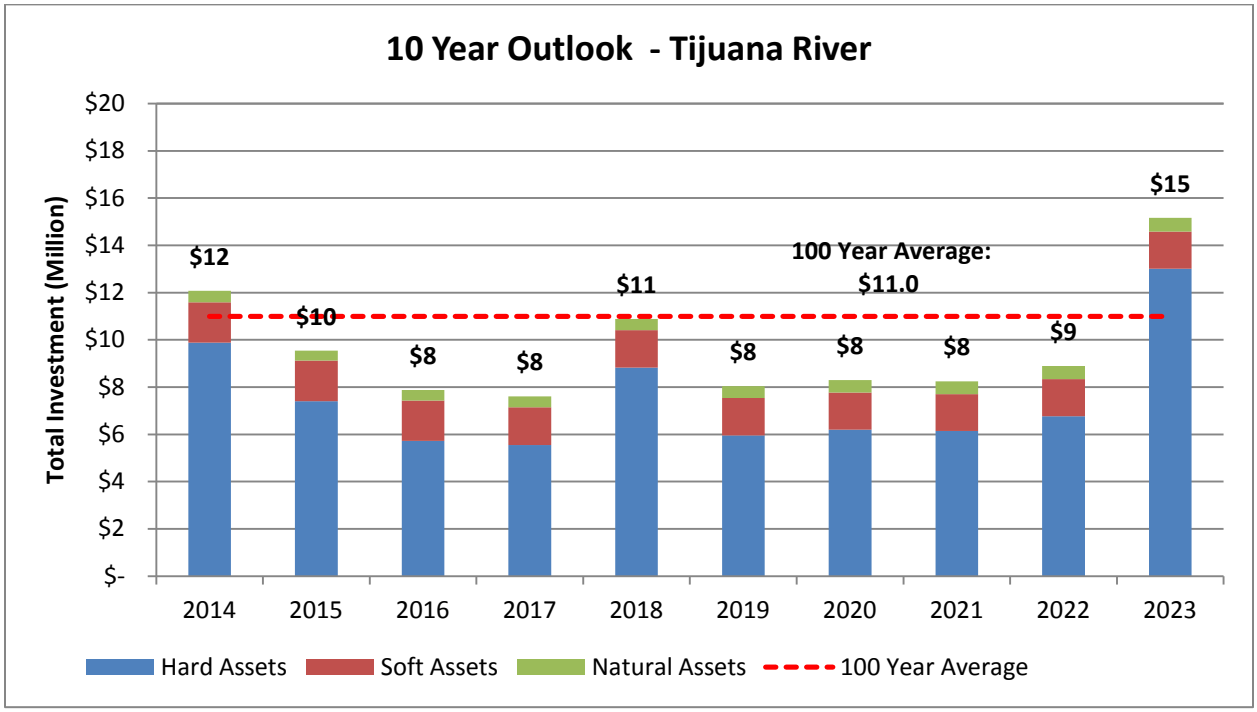


**Figure F-27. Watershed 10 Year Outlook by Asset Type – Tijuana River Watershed**

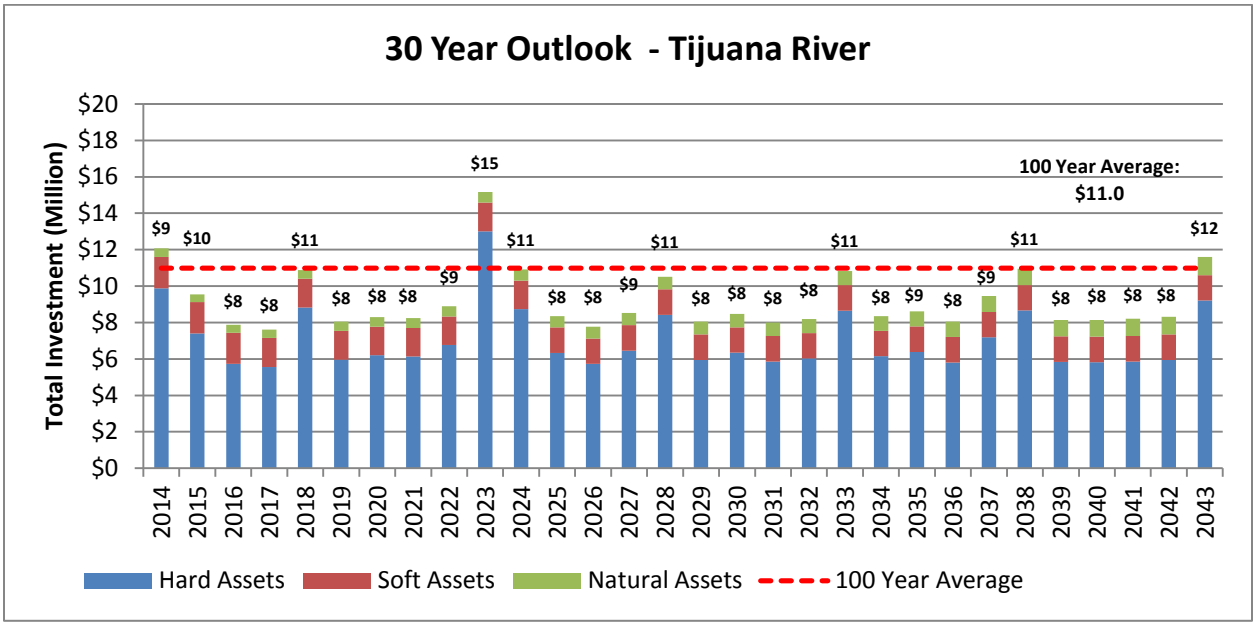


**Figure F-28. Watershed 30 Year Outlook by Asset Type – Tijuana River Watershed**

Figures F-29 and F-30 represent the overall 100 year projected results based on asset type and activity type, respectively. Based on the results, it is projected that the Tijuana River Watershed will need an average of $11 million dollars per year for capital and operational needs for the next 100 years. Some years will require more and others will require less.

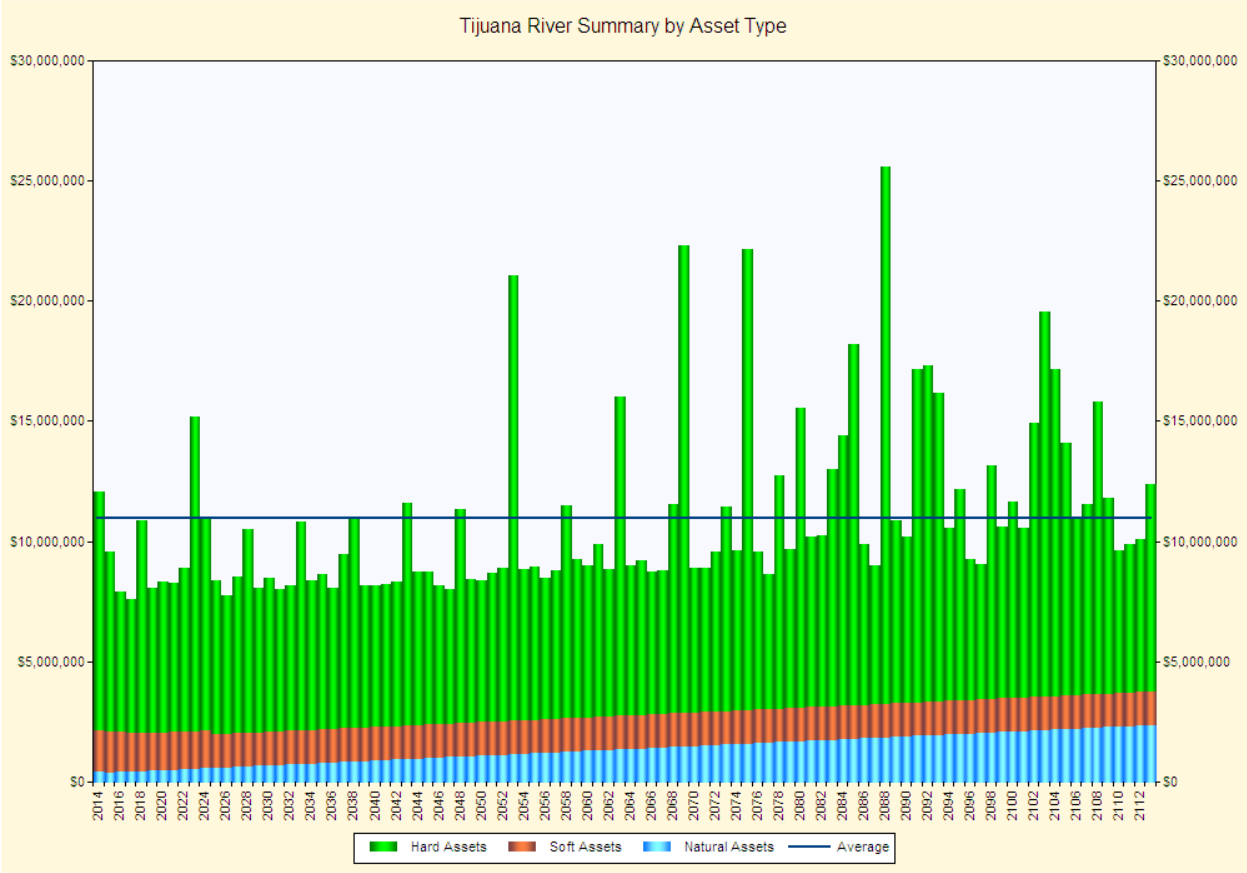


**Figure F-29. 100 Year Forecast by Asset Type - Tijuana River Watershed**

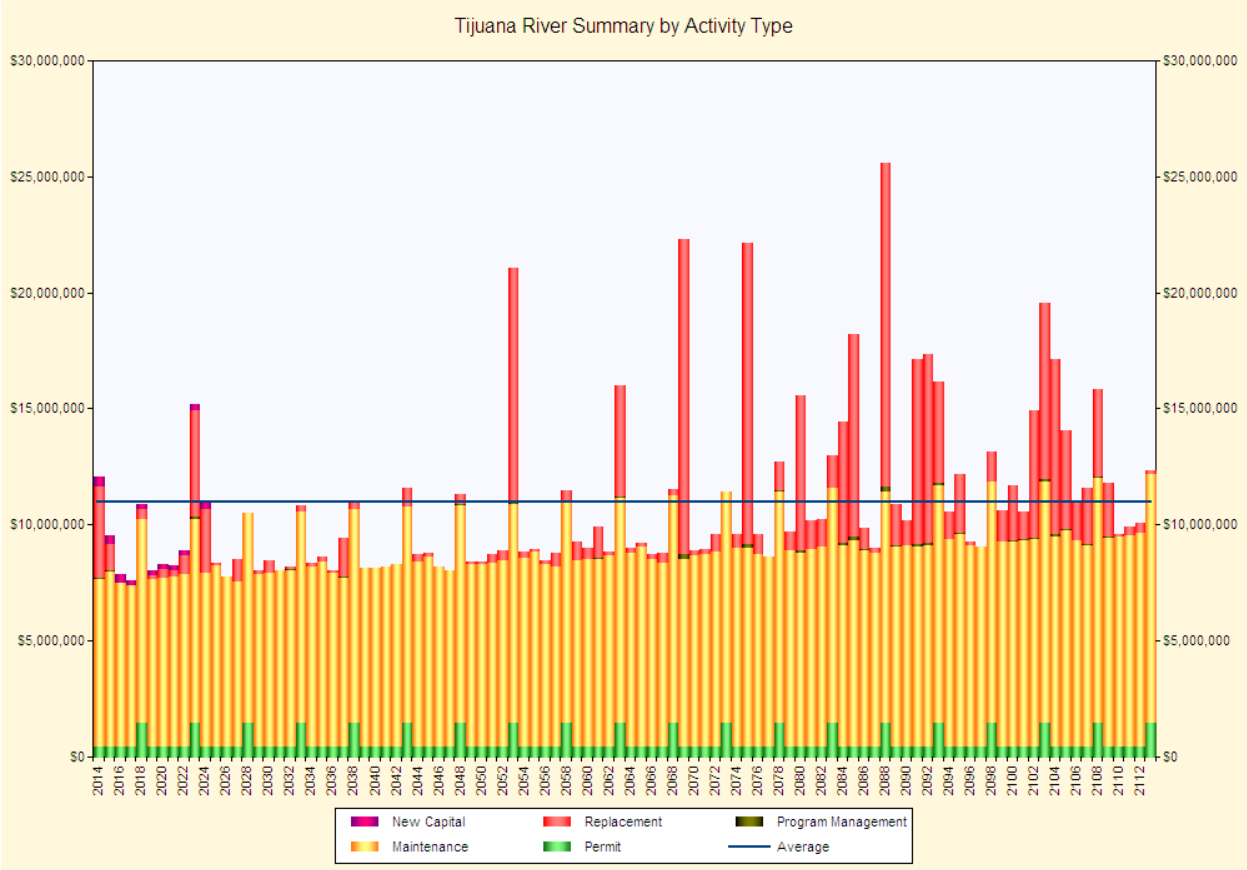


**Figure F-30. 100 Year Forecast by Activity Type - Tijuana River Watershed**

It is recommended that the Division inspect (condition assessment) on assets being called out as needing replacement or rehabilitation. If the field verification reveals the asset to be in better condition than modeled, for that asset, the useful life should be adjusted to reflect the current condition of the asset. This updating of data initiates the asset management's constant improvement process. Field verified data replaces the assumed data to refine the projections. When the field inspection verifies the need for replacement, the Division will need to schedule the asset for replacement.

Additional information, described below, may reveal that the City can spread these costs over other years. This information is summarized below.

- Condition assessment of hard assets. Assessing conditions in the field may provide information that suggests that the asset may have many years of remaining useful life.
- H&H modeling of the areas with a high frequency of flooding can show that smaller projects may meet flood risk reduction LOSs.
- City management direction may result in changed LOSs that are lower in cost.

## F.8 FUNDING STRATEGIES "HOW WILL WE PAY FOR IT?"

Potential funding strategies were presented in Section 8 of the main body of the WAMP. Funding strategies are not specific to a watershed, and, therefore, no specific funding sources or strategies will be employed in the Tijuana River Watershed that would not be employed City-wide.

## F.9 ASSESSMENT MANAGEMENT IMPROVEMENT PLAN

See Main Document.

## F.10 RECOMMENDATIONS

The summary of activities for Fiscal Year 2014, organized by asset type and class, are listed in Table F-12. In addition, Table F-13 provide additional shared activities that are managed at the Division level. It is important to note that further refinement of which costs would fall into a capital budget and which would fall into an operational budget is required so that these projections can more accurately match Division funding categories. This refinement is recommended for future WAMP updates.

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**Table F-12. FY 2014 Activity Summary – Tijuana River Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP Budget | | | Operating Budget | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | Total | Maintenance (CM) | New Capital (Nw) | Program Management (Op) | Permit (PM) | Total | |
| **Hard Assets** | | | | | | | | | | | | | |
| Channel | 24.48 | 33.12 | | | 4,774,124.12 | | 4,774,124.12 | | | | 496,246.50 | 496,246.50 | 5,270,370.62 |
| Cleanout | 8.30 | 33.20 | | | | | | 29,046.60 | | | | 29,046.60 | 29,046.60 |
| Culvert | 14.63 | 20.93 | | | | | | 8,551.03 | | | | 8,551.03 | 8,551.03 |
| Drop Manhole | 16.63 | 22.95 | | | | | | 635.70 | | | | 635.70 | 635.70 |
| Energy Dissipator | 16.27 | 38.97 | | | | 280,000.00 | 280,000.00 | 86,785.65 | | 4,253.70 | | 91,039.35 | 371,039.35 |
| Headwall | 10.37 | 20.96 | | | | | | 269,999.80 | | | | 269,999.80 | 269,999.80 |
| Inlet | 10.08 | 36.16 | | | | | | 2,640.60 | | | | 2,640.60 | 2,640.60 |
| Storm Drain | 9.65 | 55.87 | | | | 3,621,151.29 | 3,621,151.29 | 253,226.99 | | 55,011.72 | | 308,238.71 | 3,929,390.00 |
| **Sub-total Hard Assets** | | | | | **4,774,124.12** | **3,901,151.29** | **8,675,275.41** | **650,886.37** | **-** | **59,265.42** | **496,246.50** | **1,206,398.30** | **9,881,673.71** |
| | | | | | | | | | | | | | |
| **Natural Assets** | | | | | | | | | | | | | |
| LOS 04-Monitoring activities to prioritize pollutant sources and measure effects of BMPs on runoff / discharge water quality. | 23.68 | 23.68 | 7.54 | 3.14 | | | | 33,777.91 | | | | 33,777.91 | 33,777.91 |
| LOS 14-Source identification and characterization studies | 23.68 | 23.68 | 7.54 | 3.14 | | | | 275,600.92 | | | | 275,600.92 | 275,600.92 |
| LOS 18-MHPA-Assessment to identify opportunities to capture local runoff to augment water supply (desktop study plus field reconnaissance of 1/3 of sites). | 23.68 | 23.68 | 7.54 | 3.14 | | | | | 25,390.08 | | | 25,390.08 | 25,390.08 |

**Table F-12. FY 2014 Activity Summary – Tijuana River Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP Budget | | | Operating Budget | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | Total | Maintenance (CM) | New Capital (Nw) | Program Management (Op) | Permit (PM) | Total | |
| LOS 19-City Property-Initial site reconnaissance (2/3 of sites) to identify areas within City parcels with potential to capture/treat/store/infiltrate storm water and runoff. | 23.68 | 23.68 | 7.54 | 3.14 | | | | | 61,298.30 | | | 61,298.30 | 61,298.30 |
| LOS 47-Permit monitoring | 23.68 | 23.68 | 7.54 | 3.14 | | | | 93,022.25 | | | | 93,022.25 | 93,022.25 |
| **Sub-total Natural Assets** | | | | | - | - | - | **402,401.08** | **86,688.38** | - | - | **489,089.46** | **489,089.46** |
| | | | | | | | | | | | | | |
| **Soft Assets** | | | | | | | | | | | | | |
| LOS 09-Public Pollution Prevention Behavior-Develop watershed specific education materials and conduct subwatershed events and surveys. | 42.50 | 42.50 | 8.50 | 5.00 | | | | 298,333.33 | | | | 298,333.33 | 298,333.33 |
| LOS 10-City Department Cooperation-Update WAMP, become reviewer of water quality plans, have construction inspection role, update enforcement of operating departments behaviors. | 35.00 | 35.00 | 7.00 | 5.00 | | | | 337,500.00 | 16,666.67 | | | 354,166.67 | 354,166.67 |
| LOS 11-City Department Compliance Behaviors TMDL-Develop plan to increase non-structural BMP implementation (street sweeping, trash pickup, pet waste management, municipal operations management). | 35.50 | 35.50 | 7.10 | 5.00 | | | | 8,333.33 | | | | 8,333.33 | 8,333.33 |

**Table F-12. FY 2014 Activity Summary – Tijuana River Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP Budget | | | Operating Budget | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | Total | Maintenance (CM) | New Capital (Nw) | Program Management (Op) | Permit (PM) | Total | |
| LOS 12b-Land Development Regulations TMDL-Develop specification for 303(d) listings and TMDL, develop standard plans and specifications for LID and BMPs. | 30.50 | 30.50 | 6.10 | 5.00 | | | | 20,833.33 | | | | 20,833.33 | 20,833.33 |
| LOS 14-16-Regulatory Policy Basin Plan-Evaluate the appropriate beneficial uses in each watershed that the Citizens of San Diego want to achieve. | 29.00 | 29.00 | 5.80 | 5.00 | | | | 125,000.00 | 166,666.67 | | | 291,666.67 | 291,666.67 |
| LOS 17-Policy Procedures for other City Departments: responsiveness-Respond to reports of illicit discharges and flooding (including those identified by City staff) | 41.50 | 41.50 | 8.30 | 5.00 | | | | 165,065.54 | | | | 165,065.54 | 165,065.54 |
| LOS 24-City department behavior: water department-Complete a planning level study in all watersheds with 15% design concepts and costs, changes in regulatory, and develop cost sharing model. | 25.00 | 25.00 | 5.00 | 5.00 | | | | 6,416.67 | 83,333.33 | | | 89,750.00 | 89,750.00 |
| LOS 25-City department behavior: land use-Develop programmatic policies and procedures with other departments to use City parcels for water capture, storage, infiltration, and/or treatment. | 32.40 | 32.40 | 8.10 | 4.00 | | | | 7,916.67 | 13,888.89 | | | 21,805.56 | 21,805.56 |

**Table F-12. FY 2014 Activity Summary – Tijuana River Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP Budget | | | Operating Budget | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | Total | Maintenance (CM) | New Capital (Nw) | Program Management (Op) | Permit (PM) | Total | |
| LOS 26-Good will, Relationships, Credibility: public permitting-Conduct research, outreach, and resurvey | 10.20 | 10.20 | 10.20 | 1.00 | | | | 50,000.00 | | | | 50,000.00 | 50,000.00 |
| LOS 27-Good will, Relationships, Credibility: stakeholder permitting-Develop project checklist and SOPs to pull in right staff early in project, determine key issues with potential project, develop project features that mitigate those issues. | 60.00 | 60.00 | 15.00 | 4.00 | | | | 314,766.72 | | | | 314,766.72 | 314,766.72 |
| LOS 28-Storm water Use External Policy-Research and identify best options to regulate harvested stormwater while allowing broad uses. Develop state-wide support, draft legislation, and effectively promote the legislation. | 31.75 | 31.75 | 6.35 | 5.00 | | | | 3,057.69 | 16,666.67 | | | 19,724.36 | 19,724.36 |
| LOS 36-City department behavior: storm drain maintenance-Define the criticality of all the drainage systems on City parcels to determine inspection program and develop inspection requirements and enforcement. | 17.75 | 17.75 | 3.55 | 5.00 | | | | 19,650.08 | 16,666.67 | | | 36,316.74 | 36,316.74 |

**Table F-12. FY 2014 Activity Summary – Tijuana River Watershed**

| Asset Type and Class | Min BRE | Max BRE | CoF | PoF | CIP Budget | | | Operating Budget | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance (CM) | Replacement (Mh) | Total | Maintenance (CM) | New Capital (Nw) | Program Management (Op) | Permit (PM) | Total | |
| LOS 49-City Department Compliance Behaviors: NPDES-Conduct audits/walkthroughs. Follow up with training. Fines and enforcement for noncompliant | 45.25 | 45.25 | 9.05 | 5.00 | | | | 39,597.76 | | | | 39,597.76 | 39,597.76 |
| LOS 53-Policy Procedures for other City Departments: storm drain maintenance NPDES-Increase number of engagements. Offer services of inspection contractor. | 7.30 | 7.30 | 7.30 | 1.00 | | | | 1,666.67 | | | | 1,666.67 | 1,666.67 |
| **Sub-total Soft Assets** | | | | | **-** | **-** | **-** | **1,398,137.79** | **313,888.89** | **-** | **-** | **Sub-total Soft Assets** | **1,712,026.68** |
| | | | | | | | | | | | | | |
| **Grand Total** | | | | | **4,774,124.12** | **3,901,151.29** | **8,675,275.41** | **2,451,425.24** | **400,577.27** | **59,265.42** | **496,246.50** | **3,407,514.44** | **12,082,789.85** |

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**Table F-13. FY 2014 Activity Summary – Shared Assets**

| Asset Type and Class | Min BRE | Max BRE | Operating Budget | | | Grand Total |
|---|---|---|---|---|---|---|
| | | | Maintenance (CM) | Replacement (MH) | Total | |
| Hard Assets | | | | | | |
| BMP Station | 50.00 | 50.00 | | 120,000.00 | 120,000.00 | 120,000.00 |
| Drain structural repair | 27.00 | 27.00 | 186,850.50 | | 186,850.50 | 186,850.50 |
| Flapper valve maintenance | 27.00 | 27.00 | 7,182.57 | | 7,182.57 | 7,182.57 |
| Litter and loose debris removal | 27.00 | 27.00 | 141,826.25 | | 141,826.25 | 141,826.25 |
| O&M Equipment | 18.00 | 36.00 | | 3,744,210.86 | 3,744,210.86 | 3,744,210.86 |
| Operational (inspections of brand new systems) | 27.00 | 27.00 | 23,284.82 | | 23,284.82 | 23,284.82 |
| Permit for in channel trash and fence maintenance | 27.00 | 27.00 | 968,186.86 | | 968,186.86 | 968,186.86 |
| Permit for inlet, headwall, outfall cleaning | 27.00 | 27.00 | 992,517.96 | | 992,517.96 | 992,517.96 |
| Permit for repair on concrete structure | 27.00 | 27.00 | 968,186.86 | | 968,186.86 | 968,186.86 |
| Permit for vegetation trimming | 27.00 | 27.00 | 180,443.86 | | 180,443.86 | 180,443.86 |
| Portable pump setup | 27.00 | 27.00 | 253,352.76 | | 253,352.76 | 253,352.76 |
| Repair on concrete structure | 27.00 | 27.00 | 19,360.30 | | 19,360.30 | 19,360.30 |
| Transient | 27.00 | 27.00 | 76,018.50 | | 76,018.50 | 76,018.50 |
| Trash and channel fence maintenance | 27.00 | 27.00 | 63,063.22 | | 63,063.22 | 63,063.22 |
| | | | | | | |
| **Grand Total** | **18.00** | **50.00** | **3,880,274.46** | **3,864,210.86** | **7,744,485.32** | **7,744,485.32** |

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